

THE ENGLISH RESULTATIVE AS A FAMILY OF CONSTRUCTIONS

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English resultative expressions have been a major focus of research on the syntax-semantics interface. We argue in this article that a family of related constructions is required to account for their distribution. We demonstrate that a number of generalizations follow from the semantics of the constructions we posit: the syntactic argument structure of the sentence is predicted by general principles of argument linking; and the aspectual structure of the sentence is determined by the aspectual structure of the constructional subevent, which is in turn predictable from general principles correlating event structure with change, extension, motion, and paths. Finally, the semantics and syntax of resultatives explain the possibilities for temporal relations between the two subevents. While these generalizations clearly exist, there is also a great deal of idiosyncrasy involved in resultatives. Many idiosyncratic instances and small subclasses of the construction must be learned and stored individually. This account serves to justify aspects of what we share in our overall vision of grammar, what we might call the CONSTRUCTIONAL view. To the extent that our treatment of the resultative can be stated only within the constructional view, it serves as evidence for this view as a whole.*

1. A CONSTRUCTIONAL VIEW OF GRAMMAR. For fifteen years, the English resultative construction has been a focus of research on the syntax-semantics interface. Each of us has made proposals about the resultative (Goldberg 1991, 1995, Jackendoff 1990, 1997), proposals that share a certain family resemblance. The present paper is an attempt to consolidate what our approaches have in common and to add some new wrinkles to our common understanding. Our larger purpose is not only to show the virtues of our account of resultatives, but also to justify aspects of what we share in our overall vision of grammar, what we might call the CONSTRUCTIONAL view. To the extent that our treatment of the resultative can be stated only within the constructional view, it serves as evidence for this view as a whole.

In the interest of being maximally provocative, we begin by stating some aspects of the overall vision.

(1) THE CONSTRUCTIONAL VIEW

- a. There is a cline of grammatical phenomena from the totally general to the totally idiosyncratic.
- b. Everything on this cline is to be stated in a common format, from the most particular, such as individual words, to the most general, such as principles for verb position, with many subregularities in between. That is, there is no principled divide between 'lexicon' and 'rules'.
- c. At the level of phrasal syntax, pieces of syntax connected to meaning

* This paper originated during Jackendoff's residency at the University of Illinois as the George A. Miller Visiting Professor in the winter of 2002, when he and Goldberg had extended opportunities to discuss issues of mutual interest. In particular, we found it important to establish some of the basic points of convergence between our two somewhat disparate approaches to grammar—Goldberg coming by way of construction grammar/cognitive grammar with a sprinkling of lexical functional grammar (LFG) and head-driven phrase structure grammar (HPSG), Jackendoff coming by way of a long path diverging gradually from the Chomskyan tradition. The resultative seemed like an interesting quarry. Jackendoff is grateful for the support of the Miller Professorship, to Marc Hauser, who made an office at Harvard available during Jackendoff's sabbatical in 2002–3, and to Grant DC 03660 from the National Institutes of Health. We are grateful to two anonymous referees, James McCloskey, Brian Joseph, and Malka Rappaport Hovav for comments on an earlier version of this manuscript.

in a conventionalized and partially idiosyncratic way are captured by CONSTRUCTIONS.¹

These tenets of the constructional view have been developed by each of us in different ways (Goldberg 1992, 1995, 1999, 2005a, Jackendoff 2002); for closely related versions see, for example, Ackerman & Nikolaeva 2004, Barðdal 1999, Booij 2002, Croft 2001, Culicover 1999, Fillmore et al. 2004, Fried 2005, Kay 2002, Kay & Fillmore 1999, Lakoff 1987, Langacker 1987, 1991, 1992, Michaelis & Lambrecht 1996, Sag 1997, Zwicky 1994; for a review of various other positions that call themselves constructional, see Goldberg 2005c:ch. 3.

Constructional approaches can be distinguished from traditional lexicalist approaches in that the latter approaches emphasize the role of words (particularly lexical heads) in determining phrasal patterns (Bresnan 1982, Hudson 1990, Pollard & Sag 1987, 1994). The present approach, in contrast, expands this notion of the lexicon to include phrasal patterns with or without any morphological specifications in the mental lexicon.

Some constructions are especially easy to spot because they have unusual syntax and/or bits of specified morphology, as indicated by italics in the examples given in 2.

- (2) a. Our friends won't buy this analysis, *let alone* the next one we propose. (*let alone*, Fillmore et al. 1988)
- b. *One more* pseudo-generalization *and/or* I'm giving up. (*NP and/or S*, Culicover & Jackendoff 1997)
- c. *The more* we study resultatives, *the crazier* they get. (comparative correlative, Culicover & Jackendoff 1999, Michaelis 1994)
- d. *Day by day* the facts are getting murkier. (N-P-N, Oehrle 1998, Williams 1994)

Another type of construction involves garden-variety syntax, but some special meaning is attached that imposes special restrictions. These are harder to detect, but we each have argued (Goldberg 1992, 1995, Jackendoff 1990) that the examples in 3 involve constructional meaning; 3b is, of course, the resultative.

- (3) a. I'll fix *you* a drink. (ditransitive)
- b. Fred watered the plants *flat*. (resultative)

In between these are constructions in which a standard syntactic position is occupied by a special element that marks the construction.

- (4) a. Bill belched *his way* out of the restaurant. (*way* construction, Goldberg 1995, Jackendoff 1990)
- b. We're twistin' the night *away*. (*time-away* construction, Jackendoff 1997)

In each of these cases, some special interpretation is associated with the syntactic structure. For instance, the *NP and/or S* construction (2b) means, informally, 'If some contextually determined event happens/doesn't happen that involves NP, then S'. The *time-away* construction (4b) means roughly 'subject spends time frivolously doing V'. And our quarry here, the resultative construction (3b), means roughly 'subject makes object become AP by V-ing it'. Constructions are like traditional idioms: they are listed

¹ Construction grammar defines constructions to be any stored pairings of form and function; according to this definition, words and morphemes are technically constructions as well. In addition, stored (typically highly frequent) regularities between form and meaning are considered constructions even if they are fully compositional. We speak here specifically of partially idiosyncratic phrasal constructions, using the term in a fairly traditional way.

in the lexicon with a syntactic structure, a meaning, and (where there is a special morpheme) a partial phonology. Like idioms such as *take NP to task*, constructions may have argument positions. For instance, the apparent object *the night* in 4b is actually the object of the construction, not the object of the verb *twistin'*; and *flat* in the resultative (3b) is an argument of the construction, not of the verb *water*.

An important innovation in the constructional view is that in VP constructions such as those in 3 and 4, the VP's complement structure is not determined by the verb alone, as is assumed in most of mainstream generative grammar as well as in many functionalist traditions (e.g. Langacker 2003). On our view, argument structure is determined by the composite effects of the verb and the construction.² One of the crucial issues in the constructional view is to work out how this composite is constructed. The essential point is that the verb does not change its meaning so as to license these extra arguments: for instance, *belch* in 4a is not 'converted' to a motion verb in the lexicon or anywhere else. Its contribution to the meaning of 4a is the same as its contribution to the meaning of *Bill belched loudly*; it is, in both cases, a verb expressing bodily function and sound emission. The sense of motion and the sense of REPEATED belching in 4a come from the construction and from the way the construction combines semantically with the verb to express a complex event. Similarly, *fix* does not in 3a have a beneficiary role; rather, this role comes from the ditransitive construction, and the verb remains simply a verb of creation. One benefit of this approach is considerable reduction in the apparent polysemy of verbs in the lexicon: the meaning of *belch* is the same in its various uses. Moreover, Narasimhan (1998) demonstrates that many verbs that are translations of each other in different languages share the same semantic implications and aspectual properties and are used in the same types of discourse contexts. Nonetheless, different languages allow the same verbal meanings to appear in distinct constructional contexts. Distinguishing verb meaning from the constructions a verb may appear in allows us to capture these facts. The approach we are suggesting comes at the following obvious cost: (i) we need to admit meaningful constructions as items stored in the lexicon, and (ii) we need to abandon the rigid view that the verb alone determines the complement structure of its VP. We think the benefit is worth the price.

Mainstream generative grammar does not recognize constructions in this sense; phenomena that have more standardly been termed constructions, such as the passive, are taken to be epiphenomenal outcomes of more general processes in the computational system. Thus a defender of the classical view might well complain, 'By introducing so-called constructional principles, you're making an arbitrary addition to the theory of grammar. A true explanation of the resultative would make use of mechanisms we already know.' This complaint might be justified if the resultative were the ONLY phenomenon that demanded a construction.

As we see, however, there are many other such phenomena. Consider the *way* construction and the *time-away* construction, illustrated in 4. We simply see no way that general principles of syntactic structure and argument structure can predict that English has such constructions with the meanings they have. Something has to be stipulated,

² Certain generative proposals such as Marantz 1997 and Borer 1994 likewise suggest that argument structure is not determined exclusively by the main verb. These accounts, however, differ in critical respects from the present proposal: (i) the syntax proposed is an underlying level of syntax and is claimed to be general across all constructions and all languages, (ii) the meaning involved is also proposed to be general across all constructions and all languages, and (iii) the verbs are claimed to contribute only their encyclopedic semantics without specifying anything at all about their argument structure possibilities. For a critique of this approach, see Goldberg 2005c:ch. 3.

to the effect that when *way* or *away* is present in a VP under the correct conditions, the proper interpretation emerges. Regardless of how you choose to do it, you have to say something special. The constructional account says it directly, localizing the irregularity in the construction itself rather than elsewhere in the grammar. Von Stechow (1995), within a formal semantics framework, localizes it in a special rule of semantic interpretation that has effects quite similar to our constructions.

In particular, because aspects of these constructions are so rare crosslinguistically, and on occasion peculiar to English, we would seriously question an attempt to characterize them in terms of parameter settings in the sense of principles and parameters theory. Several other Germanic languages, including Swedish, Norwegian, and Dutch, have a construction that means pretty much the same as the English *way* construction, but Swedish and Norwegian use a reflexive instead of *X's way*, and Dutch uses a reflexive benefactive form instead of *X's way* (Seland 2001, Toivonen 2002, Verhagen 2002). These differences seem to us to be brute facts, stipulations that speakers of each language must learn. When we turn to constructions with abnormal syntax such as those in 2, the need for English grammar to say something special about both form and interpretation seems obvious. The proposal, then, is to expand the role of the traditional lexicon to include productive or semi-productive phrasal patterns that have previously been assumed to lie within the domain of syntax.

The point is that if indeed constructions in our sense are necessary in the theory of grammar, there can be no a priori objection to using them to account for the resultative. The resultative is unusual among the constructions mentioned here only in that it carries no overt marking of its constructional status, such as *way* or a weird syntactic structure. It is for this reason that practitioners of nonconstructional approaches have been able to hold out hope that the resultative can follow from general principles. We know of no attempts to capture the whole range of constructional phenomena in other frameworks; we hereby throw down the gauntlet.

In short, we see no justification for rejecting the constructional approach on general theory-architectural grounds: the rule TYPE, at least, that we propose for resultatives falls under more general principles. Moreover, it seems clear to us that the construction types in 2 do not lend themselves at all to the classical approach; and the types in 4 are also problematic, though perhaps not insuperably so. It seems to us that only the construction types in 3 permit any serious dispute between the classical and the constructional views, for only in such cases is there a chance that both the syntax and interpretation may be predicted on general principles. We show here that our constructional approach provides a coherent story about the resultative construction. We cannot prove that no classical solution is possible, but we show what challenges a classical solution must meet.

2. DIMENSIONS OF VARIATION IN RESULTATIVES. The resultative construction, unlike some of the other constructions mentioned above, shows a great deal of syntactic and semantic variation. The literature on the whole has treated resultatives as a unified phenomenon ('THE resultative'). We think this is a mistake. In our own work (Goldberg 1991, 1995, Jackendoff 1990), we have treated resultatives as forming a sort of 'family' of constructions (we might call them subconstructions of the resultative), sharing important properties but differing in certain specifics, including their degree of productivity.³

³ Families of constructions are relevantly like morphological constellations (Janda & Joseph 1999, Joseph & Janda 1985); see also Valimaa-Blum 1988 for an extension of the notion of a constellation to the syntactic domain.

By 'family' we have in mind the sort of family resemblances recognized to exist in nonlinguistic categories (Rosch & Mervis 1975, Wittgenstein 1955). Our strategy here is first to establish a taxonomy of the subconstructions, then to state which of their properties can be explained by the construction as a whole, and finally to pick out some of the differences.

We begin by establishing some terminology. An identifying characteristic of a resultative sentence is an AP or PP that occupies the normal position of a verbal argument, for instance, the italicized phrases in 5. We call this phrase the RESULTATIVE PHRASE or RP.

- (5) a. Herman hammered the metal *flat*. (RP = AP)
 b. The critics laughed the play *off the stage*. (RP = PP)

Resultatives must be distinguished from depictive or 'current-state' phrases which look superficially like resultatives (*She handed him the towel wet*), but which differ syntactically in that they are clear adjuncts, not argument phrases, and semantically in that they do not designate states that are contingent on the action described by the main verb: that is, they do not designate results.

A resultative may contain a direct object, in which case the RP follows the object, as in 5; we call such cases TRANSITIVE RESULTATIVES. Or a resultative may lack a direct object, in which case the RP is immediately after the verb, as in 6; we call these INTRANSITIVE RESULTATIVES.⁴

- (6) Intransitive resultatives
 a. The pond froze solid. (RP = AP)
 b. Bill rolled out of the room. (RP = PP)

In some transitive resultatives, the direct object is independently selected by the verb; in others it is not. We refer to the former cases as SELECTED transitive resultatives and the latter as UNSELECTED transitive resultatives.

- (7) Selected transitive resultatives
 a. The gardener watered the flowers flat. (RP = AP)
 (cf. The gardener watered the flowers.)
 b. Bill broke the bathtub into pieces. (RP = PP)
 (cf. Bill broke the bathtub.)
 (8) Unselected transitive resultatives
 a. They drank the pub dry. (RP = AP)
 (cf. *They drank the pub.)
 b. The professor talked us into a stupor. (RP = PP)
 (cf. *The professor talked us.)

A special case of unselected transitive resultatives has a reflexive object that cannot alternate with other NPs. This is often called a FAKE REFLEXIVE (Simpson 1983).

- (9) Fake reflexive resultatives
 a. We yelled ourselves hoarse. (RP = AP)
 Unselected: *We yelled ourselves.
 Does not alternate with other NPs: *We yelled Harry hoarse.

⁴ We set aside here passive and middle resultatives, such as *The metal was hammered flat* and *This metal hammers flat easily*. We take it that these expressions are formed by composing the passive and middle constructions with resultative constructions.

- b. Harry coughed himself into insensibility. (RP = PP)
 Unselected: *Harry coughed himself.
 Does not alternate with other NPs: *Harry coughed us into insensibility.

When RP = AP, it normally expresses a property. Some cases of RP = PP also have this semantics, for example, 7b, 8b, and 9b. We refer to these two types collectively as PROPERTY RESULTATIVES; when we need to differentiate them we refer to AP property resultatives and PP property resultatives. In other sentences with RP = PP, such as 5b and 6b, the RP expresses a spatial path; we call such sentences PP SPATIAL RESULTATIVES. There are arguably some adjectives that express spatial paths or configurations, such as *free* and *clear*; these may appear in a class of AP spatial resultatives such as *He jumped clear of the traffic* (see §8).

To sum up, there are so far three independent dimensions of variation in resultative sentences, the third of which is further subdivided.

- (10) a. RP = AP vs. RP = PP
 b. RP = property vs. RP = spatial configuration
 c. Intransitive vs. transitive
 i. Within transitive: selected vs. unselected
 1. Within unselected: normal vs. fake reflexive

These dimensions are all well known. We must, however, add one more. One of the NPs in the sentence is normally understood as undergoing a motion or a change of state whose endpoint is expressed by the RP; we call this the HOST of the RP. Normally the host of a transitive resultative is the object, for instance, the metal in 5a and the play in 5b. And normally the host of an intransitive resultative is the subject, for instance, the pond in 6a and Bill in 6b. That is, the choice of host appears to correlate exactly with transitivity and therefore does not constitute an independent dimension of variation. However, 11 shows a class of transitive examples that has newly emerged in the literature (Rappaport Hovav & Levin 2001, Verspoor 1997, Wechsler 1997) in which the host is the subject.

- (11) Transitive resultatives with subject host
 a. Bill followed the road into the forest.
 b. We drove Highway 5 from SD to SF.
 c. The sailors rode the breeze clear of the rocks.
 d. Fred tracked the leak to its source.
 e. John danced mazurkas across the room.

Another distinct subclass is shown in 12, involving verbs of bodily emission (12a,b) (Goldberg 2005a); we can also add verbs of other sorts of substance emission (12c) and verbs of ingestion (12d,e). In each of these types, the entity in motion is not overtly expressed in the sentence; the host is therefore an implicit argument.⁵

- (12) Intransitive resultatives with implicit (i.e. nonsubject) host
 a. Bill spit/urinated/coughed/sneezed out the window.
 b. Bill sweated/bled on the floor.
 c. The toilet leaked through the floor into the kitchen below.
 d. Bill ate off the floor.
 e. Bill drank from the hose.

⁵ For some of these, one might argue that the host is a deleted cognate object, as in *He spit spit onto the floor*. But this is not true of all of them: the noun *cough*, for instance, denotes the act of coughing, not what is coughed up, so **She coughed a cough into the sink* is bad.

Thus the choice of host proves to be an additional independent dimension in the resultative construction.

3. THE SEMANTICS OF THE RESULTATIVE. In this section we propose structures for the meanings of members of the resultative family, and in this section and the next we show how these meanings predict many of the properties of resultative sentences.

As hinted at in §1, the basic intuition behind our constructional approach to resultatives is that the meaning of a resultative sentence contains two separable subevents. One of them, the **VERBAL SUBEVENT**, is determined by the verb of the sentence. The other subevent, the **CONSTRUCTIONAL SUBEVENT**, is determined by the construction. A resultative sentence means more than just the conjunction of the verbal subevent and the constructional subevent. For instance, *Willy watered the plants flat* does not mean just that Willy both made the plants flat and watered them. Rather, the two subevents are related: Willy made the plants flat **BY** watering them. That is, for the bulk of cases (we discuss one class of exceptions below), the verbal subevent is the **MEANS** by which the constructional subevent takes place. This paraphrase also shows the distribution of arguments between the two subevents: *Willy* is the agent of both subevents, *the plants* is the patient of both subevents, and *flat* is the resulting property in the constructional subevent. In §§4–5 we show that many properties of the resultative construction follow from the semantics of the two subevents and the connection between them.

Using an informal, more or less common-practice semantic notation, we can express the meaning of *Willy watered the plants flat* as in 13.⁶

- (13) Syntax: Willy watered the plants flat
 Semantics: WILLY CAUSE [PLANTS BECOME FLAT]
 MEANS: WILLY WATER PLANTS

If we extract from this example its particular arguments (*WILLY*, *PLANTS*, *FLAT*) and the particular verbal subevent (*WILLY WATER PLANTS*), we can discern the semantic contribution of the construction itself, shown in 14. The subscripts in 14 indicate the correspondences between the syntactic arguments and the corresponding semantic arguments, correspondences that are discussed more fully in §6.

- (14) Causative property resultative
 Syntax: NP₁ V NP₂ AP₃
 Semantics: X₁ CAUSE [Y₂ BECOME Z₃]
 MEANS: [VERBAL SUBEVENT]

With what we have done so far, we can see already that the semantics of the constructional subevent predicts the syntax of the construction. Consider actual verbs that have the meaning ‘X cause Y to become Z’, such as *make* and *get*. These show exactly the same distribution of arguments in syntax as the construction: *Willy made/got the plants flat*. That is, whatever generalizations are responsible for mapping the semantics of these ‘intrinsically resultative’ verbs to their syntactic argument structure can also be used to map the constructional subevent to its syntactic argument structure.⁷ In other words,

⁶ For ease of exposition, we adopt a notation that is neutral between our distinct formalizations.

⁷ Goldberg would amend each of the representations in 14 and 16 to include **INSTANCE** as well as the **MEANS** relations to indicate that verbs that are lexical resultatives such as *make*, *render*, *become* are instances of the construction as well; in fact all overt expression is accomplished via constructions. Jackendoff prefers to treat these verbs as lexically determining their syntax via more traditional linking rules.

(15) **The semantic argument structure of the constructional subevent determines the syntactic argument structure of the sentence by general principles of argument linking.**⁸

This is, of course, no accident—productive constructions likely arise from speakers generalizing over verbs that lexically specify the corresponding forms and meanings (Casenhiser & Goldberg 2004, Goldberg et al. 2004).

Expressions involving verbs that are inherently resultative (let us call these *VERBAL RESULTATIVES*) often have broader or narrower selectional properties than the general construction. For example, *make* allows predicate NPs as well as APs: *They made him president/angry*.⁹ We can see that this is a verbal resultative because the ‘means’ paraphrase, **They caused him to become angry by making him*, makes no sense. Similarly, *drive*, as in *drive NP crazy*, allows only a range of APs and PPs that all refer to demented mental states: *nuts*, *bananas*, *to distraction*, *into a tizzy*, and so on (Boas 2000, Goldberg 1995). Again, the means paraphrase is out: **He caused me to become crazy by driving me*. This is to be expected if the verbal resultatives are stored as such: as stored patterns, they may acquire their own idiosyncratic properties. In fact, verbs that lexically specify a particular construction generally tend to be somewhat broader or narrower in distribution than productive instances of the pattern. For example, the prototypical intrinsically ditransitive verb, *give*, has a broader semantic distribution than constructional ditransitives such as *throw him the ball*.¹⁰

A referee suggests that it would be preferable to derive semantics from syntax, instead of allowing the semantics to predict the syntax as we do here. If the syntactic structure and the semantic structure were isomorphic, it would be impossible to decide between the proposals, but we demonstrate below that there are semantic properties that are independently required since they do not follow from syntax. That is, the semantic properties are richer and more nuanced—syntax can be mapped from them, but not vice versa.

For example, there is more to say about the semantics of the constructional subevent. In particular, there are two dimensions of variation: property vs. path resultatives and noncausative vs. causative resultatives.

PROPERTY VS. PATH RESULTATIVES

In property resultatives, the constructional subevent consists in the host coming to have the property expressed by the RP. So, for example, in *She watered the plants flat*, the plants come to be flat, and in *The pond froze solid*, the pond comes to be solid.

In path resultatives, the constructional subevent normally consists of the host traversing the path expressed by the RP (we discuss a variation with stative verbs in §4.1). For instance, in *Bill rolled the ball down the hill*, the ball travels down the hill. In the *follow*-type examples in 11 such as *Fred tracked the leak to its source*, the host is subject and travels a path terminating at the source of the leak.

⁸ Our formulation here abstracts away from any particular approach: whatever means one chooses to account for the regular mapping between syntactic and semantic arguments can be applied to the constructional approach as easily as to a completely verb-driven approach.

⁹ Boas (2000) notes that *make* cannot appear as a resultative with a PP = RP (**They made him to exhaustion*). However, it may be possible to treat examples like *They made him into a monster* as a type of resultative.

¹⁰ Many languages, including Japanese and French, allow only verbal resultatives and do not use the construction productively with other verbs (Takami 1998, Washio 1997).

In the *spit*-type examples in 12 such as *Bill spit out the window*, the host is the implicit argument, the spit, and it traverses a path that goes out the window.

Leaving the *spit* type and *follow* types aside until §7, a second dimension of variation is:

NONCAUSATIVE VS. CAUSATIVE RESULTATIVES

When the host is the subject, the constructional subevent is simply a change of state or change of position. When the host is the direct object, the constructional subevent consists in the subject causing the host to do what it does.

Example 13 is a causative transitive property resultative, with RP = AP. The other major subconstructions are shown in 16.

- (16) a. Noncausative property resultative (e.g. *The pond froze solid*)
 Syntax: NP₁ V AP/PP₂
 Semantics: X₁ BECOME Y₂
 MEANS: [VERBAL SUBEVENT]¹¹
- b. Noncausative path resultative (intransitive motion construction, e.g. *The ball rolled down the hill*)
 Syntax: NP₁ V PP₂
 Semantics: X₁ GO Path₂
 MEANS: [VERBAL SUBEVENT]
- c. Causative path resultative (caused motion construction, e.g. *Bill rolled the ball down the hill*)
 Syntax: NP₁ V NP₂ PP₃
 Semantics: X₁ CAUSE [Y₂ GO Path₃]
 MEANS: [VERBAL SUBEVENT]

A different relation between the verbal and constructional subevents appears in 17. This is a class of intransitive path resultatives in English in which the verb expresses emission of a sound (Levin & Rappaport Hovav 1990).

- (17) a. The trolley rumbled through the tunnel.
 b. The wagon creaked down the road.
 c. The bullets whistled past the house.
 d. The knee-replacement candidate groaned up the stairs.

Here, as in *The ball rolled down the hill*, the verbal subevent is the subject performing the action expressed by the verb—the trolley is rumbling—and the constructional subevent is the subject moving along the path expressed by the PP—the trolley moves through the tunnel. The meaning of the sentence, however, is not that the verbal subevent is the means by which the constructional subevent takes place (e.g. the rolling is the means of moving down the hill), but rather that the motion causes the sound to be emitted: the rumbling is a result of the trolley's motion. To see this difference more clearly, consider examples like 18, which we find ungrammatical.

- (18) a. *The car honked down the road.
 b. *The dog barked out of the room.
 c. *Bill whistled past the house.

These are evidently out because the sound is not a result of the subject's motion. The car's honking and the dog's barking are separate actions from their motion. In particular,

¹¹ In the case of this construction, the constructional subevent is noncausative while the relationship BETWEEN the verbal subevent and constructional subevent is one of causation, as indicated by MEANS.

compare 17c and 18c: the whistling noise is a result of the bullets' motion in 17c, whereas Bill's whistling in 18c is a separate volitional act. In 17d and 18a we see that what is critical is not whether the entity that emits the sound is animate, but rather that the sound must be causally related to the motion. In 17d we construe the motion to cause the painful groaning; in 18a we recognize the honking as a sound not caused by the motion of the car. This is not to say that the subevents in 18 cannot be combined into a single clause: the *way* construction allows the subevents to be simply simultaneous rather than causally related.

- (19) a. The car honked its way down the road.
- b. The dog barked its way out of the room.
- c. Bill whistled his way past the house.

We conclude that sound-emission resultatives are not licensed by principle 16b, though they share the same syntactic form and the same two subevents. Rather, they are a consequence of principle 20, another subconstruction of the resultative. (We recognize that there are speakers who accept 18. For them the semantic relation is *COOCCURRENCE* rather than *RESULT*.)

(20) Sound-emission path resultative

Syntax: NP₁ V PP₂

Semantics: X₁ GO Path₂

RESULT: [VERBAL SUBEVENT: X₁ EMIT SOUND]

Note that there is a selectional restriction on the verbal subevent that constrains the construction to sound-emission verbs. Even the closely related class of light-emission verbs is prohibited. For instance, suppose the trolley in 17a is emitting sparks from its wheels as it rumbles through the tunnel. We still cannot say **The trolley sparked through the tunnel*; again, the more liberal *way* construction, *The trolley sparked its way through the tunnel*, is all right.¹²

Another tiny class of verbal subevents forms resultatives with the pattern in 20. Some examples are given in 21. Note that an appropriate paraphrase of 21a is not 22a but rather 22b.

- (21) a. The witch vanished into the forest.
- b. Bill disappeared down the road.
- (22) a. **The witch went into the forest by vanishing.*
- b. The witch went into the forest and thereby vanished.

In short, sound-emission and disappearance resultatives involve a result relation between the constructional subevent and the verbal subevent instead of a means relation. There exist generalizations about what types of semantic relationships are more or less likely to be allowed between verbal and constructional subevents, within and across languages (Goldberg 1997). But we do not think that the fact that resultatives allow the verbal event to be either means or result is entailed by any general considerations of well-formedness of meaning, given that the *way* construction readily allows verbs

¹² Malka Rappaport Hovav (p.c., June 2003) notes that light-emission verbs are sometimes possible. In fact, the type of example in (i) is fully acceptable.

(i) The light flashed across the sky.

However, when light flashes, the flashes are not EMITTED by the light. Rather, flashing is the means of the light's motion. As stated in 16b, the means relation extends to all verb classes. What appear not to be conventional are instances in which a verb that designates light emission is used as an incidental side-effect or result of the motion.

of sound emission in particular to appear without being interpreted as standing in a means or result relation to the motion (examples in 19). Therefore, for us this is a crucial point where the resultative begins to fragment into a number of distinct subconstructions with similar syntax, similar argument structure, and similar constructional subevents, and where each subconstruction has its own peculiarities of interpretation and its own selectional restrictions. Moreover, we see no way to unify semantically events of sound emission with events of disappearance. Note for instance that events of disappearance cannot be used in the *way* construction: **The witch vanished her way into the forest*. Thus we reluctantly conclude that the selectional restriction on the choice of verbal subevent in 20 is a raw disjunction: there is no explanation to be sought at this level of detail; there is only description. We return to this issue in §8.

What makes the (sub)constructions in 14, 16, and 20 form a family is their family resemblance in syntax and semantics. The constructional subevents in the two transitive cases are causative and have arguments in parallel positions; the two property cases involve change of property; the three spatial cases involve motion in space.¹³ Apart from the sound-emission and disappearance verb classes, the verbal subevent is a means to achieving the constructional subevent. Unlike the *way* construction and time-away construction, none of them has a special morpheme that marks the construction. The fact that instances of grammatical patterns share family resemblances and not definitional necessary and sufficient features is highly reminiscent of other sorts of conceptual categories (Jackendoff 1983, Lakoff 1987, Murphy 2002, Rosch & Mervis 1975, Taylor 1995, Wittgenstein 1955). We therefore do not see it as a drawback that our analysis requires several different but related types of resultatives, but rather as an indication of a parallel with general cognition.

4. THE MEANING OF RESULTATIVES EXPLAINS THEIR ASPECTUAL PROPERTIES. We now turn from the argument-structure properties of resultatives to their aspectual and temporal properties.

4.1. TELIC, ATELIC, AND STATIVE RESULTATIVES. There seems to be a widespread view in the literature that resultative sentences are invariably telic (e.g. Boas 2000, Levin & Rappaport Hovav 1995, Rappaport Hovav & Levin 2001, Rothstein 2000, Tenny 1994: 36–37, Van Valin 1990, Wechsler 2001). In fact, the term *resultative* suggests that the sentence expresses the result of some action. However, this view is false, for three reasons.

First, although APs used with predicates of change normally denote the endstate of change (Goldberg 1991, 1995, Wechsler 2001), the AP constructions *A-er* and *A-er* and *ever A-er* do not:¹⁴ *For hours, the mixture got hotter and hotter*. When serving as RPs, these APs create atelic resultatives.

¹³ Goldberg (1991, 1995) argues that the property resultatives are related to the path resultatives by metaphorical extension insofar as the RP is interpreted as a metaphorical goal. This predicts that AP resultatives are based on PP resultatives and that we should not expect to find languages that have only AP resultatives and not PP resultatives. Jackendoff (1990) treats them as parallel instantiations of thematic structure, differing in semantic field feature.

¹⁴ It is possible to demonstrate that the *A-er* and *A-er* pattern requires a special construction. Note first that usually an adjective cannot conjoin with itself (i); only comparative adjectives can. Second, conjoined comparatives can usually appear as the predicate of either states or events (ii), but *A-er* and *A-er* can appear only as the predicate of an event (iii).

- (i) The building is tall and wide/*tall and tall.
- (ii) This building got/is taller and wider than that one.
- (iii) This building got/*is taller and taller (*than that one).

Third, with longer adjectives we get *more and more beautiful*; ordinary conjoined comparatives come out differently: *more beautiful and (more) exciting*. Thus at bottom the construction appears to be a reduplication

- (23) Non-end-bounded state of change denoted by an AP, atelic resultatives
- For hours, Bill heated the mixture hotter and hotter. (nonrepetitive)
 - For hours, Bill hammered the metal ever flatter. (nonrepetitive)
 - For years, Penelope wove the shawl longer and longer. (nonrepetitive)

Second, path resultatives are telic if and only if the RP is end-bounded (in the sense of Jackendoff 1996).¹⁵

- (24) End-bounded spatial PPs, telic resultatives
- Bill floated into the cave (*for hours). (on nonrepetitive reading)
 - Bill pushed Harry off the sofa (*for hours). (on nonrepetitive reading)
- Non-end-bounded spatial PPs, atelic resultatives
- Bill floated down the river (for hours). (nonrepetitive)
 - Bill pushed Harry along the trail (for hours). (nonrepetitive)

Third, there exist stative sentences that are indistinguishable from path resultatives in both syntactic structure and argument-structure properties.

- (25) Stative path resultatives
- The road zigzagged down the hill.
 - The rope stretched over the pulley.
 - The weights stretched the rope over the pulley.

Example 25a is paralleled by the typical intransitive path resultative *Barbara zigzagged down the hill*, but it is not a motion sentence. Examples 25b and c can be construed either as change of state (e.g. the rope gradually stretches)—in which case they fall under standard resultatives—or as continued states of tension in the rope. The latter interpretation is not even an event, much less a telic event. Yet one would like to treat the argument-structure properties of both interpretations in terms of a common solution. Thus it appears necessary to admit not only atelic resultatives, but also stative resultatives.

Let us see how these data follow immediately from the treatment of resultative semantics in 14 and 16. It has often been observed in the literature that the telicity of motion events correlates with (among other things) the end-boundedness of the path of motion (Jackendoff 1996 and references therein). For instance, the PP *into the room* expresses a path that terminates in the room, and *John went into the room* expresses a telic event, that is, one that comes to its conclusion when John is in the room. By contrast, the PP *along the river* expresses a path whose end is not specific, and *John went along the river* expresses an atelic event, that is, one whose termination is not specific. This correlation is brought out explicitly in the formalism of motion and change in Jackendoff 1996: in this formalism, the time-course of an event of change is homomorphic to the structure of the path of change, in particular preserving end-boundedness. In turn, the telicity of an event amounts precisely to the end-boundedness of its time-course.

Now consider the account of the semantics of path resultatives in 16. The constructional subevent is the 'main event' in the semantic structure. As a consequence, its temporal structure determines the telicity of the sentence. Its final argument, the RP, corresponds to the path of motion. Since the end-boundedness of the RP determines

of the comparative morpheme. The meaning involves some sort of quantification over successive stages and is paralleled by the equally idiosyncratic *ever taller*, *ever more beautiful*.

¹⁵ We abstract away here from factors such as indefinite plural subjects, which can independently induce atelicity (*People walked in for hours*). See Jackendoff 1996.

the telicity of the constructional subevent, and the telicity of the constructional subevent determines the telicity of a resultative sentence, we derive directly the correlation observed in 24. Similarly, expressions like *hotter and hotter* arguably denote an unbounded path of change in the 'hot direction'; hence when used as RP they too will result in atelic sentences like 23.

Next let us consider the statives. In general, a stative or 'extension' interpretation of an erstwhile motion verb is possible when the theme is an object idealized as extended in one dimension, that is, as an 'elaborated line'. The meaning of the extension interpretation is that the theme, rather than moving along the path, occupies the entire extent of the path.¹⁶ For example, *the road goes along the river* asserts not that the road travels but that the road occupies a linear space parallel to and nearby the river. In the formalism of Jackendoff 1996, this is because in an extension interpretation, the theme rather than the time-course is homomorphic to the structure of the path, and there is no inherent time-course. In turn, the absence of an inherent time-course is what makes a sentence stative.¹⁷

The stative interpretations in 25 fall under this generalization: the themes are *the road* and *the rope*, and these are asserted to be extended over the paths expressed by *down the hill* and *over the pulley* respectively. This is exactly what is expected under the semantic analysis in 16: like ordinary verbs of motion, the resultative construction can be coerced into an extension reading, given the right choice of subject.

Some other aspects of the extension interpretation are worthy of note. First, the verb in a path resultative often expresses manner of motion. But this cannot be true of *zigzag* in 25a, since there is no motion. Rather, the verb expresses the detailed shape of the path: at the coarsest idealization, the path just extends down the hill; but at the next level of detail it has a zigzag shape. This analysis can actually be applied just as well to the motion interpretation: zigzagging consists in traversing a zigzag-shaped path. Similarly, in 25b,c the verb is interpreted as a manner of motion (or better, manner of adopting a shape) brought about by application of force. But on the extension interpretation it is interpreted as maintenance of shape under application of force. In other words, when the resultative sentence becomes stative, the verbal subevent must be interpreted statively as well.¹⁸ In addition, consider the transitive stative resultative in 25c. Causation in this interpretation does not involve change but rather forced maintenance of a state—just like the causation with ordinary verbs in sentences like 26.

- (26) a. The weights made the rope stretch over the pulley.
- b. The weights kept the rope stretched over the pulley.

The overall generalization is:

- (27) **The aspectual structure of the constructional subevent controls the aspectual structure of the resultative sentence; in turn, the aspectual struc-**

¹⁶ This interpretation requires some suitable level of abstraction. For example, *the telephone poles run alongside the road* means not that the road's edge is covered with telephone poles, but that the poles form a virtual line that extends along the road. See Jackendoff 1990:ch. 6, Langacker 1987, Talmy 2000.

¹⁷ Talmy (2000) treats such sentences as 'fictive motion', as though one imagines oneself or one's gaze traveling the road and thereby traveling along the river. While this interpretation is intuitively seductive, a full semantic analysis still must explain why sentences expressing extension are stative rather than eventive, as far as we know an issue not addressed by Talmy. The stativity is crucial to our analysis here.

¹⁸ The relation between the two subevents must be reinterpreted as well, as means is normally a relation between two events rather than two states.

ture of the constructional subevent is predictable from general principles correlating event structure with change, extension, motion, and paths.

Thus our account of resultatives is in this respect also explanatory.

4.2. TEMPORAL RELATION OF THE TWO SUBEVENTS. Next let us turn to the temporal relation between the two subevents of the resultative. On the analysis in 14 and 16, the verbal subevent is a means toward the constructional subevent. To do X BY MEANS OF doing Y, one cannot do X first and then do Y. Thus this correctly predicts that the constructional subevent may not entirely precede the verbal subevent when the latter is interpreted as the means of effecting the former.

This prediction leaves open the question of whether the verbal subevent is concurrent with the constructional subevent, overlaps with it, or entirely precedes it. All of these options are possible with means expressions in general, depending on the pragmatics of the situation. Examples are provided in 28.

- (28) a. Cause cotermporal with effect:
Bill made the ball go up the hill by pushing it.
- b. Cause overlaps with inception of effect:
Bill made the vase fall on the floor by knocking against it.
- c. Cause completely precedes effect:
Bill made himself get sick on Tuesday by eating mushrooms on Monday.

The first two are clearly possible with transitive resultatives, as predicted.

- (29) a. Cause cotermporal with effect:
Bill pushed the ball up the hill.
- b. Cause overlaps with inception of effect:
Bill knocked the vase onto the floor.

It is not clear whether the temporal relation in 28c, in which the means entirely precedes the main event, is an option for resultatives. Goldberg (1995:194) and Rappaport Hovav and Levin (2001) observe that a temporal delay is not available with transitive resultatives generally. For example, it is not possible to utter 30a to mean that Sam cut his finger, which caused his captors to release him in order to clean him up. Such a sense is possible in 30b, for instance. Instead, 30a must mean that the cutting directly and immediately released him from his (implicit) restraints.

- (30) a. Sam cut himself free.
- b. Sam got free (at 6:00) by cutting his finger (at 4:00).

This restriction is in fact expected. Fodor (1970) observes that biclausal causatives permit a means expression in which the means entirely precedes the main event. This is the case in 28c, for instance, as well as examples like 31a. However, Fodor points out that monoclausal causatives such as 31b do not permit such a temporal relation (for possible reasons, see Jackendoff 1990:150–51, McCawley 1978).

- (31) a. Sue made Bill die on Thursday by poisoning his breakfast on Wednesday.
- b. *Sue killed Bill on Thursday by poisoning his breakfast on Wednesday.

On the analysis in 14 and 16, resultatives are syntactically monoclausal, and the verbal subevent functions semantically like a means expression. Hence, whatever the reason for the temporal constraint on means expressions in monoclausal sentences, this constraint ought to apply to resultatives as well.

Rappaport Hovav and Levin (2001) suggest that it is possible to have a time delay with the unselected object cases, citing the following example.

- (32) Sam sang enthusiastically during the class play. He woke up hoarse the next day and said, 'Well, I guess I've sung myself hoarse.' (Rappaport Hovav & Levin 2001:775)

In the case of unselected objects, the verb by definition does not have a patient argument itself—for example, in 32 there is no entity that the singing actually directly acts upon. This would seem to allow for instances in which the action designated by the verb does not cause the result directly or immediately. Still, we feel that 32 is interpreted to mean that Sam notices his throat becoming hoarse only after a time delay. It is still inferable that the injury to his throat had been initiated by the time the singing ended.¹⁹

Evidence for the predictive power of our analysis comes from a consideration of sound-emission resultatives. Note for instance that in *The door banged open*, the banging can be at the END of the opening, say, as the door strikes the adjacent wall. If the temporality restrictions observed above were a stipulation on resultatives, rather than falling out from the independently needed facts about the semantic relationship between verbal and constructional subevents, this outcome would not be predicted. However, this possibility follows automatically from 20, our treatment of the semantics of sound-emission resultatives. Here, unlike other resultatives, the verbal subevent (banging) is a RESULT OF the constructional subevent (coming open) rather than a means to it. Thus the general constraint on causation requires that the banging cannot precede the opening, precisely the correct outcome.

To summarize, we find that the temporal relations between the verbal subevent and the constructional subevent are predicted by three independently necessary factors: (i) the semantic relation between the two subevents, whether it be means or result, (ii) our pragmatic world knowledge of the particular subevents in question, and (iii) the strong tendency to interpret means expressions in monoclausal events as cotermporal. In short,

- (33) **The semantics and syntax of resultatives explain the possibilities for temporal relations between the two subevents.**

5. WORLD KNOWLEDGE RELATING TO THE SEMANTICS OF THE RESULTATIVE EXPLAINS ADDITIONAL DISTRIBUTIONAL FACTS. We have already seen that the semantic properties of resultatives explain much of their syntax and their aspectual/temporal properties. The distribution of resultatives is also constrained by general effects of world knowledge as it relates to the semantics of resultatives. For example, our taxonomy in §2 distinguished transitives with fake reflexives from other unselected transitive resultatives: example 34a has no counterpart with a nonreflexive object (cf. 34b), while the examples in 35a do (cf. 35b).

- (34) a. Bill cried himself to sleep. (fake reflexive)
 b. *Bill cried Sue to sleep.
 (35) a. Bill wiggled himself through the hole. (ordinary reflexive)
 Bill sang himself to sleep.
 b. Bill wiggled the puppet through the hole.
 Bill sang Sue to sleep.

This distinction, however, requires no grammatical stipulation because it arises from our world knowledge of what is likely to cause what. It's hard to imagine making someone else go to sleep by crying (the putative meaning of 34b); whereas it is of

¹⁹ See Pustejovsky 1995 for further discussion and formalization of various possible temporal relations among subevents.

course possible to make something else wiggle someplace and to make someone else go to sleep by singing (the meanings of 35b). Thus there seems little reason to distinguish fake reflexives as a GRAMMATICALLY special case of resultatives; the semantic requirement that the verbal subevent must be construed to be the means of effecting the event designated by the construction requires such a causal relationship be pragmatically plausible.

Another contrast that falls out from the relation between the subevents concerns the examples in 36.

- (36) a. *The elevator creaked itself to the ground.
 b. If the telephone rang, it could ring itself silly. (Rappaport Hovav & Levin 2001, ex. 34b)

The sound-emission resultative (20) applies only to INTRANSITIVE sentences, as in *The elevator creaked to the ground*. Hence, despite the fact that the verbs in 36 are sound-emission verbs, it cannot apply here. What possibilities are left? The verb *creak* cannot be used causatively: **Bill creaked the elevator*. Therefore, the only applicable resultative pattern for 36a is the unselected transitive resultative, which would have to mean ‘the elevator made itself go to the ground by creaking’, which is pragmatically implausible. The same pattern applied to 36b is pragmatically plausible, under the metaphorical interpretation in which the phone is animate and therefore can get ‘silly’: ‘the phone could make itself silly by ringing’. Alternatively, since *ring* can also be used causatively (*Bill rang the doorbell*), the selected transitive pattern is available as well: ‘the phone could make itself silly by ringing itself’. Both of these interpretations seem plausible. An interpretation that does NOT emerge is ‘the elevator made itself go to the ground, thereby emitting creaks’, ‘the telephone could make itself get silly, thereby emitting rings’, a plausible but nonexistent extension of the sound-emission resultative to transitive frames.

6. HOW ARGUMENTS ARE SHARED BETWEEN THE TWO SUBEVENTS. So far we have ignored the effects of the verbal subevent on the resultative, other than the fact that it supplies the overt verb in the syntax. Now we return to an issue set aside in §3: how the semantic arguments of the verb are related to the semantic arguments of the construction.

6.1. ARGUMENT REALIZATION. Let us turn more directly to the issue of argument sharing between the verbal and constructional subevents. Our hypothesis can be stated as 37.

(37) FULL ARGUMENT REALIZATION (FAR)

All of the arguments obligatorily licensed by the verb and all of the syntactic arguments licensed by the construction must be simultaneously realized in the syntax, sharing syntactic positions if necessary in order to achieve well-formedness.²⁰

²⁰ This condition is proposed in slightly different form in Goldberg 1995 as the CORRESPONDENCE PRINCIPLE. In Goldberg 1995, 2005b it is argued that the correspondence principle is a default principle that can be overridden by the specifications of particular constructions; for example, the passive construction specifically serves to allow a normally obligatory argument to be omitted. Goldberg also suggests that particular constructions determine which arguments must be shared between verb and construction and which can be contributed by the construction alone. Jackendoff 1990 also has a formulation, which, however, deals only with the sharing of the subject argument.

An argument is considered obligatorily licensed by a verb if and only if an expression involving the verb in active, simple past tense without the argument is ill-formed. For example, *drink*'s second argument is not obligatory because 38 is well-formed; *break*'s patient argument, on the other hand, is obligatory, because 39 is ill-formed.

(38) She drank.

(39) *She broke. (in the sense 'she broke it/something')

The two of us differ on the nature of the conditions enforcing well-formedness. For Goldberg, ill-formed structures cannot occur because there is no combination of lexical and phrasal constructions of English that licenses them. For Jackendoff, they cannot occur because the general rules of English syntax and argument linking, interacting with the verb's lexical entry, do not license them. The difference stems from whether one wishes to assume that ALL aspects of grammar can be captured by constructions (Goldberg) or whether one wants to preserve a role for traditional syntax and argument linking that is nonconstructional (Jackendoff). Since we wish to emphasize what is shared between our approaches, we leave this issue aside.

Let us work through a few examples. Consider first 40.

(40) Willy watered the plants flat.

The verb *water* is obligatorily transitive, since **Willy watered* is out.²¹ Thus by full argument realization (FAR), both arguments of the verb must appear in the syntax in 40—and they do. The constructional subevent has three arguments: a causer (or agent) mapped into subject position, a patient mapped into object position, and a predicate; FAR demands that all of these be expressed too. So we have a total of five arguments to be mapped into only three syntactic positions. However, FAR permits two of these to be shared, which is in fact the case: *Willy* and *the plants* serve as arguments of both subevents and thereby have multiple thematic roles.

Suppose instead that we tried to combine the same verbal subevent with a constructional subevent such as 'Willy made the ground become wet'. Then there would be two distinct patients competing for the same syntactic position, one from the constructional subevent and one from the verbal subevent. This is impossible in English: **Willy watered the plants the ground wet*. The reason is that there is only one syntactic position in the clause that a patient can map into. And neither of these NPs can be omitted because of FAR. Therefore this combination of events can only be expressed biclausally: *Willy made the ground wet by watering the plants*.

Suppose, however, that the verb is only optionally transitive, for instance *drink* (*the beer*), and we again wish to combine it with a constructional subevent that has a different patient, say 'make the pub dry'. This time FAR permits us to leave the verb's patient implicit and express only the construction's patient, so we can get *Dave drank the pub dry*. Here the only shared argument is *Dave*, which is agent in both subevents. Similarly, if the verb is intransitive, for instance *laugh*, there is no patient in the verbal subevent, and the agent is shared with the constructional subevent, as in *The critics laughed the play off the stage*. Thus FAR accounts for both selected and unselected variants of transitive resultatives. The analysis so far is summed up by 41 (in a notation neutral between the authors' somewhat different formalizations).

²¹ Goldberg (2000) discusses a particular construction that allows the patient argument of many causal verbs to be omitted under special discourse conditions. This construction, termed the 'deprofiled object construction', can be used to account for special circumstances where *water* can appear intransitively as in *With three new greenhouses to take care of, the gardener had to water all afternoon*. Also, in the context of two people gardening together, one could say to the other: *You weed and I'll water*.

- (41) Transitive resultatives
- a. Selected transitive resultatives
Willy watered the plants flat.
 Constructional subevent: Agent: *Willy*; Patient: *the plants*; Predicate: *flat*
 Verbal subevent: Agent: *Willy*; Patient: *the plants*
 2 arguments shared
 - b. Unselected transitive resultatives with optionally transitive verb
Dave drank the pub dry.
 Constructional subevent: Agent: *Dave*; Patient: *the pub*; Predicate: *dry*
 Verbal subevent: Agent: *Dave*; Patient: implicit
 1 argument shared
 - c. Unselected transitive resultatives with intransitive verb
The critics laughed the play off the stage.
 Constructional subevent: Agent: *the critics*; Patient: *the play*; Path: *off the stage*
 Verbal subevent: Agent: *the critics*
 1 argument shared
 - d. Impossible case
**Willy watered the plants the ground wet.*
 Constructional subevent: Agent: *Willy*; Patient: *the ground*; Predicate: *wet*
 Verbal subevent: Agent: *Willy*; Patient: *the plants*
 1 argument shared; no way to map two independent patients into the same clause

Another sort of impossible case concerns a verb that requires an obligatory PP expressing a path argument. Consider the contrast between *walk* and *pad*, both verbs of motion.

- (42) a. Bill walked (around the room) for hours.
 b. Bill padded *(around the room) for hours.

Pad obligatorily requires a path phrase, where *walk* does not. Now notice what happens when these verbs are combined with the transitive property resultative construction.

- (43) a. *Bill walked himself into a coma.*
 Constructional subevent: Agent: *Bill*; Patient: *himself*; Property: *into a coma*
 Verbal subevent: Agent/Theme: *Bill*; Path: implicit
 1 argument shared
- b. **Bill padded himself into a coma.*
 Constructional subevent: Agent: *Bill*; Patient: *himself*; Property: *into a coma*
 Verbal subevent: Agent/Theme: *Bill*; Path: implicit
 1 argument shared; violates FAR since path phrase of *pad* must be overt (42b)
- c. **Bill padded himself into the room into a coma.*
 Constructional subevent: Agent: *Bill*; Patient: *himself*; Property: *into a coma*
 Verbal subevent: Agent/Theme: *Bill*; Path: *into the room*
 1 argument shared; no way to map path PP and property PP into the same clause

Example 43b is bad because the required path argument of *pad* is not expressed, in violation of FAR; 43c is bad because two different path arguments are competing for the same slot.²²

6.2. THE SEMANTIC COHERENCE PRINCIPLE. An observation that emerges from 41 and 43 is that a shared argument has parallel thematic roles in the two subevents: it is either agent of both or patient of both. This idea proves to be a more general constraint on resultatives (and probably other VP constructions); it is stated by Goldberg (1995) as the semantic coherence principle.

(44) PRINCIPLE OF SEMANTIC COHERENCE

Roles of the construction (rC) and roles of the verb (rV) may unify only if they are semantically compatible; roles rV and rC are semantically compatible if and only if rV can be construed as an instance of rC.

This principle prevents incompatible roles from combining. For example, an agent role cannot combine with a patient role. Note that the principle is stated as a constraint on the combination of roles in a clause, not as a real-world constraint on the referent of those roles. It is quite possible for a single referent to be construed as both an agent and a patient, for example, when each role is assigned by a distinct clause, *He captured the snake(patient), and the snake(agent) bit him*, or via a coreferential argument, for example, *He(agent) talked himself(patient) hoarse*.

At the same time, the principle does not require that the role of the verb come preclassified as the same type of role as the constructional role it combines with. What is required is that the role of the verb be CONSTRUABLE as an instance of the role of the construction. For example, the object of *wipe* is not necessarily affected or a patient (cf. *She wiped the table but it was still dirty*). However, it is potentially affected by the wiping and thus is construable as a patient. This is what licenses expressions such as *She wiped the table clean*.

The principle of semantic coherence can be used to account for the contrasts in 45.

- (45) a. *She yelled hoarse.
b. *Ted cried to sleep.
c. The tiger bled to death.

The construction required in 45 is the noncausal property resultative. The constructional subevent is *X BECOME Y*; its first argument, which maps to subject position, is a patient (i.e. something happens to X). However, the verbs *yell* and *cry* require an agent argument in subject position (i.e. yelling and crying are something that X does). Since an agent role cannot be construed as a type of patient, the combination of *yell* or *cry* and the noncausal property resultative is ill-formed. Now note that it is the specific

²² A referee asks why *Bill padded himself into/around the room* is ill-formed. Indeed, it should be possible for the construction to add a patient/theme role expressed as direct object. In the case of a reflexive object, the interpretation required would be one involving a 'split self': one's superego acts on one's ego (or however one wishes to describe the split-self scenario). As predicted, this is possible with certain intransitive motion verbs such as:

- (i) She marched herself out of the kitchen.

While it is pragmatically felicitous to force oneself to march somewhere, it is hard to imagine why one's superego would cause one's ego to pad somewhere. That it is just pragmatically odd and not impossible is supported by the fact that we were able to find the following example using Google, from a story in which a mother forces herself to walk quietly up the stairs to her daughter's room.

- (ii) She **padded herself** up the steps / And knocked on the door, heart beating in her chest
(www.geocities.com/applejax8831/mailcall.html)

semantics of the verb that is important, not just the general verb class to which a verb belongs. While both *bleed* and *cry* are verbs of bodily function, the subject of *bleed* is a type of patient, since bleeding is something that happens to someone, not something that a person or other being does. Thus, semantic coherence correctly predicts that *bleed* can readily appear in the noncausal property resultative construction, as in 45c.

Consider now the bodily functions of coughing, sneezing, and yawning. The single arguments of these verbs can be construed as patients or, perhaps more typically, as agents, since coughing, sneezing, and yawning can be construed either as things that happen to us or as things that we do. As predicted, attested examples (from the Google web search engine) exist with these verbs used alternatively, both intransitively (46) and with fake objects (47).

- (46) a. He coughed awake and we were all overjoyed, especially Sierra.
(www.diabloii.net/tddl/stories/destiny2.shtml)
- b. the kittens yawned awake and played with the other young . . .
(www.geocities.com/mistacorjellicle/lifelove.html)
- c. Zoisite sneezed awake, rubbing his nose and cursing under his breath.
(www.geocities.com/Tokyo/Dojo/9951/vaults/love1.html)
- (47) a. Patamon coughed himself awake on the bank of the lake where he and Gomammon had their play. (www.furnation.com/Furryden/Main/Stories/Digi8.doc)
- b. Ron yawned himself awake. (www.schnoogle.com/authors/jsawyer/SNW06.html)
- c. She sneezed herself awake as the leaf landed on her nose.
(www.transcendzero.co.uk/halloween/hallowitches.htm)

The semantic coherence principle predicts just this variability. At the same time, we acknowledge that the examples in 47 are somewhat more natural than those in 46. We believe that this results from the fact that coughing, sneezing, and yawning are more easily construed as actions that we do rather than actions that happen to us. We also recognize that examples found on the web must be used with caution, since it is often unclear whether the author is a native speaker, or whether a typo was involved, and so forth. But dozens of instances of the types of examples in 46 were found; we take this as a clear indication that the requisite construals are possible.

The noncausative SPATIAL resultative has slightly different properties. Consider the examples *Sue ran down the stairs* vs. *The water ran down the stairs*. The subject of *run* is a theme in both cases. In the former case it is also always an agent. But in the latter case the subject can be interpreted as either doing something (i.e. an agent) or having something happen to it (i.e. a patient). In other words, *run* with an inanimate subject is indifferent as to whether its subject is an agent or a patient. In fact this is the case with many intransitive motion verbs. Given that the intransitive spatial resultative is based on the model of intransitive motion verbs, we believe the same distribution of thematic roles obtains with *GO* in the constructional subevent of the intransitive spatial resultative.

The consequence is that intransitive spatial resultatives are more liberal than intransitive property resultatives in the range of verbs they admit. So we find both 48a, where the subject of *wriggle* is an agent, and 48b, where the subject of *melt* is a patient.

- (48) a. The worm wriggled onto the carpet.
- b. The chocolate melted onto the carpet.²³

²³ The causative of this example, *the sun melted the chocolate onto the carpet*, is semantically parallel to Goldberg's (1991) *He broke the eggs into the bowl*. Levin and Rappaport Hovav (1995:60–61) cite the latter

Both are compatible with semantic coherence: 48a with the agentive reading of *GO*, and 48b with the nonagentive reading of *GO*.

In the TRANSITIVE spatial resultatives, the situation is again different. The semantics of the constructional subevent is *X CAUSE [Y GO Path]*. *X*, which maps into the subject, has to be an agent; *Y*, which maps into the object, has to be a patient. The consequence is that resultatives are more acceptable to the degree that the subject can be understood as instigating the motion of the object in the verbal subevent. This consideration is especially interesting when the object is a reflexive, as in 49a,c,d, and e.

- (49) a. Bill wiggled himself loose.
- b. Aliza wiggled her tooth loose.
- c. The mechanical doll wiggled itself loose. (mechanical doll can instigate wiggling)
- d. The off-center spinning flywheel shook itself loose. (flywheel's spinning can instigate shaking)
- e. *The ball wiggled itself loose. (ball cannot independently instigate wiggling)

In the case of 49a and b, the subject argument is clearly volitional and agentive. The subject arguments in 49c and d are also construable as instigating the wiggling—that is, are construable as agents. Only in 49e is the ball unable to be construed as instigating its own wiggling action. Therefore 49e is incompatible with the semantic coherence principle and is unacceptable. Thus semantic coherence, motivated here by the standard examples in 41 and 43, additionally helps explain many otherwise mysterious constraints on resultatives (see also Takami 1998 for a related constraint). A further application of semantic coherence is discussed in the following section.

To sum up so far, it appears that all of the acceptable classes of resultatives observe the conditions of full argument realization and semantic coherence. The two principles together account for a great deal of the distributional data. In addition, we have posited that 'the' resultative is actually a family of constructions, clearly closely related, but each subject to its own restrictions on verb classes and with its own special syntactic and semantic properties. The specifics need to be accounted for by any theory. Our choice is to formulate the analysis as directly as possible in terms of the mappings between form and meaning.

7. EXTENDING THE ANALYSIS TO ADDITIONAL TYPES OF RESULTATIVES.

7.1. *Follow* CASES. We next consider the *follow*-type cases introduced in §2. These are distinguished from everything we have looked at so far by the fact that they are transitive expressions, but the subject rather than the object is host of the RP. Semantically they fall into two subtypes (many of these examples are adapted from Rappaport Hovav & Levin 2001).

- (50) Object determines subject's path of motion, either by its own motion or by traces it leaves
 - a. Bill followed the thief into the library. (thief's motion determines Bill's path)

as a potential counterexample to their claim that there can only be one delimiting state per clause, because the eggs both end up broken and end up in the bowl. They take a stab at resolving this problem by saying the broken eggs are whole eggs and the eggs in the bowl are only the eggs' contents, so that the sentence covertly speaks of two different entities undergoing change. This story cannot be told in the present case: the same chocolate melts as ends up on the carpet.

- b. Bill tracked the leak to its source. (path of leak's outflow determines Bill's path)
- c. Bill traced the clues to the haunted house. (distribution of clues determines Bill's path)

Transitive noncausative spatial resultatives

(51) Object is vehicle

- a. Bill took the train to New York.
- b. Sara caught a plane to New York.
- c. Ann rode a limo to the hotel.

Object is path of motion

- d. Bill took/traveled the Taconic Parkway to New York.
- e. Chris rode the Oregon Trail to Kansas.
- f. Ray flew the coastal route to Buffalo.

What makes these cases semantically different from previous transitive resultatives is that, while the direct object is an argument of the verb, it is not a patient: one is not acting on the thief, the leak, or the clues in 50, nor on the various vehicles and paths in 51. Thus these verbs cannot combine with the normal causative resultative construction, which marks the object as a patient: that would violate semantic coherence. In many cases, it would also mean something bizarre, for example, ??'Bill made the leak go to its source by tracking it', *'Ray made the coastal route go to Buffalo by flying (it)'. So some different means of mapping these sentences to semantics must be invoked.

We can envisage two alternative approaches. One claims that the constructions involve a transitive variant of the noncausative resultative construction, which is normally intransitive; the other involves positing new transitive subconstructions. We sketch the two approaches in turn.

The first possibility for the *follow* cases is to treat them as a variant of the noncausative motion construction 16b (e.g. *Bill rolled into the room*): they entail that the subject argument moves along a path, just as noncausal motion expressions do generally. On this view, the direct-object argument can be viewed as an argument of the verb alone; it is not an argument of the constructional subevent. In other words, unlike previous cases, the verbal subevent has two arguments, only one of which is shared with the constructional subevent.

(52) Transitive noncausative resultative construction

Syntax: NP₁ V NP₂ PP₃

Semantics: X₁ GO Path₃

MEANS: [VERBAL SUBEVENT: X₁ GO [PATH DETERMINED BY Y₂]]

This construction requires a spatial resultative, not a property resultative. The selectional restriction on the verbal subevent, *PATH DETERMINED BY Y₂*, generalizes the separate cases in 50–51. In each of these cases, the subject traverses a path determined by the object; but they differ in exactly how the object determines this path. This selectional restriction has the effect of ruling out certain other cases that have the same relation between subevents, for instance 53a, with the plausible meaning 'she went into the room by pushing the door', as well as examples like 53b, with the implausible meaning 'we got into the building by noticing the thieves'.

(53) a. She pushed the door into the room.

(≠ she went into the room by pushing the door)

b. *We noticed the thieves into the room.

According to 52, these are out because the direct objects do not determine the path of the subject. Whether this is the correct restriction or too narrow awaits the discovery of further cases. Finally, 54a is ruled out because *sniff* cannot be construed as a verb of motion, and 54b is ruled out because *run* is not a transitive verb as required by 52.

- (54) a. *The dog sniffed the trail into the yard.
 (= the dog went into the yard by sniffing the trail)
 b. *The dog ran the clues into the yard.
 (= *the dog went into the yard by running the clues)

An alternative account of these cases might posit additional constructional subevents such as in 55 and 56.

- (55) Syntax: NP₁ V NP₂ PP₃
 Semantics: X₁ GO-AFTER Y₂ Path₃
 INSTANCE: [VERBAL SUBEVENT] e.g. *follow, track, trace*
 (56) Syntax: NP₁ V NP₂ PP₃
 Semantics: X₁ GO-BY WAY OF Y₂ Path₃
 INSTANCE: [VERBAL SUBEVENT] e.g. *take*
 OR MEANS: [VERBAL SUBEVENT] e.g. *ride, sail, drive*

We observed in §3 that constructions generally need to specify the possible range of semantic relationships between verb and construction (e.g. means or result). In the case of 55 and 56, a different relationship between the verbal subevent and the constructional subevent is indicated by the predicate, 'instance'. That is, the verbs in 50 and 51 have meanings that closely resemble the semantics of the constructions: for example, the verb *follow* designates a specific instance of the more general meaning 'X goes after Y along a Path'; *take* as used in 51d designates an instance of the more general 'X goes by way of Y along a Path'. Goldberg (1997) proposes that cases in which the verbal subevent is simply an instance or an elaboration of the constructional subevent are the most prototypical cases, both for particular constructions and crosslinguistically.

In the case of the construction represented in 55, the only acceptable relationship between verb and constructional subevent is the instance relation. Notice that means and result are not acceptable.

- (57) a. *The dog sniffed the trail into the yard.
 (= the dog followed the trail into the yard by sniffing it—MEANS)
 b. *The dog ran the clues into the yard.
 (= the dog followed the clues into the yard by running—MEANS)
 c. *The dog found her into the yard.
 (= the dog went after her into the yard thereby finding her—RESULT)

In the case of the construction represented in 56, it is possible to use a verb that designates the means of going by way of a vehicle or path as in the following examples.

- (58) a. Bill rode a train to New York. (Bill went to NY by way of a train by riding the train)
 b. Bill drove the Taconic Parkway to New York. (Bill went to NY by way of the TP by driving)

The semantic representations in 55 and 56 capture the semantic properties of the *follow* subclasses and make two additional predictions. For ease of exposition, we refer to the Y₂ argument of 55 as a SOUGHT-AFTER role and the Y₂ argument of 56 as a ROUTE role.

First, these representations ensure that this class is productive only with verbs that can be construed to involve agent/theme and, if they have a second obligatory role, it must be construable as either a sought-after or a route-type role. As expected, in accord with the semantic coherence principle, other verbs cannot integrate with these semantic templates, as seen in 53b (**We noticed the thieves into the room*). Second, the representations predict that only path phrases and not change-of-state resultatives apply to the *follow* subclasses. This prediction is borne out.

- (59) a. **We drove Highway 5 silly.*
 b. **We followed the trail silly.*

Moreover, the linking patterns between syntax and semantics specified in 55 and 56 are independently required. That the first argument of *GO* should be expressed by a subject is familiar from intransitive motion verbs such as *run*, *walk*, *jog*, and *jump*. That the path argument should be expressed by a PP is also expected. In addition, the expression of the sought-after and route roles as direct objects in 55 and 56 is also independently required for other verbs. For example, the direct objects of *seek* and *need* are naturally described as bearing a role that can be described as sought-after;²⁴ the arguments of *climb* and *pave* arguably involve route-type arguments. Thus, additional constructions may be required, but the semantic structure is required for verbs like *follow* and the relevant sense of *take*, and each aspect of the syntax is also independently needed for other verbs.²⁵

In any case, it is clear that something special needs to be said to account for these cases, since they are transitive but noncausal, unlike all of the other examples discussed so far. Our suggestion is to posit additional subconstructions that are minimally different from the other, independently required constructions.²⁶

7.2. DANCING MAZURKAS. The examples in 60 are somewhat different again from what we have seen so far.

²⁴ The reason *seek* and *need* do not appear in the construction in 55 is because they do not designate instances of the meaning 'X go-after Y Path'.

²⁵ It is possible to motivate further the constructions in 55 and 56 by demonstrating a chain of semantic relatedness such that they can be seen to be minimal variants of constructions already posited to exist. Notice that the verb *chase* has a similar meaning to that in 55. Its roles can be captured as in (i).

(i) chase (agent/theme sought-after/theme path)

Chase is causal in that the agent argument causes the sought-after argument to move. This makes *chase* itself an unremarkable instance of the transitive path resultative represented in 16c. Its close similarity to the meaning represented in 55 serves to relate the *follow* cases to the caused-motion construction. In fact, the examples in (ii) suggest a chain of semantic relatedness that serves to relate the transitive path resultative we saw earlier to the representations in 55 and 56.

(ii) a. She chased the criminals into the building. (cause-go: transitive path resultative of 16c)
 b. She followed the criminals into the building. (minimally different from a, but noncausal: instance of 55)
 c. She followed the trail of clues into the building. (minimally different from b, also instance of 55)
 d. She followed the trail into the building. (minimally different from c, instance of 56)

²⁶ The two of us differ on their preference for these two analyses, with Goldberg preferring the constructions in 55 and 56 and Jackendoff preferring the construction in 52. The difference stems from whether one wishes to allow verbs to license syntactic arguments directly (Jackendoff) or whether one views all argument linking as being done by constructions (Goldberg). Related to this is the issue of whether one views verbs that are isomorphic with the constructional meaning (e.g. *make* as it appears in the resultative or *give* as it appears in the ditransitive) to be licensed by the construction (Goldberg) or whether one wishes to allow those verbs to link their arguments to syntax directly (Jackendoff).

- (60) Verb + object together form a predicate
- Martha danced mazurkas across the room.
 - The kids played leapfrog across the park.
 - John did cartwheels through the crowd.

We note first that these are somewhat less acceptable than the examples in 61, where there is no NP object. They are also much better than those in 62, where the object has some structure beyond a bare NP.

- (61) a. Martha waltzed across the room.
 b. The children leapfrogged across the park.
 c. John cartwheeled through the crowd.
- (62) a. ??Martha danced mazurkas by Chopin across the room.
 b. ??The children played games of leapfrog across the park.
 c. ??John did impressive cartwheels through the crowd.

Our sense is that in 60 the verb plus object together form a sort of complex predicate. Once the object comes to be identified by anything other than its role in the subject's action—that is, once the object becomes referential, as in 62—the resultative is unacceptable. The complex-predicate analysis of these cases can be used to explain why these examples fail to passivize (Rappaport Hovav & Levin 2001, Visser 1963–73)—the postverbal NP is not a direct object but part of a complex predicate.²⁷ However this distinction may be formalized, at worst it has to be added to 16b, the noncausative path resultative, as another type of possible verbal subevent.²⁸

7.3. *Spit* CASES. Our last case is the *spit*-type examples introduced in §2.

- (63) Intransitive resultatives with implicit (i.e. nonsubject) host
- Bill spit/urinated/coughed/sneezed out the window.
 - Bill sweated/bled on the floor.
 - The toilet leaked through the floor into the kitchen below.
 - Bill ate off the floor.
 - Bill drank from the hose.

We note that the examples in 63 do superficially fit the criteria for resultatives—the spit ends up outside the window, the sweat ends up on the floor, and so on. These are interesting because they appear to violate full argument realization. That is, while the verbs do not require the entity in motion to be expressed, the causative resultative construction normally does. So these cases are potential counterexamples to our analysis.

²⁷ Visser and Rappaport Hovav and Levin attribute the failure of passive to the fact that these expressions have subject hosts. However, the *follow* cases discussed above also have subject hosts and they readily passivize.

(i) The leak was tracked to its source.
 (ii) The clues were traced to the haunted house.

²⁸ Rappaport Hovav and Levin (2001) have one further example, *John swam laps to exhaustion*, which is a property resultative. Again, it is far worse if the object is more elaborate: **John swam laps of the pool to exhaustion*. Moreover, we suspect that the judgment here is clouded by an analogy to *John swam laps to the point of exhaustion*, where the PP is an adjunct: *Sue swam laps until she fainted and John did so to the point of exhaustion*. Similar considerations may be operative in 60a and b, where substitution of the adjunct *all the way across the park* improves matters. Moreover, Jackendoff (1990) found examples like 60, but with goal PPs, very dubious: **Dave danced waltzes into the room*. On the whole, then, everything points to the marginality of this resultative type.

Consider 64, however.

- (64) a. Bill entered/left/exited (the room) through the bathroom window.
- b. Bill crossed (the street) to our side.
- c. The cream rose to the top.

The verbs in 64 express inherent paths: one cannot enter without going into something, exit without going out of something, cross without passing from one side to the other of something, or rise without going in an upward direction. But it is always possible to add a PP that further delineates the path, even when not selected by the verb. Jackendoff (1990:170–71, 280) formalizes this possibility as what in present terms might be called ‘the PP-adjunct path construction’. What is important in the present context is that the construction serves only to modify or amplify an argument of the verbal event, namely the path.

Now return to the verbs in 63. They all express some entity or substance in motion, but in these cases the entity is implicit. In addition, like the verbs in 64, the entity or substance in motion has a specified path: in 63a,b,c, and f, out of or away from the subject, in 63d and e, into the subject. The PP simply further delineates the path, just as in 64. Therefore these examples can be produced by the PP-adjunct path construction rather than the resultative. This means that there is no constructional subevent whose theme argument (the entity in motion) must be expressed to satisfy full argument realization.

But there are other examples of this type in which the verb does not imply any necessary entity in motion.

- (65) Bill coughed/sneezed on the mirror.

It is quite possible to cough or sneeze expelling only air. No motion trajectory is normally specified with these verbs. Therefore there is no NECESSARY path implied by the verb that the PP can amplify. So an alternative approach would be to recognize a construction in the grammar that allows a highly inferable theme argument to be unexpressed for certain classes of verbs (namely verbs of bodily emission, ingestion, and contribution). The construction would specify that a particular semantic argument need not be overtly expressed, a specification required anyway for the passive and middle constructions (see Goldberg 2005b).

While the present account explicitly recognizes a family of related constructions in order to account for the evident semantic variability, it may seem that other approaches yield greater generalizations. Few accounts, however, have even attempted to account for the full range of data discussed here. One recent exception that does discuss most if not all of the types of examples explored here is that of Rappaport Hovav and Levin (2001). But a close look at this account reveals that it classifies resultatives in an extremely heterogeneous fashion. The account is based on a distinction in which certain resultatives are claimed to involve simple event structure and others are based on complex event structure. In their appendix B, Rappaport Hovav and Levin classify the examples in 66 as having simple event structure, where simple event structure is defined such that the verbal and constructional subevents unfold at the same time (2001: 793–94).²⁹

- (66) a. The pond froze solid.
- b. Robin danced out of the room.

²⁹ As they put it, ‘the happening in the world described by . . . [the] resultative is not linguistically construed as two distinct events’ (2001:782).

- c. We pulled the crate out of the water.
- d. The wise men followed the star out of Bethlehem.

They classify the examples in 67 as having complex event structure in which two subevents need not be cotemporal.

- (67) a. The joggers ran the pavement thin.
- b. We yelled ourselves hoarse.
- c. They drank the pub dry.
- d. The cows ate themselves sick.
- e. The critics panned the play right out of town.

Note that 66 includes intransitives (66a,b) as well as transitives (66c,d), and the latter have both object hosts (66c) and subject hosts (66d). All of the examples in 67 have object hosts, but so does 66c. Examples 67a–d are unselected transitive resultatives, but 67e, like 66c, is a selected transitive resultative. Rappaport Hovav and Levin suggest that all of the examples in 66 are noncausative whereas all of the examples in 67 are causal. But it is unclear why 66c is considered noncausative: notice that it is naturally paraphrased by ‘we caused the crate to move out of the water by pulling’, and it is expressed transitively with agent and patient arguments. Thus it is hard to see any natural division among resultatives that is captured by the notion of temporal dependence in Rappaport Hovav and Levin’s sense. In fact, this notion only distinguishes fake-reflexive property resultatives from intransitive property resultatives, a generalization that accounts for only a proper subset of data from 66 and 67. Other syntactic attributes of resultatives, such as their overt transitivity, and particular semantic properties other than the temporal one on which the account is based, are not addressed. Neither do previous general analyses attempt to account for the partial productivity that is strikingly present in the resultative. We address this issue in the following section.

8. ON THE PRODUCTIVITY OF THE RESULTATIVE CONSTRUCTIONS. We have already seen that in order to account for the full range of data, it is necessary to posit minimally distinct constructions. As noted above, the family of constructions required is akin to the type of families that are familiar from derivational morphology, as well as from nonlinguistic categorization. Also parallel to morphological processes is the partially productive nature of the resultative. What we find are areas of productivity with many diverse pockets of idiosyncrasy.

Spatial resultatives appear to be totally productive, within constraints posed by the meaning of the construction. In English, any spatial PP that can be construed as a path can be used as RP, whether it be telic or atelic (68a,b), complex or simple (69a,b), goal directed or source directed (70a,b).

- (68) a. Pat ran into the room.
- b. Pat ran towards the room.
- (69) a. Pat ran down the hall out the door into the alley.
- b. Pat ran outside.
- (70) a. Pat ran to the river.
- b. Pat ran from the river.

APs such as *free (of NP)*, *clear (of NP)*, *apart*, *open*, and *shut* are also fairly freely productive within the semantic constraints imposed by the construction. These adjectives can arguably be interpreted as spatial configurations with some force-dynamic overtones.

- (71) a. Willy wiggled/squirmed/pried free/loose (of the ropes).
 b. Judy jumped/leaped/slid clear of the rocks.
 c. The bottle broke/spilled/fell/smashed open.

Willy ends up in a position in space where the ropes don't constrain him, and Judy ends up in a position in space where the rocks can't injure her. Likewise, being open is not only a property but also a spatial configuration, affording free passage between the interior and exterior of the object; being shut precludes such access. We therefore tentatively take these cases to be interpretable as either property resultatives or spatial resultatives.

Turning our attention to PROPERTY resultatives, we find a number of lexical resultatives such as *make*, *get*, *turn*, and *render* (transitive) and *become*, *turn*, and *get* (intransitive) which are quite productive and allow a broad range of predicates. *Make*, *render*, and *become* in particular allow predicate NPs as well as APs (e.g. *make him president*, *render him a nonentity*, *become a pariah*). In Boas's (2003) search of the 10-million-word British National Corpus, some adjectives such as *wet*, *sleepy*, *brown*, and *dirty* appear as RPs only with lexical resultative verbs. Below are additional cases drawn from Boas's appendix A, which enumerates which verbs appear with which RPs; many form minimal pairs. Note that the list of adjectives that can appear freely as property RPs with inherently nonresultative verbs is quite limited (Goldberg 1995, Green 1972, Takami 1998, Wechsler 2001).

(72) <u>fairly productive as RP</u>	<u>RP only with inherently resultative verbs</u>
dry	wet
awake	sleepy
black	brown
clean	dirty
flat	thick
thin	fat
straight	crooked
smooth	rough
sick	ill
full	empty
dead	famous
silly	safe
stupid	calm
hoarse	tired

As noted above, some verbs that are lexical resultatives are MORE constrained than resultatives formed productively. Some inherently resultative verbs lexically specify a semantic restriction on the RP, while not specifying its exact form. For example, both *pry* (transitive) and *come* (intransitive) can appear only with RPs that express a semantic notion that corresponds roughly with 'apart'.

- (73) He pried it apart/open/loose/free/*flat/*straight.
 (74) It came apart/open/loose/free/*flat/*straight.

Similarly, §3 mentioned the verb *drive*, which in its resultative use selects only predicates denoting negative and extreme mental states: *drive NP crazy/nuts/bananas/to desperation/to drink/up the wall/meshugal/frantic* but not **drive NP happy/sick/silly/clean/calm/thin/sober*. Again, most of the RPs that are good with *drive* occur only

with it and with *make* and *go*. The apparently productive choice of APs in the resultative often boils down to occurrence with one of these inherently resultative verbs.

As is often the case with phrasal constructions, there exist idioms that pattern like the general construction. A good example of an idiom with resultative form is *drink NP under the table*, which patterns like a spatial resultative but has a specialized meaning and a rigid choice of lexical items. There also exist cases such as those in 75, where the choice of verb is quite broad, but the object and the RP are fixed. In all cases, the meaning is approximately 'do V to excess' (75a–c from Jackendoff 1997, 75d from Boas 2003).

- (75) a. She talked/sang/cooked/knitted/programmed her head/butt/tush off.
- b. She talked/sang/cooked/knitted/programmed her heart out.
- c. She talked/sang/cooked/knitted/programmed up a storm.
- d. She talked/sang/cooked/knitted/programmed herself blue in the face.

Here the idiom is the combination of the object and the RP.³⁰ Somewhere in this mix also falls *She worked/wore/knitted/?typed her fingers to the bone*.

There are heavy and apparently idiosyncratic constraints on the choice of property APs and on the combinations of APs with verbs. Examples 76–77 give a little of the flavor of this problem.

- (76) a. ?Amy ran herself weary.
- b. *Amy ran herself exhausted.
- (77) Amy ran herself to exhaustion.

There are some generalizations about which APs are more productive. For example, more productive APs tend to be nongradable and when used as RPs strongly tend to encode a clearly delimited state. Consider the contrast between *dry*, which is quite productive as an RP, and *wet*, which is not. Things are either dry or not dry—it is odd to refer to them as 'a little dry'; on the other hand, things can be more or less wet. Similarly, someone is either awake or not awake, while someone can be more or less sleepy.³¹ Recognizing that the class of property AP RPs is limited in a principled way allows us to account for a great many examples that are ill-formed, such as 78 and 79.

- (78) He danced himself to fame/*famous. (Verspoor 1997:119)
- (79) We danced ourselves to dust/*dusty. (Boas 2003:257)

Famous and *dusty* are gradable adjectives and it is quite natural to say someone is 'a little famous' or 'a little dusty'.

Another restriction on property RPs concerns those coded as PPs. It turns out that PPs that correspond to acceptable APs are for the most part impossible as RPs.

- (80) a. He danced his feet sore.
- b. *He danced his feet to soreness. (Verspoor 1997:119)
- (81) a. Denny Butler nearly crushed you flat. (British National Corpus, cited in Boas 2000:257)
- b. *Denny Butler nearly crushed you to flatness. (Boas 2000:257)

³⁰ Jackendoff (1997, 2002) argues that these are constructional idioms of English on a par with the way construction—not really resultatives. Goldberg would prefer to treat them as conventionalized instances of the resultative construction related via a default inheritance hierarchy structure.

³¹ Goldberg (1995:195–96) argues that this generalization holds even for RPs such as *sick* or *hoarse*. Although these are normally gradable, when used as RPs they strongly tend to imply a clearly delimited boundary beyond which the activity cannot continue. That is, *He ate himself sick* implies that he ate to a point beyond which he could no longer continue eating.

- (82) a. He talked himself hoarse.
 b. *He talked himself to hoarseness.

This is on the face of it surprising, given that PP RPs are generally more productive than AP RPs. An explanation for the ill-formedness of the above PP RPs is that they are blocked or preempted by the highly conventional verb + AP forms.³² In order to invoke blocking, it is necessary to recognize that the preempting forms are stored in the mental lexicon, a recognition that is central to the present approach. This is another virtue of the constructional approach, since conventionalized resultative expressions are assumed to be stored as subregularities along with the more generalized constructions.

The choice of possible RPs is often highly dependent on the main verb involved (Boas 2000, Goldberg 1995, Verspoor 1997). For example, in Boas's large corpus search, the verbs *stab*, *bat*, *put*, *batter*, *frighten*, *crush*, *scare*, *burn* occur only with the RP *to death* and never with *dead*. *Shoot*, by contrast, occurs most often with *dead* (408 times) compared with *to death* (11 times). This difference has a semantic basis. *Dead* is used as an RP only when the endstate is an instantaneous result of the action denoted by the verb. It is possible to shoot someone and cause them to die instantly. If more than one shot is used, *to death* is preferable.

- (83) Riddling him with 16 bullets, Billy Bob shot him to death/??dead.
 (84) Firing a single bullet to the heart, Billy Bob shot him dead/?to death.

Most methods of killing (including stabbing, battering, frightening, crushing, and burning) are not normally understood to cause instantaneous death; thus *to death* is preferred with the corresponding verbs.

An apparently arbitrary restriction has been known for a long time (Carrier & Randall 1992, Green 1972): the resultative excludes past participial adjectives as RP (85a) whereas more or less synonymous PPs are acceptable (85b). We know of no convincing semantic explanation for this restriction, particularly given the fact that the inherently resultative verbs do allow past participial adjectives (85c).

- (85) a. *He sang himself exhausted/bored/exhilarated.
 b. He sang himself to exhaustion/to boredom/to (a state of) exhilaration.
 c. He made himself exhausted/bored/exhilarated.

Regardless of how these semi-systematic threads are accounted for, there remains a fairly large dose of idiomaticity or conventionalization. For example, *ill* is a near synonym of *sick* and yet is not nearly as felicitous as an RP.

- (86) a. She ate herself sick
 b. *She ate herself ill.

Asleep describes a normally nongradable and clearly delimited state and yet it is far less conventional as an RP than *awake* or *to sleep*.

- (87) a. ?She cried herself asleep.
 b. She cried herself to sleep.
 c. She jerked herself awake.

In addition, it is not sufficient to simply tag adjectives in the lexicon as being possible RPs. There must be a cross-referencing between verb and RP. For instance, despite the fact that *crazy* is completely acceptable as an RP with *drive*, it is markedly odd with *talk*, even though an interpretation is imaginable (Goldberg 1995:137).

³² Brian Joseph suggests the pair *beat someone senseless* and *beat someone into submission* as possible counterexamples, but we maintain that the two examples are not synonymous. Notice that the following are decidedly odd: ?*beat someone to senselessness*, **beat someone submissive*.

(88) ?He talked himself crazy.

Other minimal pairs that do not readily admit of an explanation include those in 89.

- (89) a. They stirred the paint smooth/*homogeneous.
 b. His pants wore thin/?threadbare/*rough.
 c. They twirled themselves dizzy/*happy.

The view that is emerging is that the grammar contains the property resultative as an overarching generalization, but particular subclasses, constrained in all sorts of different ways, are learned individually (see also Boas 2000, and for a learning theory in which this is expected see Tomasello 2000, 2003). This may be an unappealing result to those committed to a maximally general view of grammar, but we think it cannot be avoided. The fact of limited productivity is already widely recognized in other corners of English grammar, for example in derivational morphology (e.g. Chomsky 1970, Janda & Joseph 1999). The property resultatives provide a parallel case in syntax.

At the same time, an approach that disallows any degree of productivity runs into just as much trouble. For example, we feel that Boas (2000, 2003) takes the implications of the semi-idiosyncrasy of the resultative too far when he claims that 'In order to be able to describe which senses of a verb may occur with a specific semantic and/or syntactic type of result phrase, we must encode this information in the event-frames representing the individual senses of the verbs' (2000:301). We believe his own corpus data indicate that the construction is in fact partially productive, in that there are many verbs that occur only once in the 10-million-word corpus with a particular RP. This is illustrated in Table 1.

RP	# OF VERBS	RP	# OF VERBS
apart	13	into shape	41
awake	11	into the ground	21
black	5	open	10
clean	5	shut	13
dead	3	silly	9
dry	9	stupid	7
flat	16	to death	35
full	4	to pieces	11
hoarse	4	to sleep	9
into pieces	4		

TABLE 1. Productive uses of RPs: Tally of distinct singleton verbs that appear only ONCE with listed RPs in 10-million-word corpus (based on raw data reported in Boas 2000, 2003).

If a particular verb appears only once in a 10-million-word corpus with a particular property RP, we feel it is safe to infer that the use of that verb with that RP is not likely a conventional fact about the verb. The following provide a tiny sample of such examples, and we feel their novel character is apparent.

- (90) Shadows cast by thin trees yawn and stretch themselves awake
 (91) After waiting two years on the backburner for Batmania to boil itself dry . . .
 (92) Plus a recess above the nibs allows the tiles to be stacked virtually flat
 (93) That the girls might be unaware of the camera rather than seducing it to death
 (94) She held out her dish and Vi spooned it full.
 (95) . . . bloody vultures overhead shitting themselves silly
 (96) Shouldering the door shut . . .

Table 1 above includes only conventional RPs and the data collected involves only transitive property resultatives. Including more novel RPs and intransitive resultatives would increase the number of productive resultative expressions that much more.

We wish to simply acknowledge that resultative constructions are partially, but not fully, productive. We do not attempt to provide a full explanation of conservative productivity here (but see Baker 1979, Brooks & Tomasello 1999, Goldberg 1995, Pinker 1989 for discussion and suggestions).

9. CONCLUSIONS. What does this corner of English tell us about the nature of the grammar? It tells us that having a phrase structure rule *V NP AP/PP* does not tell us enough about the construction. We see no choice but to treat the resultative construction as made up of a family of subconstructions, united by related but not identical syntax and by related but not identical semantics. Moreover, among the subconstructions are cases with only a single example, that is, classical idioms. Like classical idioms, resultative idioms have the syntax of the (more) productive class and share to some degree in the semantics, yet have to be learned one by one.

We differ to some degree in our optimism that a learning theory capable of assimilating these facts is imminent (Jackendoff being less optimistic than Goldberg). But we are in solid agreement that no learning theory based purely on setting universal parameters (à la principles and parameters theory) or purely on ranking universal violable constraints (à la optimality theory) is going to come up with anything close to this pattern.

We have attempted here to offer a comprehensive, descriptively adequate account of English resultatives. Section 3 posited four major subconstructions, repeated here. Note that we have folded the special cases of sound-emission and disappearance resultatives into 97c.

- (97) a. Causative property resultative (e.g. *Bill watered the tulips flat*)
 Syntax: NP₁ V NP₂ AP/PP₃
 Semantics: X₁ CAUSE [Y₂ BECOME Z₃]
 MEANS: [VERBAL SUBEVENT]
- b. Noncausative property resultative (e.g. *The pond froze solid*)
 Syntax: NP₁ V AP/PP₂
 Semantics: X₁ BECOME Y₂
 MEANS: [VERBAL SUBEVENT]
- c. Noncausative path resultative (intransitive motion construction, e.g. *The ball rolled down the hill*, *The truck rumbled into the station*)
 Syntax: NP₁ V PP₂
 Semantics: X₁ GO Path₂
 i. MEANS: [VERBAL SUBEVENT]
 ii. RESULT: [VERBAL SUBEVENT: X₁ EMIT SOUND]
 iii. RESULT: [VERBAL SUBEVENT: X₁ DISAPPEAR]
- d. Causative path resultative (caused motion construction, e.g. *Bill rolled the ball down the hill*)
 Syntax: NP₁ V NP₂ PP₃
 Semantics: X₁ CAUSE [Y₂ GO Path₃]
 MEANS: [VERBAL SUBEVENT]

We also offered two possible accounts of the *follow* subclasses in §7.1, and two of the *spit on the floor* examples in §7.3; each of these involves adding further specialized members to the family. Any treatment of resultatives has to account for the fact that they have the range of forms and interpretations shown above. For a first approximation, a constructional approach to resultatives says that the syntax-semantics interface of English contains this family of four subconstructions in addition to the more general

principles (or constructions!) that link the semantic arguments of a verb to its syntactic arguments (via a thematic hierarchy or whatever). Languages such as Spanish, Japanese, and Hindi have far less general resultative constructions: they allow only atelic path RPs combined with verbs that independently encode motion (Aske 1989, Nakamura 1997, Narasimhan 1998, Takami 1998). It is clear that something about English allows it to license resultatives with the particular range of interpretations that it does. The generalizations in 97 capture what this something is.

Overall, it is clear that SOMETHING must be stipulated in order to equip English with resultative sentences. Perhaps the stipulation is some unusual syntactic structure involving small clauses or the like (Hoekstra 1988); but this syntactic structure must also come with rules of interpretation that result in the interpretations in 97. Or perhaps the stipulation is a rule in the lexicon that amplifies verbs' argument structures (as in Levin & Rappaport Hovav 1990 and some versions of HPSG and LFG); if so, this rule must also specify the resulting meaning. Or perhaps the stipulation is some extra principle of semantic interpretation or inference (as in von Stechow 1995); if so, this rule again must specify the special meaning. Even if some stipulation is possible in the form of an abstract parameter that connects to other properties of the language (Snyder 2001), the grammar still must predict what the allowable forms and meanings of resultative sentences are in English. In other words, something like the generalizations in 97 ultimately must be captured. The constructional approach simply states the generalizations directly, thereby avoiding further complexities in (i) the syntax, (ii) the lexical entries of verbs, or (iii) mappings from abstract parameters to grammatical properties.

We have demonstrated that a number of generalizations follow from our hypothesis. In particular, the semantic argument structure of the constructional subevent determines the syntactic argument structure of the sentence by general principles of argument linking. Similarly, the aspectual structure of the constructional subevent controls the aspectual structure of the resultative sentence; in turn, the aspectual structure of the constructional subevent is predictable from general principles correlating event structure with change, extension, motion, and paths. Finally, the semantics and syntax of resultatives explain the possibilities for temporal relations between the two subevents. Using the semantics of the constructional subevent, the semantics of the verbal subevent, and the semantic relationship between the two, we were able to explain many of the distributional properties of resultatives.

We were able to prevent many further conceivable overgeneralizations by adopting the full argument realization and semantic coherence principles, which appear to apply generally to all VP constructions such as the *way* construction as well as the resultative.

Finally, it is important to recognize the limits of explanation. For instance, we have seen that two unrelated classes of verbal subevents appear in construction 97c.ii, iii: sound emission and disappearance. It is unlikely that any general principles of syntax or semantics are going to explain why these particular cases work and many other conceivable ones do not. We have shown that there are pockets of productivity, but there is also a great deal of idiosyncrasy involved in the resultatives, especially the property resultatives. Many idiosyncratic instances and small subclasses of the construction must be learned and stored individually. So far as we can determine, this pattern can be described only within a constructional approach to grammar. We leave it as a challenge for practitioners of other approaches to develop comparably detailed accounts.

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