AN EVENT STRUCTURE ACCOUNT OF ENGLISH RESULTATIVES

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Current syntactic accounts of English resultatives are based on the assumption that result XPs are predicated of underlying direct objects. This assumption has helped to explain the presence of reflexive pronouns with some intransitive verbs but not others and the apparent lack of result XPs predicated of subjects of transitive verbs. We present problems for and counterexamples to some of the basic assumptions of the syntactic approach, which undermine its explanatory power. We develop an alternative account that appeals to principles governing the well-formedness of event structure and the event structure-to-syntax mapping. This account covers the data on intransitive verbs and predicts the distribution of subject-predicated result XPs with transitive verbs.*

A hallmark of the English resultative construction is the presence of a result XP—an XP denoting a state or location that holds of the referent of an NP in the construction as a result of the action denoted by its verb. Studies of resultatives have often focused on the constraints on the distribution and interpretation of these XPs. These constraints seem to lend themselves to a syntactic explanation, and a number of syntactic accounts have been developed (Bresnan & Zaenen 1990, Hoekstra 1984, 1988, Levin & Rappaport Hovav 1995:33–78, Simpson 1983), with an impressive coverage of the data. Recently, however, Verspoor (1997) and Wechsler (1997) have raised empirical problems for such accounts, and our own investigations have uncovered additional problematic data. These findings call into question the foundation of the syntactic approach to English resultatives. In fact, a number of authors have proposed that the properties of the construction are explained by appeal to semantic notions (e.g. Goldberg 1995: 180–98, Jackendoff 1997, Van Valin 1990:254–55, Wechsler 1997), and in this article we also propose a semantic account. In our semantic account the explanatory burden is borne by event structure representations, well-formedness conditions on these representations, and principles of mapping from event structure to syntactic structure. We show that our event structure account maintains the wide empirical coverage of syntactic accounts, without suffering from their shortcomings. In addition, it illuminates the nature of event structure, as well as its lexical semantic underpinnings.

The success of syntactic accounts rests to a large extent on the adoption of the UNACCUSATIVE HYPOTHESIS (Burzio 1986, Rosen 1981, Levin & Rappaport Hovav 1995, Perlmutter 1978). It has been argued that the distinction between unaccusative and unergative intransitive verbs must be syntactically encoded in order for a uniform generalization to be stated governing the different English resultative patterns, and this observation is considered to provide some of the strongest support for the syntactic encoding of unaccusativity in English (Hoekstra 1984, Levin & Rappaport Hovav 1995: 33–78, Simpson 1983). Much of the data we consider here involves intransitive verbs in the resultative construction. We show that appeal to the unaccusative hypothesis

leaves a number of important questions unanswered. Instead, we propose that the lexical semantics of a verb together with the properties of the event structures it can be associated with can serve as the foundation of an event structure-based analysis. Thus, our account, though not providing direct evidence against the syntactic encoding of unaccusativity, does not require it.

Throughout this article we take our examples, wherever possible, from a collection of over two thousand naturally occurring resultatives. Our collection confirms that the data in previous studies of resultatives quite accurately reflects linguistic reality. Furthermore, it has provided us with data critical to assessing previous analyses of resultatives, to understanding some of their less well-studied properties, and to formulating an improved analysis. Although one referee calls a few of our examples 'literary', our sources are not literary in the commonly understood sense of the word. The examples are predominantly culled from daily newspapers and current fiction, particularly mysteries. Our conviction is that 'real' examples only strengthen the points we make, just as such examples have contributed to a growing body of recent work.

1. Constraints on the resultative construction: a syntactic formulation. As first observed by Simpson (1983), result XPs in English appear invariably to be predicated of NPs in object position, whether or not these NPs are arguments of the verb heading the construction. Following Levin and Rappaport Hovav, we call this generalization the direct object restriction (DOR) (1995:34). Most trivially, the DOR is motivated by resultative constructions headed by transitive verbs, as in 1, where the result XP is predicated of the verb's own object, but never of its subject. In 1a, for example, the container ends up clean and not the dog Lancelot, though the predicate *clean* could apply to either. Such resultatives instantiate what we call the object-oriented transitive-based pattern.[1]

    (1) a. Lancelot had discovered my empty yogurt container and was working hard to lick it clean . . .

        (Barbara Lee. 1995. *Death in Still Waters*. New York: St. Martin's, p. 110)

        b. Ma pats the bag smooth . . .

        (Pearl Abraham. 1995. *The Romance Reader*. New York: Riverhead, p. 93)

        c. Last night, the dog poked me awake every hour to go outside.

        (*The Toronto Sun*, 27 Nov. 1994, p. 6)

Further motivation for the DOR comes from resultatives based on intransitive verbs. As noted repeatedly, many intransitive verbs do not allow result XPs to be predicated directly of their subjects. Rather, the result XP is predicated of a reflexive pronoun direct object, apparently to allow satisfaction of the DOR, and, because of coreference between the object and the subject, the XP is ultimately predicated of the subject. The sentences in 2 illustrate this pattern, which we refer to as the reflexive intransitive-based pattern. The examples in 3 show that the result XPs in 2 cannot be predicated directly of the subject of their verbs; those in 4 show that these verbs are intransitive and cannot take a reflexive object in isolation.

    (2) a. 'Miss Bates, are you mad to let your niece sing herself hoarse in this manner . . .'   (Joan Aiken. 1990. *Jane Fairfax*. New York: St. Martin's, p. 200)

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[1] Resultative patterns are characterized by a number of properties, but the labels we attach to them reflect only the most salient ones to keep them from being too unwieldy. Appendix B provides a full list of resultative patterns, together with their properties; Appendix A includes further discussion of the patterns that receive less attention in the body of the article.

   b.   poor Sam . . . had coughed himself into a haemorrhage . . .

                                    (*Jane Fairfax*, p. 98)

   c.   'You gonna think yourself into a nervous breakdown if you keep this
      up.'   (Grace F. Edwards. 1997. *If I Should Die*. New York: Doubleday, p. 170)

(3) a. *Your niece sang hoarse.

   b. *Sam coughed into a haemorrhage.

   c. *You gonna think into a nervous breakdown.

(4) a. *Your niece sang herself.

   b. *Sam coughed himself.

   c. *You gonna think yourself.

Yet notwithstanding the DOR, some intransitive verbs may predicate a result XP directly of their subjects, as in 5. We refer to this as the BARE XP INTRANSITIVE-BASED PATTERN.[2]

(5) a. The pond froze solid.

   b. the garage door rumbles open . . .

        (Chitra Banerjee Divakaruni. 1995. *Arranged Marriage*. New York: Anchor, p. 297)

   c. Sitting with our damp outer clothes steaming dry on the radiators . . .

                (Nicky Edwards. 1986. *Mud*. London: Women's Press, p. 38)

An explanation is needed for why two syntactic patterns arise when result XPs are added to intransitive verbs. A syntactic explanation, built on the classification of the verbs in the reflexive pattern as unergative and those in the bare XP pattern as unaccusative, is offered by Simpson (1983) and developed by Bresnan and Zaenen (1990), Hoekstra (1984, 1988), Levin and Rappaport Hovav (1995:33–78), and others. The DOR must be formulated in terms of underlying rather than surface objects, given that result XPs can be predicated of passive subjects, as in 6, in the object-oriented transitive-based pattern.

(6) a. The table was wiped clean.

   b. The baby was rocked to sleep.

   c. The metal was pounded flat.

If the subject of an unaccusative verb is also an underlying object, as posited by the unaccusative hypothesis, then the result XPs in 5 are predicated of objects at some level of representation; thus, these examples meet the DOR.[3] In contrast, the subject of an unergative verb is not an object at any level of representation, explaining why such verbs are not found in the bare XP pattern, as shown in 3. The relevance of the unaccusative/unergative verb distinction receives independent support in that the verbs' classification on the basis of the resultative patterns conforms to the semantic generalizations associated with membership in each class (Levin & Rappaport Hovav 1995, Perlmutter 1978).

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  [2] Kaufmann (1995a:416, 425) and Pustejovsky (1991b:76) have claimed that bare XP resultatives are semantically distinguished since their result XPs are added to verbs which lexically entail the achievement of a result state and merely modify this state further. Although this property holds of some bare XP resultatives, such as *The bottle broke open* and 5a, it does not hold of the others in 5. In 5b, for example, *rumble* is atelic and does not lexically entail a result state. Rothstein (2000) suggests that the subject of a verb in the bare XP pattern is always the incremental theme (Dowty 1991:567) of the verb in isolation; however, this requirement is not always met. The subject of *freeze* is an incremental theme, but the subjects of *rumble* and *steam* are not. See §3.3 and Rapoport (1999:674–75) for further discussion.

  [3] This explanation is implemented differently by Bresnan and Zaenan (1990), who formulate their analysis within LFG's lexical mapping theory (Bresnan & Kanerva 1989). Instead of assigning the surface subjects in the two patterns different underlying grammatical relations, they are assigned different initial 'argument classifications', which have repercussions for their realization. This analysis also handles the facts in 9 by appealing to a constraint on the number of arguments that can have a particular argument classification.

The syntactic account also explains why unergative verbs show up in yet another pattern. This pattern resembles the reflexive pattern in that an intransitive verb is followed by an NP and an XP, but the NP is not a reflexive, nor is it subcategorized by the verb. For this reason, we call the pattern the NONSUBCATEGORIZED NP INTRANSITIVE-BASED PATTERN.[4] This pattern is illustrated in 7; 8 shows that the postverbal NPs in 7 are not subcategorized.

(7) a.   Miss Kitty Perkins, who talked seven warts off my hands . . .

        (Margaret Maron. 1998. *Home Fires*. New York: Mysterious Press, p. 153)

   b.   She winked us past . . .

        (D.H. Murray. 1997. *School of Hard Knocks*. New York: St. Martin's, p. 185)

   c.   the dog barked him awake . . .

        (Sara Paretsky. 1988. *Blood Shot*. New York: Dell, p. 183)

(8) a.   *Miss Kitty Perkins talked seven warts.

   b.   *She winked us.

   c.   *The dog barked him.

If the verbs found in the nonsubcategorized NP pattern, like those found in the reflexive pattern, are unergatives, the postverbal NPs in 7 receive Case from their verbs, since as argued by Burzio (1986:185), unergatives are Case-assigners. Although these NPs do not receive a theta role from the verb, they do receive one from the result XP (Hoekstra 1988:121–22, Rothstein 1992:127). Unaccusative verbs, however, are not Case-assigners, and as noted by Bresnan and Zaenen (1990:47–8), Levin and Rappaport (1989:323, and Levin and Rappaport Hovav (1995:39), they are not found in the nonsubcategorized NP pattern.

(9) a.   *The bomb exploded the watermelons into the air.

   b.   *The ice melted the floor clean.

   c.   *The water evaporated the pan dry.

This account of the resultative patterns is syntactic in that it relies on a difference in the syntactic properties of intransitive verbs to explain why a result XP can be predicated of a subject directly with some verbs, but not with others. Moreover, the NP which a result XP can be predicated of is determined solely by its grammatical function—direct object—and not in terms of its semantic role or the semantics of the verb. Given its crucial reliance on the correctness of the DOR as a descriptive generalization, the syntactic account is incomplete until an explanation is given for the DOR itself, a point stressed by Levin and Rappaport Hovav (1995:41–42). Two types of syntactic explanations have been proposed: purely syntactic accounts (Hoekstra 1988), where the predication of a result XP of a nonderived subject violates syntactic principles such as the ECP, and hybrid accounts (Levin & Rappaport Hovav 1995:33–78), which rely primarily on principles of mapping from event structure to syntax. We will not review the details of these accounts since, as we argue in §2.1, the DOR—the generalization that they are trying to explain—is incorrect. Nevertheless, we show that the syntax of the construction is indeed determined by principles of mapping from event structure to syntax, as in the second type of syntactic account. The results of our

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[4] Transitive verbs are also found in the reflexive and nonsubcategorized NP patterns with their usual objects omitted, as in *They drank themselves insensible* (cf. *They drank wine*) or *The horses ate the field bare* (cf. *The horses ate the grass*), while the bare XP pattern seems to be reserved for intransitive verbs. Nevertheless, since our focus is on the reflexive and nonsubcategorized NP patterns when they are headed by intransitive verbs, we drop the modifier intransitive-based from the labels for brevity, except where needed for clarity. We consider the transitive-based forms of these patterns only briefly in §4; generally, they do not differ from the intransitive-based instances in terms of the properties at issue in this article.

investigation also illuminate why the DOR is so nearly correct and, thus, so enticing as a generalization.

2. EMPIRICAL CHALLENGES FOR THE SYNTACTIC APPROACH.

2.1. SUBJECT-ORIENTED RESULTATIVES WITH TRANSITIVE VERBS. The correctness of the DOR has been challenged by Verspoor (1997:150–51) and Wechsler (1997:313). Both present transitive-based resultatives, where the verb retains its own object, yet the XP is predicated of its subject, in clear violation of the DOR.[5] Wechsler's examples are given in 10, followed by Verspoor's in 11[6] and by some additional examples suggested to us by David Dowty in 12. Since this pattern contrasts most strikingly with the object-oriented transitive-based pattern, which is the only other one that involves a transitive verb taking an argument as the postverbal NP, we refer to it as the SUBJECT-ORIENTED TRANSITIVE-BASED PATTERN.

(10) a. The wise men followed the star out of Bethlehem.
  b. The sailors managed to catch a breeze and ride it clear of the rocks.
  c. He followed Lassie free of his captors.

<div align="right">(Wechsler 1997:313, ex. 15)</div>

(11) a. John danced mazurkas across the room.
  b. John swam laps to exhaustion.
  c. The children played leapfrog across the park.

<div align="right">(Verspoor 1997:151, ex. 4.102)</div>

(12) a. Fly American Airlines to Hawaii for your vacation!
  b. We took the IRT [a subway line] from Grand Central to the Brooklyn Fine Arts Museum.
  c. We drove the Blue Ridge Skyway from beginning to end.

<div align="right">(David Dowty p.c.)</div>

The DOR could be maintained in the face of such examples if their subjects could be shown to be underlying objects and, hence, derived subjects; however, it is difficult, though not impossible, to make this argument. The verbs in these examples also have objects, so such an analysis requires showing both that the subjects are underlying objects and that the apparent objects are not true objects, but occupy a position elsewhere in the VP. We do not explore such an explanation, but see Dowty's (1991:571) discussion of the verb *enter*, which raises comparable problems for those who want to maintain that incremental themes are always objects.

Two referees suggest these examples only appear to have subject-predicated result XPs and are more appropriately analyzed as having the result XP predicated of the object, consistent with the DOR. They propose that the result XP is felt to be predicated of the subject due to a semantic relation between the subject and the object.[7] Most of

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[5] The DOR's correctness has been previously called into question for Chinese; see Cheng 1993, Cheng & Huang 1994, Li 1990, and Sybesma 1993.

[6] We omit Verspoor's 4.102b, *John walked the dog to the store*, from 11 because as Croft (2000:96–97) points out, it is most likely a causative and not a resultative. We include Verspoor's 4.102c, our 11b, although we and some others find it questionable. What sets this example apart is a result XP that denotes a state rather than a location. We suspect this property is the source of its reduced acceptability, but do not pursue this issue further. Finally, we note that Lassie is female, so the possessive in 10c cannot refer to the object.

[7] Among the examples in 10–12, 12c is most obviously open to an analysis where the result XP is predicated of the object and, thus indirectly, of the subject since *the Blue Ridge Skyway* denotes the subject's path and the XP specifies its endpoints. If *the IRT* is taken to refer to the path that a train on this subway line traverses, then 12b is also amenable to such an analysis.

the examples in 10–12 fall into two types. Those in 10 describe what Croft (2000: 95–96) calls 'correlated motion': events where the position of the subject is necessarily 'correlated' with—or, perhaps more accurately, constrained by—that of the object, often with both changing location. On the suggested analysis, the result XP really specifies the position of the object, and the location of the subject is indirectly determined since its motion is constrained by the location of the object. The examples in 11 involve the creation of a performance named by the object, according to Croft (2000: 97), or involve cognate objects (or, more accurately, hyponyms of cognate objects) which name the performance, according to a referee. The suggestion is that the performance itself traverses a path as it is created, and since the subject is engaged in this performance, the subject's own path can be determined from that of the performance. Given the preponderance of object-oriented transitive-based resultatives, an analysis of 10–12 that maintains the DOR deserves serious consideration. However, we introduce a diagnostic that can pinpoint whether a result XP is predicated of the subject or the object and use it to show that the result XP is clearly predicated of the subject in at least some examples.

As pointed out by Bach (1979:521–22, 1980:302–3) and Bresnan (1978:22, 1982: 402), verbs with subject-predicated complements cannot be passivized, a generalization Bresnan (1982:402) attributes to Visser (1963–73, part III.2:2118).[8] Visser's generalization, as Bresnan calls it, accounts for the ungrammaticality of *Sam was promised to leave the country*, where the controller of the missing subject of the embedded clause is the logical subject of the matrix verb. As argued by Levin & Rappaport Hovav (1995: 49), Roberts (1988:705), and Rothstein (2000), result XPs pattern like complements with respect to a variety of syntactic processes. Thus, if the sentences in 10–12 truly involve subject-predicated result XPs, their passive counterparts should be unacceptable.

We presented passive variants of 10–12 to several native speakers and for the most part they were judged ungrammatical. Though some were judged better than others, in some instances passivization resulted in clear ungrammaticality, thus establishing that there are indeed some subject-oriented transitive-based resultatives.[9]

(13) a.   *The star was followed out of Bethlehem.
    b.   *The breeze was ridden clear of the rocks.
    c.   *Lassie was followed free of his/the captors.
    d.   *Leapfrog was played across the park.
    e.   *American Airlines was flown to Hawaii.
    f.   ??The IRT subway line was taken to the Brooklyn Museum.

[8] We thank David Dowty for pointing out the relevance of Visser's generalization to establishing that these examples are indeed subject-oriented.

[9] One referee asks whether passives with these verbs are independently ruled out since when the subject-oriented result XPs in 13 are omitted, the XP-less passives at best sound awkward (e.g. *The star was followed*, *The breeze was ridden*, ??*Leapfrog was played*). However, the well-known discourse constraints on passivization mean that the unacceptability of passives cannot always be taken at face value. Passive sentences can often be improved in various ways, for instance, by making the context modal or generic. As the referee notes, what is relevant is that material that improves passives without subject-oriented result XPs does not always also improve the same passives with these XPs. Compare *Lassie could be followed* with *Lassie could be followed free of the kidnappers*. Another minimal pair is *Leapfrog can be played in this park*, with a locative PP, vs. *Leapfrog can be played across this park*, with a result XP predicated of the unexpressed logical subject.

We now elaborate on some of these examples and the associated judgments, which are sometimes clouded by lexical semantic complications.

One confounding factor is that *follow* has two relevant senses. In the first the subject is intentionally and actively pursuing the object, which is capable of independent motion, as when a detective follows a suspect. In this sense, the object determines the path of motion, so that any result XP would be object-predicated. The second sense is a correlated motion sense—the motion of the subject is constrained by the position of the object—but the verb nevertheless describes the subject's path. For example, in *Sandy followed a couple with a baby and a toddler onto the plane* Sandy ends up on the plane, even if her movement is constrained by the movement of those ahead of her. When the object of *follow* denotes a stationary entity, the verb must have the correlated motion sense, as in 10a. In fact, we suggest that both 10a and 10c involve correlated motion *follow* and are subject-oriented because they describe the path of the subject. The passive counterparts of sentences where *follow* has only the correlated motion sense are consistently judged unacceptable; compare 10a with 13a. More generally, passive sentences with *follow* are acceptable only on the detective-suspect sense. *Kim was followed into the lab* is felicitous, but it clearly receives the detective-suspect—and not the correlated motion—interpretation, though its active counterpart is open to both interpretations. In fact, one consultant wondered whether 13c might be acceptable, but further questioning elicited that she had attributed the detective-suspect sense to the verb.

A related point can be illustrated with 13e and comparable examples with verbs involving motion in a vehicle. When transitive, such verbs show two senses. The first is a causative sense, where an agent causes the entity denoted by the object to move to a goal in the relevant vehicle. The second is a correlated motion sense, with the entity denoted by the subject moving to a goal in the vehicle or using the company owning the vehicle expressed by the object. On the first sense, the goal XP must be object-predicated since only motion of the object is entailed; however, in the second sense a goal XP must be subject-predicated since the motion of the subject is described. When the object names the company that owns a vehicle, as in 12a, the company cannot move, and when the object names a vehicle, the vehicle moves, but this is incidental. This distinction is brought out by the following pair, where 14a most naturally receives the causative interpretation and 14b the correlated motion interpretation. Consistent with this, 14b, but not 14a, can be paraphrased as 'flew on the new 777', showing that its object is understood as the vehicle conveying the subject to a destination.

(14) a. The pilot flew the new 777 to Europe.
     b. The diplomat flew the new 777 to Europe.

Only the causative sense should have a related passive given Visser's generalization, and, in fact, *The new 777 was flown to Europe* has only this interpretation. This observation is reinforced by the addition of disambiguating *by* phrases.

(15) a.   777s are flown to Europe only by experienced pilots.
     b. *777s are flown to Europe only by senior diplomats.

The existence of result XPs predicated of the subjects of transitive verbs with overt direct objects undermines the DOR's validity. If the DOR is not valid, the presence of reflexives in some resultatives cannot be traced to it. Moreover, previous accounts of resultatives where a transitive verb appears with a subcategorized postverbal NP explain why *Pat wiped the table clean* does not mean that Pat becomes clean by appealing to the fact that *Pat* is the subject and not the object of *wipe*. If a result XP can be predicated of a subject of a transitive verb, then this account is no longer viable. When a result

XP is combined with a transitive verb, the NP it is predicated of cannot be identified by its grammatical relation.

Despite the existence of subject-oriented transitive-based resultatives, more often than not the DOR is valid, and the question is why this is so. In the following sections we present an account of the resultative construction; and while we do not rely on the DOR, one of our goals is to ascertain precisely when and why the DOR is valid. Our account will clarify why resultatives that conform to the DOR are ubiquitous, thus explaining why the DOR is so attractive. First, we turn to another set of examples that are problematic for the simple syntactic account of resultatives.

2.2. PROBLEMATIC BARE XP/REFLEXIVE PATTERN MINIMAL PAIRS. Linguists (e.g. Hoekstra 1984:246, Levin & Rappaport Hovav 1995:186–87, 191) have noted that verbs of manner of motion such as *run*, *dance*, and *hop* and verbs of sound emission such as *rumble*, *whistle*, and *screech* are found in the bare XP and reflexive patterns, as 16 and 17 illustrate.

(16) a. They [the dogs] padded behind him up the path to the cottage . . .

     (S. Cameron. 1993. *Natural Enemies*. Atlanta: Turner, p. 96)

  b. '. . . Walk yourself into a coma and see what your subconscious comes up with.' (Mary Wesley. 1984. *The Camomile Lawn*. New York: Summit, p. 213)

(17) a. The elevator creaked to the ground floor . . .

     (Sara Paretsky. 1992. *Guardian Angel*. New York: Delacorte, p. 96)

  b. If the telephone bell rang, it could ring itself silly.

    (Patricia Wentworth. 1991 [1939]. *The Blind Side*. New York: Warner, p. 23)

Accommodating such verbs within the syntactic account requires the crucial assumption that they have both unergative and unaccusative syntactic classifications. The idea is that these verbs are unergative when found in the reflexive pattern, but unaccusative when found in the bare XP pattern. In this way the DOR is preserved. Earlier work of ours (Levin & Rappaport Hovav 1995:187, 191–93) supports this dual classification by pointing to correlated differences in the meanings of the different patterns, which are manifested in differences in the semantic type of the associated result XPs. The result XPs in 16a and 17a, in the bare XP (or unaccusative-based) pattern, represent spatial goals; those in 16b and 17b, in the reflexive (or unergative-based) pattern, represent result states. This observation is consistent with well-known correlations between a verb's semantic class and its syntactic classification: directed motion verbs are unaccusative, whereas verbs that describe motion in some manner (without necessarily specifying any goal) and verbs of sound emission are unergative.

This account leaves unexplained why it is precisely verbs of manner-of-motion and verbs of sound emission that can appear in both the bare XP and reflexive patterns. The unergative use of these verbs is taken as basic, yet other unergative verbs rarely appear in both patterns, as Wechsler (1997:312–13) points out. The question is why *fret*, *laugh*, and *play* cannot appear in bare XP resultatives, as in 18, though as expected if they are unergatives, they can appear in reflexive resultatives, as in 19. Levin & Rappaport Hovav 1995 raises the question (1995:202), but we have no answer.

(18)   *Penny fretted/laughed/played into the room.

(19) a. 'She's going to fret herself sick soon.'

    (Jane Aiken Hodge. 1998. *Susan in America*. Sutton, Surrey: Severn House, p. 245)

  b. . . . the other officers laugh themselves helpless.

     (Penelope Lively. 1988. *Moon Tiger*. New York: Grove, p. 112)

  c. He hopes to play himself into shape.

     (*The New York Times*, 23 Feb. 1995, p. B13)

Furthermore, the descriptive generalization just set out—that for verbs found in both bare XP and reflexive resultatives, the semantic type of the result XP correlates with the syntactic pattern—may itself not be correct. The naturally occurring bare XP resultative in 20 casts doubt on this correlation since it involves a verb of sound emission with a result XP denoting a result state, not a spatial goal.

(20) The line clicked dead.
                                 (Sarah Andrews. 1998. *Only Flesh and Bones*. New York: St. Martin's, p. 235)

A referee questioned the status of this example, but it is not a one-off example. A search of Nexis revealed more than half a dozen similar examples in various newspapers in the United States and Britain over the last twenty years. Nevertheless, a complete account of resultatives should explain why over all the bare XP-reflexive pattern minimal pairs suggest Levin & Rappaport Hovav's generalization and why this example can fall outside of it.

Another type of minimal pair, however, cannot be explained by appeal to the semantic type of the result XP. These minimal pairs, which were introduced in another context in Levin & Rappaport Hovav 1999:210, involve bare XP and reflexive resultatives that share both the same verb and the same result XP. Illustrative pairs are given in 21–23.[10]

(21) a. a man grabbed and groped her and tried to get under her clothing, but she kicked free and fled.   (*The Courier-Journal*, 21 Apr. 1998, p. 05B)
     b. 'Laughing uproariously, Beckett lunged around the office with one leg of his pants on fire, trying to kick himself free.'
                                 (*The Washington Post*, 9 Aug. 1998, p. F01)
(22) a. One woman gets up to leave, but Red-Eyes grabs her roughly by the arm and pulls her into his lap. She wriggles free, but remains seated obediently beside him.   (*The Ottawa Citizen*, 30 Nov. 1997, p. D10)
     b. 'Mr Duggan became alarmed about being caught in the door of a lift which was about to begin its descent and wriggled himself free.'
                                 (*The Irish Times*, 2 Dec. 1994, p. 4)
(23) a. . . . one of his race cars wiggled loose inside the transporter and caused damage to both of his cars.   (*Kansas City Star*, 1 Aug. 1997, p. D11)
     b. 'I had it [the snake] pinned and when I lifted it up into the bag, it wiggled itself loose and just sank its fangs on my knuckle'
                                 (*The Washington Post*, 11 Jul. 1998, p. C03)

In these pairs the choice of pattern cannot be attributed to either the verb or the result XP. Thus, neither the syntactic classification of the verb nor the semantic type of the result XP can determine the resultative patterns in which a verb can be found.

As far as we know, Wechsler (1997) first suggested that the distribution of the resultative patterns is determined by the semantic relation between the verb and the result XP. Following his lead, we suggest this question for investigation: What must

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[10] We have been asked whether the (b) sentences really represent the reflexive pattern. Since their verbs have transitive as well as intransitive uses, it is possible that they involve the transitive use of the verb with a reflexive object. In 21b however, it is clear from the context that this is not the case: Beckett is not kicking himself. Furthermore, *wiggle* and *wriggle* do not appear with an isolated reflexive object (**I wiggled/wriggled myself*); they almost exclusively take body-part objects (*The child wiggled his ears*). Thus, the objects in 22b and 23b are not ordinary reflexive objects of transitive verbs. The sentences also receive interpretations appropriate to reflexive resultatives. In 22b Mr Duggan wriggles, resulting in his freedom, parallel to *Sam sang himself hoarse*, where Sam sings, resulting in his hoarseness; the interpretation is not a causative one where Mr Duggan does some unspecified activity that causes him to wriggle free.

the semantic relation be between the event denoted by the verb and the event represented by the result XP in order for the result XP and the verb to be combined without the mediation of a reflexive? We offer an answer framed in terms of event structure.

3. CAUSATIVE AND NONCAUSATIVE RESULTATIVES. An English verb-result XP combination describes a complex event consisting of two subevents, one represented by the verb and the second by the result XP. *Kelly sang herself hoarse* involves an event of singing and an event of becoming hoarse, and *The couple waltzed out of the room* involves an event of waltzing and an event of traversing a path that ends outside the room. The temporal relation between the subevents is different in the two patterns, and we propose that the two patterns are associated with distinct event structures. Resultatives with the mediating reflexive have a complex event structure, while those with bare XPs do not. We appeal to principles governing the event-structure-to-syntax mapping to account for the presence of the reflexive in one pattern, and propose a particular simple event structure for the bare XP pattern that accounts for the lack of the reflexive. We argue (§3.4) that complex event structures are causative event structures.

3.1. TEMPORAL RELATIONS BETWEEN SUBEVENTS IN RESULTATIVES. The temporal relation between the event described by the verb and the event of achieving the state/ location represented by the result XP in the reflexive pattern is different from that in the bare XP pattern. In the bare XP pattern the progress of the event denoted by the verb and the progress towards the achievement of the result state are temporally dependent, while in the reflexive pattern they need not be. We presented this distinction briefly in Levin & Rappaport Hovav 1999:207–9 in the context of a discussion of what makes a complex event.

In the bare XP pattern the progress of the event denoted by the verb and the progress towards the achievement of the state denoted by the result XP are temporally dependent; the subevents are temporally coextensive and unfold at the same rate. The event denoted by the verb begins when the progress towards the result begins, and it necessarily extends until the result is achieved. For example, in *Tracy danced to the other side of the stage* the dancing must continue until Tracy reaches the other side of the stage. In contrast, in the reflexive pattern, temporal dependence is not necessarily evident; the subevents need not be temporally coextensive, nor need they unfold at the same rate. These properties are illustrated in 24, where the hoarseness is achieved some time after the singing is over.

(24) Sam sang enthusiastically during the class play. He woke up hoarse the next day and said, 'Well, I guess I've sung myself hoarse.'

The properties are also evident in naturally occurring examples. In 25 it is most likely that the path to being out of a job did not start when the partying began.

(25) Matt Leblanc has his Friends' co-stars worried he is about to party himself out of a job. (*Sunday Mail*, 19 Jan. 1997, p. 40)

Levin & Rappaport Hovav 1999:208 presents aspectual evidence for positing temporal dependence between the subevents in the bare XP pattern. The time course of the subevent introduced by the result XP mirrors the time course of the event denoted by the verb and, thus, depends on the nature of the event denoted by the verb. Consequently, when verbs with different aspectual classifications enter into such resultatives, these classifications are reflected in the aspectual characterization of the construction as a whole. A minimal pair is provided in 26; its members have the same result XP,

and though both are headed by verbs of sound emission, the verbs have different aspectual classifications.

(26) a. The trapdoor banged/thudded shut.
    b. The gate creaked/rumbled shut.

In isolation, *bang* and *thud* denote punctual events, while *creak* and *rumble* denote durative events. When the first two verbs are found in the bare XP pattern, as in 26a, the shutting is interpreted as close to punctual, and so is the event as a whole. In contrast, when the other two verbs are used in this pattern, as in 26b, the shutting is interpreted as durative, and so is the event as a whole. This difference can be brought out with an appropriate adverbial. As shown in 27, *slowly* can be added felicitously to 26b, but is odd when added to 26a: an event must have some duration to be carried out slowly, but the event in 27b has minimal duration.

(27) a. The gate slowly creaked/rumbled shut.
    b. #The trapdoor slowly banged/thudded shut.

As discussed in Levin & Rappaport Hovav 1999:207–8 and as we elaborate here, adverbial modification can be used more generally to distinguish resultatives with necessarily temporally dependent subevents from those without. Since the subevents of a bare XP resultative are temporally dependent, a rate adverbial inserted into such a resultative is understood as modifying both subevents. *Tracy quickly ran to the library* entails both that Tracy got to the library quickly and that she ran quickly. If the two subevents described were not necessarily temporally dependent, then *quickly* should be able to modify only one subevent, say the running, allowing for a second temporal phrase to specify the amount of time it takes to reach the destination. The attempt to do this in 28 gives the impression of a contradiction.

(28) Tracy ran quickly to the library, but it took her a long time to get there since she took a circuitous route.

The fact that 28 is judged to be contradictory shows that the adverbial applies to both the running and the going to the library: they are understood to be both simultaneous and quick. This, in turn, leads to incompatibility with the temporal extent phrase *a long time* in 28, which requires that the getting there extended over a long period of time. This conclusion is reinforced when 28 is contrasted with 29, which lacks a goal phrase in the first clause and is not understood to be a contradiction.

(29) Tracy ran quickly, but it took her a long time to get to the library since she took a circuitous route.

In contrast, in the reflexive pattern rate adverbials need not modify both subevents since the subevents are not necessarily temporally dependent and need not unfold at the same rate. Although it can be somewhat tricky to state the scope of such adverbials exactly, the sentence *Peter quickly read himself into an inferiority complex, after a few slow deliberate readings of his classmates' theses* entails that Peter quickly developed an inferiority complex, but it need not entail that he read quickly. In fact, it is vague about the rate of reading. Bill Croft suggested to us that the adverb in this example modifies the entire event relative to the rate of the subevents and that 'the quick event is that from beginning to read the theses to developing the inferiority complex'. The difficulty in pinpointing the adverbial's exact scope does not affect the force of our argument. The important point is that in the reflexive pattern the time course of either subevent can be independent of the adverbial. Ex. 30 reinforces this point. Here *slowly* applies to the amount of time that it takes to achieve the result state, but the rate of

coughing is not specified. There is no necessary implication that the coughing is slow; in fact, it is unlikely that the rate of coughing is even constant.

(30) She's [the actress] searing as the widow of one miner and the daughter of a disabled one, who spends his days coughing himself slowly to death.

(*Austin American-Statesman*, 9 May 1997, p. E4)

Despite the evidence just cited for taking the bare XP pattern to involve temporally dependent subevents, the bare XP resultative 31 might appear open to an analysis where its subevents are consecutive rather than contemporaneous: the door slides and as a result becomes open.

(31) The door to the left of the judge's bench slid open

(G. F. Edwards. 1997. *A Toast Before Dying*. New York: Doubleday, p. 62)

If this analysis were plausible, then such bare XP resultatives would be problematic as they would have the temporal properties claimed to be characteristic of reflexive resultatives. A closer scrutiny, however, suggests the sequential analysis is not viable. Imagine a window that can open in two ways, as some windows in Germany do: either it swings open from the side on a vertical hinge or it opens from the top with the pane lowering outward because of a horizontal hinge at the bottom. If such a window swung repeatedly back and forth on its vertical hinge and, as a result, the window fell open through the pane lowering outward, there are two swingings: a vertical one and a horizontal one. But crucially, *The window swung open* cannot refer to this scenario. It can refer to the window falling open from the top with a single horizontal swing outward, or it can refer to the window opening outward from the side due to a swing on the vertical axis. The result XP *open* must describe a swing that begins simultaneously with the opening and is delimited by that opening.

On the proposed account, then, the choice of resultative pattern reflects the temporal structure of the event and not the syntactic classification of the verb or the semantic type of the result XP. The temporal relation between the subevents is in turn determined by the nature of the event denoted by the verb and the nature of the achieved state, in ways that still need to be made clear. If a particular verb–result XP combination could represent either temporally dependent or independent events, then it should be found in both patterns. *Kick/free*, *wriggle/free*, and *wiggle/loose* in the minimal pairs 21–23 are such combinations. There is a difference in interpretation between the members of each pair that is consistent with the hypothesized difference in the relation between subevents characteristic of the two patterns. Consider again the pair in 22, repeated as 32.

(32) a. One woman gets up to leave, but Red-Eyes grabs her roughly by the arm and pulls her into his lap. She wriggles free, but remains seated obediently beside him. (*The Ottawa Citizen*, 30 Nov. 1997, p. D10)

b. 'Mr Duggan became alarmed about being caught in the door of a lift which was about to begin its descent and wriggled himself free.'

(*The Irish Times*, 2 Dec. 1994, p. 4)

The bare XP example 32a shows the predicted temporal dependence between subevents. The wriggling and the becoming free unfold together; the woman's wriggling, which bit by bit loosens Red-Eyes' grasp, is her becoming free. Although in 32b the wriggling and becoming free could be temporally coextensive, this sentence also has a natural interpretation where the events are temporally independent: the man wriggles for some time before he is no longer stuck in the door. Although becoming free is a natural result of wriggling, this example shows that the wriggling does not lead incrementally

to this result state—the wriggling and the becoming free are not temporally coextensive. A reflexive resultative is required whenever wiggling, wriggling, or kicking is used to bring about a state that is not incrementally brought about by moving in the designated manner since in such instances the events cannot unfold together. Thus, the attainment of a state of comfort—a state that is not necessarily achieved by continued wriggling—must be expressed via the reflexive and not the bare XP pattern, as in 33.[11]

> (33) a.   I tried to wiggle myself comfortable in the passenger seat.
>
> > (Linda Barnes, 1995. *Hardware*. New York: Delacorte, p. 35)
>
> b.   *I tried to wiggle comfortable in the passenger seat.

The reflexive resultative with *kick* in 21b, repeated with additional context as 34, also depicts temporally independent subevents.

> (34) One day, Beckett tried to stamp out a burning wastebasket, and got his foot caught. McFarlane writes: 'Laughing uproariously, Beckett lunged around the office with one leg of his pants on fire, trying to kick himself free.'
>
> > (*The Washington Post*, 9 Aug. 1998, p. F01)

The reflexive explicitly sets a scene where a person is moving around while kicking his leg (the lunging); the kicking clearly continues for some time before the achievement of the result state, freeing the leg from the wastebasket, even begins. In fact, we showed this example minus the reflexive pronoun to several people, who found it odd, a fact we attribute to the context, which precludes a temporally dependent interpretation. With the reflexive reinserted as in the original, they found the example fine; on viewing the reflexiveless version, one person even independently suggested that a reflexive was necessary.

Since it is irrelevant to our account whether the verb in a resultative construction is unaccusative or unergative, two temporally dependent events should be expressible via the bare XP pattern, even if the verb naming one of them is typically classified as unergative. Thus, there is no need to posit a second syntactic classification for verbs of manner of motion and verbs of sound emission simply because they can appear in bare XP as well as reflexive resultatives. Furthermore, on the syntactic account this semantic reclassification is justified by the presence in the bare XP pattern of a result XP that describes a location rather than a state, as in the reflexive pattern. The temporal account does not impose this restriction, allowing for bare XP resultatives headed by verbs commonly taken to be unergatives, even when the result XP does not describe a spatial goal. Ex. 20, repeated here, which posed a problem for the syntactic account, is precisely such a resultative.

> (35) The line clicked dead.
>
> > (Sarah Andrews. 1998. *Only Flesh and Bones*. New York: St. Martin's, p. 235)

This example involves two temporally dependent events—the line's clicking and its going dead coincide at a point in time—and on the temporal account this allows for

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[11] A referee suggests that the subject's animacy is relevant to choosing between the bare XP and reflexive patterns in these minimal pairs. In our collection of naturally occurring examples, inanimate subjects are invariably found in the bare XP pattern, while animate subjects are found in both patterns. We assume that this distribution arises because animates can be agents and can control their actions so that they can bring about a change in themselves or, usually more accurately, their body in a nonincremental manner. This permits the event denoted by the verb and the event of achieving the result state to be viewed as not being temporally dependent. See Haiman 1985:144–45 for discussion of the use of reflexives in conveying a 'mind/body' split.

a bare XP resultative. The ability to handle such examples gives the semantic account an advantage over the syntactic account.

3.2. THE EVENT STRUCTURE AND SYNTAX OF REFLEXIVE RESULTATIVES. Resultatives are often given a complex event analysis (Dowty 1979:220, Carrier & Randall 1993: 124–25, Pustejovsky 1991b:64–65), perhaps because so many of them can be easily given a paraphrase that makes explicit reference to two events: *Tracy wiped the table clean* could be paraphrased as 'Tracy cleaned the table by wiping it'. We show that if the reflexive pattern is given a complex event analysis, the appearance of 'fake' reflexives can be immediately explained using the theory of mapping from event structure to syntax introduced in Rappaport Hovav & Levin 1998. That paper proposes that the event structure-to-syntax mapping is governed by several well-formedness conditions on argument realization, some of which are sensitive to event complexity. As we now elaborate, the reflexive pronoun in the reflexive pattern is required to ensure that one of these conditions is met.

A consequence of the well-formedness conditions on the mapping from event structure to syntax in Rappaport Hovav & Levin 1998 (112–13) is the condition in 36 (though it is not actually one of the conditions proposed there); similar conditions are proposed by Grimshaw and Vikner (1993:144), van Hout (1996:201), and Kaufmann and Wunderlich (1998:25).

> (36) ARGUMENT-PER-SUBEVENT CONDITION: There must be at least one argument XP in the syntax per subevent in the event structure.

If this condition is correct, argument realization patterns should reflect event complexity, in that event structures with two subevents must give rise to sentences with both a subject and an object, while simple event structures would give rise to sentences that require only a subject. Rappaport Hovav & Levin 1998 (114–23) argues that this prediction is met. We show that differences in event complexity underlie the different behavior of verbs of surface contact and motion (e.g. *wipe*, *rub*, *sweep*) and verbs of change of state (e.g. *break*, *open*). As activity verbs, verbs of surface contact and motion have a simple event structure with a single subevent, while verbs of change of state have a complex event structure with two subevents. Given the argument-per-subevent condition, verbs of change of state are expected to always be transitive, while verbs of surface contact and motion are not, even though they describe events with two participants. In fact, verbs of surface contact and motion allow unspecified objects, while verbs of change of state do not.[12]

> (37) a. Leslie swept (the floor).
> b. *Kelly broke again tonight when she did the dishes.

Furthermore, these two types of verbs differ in the range of objects that they take: verbs of surface contact and motion may take other than 'normal' objects, but change of state verbs cannot.

> (38) a. Leslie wiped the cloth over the table.
> b. Leslie wiped the table with the cloth.

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[12] Goldberg (2001:510–17) points out that the object of verbs of change of state can be 'omitted' when they have what she calls 'low discourse prominence', as in *Tigers only kill at night* or *The sewing instructor always cut in straight lines* (Goldberg's 6b,f). We do not challenge the validity of her observations, but note that verbs of surface contact and motion and other transitive verbs having an event structure with a single subevent do not have to meet these special conditions in order to appear without their objects. Thus, although the conditions on argument realization need to be modified to allow for unspecified objects under certain circumstances with verbs of change of state, we contend that the differences between the two verb classes (described in Rappaport Hovav & Levin 1998:102–3) remain valid.

(39) a. Kelly broke the stick over the fence.
     b. Kelly broke the fence with a stick.

In 38a, the object of *wipe* is not the surface, as it is in 38b, but rather an instrument. In contrast, though the object of *break* in 39a, *the stick*, is a prototypical instrument, as shown by its use in 39b, it is nonetheless understood as a patient (Fillmore 1977: 77). The object of *break* is always understood to be the patient and thus never qualifies as nonsubcategorized. Furthermore, verbs of surface contact and motion may also take the type of nonsubcategorized objects characteristic of the resultative construction (see §4 for further discussion), but verbs of change of state cannot.

(40) a. Leslie scrubbed her knees sore.
         (meaning 'Leslie's scrubbing the floor made her knees sore')
     b. *The clumsy child broke his parents to distraction.

On Rappaport Hovav and Levin's account (1998:120–22) only the agent argument of a verb of surface contact and motion needs to be expressed to meet the argument-per-subevent condition, so such verbs may take other than normal objects. In contrast, since verbs of change of state must express two arguments, they cannot take other than normal objects; their object is always the patient.

The argument-per-subevent condition explains the appearance of a reflexive pronoun coreferent with the subject in the reflexive pattern. The reflexive pattern is used to express complex events whose subevents share a participant, specifically the participant that is the subject of the resultative construction. The presence of the reflexive means that the shared participant is expressed twice. In fact, the expression of the entire event cannot simply include one NP realizing this participant. That is, an event in which someone coughs a lot and as a consequence has a hemorrhage must be described as in 41a, and not as in 41b.

(41) a. poor Sam . . . had coughed himself into a haemorrhage . . .

                                                    (ex. 2b, *Jane Fairfax*, p. 98)

     b. *Poor Sam had coughed into a haemorrhage.

An object is necessary to meet the argument-per-subevent condition, which requires that a complex event structure be associated with two participants, one for each subevent. Since the same participant is found in both subevents, the object, which represents the participant in the second subevent, is realized as a reflexive pronoun. The reflexive object, then, is required by the argument-per-subevent condition. It is not a syntactic placeholder as some syntactic accounts suggest (e.g. Simpson 1983), despite lacking an apparent semantic contribution.

3.3. THE EVENT STRUCTURE AND SYNTAX OF BARE XP RESULTATIVES. Following the line of argument in the previous section, we explain the properties of the bare XP pattern by claiming that such resultatives are not associated with a complex event structure. In fact, an analysis in terms of two subevents is clearly inappropriate for certain bare XP resultatives: those whose result XP further specifies a result lexically entailed by the verb (Kaufmann 1995a:416, Pustejovsky 1991b:76, Rapoport 1999: 673–74; see note 4). Thus, in *The pond froze solid*, there is only one event, coming to be in a frozen state, and the result XP *solid* further specifies this state: the frozen state holds of all the water in the pond and not just the pond's surface. A similar analysis can be given to *The bottle broke open*. Furthermore, these two examples cannot be given paraphrases that make reference to two events. 'The pond got solid by freezing' and 'The bottle opened by breaking' do not really capture the intended sense of the

sentences above. These resultatives, then, have the syntactic form appropriate to a simple event structure.

In many bare XP resultatives, however, the result XP is not lexically entailed by the verb, and two subevents are distinguishable.[13] *Kim danced out of the room* and *The coats steamed dry* illustrate resultatives of this type. The first can receive a paraphrase that makes reference to two events, 'Kim went out of the room by dancing', as can the second, 'The coats got dry by steaming'. We assume that the fact that bare XP resultatives with nonlexically entailed results share the same syntactic structure as bare XP resultatives with lexically entailed results reflects their association with the same, simple event structure. This position has been arrived at independently by Van Valin, who in earlier work (1990:224) proposes a causative complex event account of sentences such as *Susan ran to the house*, but later retracts it (Van Valin & LaPolla 1997: 101), providing additional arguments against such an analysis, which we do not review for lack of space.

Additional evidence, presented in Levin & Rappaport Hovav 1999 (206–7), against the complex event analysis of bare XP resultatives comes from the observation that there is not a single meaning-form correlation for the verb and the result XP. In *Kim ran into the room* the running is the apparent cause of the movement into the room, so that the verb expresses the cause and the XP the result. When the verb of manner-of-motion is replaced by a verb of sound emission, as in *Terry rustled into the room*, the rustling does not cause the movement; if anything, it is the movement that causes the rustling. That is, the verb expresses the result and the XP the cause (see also Croft 1991:291, n.15, Goldberg 1995:62, Talmy 2000:46–47). The bare XP pattern, then, lacks a consistent association of notions of cause and result with verb and XP. In contrast, in the reflexive pattern the verb consistently represents the cause and the XP the result. In *Sam sang himself hoarse*, the singing is the causing event and the becoming hoarse is the result event. The variability in the meaning-form correspondence in bare XP resultatives is explained if they have a simple event structure. Such an event structure obviates the need to pair particular meaning components with particular expressions since the relevant meaning components are always associated with the event as a whole. Reflexive resultatives, however, receive a complex event structure, comprised of two subevents. Since each subevent has a fixed meaning and expression, each shows an invariant meaning-form correlation.

The syntax of bare XP resultatives suggests they have a simple event structure; nevertheless, those bare XP resultatives where the result is not lexically entailed still represent compositionally derived event descriptions. The appropriate event structure must involve a form of event composition that gives rise to an event structure with only a single subevent. A clue to the appropriate analysis is suggested by the observation that when two distinct subevents are distinguishable in bare XP resultatives, these subevents satisfy conditions on event identity (Davidson 1969, Parsons 1990:152–59). The subevents must have the same location and must be temporally dependent. An additional condition involves an aspectual notion: a scale that can be used to measure

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[13] As will become clear immediately below, we always assign a simple event structure to the bare XP pattern. Thus, in writing that two subevents are discernible in some bare XP resultatives, we do not mean that they are associated with an event structure with two subevents but rather that they are event descriptions compositionally derived from the verb and the result XP, since, as mentioned, their result XP is not lexically entailed by the verb. In what follows we refer to the formation of a complex event description as EVENT COMPOSITION, though it is clear that we are not talking about composing events, that is, entities in the world, but rather descriptions of such events.

out a change in a participant in the event (Hay et al. 1999:140–41, Kennedy & Levin 2001, Tenny 1987, 1992, 1994); such a scale is one of the larger family of aspectual concepts that includes the much discussed notion of incremental theme (Dowty 1991: 567; see also Krifka 1992, 1998, Ramchand 1997:115–20). We propose that this scale must be predicated of a participant in both subevents. Thus, in *Kim ran into the room*, the scale is Kim's path into the room. This scale is predicated of Kim, a participant in both the running event and the entering the room event. In *The clothes steamed dry*, there is a scale of dryness predicated of the clothes, which participate in both the steaming and drying events. The shared participant helps guarantee the temporal dependence of the two subevents in such compositionally derived events.

In Levin & Rappaport Hovav 1999 (212–14) we propose that the subevents of bare XP resultatives with nonlexically entailed results are 'coidentified': they are represented as one event in event structure terms. That is, the happening in the world described by a bare XP resultative is not linguistically construed as two distinct events, even though it involves properties that can be lexicalized by two distinct predicates and thus could potentially be conceptualized as involving two events. Formally, coidentified events could be seen as predicated of the same event variable, as in the neo-Davidsonian representation for *Kim ran into the room* in 42; we use the label RUN-INTO to suggest the two event descriptions become one and the label AGENT-THEME to indicate that one participant has two roles.

(42) ∃e [RUN-INTO(e) & AGENT-THEME(e,Kim) & GOAL(e,room)]

Why MUST event coidentification take place when the appropriate conditions are met? That is, why is the bare XP resultative 43a preferred to the reflexive resultative 43b?

(43) a.   Robin danced out of the room.
     b.   ??Robin danced herself out of the room.

Levin and Rappaport Hovav (1999:215–16) propose that the preferred expression of a situation is the one giving it the tightest event structure and that this preference follows from some version of Grice's (1975:45) maxim of quantity (cf. McCawley's 1978: 246–48 discussion of the distribution of lexical vs. periphrastic causatives). The consequence is that a bare XP resultative is preferred to a reflexive resultative when the subevents meet the conditions for event identity, unless pragmatic considerations override the maxim of quantity. In such instances, information that might usually have been 'packaged' into what is syntactically represented as one event might instead be packaged as two. In fact, there are a few examples comparable to 43b in our collection of resultatives, and Levin & Rappaport Hovav 1999 shows that there are good pragmatic reasons for flouting the maxim of quantity in each (216–17).[14] Alternatively, as Bill Croft (p.c.) suggests, the preference for the bare XP pattern could arise from iconicity considerations of the type described by Haiman (1985:140–42, 220–22) for causatives and subordinate clauses, which favor a tighter syntactic expression for events with more tightly integrated subevents. That is, the connection between temporally dependent events in the real world is the tightest one possible, and so the linguistic expression of such events should also take the tightest form possible.

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[14] We do not give minimal pairs such as 43 the same analysis as those in 21–23. We proposed that pairs such as those in 21–23 arise because their verb-result XP combinations describe events whose subevents could be either temporally dependent or independent. However, the verb-result XP combination in 43 appears to be compatible only with temporal dependence, so another explanation for the reflexive pattern in 43b is necessary.

3.4. Complex event structures are causative event structures. In many analyses the event structure associated with resultatives is not only complex, as we argued in §3.2, but also causative. Indeed, for many resultatives, an explicitly causative paraphrase is appropriate. Thus, *The searchers yelled themselves hoarse* can be paraphrased as 'The searchers' yelling caused them to become hoarse'. The causative analysis receives hitherto unadduced support when reflexive resultatives are compared to sentences with lexical causatives, change-of-state verbs such as *open*, *break*, and *melt*. As sentences with a transitive use of a lexical causative verb V are fairly well paraphrased as 'cause to V-intransitive', such verbs are usually assigned an event structure involving two causally related subevents (e.g. Dowty 1979:91–94, Levin & Rappaport Hovav 1995:83, Parsons 1990:109–11). Interestingly, the lexical causatives show the same temporal relation between their subevents as reflexive resultatives: they need not be temporally dependent. In 44a the act of putting arsenic in the coffee does not extend to the point when the drinker dies, and in 44b the banging may be protracted, but the breaking is punctual.

> (44) a. The widow murdered her guest by putting arsenic in his coffee.
>   b. Leslie's persistent banging broke the window.

Reflexive resultatives and lexical causatives share not only this property, but also additional properties involving the relation between their subevents, which could be described as a causing subevent and a result subevent. These properties are all listed in 45.

> (45) a. The subevents need not be temporally dependent.
>   b. The result subevent cannot begin before the causing subevent.
>   c. Only the result subevent can bound the event as a whole.
>   d. There is no intervening event between the causing subevent and the result subevent; that is, causation is direct.

The first property has already been discussed. The second, 45b, should follow from the nature of causation itself; 45c specifies that any assertion about the end point of the entire event is also an assertion about when the result subevent ends, but not about the temporal extent of the causing subevent, which is never explicitly indicated. Goldberg (1995:194–95) points out that resultatives also show the property in 45d, which has been firmly established for lexical causatives (Fodor 1970, McCawley 1978, Pinker 1989:66, Shibatani 1976b, Smith 1970). In stating the property as we do, we suggest that the lack of an intervening event between the causing subevent and the result subevent is what defines direct causation.

Given these parallel properties, we propose that reflexive resultatives and lexical causatives have the same causative event structure consisting of a causing subevent and a result subevent.[15] In Appendix A we show that the causative analysis is also appropriate for other resultative patterns whose subevents are not necessarily temporally dependent, though not for those patterns where this is not the case.

From a commonsense perspective, some instances of the bare XP pattern could be

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[15] We have stressed what is common to resultatives and causatives. Resultatives, however, place more restrictions on their constituent subevents than either lexical or periphrastic causatives. The second subevent in a causative's event structure can be atelic (*Gerry flew the new kite*, *Sandy made Gerry fly the new kite*), as well as telic, but as has been often observed, the second subevent in a resultative's event structure must be telic (Goldberg 1995:196, Levin & Rappaport Hovav 1995:56–58, Rothstein 2000, Tenny 1994:36–37, Vanden Wyngaerd 1999:81, 2001:64).

viewed as having two causally related subevents, as suggested by Croft (1991:160),[16] Pustejovsky (1991b:63), and Van Valin (1990:224). In *Terry ran across the room* the running appears to cause the traversal of the path. Nevertheless, there are good reasons for assuming that bare XP resultatives are not causatives, consistent with our proposal that they have a simple event structure. Our proposal receives support from an examination of the availability of causative paraphrases for lexical causatives, reflexive resultatives, and bare XP resultatives. This issue is discussed at length in Rappaport Hovav & Levin 1999, and we summarize that discussion; also see Verspoor 1997:114–17. First, causative paraphrases are appropriate for lexical causatives and reflexive resultatives. Thus, *Alex broke the vase* could be paraphrased as 'Alex's doing something to the vase caused it to break' and *Pat yelled himself hoarse* as 'Pat's yelling caused him to become hoarse.'[17] In contrast, a causative paraphrase is clearly inappropriate for those bare XP resultatives where there is no reason to posit two subevents. 'The bottle's breaking caused it to become open' does not seem to capture the intended sense of *The bottle broke open*. In bare XP resultatives arising from event coidentification, a causative paraphrase is by and large inappropriate, and its acceptability diminishes when the subject is inanimate. Thus, 'The invalid's limping caused him to get over to the armchair' is not a viable paraphrase of *The invalid limped over to the armchair*, nor is 'The truck's rumbling caused it to be in the driveway' a plausible paraphrase of *The truck rumbled into the driveway*. To conclude, a causative analysis is not justified for bare XP resultatives. In fact, we propose that what is crucial for two events to be encoded in natural language with causative morphosyntax is that they not be necessarily temporally dependent. We suggest that an explicit operator CAUSE need not be included in an event structure because the only kind of nontemporally dependent relation between events in natural language is causation.[18]

4. WHICH ARGUMENT OF A TRANSITIVE VERB IS THE RESULT XP PREDICATED OF? Having accounted for two intransitive-based resultative patterns—the bare XP and reflexive patterns—by appealing to event complexity rather than the DOR, we turn now to another major set of data previously attributed to the DOR: transitive-based resultatives with a subcategorized postverbal NP. These resultatives, which we refer to collectively as SUBCATEGORIZED NP RESULTATIVES, encompass what we called object-oriented and subject-oriented resultatives in §§1 and 2.1. The central question involving subcategorized NP resultatives is characterizing and explaining which argument of a transitive

[16] In recent work, however, Croft (2000, ch. 4 and 7) adopts a coidentified event analysis of the bare XP pattern.

[17] Two types of causative paraphrases are found in the literature. These types are best illustrated using the example *Pat yelled himself hoarse*. One paraphrase is the one we use, 'Pat's yelling caused him to become hoarse'; the second is 'Pat caused himself to become hoarse by yelling'. We have chosen the first paraphrase over the second because it is in line with our analysis of causatives as complex events comprised of two subevents. The second paraphrase is more in line with a second analysis of causatives found in the literature as relations between an individual and an event. See Dowty 1979, Levin & Rappaport Hovav 1995, Parsons 1990, Pustejovsky 1991b, 1995 for arguments in favor of the complex event analysis. We thank a referee for helping us clarify this point.

[18] We have proposed that there are two strategies for forming compositionally derived events: one giving rise to a complex event structure and the other to a simple coidentified event structure. In fact, Wunderlich (1997:115) presents a similar proposal. In principle, we might also expect to find a compositionally derived event in which a result XP combines with a lexical causative via event coidentification; we suggest that *Casey sliced the mushrooms into the bowl* exemplifies this possibility. In this example, Casey's action with a knife causes the mushrooms to be in slices and, as the mushrooms are sliced, they simultaneously go into the bowl.

verb a result XP can be predicated of.[19] The syntactic account, which builds on the DOR, suggests that result XPs are always predicated of direct objects, yet as discussed in §2.1, the existence of subject-oriented transitive-based resultatives means that this cannot be taken for granted. Our answer to this question is also cast in event structure terms and makes reference to the representation of the causal chain encoded in an event.

A survey of our collection of naturally occurring resultatives shows that if a transitive verb lexically entails that one of its arguments undergoes any kind of definite or indefinite change, the result XP is predicated of this argument, as in 46. This generalization appears to be exceptionless.

(46) a. The rest would be spent in cervical traction with up to 12 pounds of sandbag weights attached by pulley to her halo, stretching her spine into realignment. (*People*, 1 Dec. 1997, p. 70)

b. Burns looked at his boots and found them charred black.
(Mildred Walker. 1941. *Unless the Wind Turns*. New York: Harcourt, Brace, p. 188)

c. She might employ it [her body] as a weapon—fall forward and flatten me wafer-thin. (Delia Ephron. 2000. *Big City Eyes*. New York: Putnam, p. 92)

The fact that such resultatives are so widespread invites the hypothesis that the result XP is predicated of an NP entailed to undergo a change of state. Proposals along these lines have been suggested by Carrier and Randall (1993:125), Goldberg (1995:188–89), Simpson (1983:146–47), and Wechsler (1997:308). In many transitive-based resultatives, however, the verb does not entail a change in the entity denoted by the NP that the result XP is predicated of, as in those based on verbs of surface contact and motion in 47 or verbs of exerting force in 48.

(47) a. In the kitchen Hilaria and Clio stripped wet clothes off their children, rubbed their hair dry . . .
(Mary Wesley. 1992. *A Dubious Legacy*. New York: Viking, p. 269)

b. She was wiping the mirror free of steam . . .
(Elizabeth George. 1993. *Missing Joseph*. New York: Bantam, p. 251)

c. I . . . brush brownie from his chin.
(Michael Grant Jaffe. 1996. *Dance Real Slow*. New York: Farrar Straus Giroux, p. 105)

(48) a. the child who had gone under the lorry and been pulled free of the wreckage dead (Patricia Hall. 1997. *The Dead of Winter*. New York: St. Martin's, p. 39)

b. He yanked it out of her hands . . .
(Karen Kijewski. 1996. *Honky Tonk Kat*. New York: Putnam, p. 318)

c. she tugged them [the stalks] from the dry, cold soil.
(Yvonne Montgomery. 1990. *Scavengers*. New York: Avon, p. 129)

Verbs of surface contact and motion do not entail a change in the surface, even if most of these verbs describe actions that have conventionally expected results relating to the surface (Washio 1997:13–14, 24–26). Scrubbing, for example, is typically carried out with the intent of removing something unwanted from a surface, but *Tracy scrubbed the bathtub* does not entail that the bathtub became clean, though all things being equal this result is inferable unless explicitly contradicted by the context (*Tracy scrubbed and scrubbed the bathtub, but the stains didn't come off*). Similarly, verbs of exerting force do not entail a change in the location of the entity that the force is exerted on, though they describe actions usually carried out with an intent to displace this entity.

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[19] The status of these resultatives with respect to the temporal relation between subevents is discussed in Appendix A.

In *The men pushed the piano*, the piano is assumed to move, all things being equal. Despite the fact that these verbs do not entail a change of state in their objects, in resultatives based on these verbs it is still impossible to predicate the result XP of the subject; that is, *Tracy scrubbed the bathtub clean* cannot receive the interpretation that Tracy got clean, nor can *The men pushed the piano off the stage* mean that the men went off the stage.

The question, then, is what differentiates 46–48 from those subcategorized NP resultatives in which the result XP CAN be predicated of the subject, such as the examples below drawn from 10–12.

> (49) a. The wise men followed the star out of Bethlehem.
> b. The sailors managed to catch a breeze and ride it clear of the rocks.
> c. John danced mazurkas across the room.
> d. Fly American Airlines to Hawaii for your vacation!

Studies of transitivity from an event structure perspective (Croft 1991:173, DeLancey 1984:185, Lakoff 1977:244, Langacker 1987, Rice 1987:423) point out that the type of event prototypically denoted by a transitive verb involves the transmission of a force from one entity to a second and a change of state in the second entity, which as Croft (1991:173) puts it, is the manifestation of this transmission of force. Verbs that entail any kind of change in the direct object, such as those in 46, involve a transmission of force to their direct object. The direct objects in 47 and 48 are also the recipients of a transmitted force, even if these verbs in isolation do not entail a change of state or location in their object and thus do not conform to the prototypical model of a transitive event. The generalization appears to be that in subcategorized NP resultatives the result XP must be predicated of the argument of the verb that is the force recipient, if there is one. Since most transitive verbs describe events involving the transmission of force, and the argument that is the force recipient is usually expressed as the verb's direct object (Croft 1991:186, Tsunoda 1985:388–89), the majority of transitive-based resultatives have result XPs predicated of direct objects. This explains why the DOR comes so close to being empirically correct. However, with noncanonical transitive verbs, which lack an NP denoting an entity that is the force recipient, the result XP is free to be predicated of the subject. This situation holds of the resultatives in 49.

We can reinforce the proposal that NPs denoting force recipients have a special linguistic status by considering them in a context highlighted by Jackendoff in an analysis of the semantics of the resultative (1990:230). Jackendoff notes that the objects of verbs found in transitive-based resultatives can appear as *Y* in the frame *What X did to Y was . . .* , as illustrated using verbs from some of the examples in 46–48.

> (50) a. What they did to her spine was stretch it.
> b. What the fire did to his boots was char them.
> c. What they did to their children's hair was rub it.
> d. What she did to the mirror was wipe it.
> e. What they did to the child was pull him.
> f. What they did to the stalks is tug them.

Jackendoff (1987:394, 1990:125–30) takes this frame to be a diagnostic for a 'patient', which he also defines as an 'affected entity' (see also Fiengo 1980:37). He notes, however, that the NPs his diagnostic picks out do not correspond precisely to those picked out by middle formation or NP-preposing in nominals (1996:312, n.7), phenomena also associated with affectedness (Anderson 1978:14–15, Doron & Rappaport Hovav 1991:81–82, Fiengo 1980:37–38, Jaeggli 1986:607–8). To avoid confusion, we

restrict the term patient to its more traditional and narrow use, where affectedness is understood in terms of change of state. For this reason we do not call Jackendoff's diagnostic a test for patienthood. We suggest, instead, that it identifies a force recipient since verbs whose arguments do not qualify as force recipients are not found in this environment, as shown in 51, and verbs whose objects are force recipients though not patients in the narrow sense are found in it, as shown in 50c–50f.

(51) a. *What they did to the star is follow it.
      b. *What they did to the mazurkas is dance them.
      c. *What they did to the breeze is ride it.
      d. *What they did to American Airlines was fly it.

In fact, Jackendoff's notion patient, which corresponds to force recipient, figures prominently in his account of the semantics-to-syntax mapping. It is not surprising, then, that a corresponding notion also figures in our account of the mapping from event structure to syntax in resultatives.

Why must the force recipient in a transitive-based resultative have the result XP predicated of it? We suggest that this restriction has its source in the basic properties of events articulated and supported in Croft 1990 and 1991 (1990:53, 1991:173, 269). In 52 we present these essential properties.[20]

(52) a. a simple event is a (not necessarily atomic) segment of the causal network;
      b. simple events are nonbranching causal chains;
      c. a simple event involves transmission of force;
      d. transmission of force is asymmetric, with distinct participants as initiator and endpoint

(Croft 1991:173)

The event a verb describes may be represented via a CAUSAL CHAIN, a notion which has its roots in the work of Talmy (1976, 1985:78–85, 1988). Talmy sets out a family of 'force-dynamic' relations, which describe the interactions between two event participants with respect to force. The causal chain represented in an event structure is essentially a representation of the event as a series of force-dynamic relations. Transmission of force and change of state/location are the two force-dynamic relations that are probably most relevant to simple transitive verbs.[21]

The proposed restriction that the force recipient must have the result XP predicated of it follows from 52b, that events are necessarily nonbranching causal chains. Consider the two potential interpretations of *Tracy wiped the table clean*: the first with *clean* predicated of the object, the second of the subject. Both involve a transmission of force from Tracy to the table, which represents a segment of the causal chain associated with this sentence. On the first interpretation, another segment would be added to the same causal chain, representing the change of state in the table. Since the change of state occurs in the force recipient, this segment follows directly on the previous one, without creating a new branch in the chain. This chain might be represented as in 53, where each arrow represents a segment in the chain; we use the label ACT ON for instances of force transmission.

[20] We list only the first four of seven properties presented in Croft 1991:269 since these are the most relevant. In fact, in later work Croft (1998:47–48) drops two of the additional properties.

[21] See Talmy 1976, 1985:78–85, 1988 and Jackendoff 1990:130–51 for further elaboration of force-dynamic relations. We leave for future research the question of how the causal chain representation of an event is to be integrated with other facets of event structure.

(53) Causal chain for *Tracy wipes the table clean*

$$\text{Tracy} \xrightarrow{\text{ACT ON}} \text{table} \xrightarrow{\text{CHANGE}} \text{table}$$
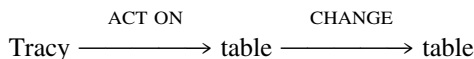
On the second potential interpretation, where Tracy undergoes the change of state, the causal chain necessarily branches. One branch represents the transmission of force from Tracy to the table, and the other represents the change of state in Tracy. This causal chain, diagrammed in 54, violates 52b, explaining why this interpretation is unavailable.

(54) Causal chain for *Tracy becomes clean by wiping the table*
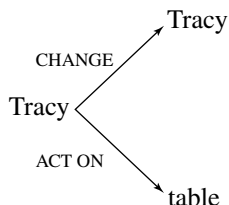
This example also clarifies why a result XP can be predicated of the subject of a transitive verb whose object is not a force recipient. It is the transmission of force to the object that contributed the second branch that prevents the subject-predicated interpretation of the XP in *Tracy wiped the table clean*. Thus, the observed predication constraint on subcategorized NP resultatives follows from independent constraints on the well-formedness of events.[22]

   Given the proposed account of the impossibility of a subject-oriented result XP with transitive verbs like *wipe*, the grammaticality of a type of resultative we have not yet discussed, a transitive-based resultative whose postverbal NP is not subcategorized by the verb, as in 55, deserves a closer look.

(55) They drank the pub dry.

In 55, the transitive verb *drink* describes an event with a force-dynamic relation between the drinkers and what's drunk (e.g. *They drank the beer*), but it also involves a change of state in the pub, its becoming empty of drink. It appears that there is a branching causal chain with two segments, each originating in the drinkers. Yet, this sentence is possible, and indeed this type of resultative is well attested in our collection, as illustrated in 56.

(56) a. Sudsy cooked them all into a premature death with her wild food.

   (P. Chute. 1987. *Castine*. Garden City, NY: Doubleday, p. 78)

   b. They [the grasshoppers] ate the whole prairie bare and brown. (Laura Ingalls Wilder. 1965 [1953]. *On the Banks of Plum Creek*. Harmondsworth: Puffin, p. 169)

Our account of such resultatives capitalizes on the fact that they involve a use of a transitive verb in which the normal object is left unexpressed. A well-known property of such unexpressed objects is that they are understood as existentially quantified in some way (Bresnan 1978:20, Mittwoch 1982). We propose that the transmission of force to an unspecified object is not represented in the causal chain, and therefore no

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[22] This account necessitates a departure from Croft's theory (1991) since for him even when there is no actual transmission of force from the subject to the object, there is a 'coercion', whereby the event nonetheless comes to represent transmission of force from the subject to the object (1991:173, 198–228). Obviously, if this were always the case, we would lose our explanation of the difference between transitive verbs which do and do not allow subject-oriented result XPs. We must, therefore, allow for direct objects which are not represented as force recipients.

branching causal chain is involved in 55. After all, we are not dealing with whether there is a branching causal chain in the real world, but rather with whether there is a branching causal chain represented in the event structure associated with the sentence. The first segment in the causal chain for 55 represents a transmission of force originating in the drinkers and directed towards the pub rather than towards the liquid drunk. The next segment represents the change of state in the pub brought about by the drinking.[23]

(57) Causal chain for *They drank the pub dry*

$$\text{they} \xrightarrow{\text{ACT ON}} \text{pub} \xrightarrow{\text{CHANGE}} \text{pub}$$
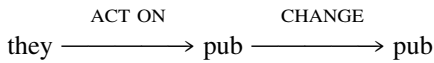
Support for this analysis comes from the fact, pointed out by Jackendoff (1990:230–31), that the nonsubcategorized NPs in such examples pass the test for force recipients, as shown in 58.

(58) What they did to the pub was drink it dry.

Jackendoff (1990:230) proposes that the force recipient—patient in his terms—is not lexically specified by the verb, but is identified on pragmatic grounds. For example, 55 is understood to imply a situation where the subject's action adversely affects the pub. We suggest that this pragmatic link between the verb and the postverbal NP comes about as a consequence of the principle in 59 introduced by Wunderlich (1997:42), building on the work of Kaufmann (1995b:89, 92–93).

(59) CONNEXION: The second member in a lexical SF [semantic form] conjunction [an event with more than one subevent] specifies inferences about the first member.   (Wunderlich 1997:42, (31))

Connexion can be applied to the event described in 55 to generate the appropriate causal chain. (See Kaufmann & Wunderlich 1998:6 for discussion of a similar example.) The pub, as a locale where one drinks, is related to the drinkers' drinking by inference; thus, the change of state in the pub is licensed by connexion to be a segment in the causal chain for 55. Once this segment is licensed, a link can be established between the drinkers and the pub, forming the first segment of the causal chain. In fact, Jackendoff (1990:226–27), and Sato (1987:93) have observed that the postverbal NP in the nonsubcategorized NP pattern often bears a relation to the verb that is expressed elsewhere via an adjunct. This property holds of 55, as seen in *They drank in the pub*. The ability of the postverbal NP to be a potential adjunct might indicate that it satisfies connexion.[24]

There is another possible event structure–dependent answer to the question of which argument of a transitive verb a result XP is predicated of: the verb's incremental theme (Rothstein 2000). We briefly lay out why the notion of force recipient is preferable. As noted, result XPs are necessarily predicated of the objects of verbs of change of state, verbs of surface contact and motion, and verbs of exerting force. Although the objects of verbs of change of state are lexically entailed to be incremental themes, those of the other two verb types are not—a problem for the incremental theme ap-

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[23] A branching causal chain is never an issue with a nonsubcategorized NP resultative based on an intransitive verb, such as *The dog barked the neighbor awake*, since the base verb lacks an object. We do not discuss such resultatives further since the analysis of nonsubcategorized NP resultatives based on transitive verbs carries over straightforwardly to them.

[24] Similar issues are relevant to reflexive resultatives based on transitive verbs, which are also extensively instantiated in our corpus, as in *By that time Sophie had swept and scrubbed herself into a state when she could hardly move* (Diana Wynne Jones. *Howl's Moving Castle*. New York: Greenwillow, 1986, p. 43).

proach. There are proposals to the contrary, which are the source of the claim that the notion INCREMENTAL THEME can be used to identify the NP that a result XP is predicated of. These claims surface because, as Tenny notes, certain transitive verbs—and verbs of surface contact and motion and verbs of exerting force are among them—have 'latent aspectual structure' (1992:20). For instance, although certain verbs do not lexically entail an incremental theme, they can appear with *in* temporal phrases (*I wiped the counter in 30 seconds flat*), a property of verbs with incremental themes. We suggest, however, that the latent aspectual structure arises because these verbs have force-recipient objects, and in general verbs with such objects are associated with a cancellable implicature that the force recipient undergoes a change related to the conventionally expected result of the action. This implicature creates the impression that these verbs have an incremental theme, but it is the property of having a force recipient that is the basic property responsible for this perception.

   The force-recipient approach receives support from the observation that verbs whose objects are incremental themes, but not force recipients (e.g. *memorize*, *study*, *read*, *sing*) cannot appear with object-predicated result XPs; for instance, there are no relevant examples in our collection of naturally occurring resultatives. An apparent exception further reinforces this conclusion. In *Shelly read* Jane Eyre *to tatters*, *read* is found in an apparently object-oriented resultative. This is unexpected since its normal direct object is a narrative and, thus, does not qualify as a force recipient. In this example, however, the object refers to the physical notion of book (Cruse 1992/93:91–92, 2000: 34, 39–41, Postal 1966:88, n.16, Pustejovsky 1991a:427–30), as is clear from the result XP, which describes physical appearance. A book in this sense is manipulated during a reading event and qualifies as a force recipient, so a result XP can be predicated of it.

   5. VERB DISTRIBUTION IN NONSUBCATEGORIZED NP RESULTATIVES. In this section we reexamine another distributional property taken to support the syntactic account of resultatives. Intransitive verbs are also found in another pattern that resembles the reflexive pattern, the nonsubcategorized NP pattern. As mentioned in §1, unergative verbs are found in this pattern, but unaccusative verbs are not; contrast 7 and 9, repeated as 60 and 61.

   (60) a.   Miss Kitty Perkins, who talked seven warts off my hands . . .
        b.   She winked us past . . .
        c.   the dog barked him awake . . .
   (61) a. *The bomb exploded the watermelons into the air.
        b. *The ice melted the floor clean.
        c. *The water evaporated the pot dry.

There are two possible accounts of the contrasting behavior of unaccusative and unergative verbs in the nonsubcategorized NP pattern that refer to event structure notions. The contrast can follow either from an assumption about the maximum complexity of a well-formed event structure or from a constraint against events with two incremental themes. We discuss each in turn.

   Levin and Rappaport Hovav (1995: 90–98), drawing on observations in Smith 1970, propose there are two semantic subclasses of verbs: internally and externally caused verbs. Externally caused verbs describe eventualities conceptualized as being brought about by an external cause with immediate control over the eventuality. Core members of this class are verbs of change of state (*break*, *close*, *thicken*). These verbs have a complex, causative event structure. Their intransitive uses have the same event structure,

though the causing subevent is lexically bound and receives no direct syntactic expression (Levin & Rappaport Hovav 1995:108, Rappaport Hovav & Levin 1998:117–18). In contrast, internally caused verbs describe eventualities that are conceptualized as arising from inherent properties of the verb's argument. These properties are 'responsible' for the eventuality denoted by an internally caused verb. Such verbs include *laugh*, *play*, *speak*, *walk*, *buzz*, and *glow*, as well as a few verbs of change of state, such as *bloom*, *rot*, and *deteriorate*. These verbs have an event structure consisting of a single subevent with one participant since there is no external causing event involved.

The acceptable nonsubcategorized NP resultatives in 60 involve internally caused verbs. The event structure of such verbs consists of a single subevent, allowing the augmentation of the verb's event structure to form the complex, causative event structure associated with nonsubcategorized NP resultatives (Rappaport Hovav & Levin 1998:118–20); see Appendix A for justification of this event structure. The unacceptable examples in 61 involve resultatives based on intransitive uses of externally caused change-of-state verbs.[25] The verbs in these resultatives have a complex, causative event structure, with the causing subevent lexically bound (Levin & Rappaport Hovav 1995: 108). If event structures can have at most two subevents, these verbs in isolation already have a fully elaborated event structure. Thus, since the result XP represents the addition of another subevent, these resultatives are ruled out by constraints on the maximal complexity of an event structure.

An alternative explanation is that resultatives of the type in 61 violate a well-established constraint that an event may have only one incremental theme and thus be delimited only once (Goldberg 1991:368, Tenny 1987:183–84, 1994:68). As verbs of change of state, externally caused verbs are associated with an incremental theme, but with nonsubcategorized NP resultatives, the result XP, by adding a second event of change, would be adding another, distinct, incremental theme, violating the constraint.

There are some data that might help decide between these explanations. Sentences such as ??*The ball bounced the markings off the floor* or ??*The wagon rolled the rubber off its wheels* involve externally caused verbs that specify a change that is not scalar in nature, and hence these verbs lack an incremental theme. What is the status of these examples? Although we considered them ungrammatical (Levin & Rappaport Hovav 1995:39), and we have no clear examples of this kind in our collection of resultatives, in a survey we conducted they were uniformly judged better than examples such as 61, which clearly have two incremental themes. Their marginal status could be attributed to their violating the constraint on event complexity, but not the constraint against two incremental themes, contrasting with the examples in 61, which violate both. If so, both constraints might be operative.

6. Conclusion. We have critically reexamined the syntactic account of the English resultative construction and shown that the syntactic explanation for the restrictions on the distribution of the result XP is not tenable. Instead, we offer an account based on the event structures associated with the different resultative patterns and a theory of the mapping between event structure and syntactic structure. Our study sheds light on

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[25] An analysis in terms of internal versus external causation is to be preferred to one that attributes the contrast to animacy or agentivity. Internally caused verbs with inanimate arguments are attested, as in *The phone jangled me into consciousness* (Janet Dawson. 1993. *Take a Number*. New York: Ballantine, p. 108). Nor can the contrast be attributable to change-of-state predicates, as a few internally caused verbs of change of state are attested, as in *Many gardeners take this opportunity to . . . enjoy their hanging basket*, *allowing it to bloom itself into oblivion* (*The New York Times*, 2 Nov. 1986, p. 37).

why the DOR, which forms the foundation of most accounts of resultatives to date, comes so close to being right and is thus so appealing. To the extent that the DOR does account for most of the resultative data, it holds for two interrelated reasons. First, the causative event structure associated with resultatives that describe events that are not necessarily temporally dependent requires that two arguments be realized in the syntax, resulting in the introduction of a reflexive when the two subevents share an argument. Second, most transitive verbs describe events involving the transmission of force and thus can only be found in subcategorized NP resultative constructions with object-predicated result XPs. Consequently, there are few subject-predicated result XPs with transitive verbs.

These distributional facts for the NPs that result XPs are predicated of have constituted the strongest evidence for positing distinct syntactic classes of unaccusative and unergative verbs in English, a language that lacks the explicit morphosyntactic indicators of unaccusativity (e.g. auxiliary selection) found in some Romance and Germanic languages. Since our account does not preclude the syntactic encoding of the unaccusative/unergative distinction, it cannot be considered direct evidence against a syntactic account of unaccusativity. Yet, in proposing that the resultative construction can receive an event structure account, our work calls even more seriously into question the existence of any evidence for the syntactic encoding of unaccusativity in English. In so doing, our work echoes doubts previously raised about whether unaccusativity is syntactically encoded in English (Dowty 1991, Kaufmann 1995a, 1995b, Napoli 1988, Van Valin 1990, Wechsler 1997); further work is necessary to pursue these implications of our study.

APPENDIX A: OTHER RESULTATIVE PATTERNS

We round out the larger picture by briefly considering the event structures of the types of resultatives that were less central to our discussion. In the process, we underscore the importance of the notion of temporal dependence, which was essential to characterizing the difference between bare XP and reflexive resultatives. This notion applies to other types of resultatives, and we provide further support for our proposal in section 3.4 that the complex, causative analysis extends to all resultatives whose subevents are not necessarily temporally dependent and the simple event analysis applies to all resultatives whose subevents are necessarily temporally dependent.

Intransitive verbs are also found in the nonsubcategorized NP pattern. The reflexive pattern is a special case of this pattern, with a reflexive pronoun as the nonsubcategorized NP. Thus, the nonsubcategorized NP pattern is analyzed like the reflexive pattern, with a complex, causative event structure with subevents that are not necessarily temporally dependent. The relation between subevents is confirmed by (a), where the move away from Fuentes's affairs need not start the moment the hinting is over.

(a) Ralph MacDonald had descended from his throne to hint me away from Roz Fuentes's affairs.

(Sara Paretsky. 1990. *Burn Marks*. New York: Delacorte, p. 202)

Furthermore, temporal adverbials need not modify both subevents in such resultatives. The sentence *The joggers slowly and steadily ran the pavement thin* can entail that the pavement slowly and steadily became thin without entailing that the joggers ran slowly and steadily. As also expected, causative paraphrases are available for nonsubcategorized NP resultatives. *The joggers ran the pavement thin* could be paraphrased as 'The joggers' running on the pavement caused it to be thin'. In fact, such resultatives cannot, in principle, receive a simple event analysis with coidentified subevents since coidentification requires that the subevents share an argument, and the nonsubcategorized postverbal NP makes this impossible. As mentioned in notes 4 and 23, the properties of reflexive and nonsubcategorized NP resultatives based on transitive verbs parallel those of the comparable intransitive-based resultatives, and therefore they also have subevents that are not necessarily temporally dependent and receive a complex, causative event analysis. We do not, however, justify this analysis here.

The importance of the temporal relation between subevents to the analysis of resultatives is further demonstrated by object-oriented resultatives based on transitive verbs. The subevents of some resultatives of this type are necessarily temporally dependent, as in (b), while the subevents of others need not be, as in (c).

   (b)   i.   We all pulled the crate out of the water.
         ii.   They yanked the nails out of the board.
       iii.   The coast guard tugged the raft back to shore.
   (c)   i.   Clara rocked the baby to sleep.
         ii.   The police shot the robber to death.
       iii.   The critics panned the play right out of town.

The verbs in (b) are verbs of exerting force. As mentioned in §4, they describe the exertion of a force on a physical object, but do not lexically entail that the force displaces the object. However, when the force does cause a displacement, as in (b), then it must be exerted until the result location is attained. Thus, the exertion of force and the displacement occur in tandem.[26] In contrast, the subevents of the resultatives in (c) need not unfold together. In the most striking of these, (ciii), suggested by Chris Kennedy, the play cannot close until after the reviews appear.

    The two types of object-oriented resultatives show differences with respect to adverbial modification consistent with our proposal concerning the relation between the subevents in each. The adverbial modifies both subevents in *The coast guard slowly tugged the raft back to shore*, so that this sentence entails both that the coast guard slowly tugged the raft and that they slowly brought it back to shore. In contrast, *Clara quickly rocked the baby to sleep* entails that the baby quickly fell asleep, but leaves the rate at which the baby is rocked unspecified; that is, the adverbial need not modify both subevents. We further propose that the complex, causative analysis extends to resultatives like those in (c) since their subevents are not necessarily temporally dependent, but not to those based on verbs of exerting force since their subevents are temporally dependent. Consistent with this proposal, causative paraphrases do not capture the sense of resultatives with verbs of exerting force as well as they capture the sense of those in (c). *Dana rinsed the mugs clean* is paraphrasable as 'Dana's rinsing the mugs caused them to become clean'. but *We all pulled the crate out of the water* is not so well paraphrased by 'Our pulling the crate caused it to become out of the water'.

    Finally, we note that subject-oriented resultatives must necessarily have temporally dependent subevents and a simple event structure. If such resultatives had a complex, causative event structure, then one argument from each subevent would have to be expressed. Since the only argument of the result subevent has the same referent as the argument expressed as the subject, this analysis would require the introduction of a reflexive, but there are not enough syntactic positions to allow both the verb's own second argument and a reflexive to be expressed. In fact, in *The wise men followed the star out of Bethlehem*, following the star and leaving Bethlehem unfold together, as expected if the subevents are temporally dependent, consistent with a simple event structure. Furthermore, the causative paraphrase 'The wise men's following the star caused them to leave Bethlehem' does not really capture the sense of this sentence.

<div align="center">Appendix b: summary of resultative patterns referred to</div>

    For each pattern, we give the label used to refer to it in small caps, followed by its most salient identifying properties and a representative example. We have subdivided this list according to whether the patterns involve necessarily temporally dependent subevents or not. Within these classes the other properties include the verb's transitivity, whether there is a postverbal NP, and, if so, whether it is subcategorized or not, and, finally, whether the result XP is subject- or object-predicated.

Resultatives with no distinct subevents (simple event structure):
    BARE XP RESULTATIVE
    Intransitive-based, no postverbal NP, subject-predicated XP
    The pond froze solid.

Resultatives with temporally dependent coidentified subevents (simple event structure):
    a. BARE XP RESULTATIVE
        Intransitive-based, no postverbal NP, subject-predicated XP
        Robin danced out of the room.
    b. SUBJECT-ORIENTED TRANSITIVE-BASED RESULTATIVE
        Transitive-based, subcategorized NP, subject-predicated XP
        The wise men followed the star out of Bethlehem.

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[26] Verbs of exerting force have been singled out in studies of the dative alternation because they cannot appear in the double object construction (Pesetsky 1995:137, Pinker 1989:103, 110–11): **Sandy pulled Tracy the cart.* Pesetsky and Pinker tie this limitation to temporal dependence between subevents, though they do not use precisely this term; see Krifka 1999 for an event structure analysis of this property. The notion of temporal dependence, then, has relevance beyond resultatives.

   c. OBJECT-ORIENTED TRANSITIVE-BASED RESULTATIVE

      Transitive-based (verb of exerting force), subcategorized NP, object-predicated XP

      We pulled the crate out of the water.

Resultatives whose subevents need not be temporally dependent (complex, causative event structure):

   a. NONSUBCATEGORIZED NP INTRANSITIVE-BASED RESULTATIVE

      Intransitive-based, nonsubcategorized NP, object-predicated XP

      The joggers ran the pavement thin.

   b. REFLEXIVE INTRANSITIVE-BASED RESULTATIVE

      Intransitive-based, reflexive object, object-predicated XP

      We yelled ourselves hoarse.

   c. NONSUBCATEGORIZED NP TRANSITIVE-BASED RESULTATIVE

      Transitive-based, nonsubcategorized NP, object-predicated XP

      They drank the pub dry.

   d. REFLEXIVE TRANSITIVE-BASED RESULTATIVE

      Transitive-based, reflexive object, object-predicated XP

      The cows ate themselves sick.

   e. OBJECT-ORIENTED TRANSITIVE-BASED RESULTATIVE

      Transitive-based, subcategorized NP, object-predicated XP

      The critics panned the play right out of town.

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