ASPECT AND FORCE DYNAMICS: WHICH IS MORE ESSENTIAL TO RESULTATIVES?

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This paper discusses the theory of event structure proposed in Croft (2012), which integrates aspectual and force-dynamic representations. Aspectual structure, which is represented two-dimensionally according to the time dimension and the qualitative state dimension, is integrated with a force-dynamic (and causal) representation, forming a three-dimensional representation. The three-dimensional event structure is then applied to the analysis of resultatives, along with many other linguistic phenomena.

While prototypical resultatives may be characterizable in aspectual terms as Croft maintains, a closer inspection reveals that some resultatives resist a unified, aspectual characterization. If anything, some characteristics of resultatives may be better approached in terms of force-transmission. For the proposed theory to be truly explanatory, it remains to work out which characteristics of resultatives are to be accounted for in aspectual terms and which in force-dynamic terms.*

Keywords: event structure, aspect, force dynamics, resultative

1. Introduction

Given the central role event structure plays in today’s linguistics, one central challenge in lexical semantics—or linguistics in general—is to elucidate the nature of event structure. That is exactly what Croft attempts to do in this book.

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Two major dimensions of event structure that are grammatically relevant are aspectual structure and force-dynamic structure: Aspectual structure specifies how events unfold over time, while force-dynamic structure plays a crucial role in argument realization (p. 4). Accordingly, Croft develops a theory of event structure that integrates both aspectual structure and force-dynamic structure.

The book under review consists of nine chapters (apart from “Envoi” in chapter 10). The first part of this book (chapters 2–4) is devoted to developing a theory of aspectual structure, which is two-dimensional. In the second part (chapters 5–8) this two-dimensional aspectual structure is integrated with force-dynamic structure, resulting in a three-dimensional representation, which is further applied to various linguistic phenomena. Lastly, in chapter 9 the need to introduce lower-level constructions is discussed.

Although quite a wide range of linguistic phenomena are discussed throughout the book, it goes without saying that this review can focus only on the very essence of Croft’s theory of event structure. This paper is organized as follows. Section 2 reviews Croft’s three-dimensional event structure, which integrates aspectual structure and force-dynamic structure. In section 3, the validity of the proposed theory is assessed. Then in sections 4 and 5, his theory as applied to the analyses of resultatives is critically examined. Conclusions are given in section 6.

2. The Three-Dimensional Model

2.1. Fundamental Assumptions

Nowadays there is quite a lot of work done on event structure across three different frameworks: Formal semantics, generative grammar, and cognitive linguistics (p. 4). Croft’s theory draws on insights from all of these three frameworks and likewise it is intended to benefit any scholar working in any of these frameworks as well. But his own theoretical commitment is to the cognitive approach, of course.

Accordingly, there are a couple of characteristics which distinguish Croft’s theory particularly from formally-oriented theories. First, it takes a frame semantic view: The meaning of a word (or construction) can be understood only against background frames. For instance, the concept UNCLE can be understood only in a frame that defines kinship relations. Or to take a very famous example from Fillmore (1982), LAND and GROUND appear to denote the same thing, but LAND profiles the dry surface of the earth in contrast with SEA, whereas GROUND profiles the same
thing in contrast with AIR (p. 11). This frame semantic view is adopted in developing aspectual structure, as will be seen below.

Second, Croft’s theory lays emphasis on the notion of construal: The same experience may be construed in alternative ways. The scope of construal and constraints on construal are described in terms of three general principles: (1) Construal serves the interlocutor’s goal in the discourse; (2) the nature of reality limits construal; and (3) construals associated with a lexical item are limited by the cultural conventions of the speech community (p. 18).

It is also to be noted in passing that Croft is committed to Construction Grammar (Croft (2001)). Accordingly, the linguistic generalizations discussed in this book pertain to (1) tense-aspect constructions (e.g. the present tense construction or the Progressive construction) and (2) argument structure constructions.

With this background in mind, it is now time to turn to Croft’s theory of event structure. We will begin with how Croft reconsiders the aspectual types.

2.2. Aspectual Types

As is well-known, Vendler (1967) proposes a four-way distinction of lexical aspects: activities, accomplishments, achievements, and states, as shown in (1).

(1) a. activity: He ran.
   b. accomplishment: He built a house.
   c. achievement: He reached the summit.
   d. state: He loves Mary.

Subsequent scholars have proposed alternative classifications by adding to the aspectual types (Mourelatos (1981), Dowty (1979)).

Seen in this light, then, the new aspectual system proposed by Croft (2012) might appear to be simply another new model. Croft’s aspectual classification is far more extensive than the previous ones, however. There are four general aspectual categories (state, accomplishment, achievement, and activity) corresponding to Vendler’s four types, but each of these four has further sub-types, and sometimes the membership in a particular aspectual class is rather different.

First, there are four kinds of states. The first type is transitory states, as

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1 Pustejovsky (1991) is a notable exception. He tries to reduce the Vendlerian four types to three, by collapsing achievements and accomplishments into a single type.
exemplified in (2), which have a start and may have an end.

(2) transitory state: He is angry.

Next, permanent states hold for the lifetime of the entity, and are further divided into inherent states as in (3a) and acquired states as in (3b).

(3) permanent state
  a. inherent state: John is Polish.
  b. acquired state: The vase is cracked.

The fourth type of state is point states as in (4), the duration of which is only a given point in time.

(4) point state: It is 5 o’clock.

Second, Croft’s accomplishment category includes not only sentences like (5) (which is the sole exemplar of Vendler’s accomplishment class) but also those like (6), which are referred to as run-up achievements.

(5) accomplishment: He built a house.

(6) run-up achievements: They reached the summit.

Third, Croft’s achievement category includes achievements which are reversible as in (7a) and those which are not as in (7b, c).

(7) a. The door opened twice.
  b. *The mouse died twice.
  c. *The window shattered twice. (Croft (2012: 43))

These two types are referred to as reversible achievements and irreversible achievements, as seen in (8).

(8) a. reversible achievement: The door opened.
  b. irreversible achievement: The window shattered.

There is also a third type of achievements, i.e. cyclic achievements as shown in (9).

(9) cyclic achievements: Harry coughed.

Now in the literature, certain verbal expressions which are ambiguous between telic and atelic readings are known as degree achievements (Dowty (1979: 88–90)). But Croft (2012) categorizes the two readings as two types of activity: directed activities and undirected activities, as shown in (10).

(10) a. directed activity: The soup cooled in an hour.
  b. undirected activity: The soup cooled for an hour.

Clearly, these eleven types are different from each other as to how the events unfold over time. On the assumption that the unfolding of events is the sequence of qualitative states, Croft proposes a two-dimensional representation. Thus the aspectual structure of, for instance, a seeing event is represented as in Figure 1.
The $x$ axis is the time dimension ($t$), and the $y$ axis is the qualitative state dimension ($q$). The time dimension is continuous, while the qualitative dimension may or may not be continuous, depending on what qualitative states are defined for the event. Thus seeing has only two defined states on $q$: not seeing something and seeing something (p. 53).

This two-dimensional representation allows one to differentially represent the eleven aspectual types seen above, as well as to characterize the four general categories systematically. First, with states, the profiled phase is only a single point on the $q$ dimension.

Achievements are described as transitions from one state to another on the $q$ dimension at a single point on the $t$ dimension.
Reversible
Directed

Irreversible
Directed

Cyclic
(Semelfactive)

The door opened.  

The window shattered.  

The mouse squeaked.

Figure 3. Three kinds of achievements (Croft (2012: 60))

Activities are durative, unbounded processes.

Directed Activities

Undirected (Cyclic) Activities

The soup cooled.  

The girls chanted.

Figure 4. Two kinds of activities (Croft (2012: 61))

Lastly, accomplishments are unique in that all the three phases are profiled: the inception, the completion, and the directed change phases.

(Incremental)  
Accomplishments

Run up Achievements
(Nonincremental accomplishments)

I ate an apple pancake.  

Harry repaired the computer.

Figure 5. Two kinds of accomplishments (Croft (2012: 62))
2.3. Integrating Force-Dynamic and Aspectual Representations

The aspectual structure representations just reviewed are then to be integrated with a force-dynamic representation, so as to address a larger issue of argument realization.

One challenging problem that has been discussed over the years in the lexical semantics literature is: How are the participants in events expressed as grammatical arguments of a predicate? (p. 173) To address this question, a number of approaches have been proposed, ranging from an event decomposition analysis (Jackendoff (1990, 2002), Rappaport Hovav and Levin (2001), Van Valin (2005), among many others), to an entailment analysis (Dowty (1991)), to a thematic role hierarchy analysis (Bresnan (2001)). But Croft finds all of these approaches unsatisfactory, and thus he has been developing a force-dynamic account over the years (Croft (1991, 1998)): What determines participant role ranking for the argument realization is the transmission of force relationships between participants (p. 198). Thus Sue broke the coconut for Greg with a hammer receives a force-dynamic representation as follows:

(11) Sue broke the coconut for Greg with a hammer.

Sue → hammer → coconut → Greg

SBJ A.OBL OBJ S.OBL

Sue acts on the hammer (she grasps it), the hammer acts on the coconut (it impacts it), and the coconut “acts on” Greg (its breaking benefits him in some way) (p. 198).

The segment of the causal chain profiled by the verb is indicated by the solid arrows, while segments profiled by nonverbal elements (for Greg, in this case) are indicated by a dashed arrow. So the force-dynamic representation in (11) indicates that the verb break in the transitive argument structure construction profiles only part of the causal chain, namely that segment from Sue to the coconut.

There is one thing lacking in this representation, however. In the literature, causation is generally defined in terms of one event causing another. But the force-dynamic representation simply expresses the relationship between participants, not between events, and thus fails to capture causal relations between events. In order to reconcile the force-dynamic representation with the causal relations between events, then, a complex verbal semantic structure is decomposed into subevents, which are related to each other causally. Each subevent is represented in terms of a two-dimensional model, and the causal chain linking the individual participant subevents is represented in a third dimension, as shown in Figure 6.
Crucially, each participant has its own subevent in the causal chain (p. 212). Accordingly, both the force-dynamic pattern and causal relations between subevents are captured.

Since the decomposed subevent is represented along with the aspectual structure, each causal subevent is the aspectual profile/contour for that participant, with its associated temporal and qualitative scales. Thus each subevent expresses what each individual participant does or undergoes during the course of an event. At the same time, each participant’s subevent stands in a causal relation to the subevent of the next participant in a causal chain (p. 212).

The three-dimensional representation thus successfully integrates force-dynamic and aspectual representations. But one practical problem is that this is difficult to apprehend on a two-dimensional display, so Croft adopts the representation in Figure 7, where both the causal and qualitative state dimensions are aligned onto the vertical dimension (p. 212).
In this modified representation, the causal chain like in (11) finds its place on the vertical dimension, i.e., it proceeds from bottom to top. Despite its apparently two-dimensional display, Croft continues to call this complex representation a “three-dimensional representation,” to be distinguished from a two-dimensional representation, which deals only with the aspectual structure, as seen in 2.2.

Now this three-dimensional semantic structure is paired with the syntax, following the Construction Grammar framework. In Figure 7, this is indicated by the grammatical functions like SUB or OBJ to the left of the argument phrases (Jack and vase). The fully spelled-out representation is as shown in Figure 8.

![Figure 8. Syntactic and semantic representation of argument structure (Croft (2012: 213))](image)

By comparing this representation with Goldberg’s (1995), one can immediately recognize that Croft’s theory gives far more substance to the notion of verb meaning, in that the semantic structure comprises aspectual and force-dynamic information, rather than displaying a mere list of participant roles.

Now to return to Sue broke the coconut for Greg with a hammer, its full semantic structure is as shown in Figure 9.
According to Croft, the three-dimensional representation has the following merits: First, it clearly distinguishes the aspectual and the causal structure of events. Second, it allows us to employ the fine-grained aspectual analysis. Third, it captures both analyses of causation: the transmission of force relations and the role of events causing other events (p. 216).

2.4. Application to Resultatives

Croft goes on to apply his three-dimensional model to various phenomena in English and other languages (chapters 6 and 7), and then turns to complex predicate constructions, including resultatives (chapter 8). In discussing resultatives, Croft first reviews Rappaport Hovav and Levin’s (2001) dichotomy between temporally dependent vs. independent types: whether verbal events and result states occur simultaneously or not. He then observes that Iwata (2006), who follows Washio (1997), assumes essentially the same dichotomy in resultatives as do Rappaport Hovav and Levin, although he analyzes the two types differently: whether the change is entailed in the verb meaning (adjunct resultatives) or not (argument resultatives).²

² Different terms are used to refer to the two types of resultatives in Iwata’s subsequent works (Iwata (2008b, 2010)). But for ease of exposition, the terms Argument resultative and Adjunct resultative are used in this paper.
(12) The river froze solid. Temporally dependent/Adjunct resultative

(13) The dog barked him awake. Temporally independent/Argument resultative

Croft argues that the two types of resultatives, which are differently analyzed between Rappaport Hovav and Levin (2001) and Iwata (2006), can be accommodated in his theory as follows. The prototypical Bare XP Resultative/Adjunct Resultative denotes an incremental accomplishment, that is, an incremental directed change process that leads to a result state (p. 329). Thus *The pond froze solid* is analyzed as in Figure 10.

\[
\begin{array}{c}
\text{SBJ pond} \\
\text{freeze} \\
\text{solid}
\end{array}
\]

Figure 10. *The pond froze solid* (Croft (2012: 329))

In contrast, the prototypical Fake NP/reflexive Resultative/Argument Resultative denotes a nonincremental accomplishment, that is, an undirected activity that ends in a directed achievement to the result state (p. 329). Thus *They yelled themselves hoarse* is analyzed as in Figure 11.

\[
\begin{array}{c}
\text{SBJ They} \\
\text{yell} \\
\text{be hoarse}
\end{array}
\]

Figure 11. *They yelled themselves hoarse* (Croft (2012: 329))

In other words, in the English Bare XP Resultative, the construction
employs directed change aspectual construal and adds and/or specifies the result state on the $q$ dimension. In contrast, if a verb occurs in the English Fake NP/Reflexive Resultative construction, the undirected activity construal applies, followed by a result state (p. 330).

3. What Has Been Achieved and What Remains to Be Achieved

3.1. Two-Dimensional Aspectual Structure

As we have seen, the semantic structure which Croft proposes for verbs is a composite of aspectual and force-dynamic (and causal) structures. Accordingly, it seems appropriate to assess the validity of his theory by looking at these components in turn. Let us begin with aspectual structure.

While representing aspectual structure two-dimensionally is (relatively) novel, Croft (2012) is not the only scholar to entertain this idea. As a matter of fact, this idea has been recently implemented by Iwamoto (2008) (see also Miyakoshi (2010)). Nevertheless, Croft’s two-dimensional model has a number of attractive features. Here I will mention a couple of them.

First, the two-dimensional model allows one to straightforwardly account for the aspectual potential of certain verbs to be construed as belonging to more than one type. Thus in the literature on aspect (Vendler (1967), Brinton (1987), among many others), see is shown to be construed either as a state or as an achievement, as in (14).

(14) a. I see Mount Tamalpais.
   b. I reached the crest of the hill and saw Mount Tamalpais.

(Croft (2012: 54))

In Croft’s theory, this means that see allows either transitory state construal or achievement construal, as described in Figure 12 (a) and Figure 12 (b), respectively.

![Diagram of aspectual structure](image)

Figure 12. Alternative profiling of English see (Croft (2012: 55))

As the two figures clearly indicate, the two construals are obtained by pro-
filing different phases against the same background frame: the resulting state (seeing) phase in the former and the ‘coming to see’ phase in the latter. In other words, the alternation between transitory state and achievement construals can be readily accommodated precisely because the two-dimensional model is a frame semantic representation: The semantic similarities between the meanings of (14a, b) are captured by the identity of the semantic frames for the two sentences, while the semantic difference is captured by the difference in the profiled concept in the semantic frame.

I am really impressed by this analysis. As far as I know, this is the most intuitively-appealing way to handle the fact that see can receive an interpretation either as a state or as an achievement.

Some other cases of aspectual alternation which are neatly captured in the two-dimensional model are the following: Flash may express a single flash as in (15a), a sequence of iterated flashes as in (15b), or iterated flashes in temporally contiguous groups as in (15c).

(15)  a. The light flashed.
      b. The light flashed four times.
      c. The light flashed for five minutes.

The three construals are differentially represented as in Figure 13.

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Or disposition predicates may be construed as describing a person’s behavior on one occasion as in (16a) or as a personality trait of the person as in (16b).

(16)  a. He is being polite.
      b. He is polite.

The contrast between the two interpretations is accounted for as that between activity and inherent state, as in Figure 14.
Figure 14. *He is being polite* vs. *He is polite* (Croft (2012: 96))

The application of a frame semantic view to the analyses of aspect may well extend to other cases. Among them is the fact that the in-PP may express the time interval before the inception, rather than the endpoint, of an event.

(17) The TV show starts/is starting in five minutes. (Croft (2012: 66))

This ‘inception’ reading may well be accommodated by having the in-PP modify the ‘preparatory stage’ (Moens and Steedman (1988)), although Croft himself is not very sure whether this is the correct analysis (p. 66).

Still another respect in which the two-dimensional model seems attractive concerns the distinction between two types of boundedness. The first type of boundedness is associated with Vendlerian categories of achievements and accomplishments and stands for a natural endpoint of an event, whereas the second type simply refers to an action that is finished, irrespective of whether a natural endpoint has been reached or not. Thus while the event in (18a) is bounded in either definition, that in (18b) is not: It seems bounded in the sense of being an accomplishment, but is not bounded in the sense that the natural endpoint is not necessarily attained.

(18) a. I wrote a letter.

b. I was writing a letter.

The two-dimensional analysis allows one to straightforwardly distinguish the two types of boundedness. The existence of a natural endpoint is the existence of a result state defined on the qualitative state dimension. This is called *q*-boundedness. In contrast, the boundedness of a particular event in a particular occurrence is defined by the existence of profiled beginning and ending phases on the *t* dimension. This is called *t*-boundedness. In this way the two types of boundedness can be overtly differentiated in the
two-dimensional analysis.\footnote{Declerck and his followers (Declerck (1991), Depraetere (1995)) employ different terms (telicity vs. boundedness) to distinguish the two notions.}

Croft’s two-dimensional representation is certainly very attractive: It clarifies key aspectual notions, and brings into the study of aspect the insights of frame semantics.

3.2. Aspect and Argument Realization

When it comes to the role of aspectual structure in an account of argument realization, again the wide coverage of linguistic phenomena related to verbs is quite impressive. At the same time, however, it is also true that the correlation between aspect and argument realization is far more complex than the role of aspect alone. Here I note a couple of things that indicate that aspect and force-dynamic structures are not so transparently correlated, after all. First, in the Cognitive Linguistics literature, sentences like (19) have been extensively discussed.

(19) The road \{goes into/zigzags through/enters/reaches\} the forest. Crucially, the sentences in (19) express states. This is because these sentences involve subjective motion, as opposed to objective motion as in (20) \cite{Langacker 1986, Matsumoto 1996a, 1996b, Iwata 1996, Talmy 2000a, 2000b}. Among others).

(20) John \{went into/zigzagged through/entered/reached\} the forest. In (19), the conceptualizer mentally moves along the path in the manner described by V, in sharp contrast to (20), where the subject entity moves physically along the path. Since nothing moves objectively with the passage of time, subjective motion sentences like (19) cannot be accommodated into the three-dimensional theory as it stands, where change is characterized in terms of the passage of time. In order to handle subjective motion sentences like (19), Croft would have to devise a way to capture an abstract change of location without reference to the passage of time.\footnote{Subjective motion sentences may become eventive when the passage of time is somehow superimposed. See Iwata (1996).}

Second, the telic/atelic distinction is not so transparently correlated with the quantization of direct objects as once believed. In the literature, sentence pairs like (21a, b) have often been cited as an indication that objects comprising a specified amount induce a telic reading as in (21a), and those comprising an indefinite amount an atelic reading as in (21b).
(21)  a. She ate an apple in a couple of minutes.
    b. She ate apples for a couple of minutes.

This contrast has been accounted for by saying that in (21a) *an apple* is quantized and therefore provides an endpoint, whereas in (21b) *apples* is non-quantized and fails to provide an endpoint.

Recently, however, a number of scholars have pointed out that even with a singular definite object the endpoint need not be reached (Borer (2005), Smollett (2005), Rappaport Hovav (2008)). Thus Smollett (2005) observes that both *in-PP and for-PP are acceptable in (22a, b).

(22)  a. Thomas mixed the batter {in/for} 5 minutes.
    b. Anne Marie polished the countertop {in/for} 15 minutes.

(22)  a. Thomas mixed the batter {in/for} 5 minutes.
    b. Anne Marie polished the countertop {in/for} 15 minutes.

(22)  a. Thomas mixed the batter {in/for} 5 minutes.
    b. Anne Marie polished the countertop {in/for} 15 minutes.

(22)  a. Thomas mixed the batter {in/for} 5 minutes.
    b. Anne Marie polished the countertop {in/for} 15 minutes.

(22)  a. Thomas mixed the batter {in/for} 5 minutes.
    b. Anne Marie polished the countertop {in/for} 15 minutes.

(22)  a. Thomas mixed the batter {in/for} 5 minutes.
    b. Anne Marie polished the countertop {in/for} 15 minutes.

(22)  a. Thomas mixed the batter {in/for} 5 minutes.
    b. Anne Marie polished the countertop {in/for} 15 minutes.

(22)  a. Thomas mixed the batter {in/for} 5 minutes.
    b. Anne Marie polished the countertop {in/for} 15 minutes.

Even with sentences like (21a), an atelic reading is easily obtained, given suitable contextualization (Smollett (2005: 50); cf. Borer (2005: 140–141)).

(23)  a. Kathleen ate an apple for a couple of minutes while talking on the phone.
    b. Kathleen ate an apple for a couple of minutes, and then she read her novel.

In other words, even with an incremental theme object, both telic and atelic readings are available. 5

The availability of both readings may not be a big problem for Croft’s theory. The two readings can probably be readily accommodated by saying that the verb *eat* may express either a directed activity or an undirected activity.

(24)  a. She ate an apple in a couple of minutes. → directed activity
    b. She ate an apple for a couple of minutes. → undirected activity

However, an activity may go on even after the ‘endpoint’ is reached. In the literature on locative alternation, where certain verbs alternate between a locatum-as-object variant and a location-as-object variant as in (25) (Rappaport and Levin (1988), Pinker (1989), Iwata (2008a)), the location-as-object variant is generally taken to express a change of state and therefore to be telic, as shown in (26).

5 An anonymous reviewer questions Smollett’s observation about (23a, b). But all three of my informants (two Americans and one New Zealander) unanimously agree that both sentences are perfectly natural.
(25)  a. John sprayed paint on the wall. locatum-as-object
    b. John sprayed the wall with paint. location-as-object

(26)  John sprayed the wall with paint in an hour. However, this is not necessarily the case. Citing (27), Dowty (1991: 591–592) observes that even after the wall is completely covered, one can go on putting paint on it indefinitely.6

(27)  John sprayed this wall with paint for an hour. Thus an atelic reading may arise not only when the endpoint is not reached, but also after the endpoint has been reached. This latter type of atelic reading is not covered in Croft (2012), although it can be readily accommodated given his three-dimensional representation.

4. Resultatives and Aspectual Structure

The two problems noted in the last section may or may not be big problems, depending on one’s stance. But the reason why I specifically chose to mention these two is that they are exactly the two problems that arise with resultatives as well.

4.1. Resultatives that Are Stative

In the literature, there seems to be a consensus that resultatives are necessarily eventive. As far as I know, there are few, if any, studies that point out the existence of resultatives that are stative. Notice, however, that the sentences in (28) count as adjunct resultatives in the sense of Iwata (2006): In (28a, b), the result phrases further specify the changes entailed in the verb meanings.7

(28)  a. The trees around them stood tall and straight, like a phantom army.
    b. In complete figures the head generally sits straight on the lion-neck, but the long, sinuous bird’s neck is a constant feature of the cauldron-heads. (both from BNC)

Significantly, both stand in (28a) and sit in (28b) are predicated of inanimate entities and therefore cannot be in the ‘assume position’ meaning

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6 Notice that this reading is available when a substance is applied to a surface, like spray or smear, but not when stuff is put into/onto a container, like load or pack.

7 As a matter of fact, sentences like (28) and (29) are cited as instances of Adjunct resultatives in Iwata (2006: 456).
or ‘maintain position’ meaning in the sense of Levin and Rappaport Hovav (1995: 127). Rather they are simply in a fixed position with the meaning ‘simple position’ and are therefore stative.

Similarly, note that the sentences in (29) also qualify as adjunct resultatives, in that the result phrases further specify the changes entailed in the verb meaning.

(29) a. Behind the house, the railway embankment stretches straight and level in both directions as far as the eye can see, which is a long way.
   b. A red and orange sunset spread across the sky, and the shadows stretched long across the path.
   c. The beautiful brocade coat stretched taut across the back, spreading to an intimidating width with his angry, indrawn breath.

(all from BNC)

Again, in these sentences the verb stretch is predicated of inanimate entities and therefore these sentences cannot express any special interpretation (e.g. habitual or ‘hot news’) of an action accorded by the present tense construction. Rather, it is used as a stative verb.

How are these stative resultatives to be accounted for? Quite probably, the sentences in (29) are to be analyzed as abstract motion sentences, as noted in the previous section.\(^8\) Those in (28) may well be handled along the same lines.

4.2. Resultatives that Are Atelic

Another thing that has been agreed upon in the literature concerning resultatives is that resultatives are necessarily telic (Levin and Rappaport Hovav (1995), Wechsler (2005), among many others). This seems to be a valid generalization, as long as we look at resultatives that are based on transitive verbs, like hammer the metal flat or wipe the table clean. But when we turn to resultatives that are based on intransitive verbs (i.e. so-called unergative verbs), it turns out that this generalization is not without exceptions. Thus while shout oneself hoarse certainly expresses a telic event in (30), it is clearly atelic in (31), as evidenced by an until-clause in (31a) and for a while in (31b).

\(^8\) Furthermore, stretch needs to be analyzed by means of a reflexive path, as proposed by Lindner (1983: 94). It seems that stand tall and sit straight in (28) are to be analyzed similarly.
(30) He could’ve shouted himself hoarse before anyone inside heard him.  
(COCA)

(31) a. Scared of the dark and freezing in a T-shirt and track suit bottoms, Matthew shouted himself hoarse until he was discovered.  
(BNC)
b. I lay there and screamed myself hoarse for a while …  
(COCA)

Similarly, it is not difficult to find similar instances for drink oneself silly: In (32a) a for-PP indicates that drink oneself silly is atelic, and so does an until-clause in (32b).

(32) a. We then drank ourselves silly for the rest of the evening and had a few rounds of Auld Kendal snuff.  
(http://drownedinsound.com/in_depth/2944206)
b. I remember one specific evening when we drank ourselves silly until 2am …  
(http://sadnewspaper.blogspot.com/2006/04/end-has-no-end.html)

Thus all these evince an atelic usage of resultatives.

But why can shout oneself hoarse and drink oneself silly express atelic events at all, in sharp contrast to resultatives like hammer the metal flat or wipe the table clean? The key seems to lie in how we construe the activities in question. One usually stops hammering the metal when the metal becomes flat, because it is meaningless to continue hammering it; similarly, one is likely to stop wiping the table once the table has become clean. In other words, both hammering the metal and wiping the table are goal-directed activities, so that once the goal has been attained, the activity stops. This is why the result phrase serves to mark the endpoint of an activity.

But one can continue to drink even after one becomes ‘silly’; the drinking activity and the state of being silly can go on together. Similarly, one can continue to shout even when one has become hoarse. Obviously, one does not laugh or drink so as to attain the goal of being silly or hoarse. If anything, the activity and the result state are coalesced into a single whole and are practically indistinguishable in both cases.

Thus the seeming telicity of resultatives may actually be due to our world knowledge, rather than telicity being a defining characteristic of resultatives. At the same time, the atelic resultatives as illustrated in (31) and (32) bear a resemblance to the atelic interpretation of the location-as-object variant in (27): In both cases, an activity may continue even after a putative
endpoint has been reached. This suggests the need to devise a way of handling an activity reading which shows continuation even after an endpoint has been reached.

5. Resultatives and Force Dynamics

5.1. Spurious Resultatives

It has been shown in 4.1 that some adjunct resultatives like stand straight and stretch long are stative and therefore resist an explanation in terms of the three-dimensional model. Note that this serves to indicate that not all adjunct resultatives can be characterized in terms of “an incremental directed change process that leads to a result state” (Croft (2012: 329)). In this section, I will mention another respect in which some adjunct resultatives defy Croft’s analysis as it stands.

One of the three types of resultatives in Washio’s (1997) classification is spurious resultatives (which are regarded as a subtype of adjunct resultatives in Iwata (2006)). One characteristic of spurious resultatives is that they cannot be paraphrased in the same way that normal resultatives can be. Thus (33a) cannot be paraphrased as in (33b), and neither can (34a) be paraphrased with (34b).

(33)  
   a. He cut the meat {thick/thickly}.
   b. ≠He caused the meat to become thick by cutting it.

(34)  
   a. He cut the meat {thin/?thinly}.
   b. ≠He caused the meat to become thin by cutting it.

(Washio (1997: 17))

The failure of (ordinary) paraphrasing is due to the fact that the result phrase is not predicated of the direct object. Rather, what becomes thick and thin are slices of the meat. In other words, the result phrase is predicated of the created object which is not overtly expressed.

Thus, Croft’s account needs to be revised in such a way as to accommodate a created object of which the result phrase is predicated.

5.2. Resultatives with Non-Subcategorized Objects

5.2.1. Run the Pavement Thin

Despite many years of research on resultatives, there are still a number of problems that have not been satisfactorily solved. One of them is how to account for non-subcategorized object cases. Specifically, what entity may appear as a non-subcategorized object? Croft does not put much energy into addressing this problem. Citing (35), Croft (2012: 332) simply ob-
serves as follows:
The Fake NP Resultative of incremental theme verbs also lacks the Object participant found in the Transitive argument structure construction with these verbs. Instead, it realizes a new participant as Object, such that the undirected activity subevent of the participant in the one-participant construal causes the (nonincremental) accomplishment subevent of the Object participant to come about.

(Croft (2012: 332))

(35) The teacher read us into a stupor.

It is not very clear what entity can appear as a “new participant,” and what entity cannot.

In this connection, a very interesting thing becomes clear when we closely examine the resultative in (36).

(36) a. The joggers have run the pavement thin.

(Carrier and Randall (1992: 217))

b. The pavement in Central Park has been run thin by all the jogging enthusiasts.

(Levin and Rappaport Hovav (1995: 44))

While this kind of resultative has been very popular among linguists working on resultatives, not a single instance is found in the BNC or the COCA. Even on the web, few, if any, attested instances have been found (save for those that are constructed by linguists!). So run the pavement thin is far from being conventionalized. But when presented with this resultative, people generally seem to find it acceptable. This suggests that run the pavement thin conforms to some fundamental principle governing the formation of resultatives. But what is it?

The answer is to be found in the running scene. Note that running entails beating the path with one’s feet, as described in Figure 15.

Figure 15. Force transmission from the runner to the pavement

9 In this respect, sneeze the handkerchief off the table is similar to run the pavement thin. See also Kay (2005: 97, note 19).
In fact, that paths are beaten in walking or running is reflected in the expression *beat a path*, which we come across quite often.

(37) “They’ll *beat a path to your door* now. Aunt May is only the front runner. But then, she usually is.” (BNC)

The passive form is also acceptable.

(38) a. *A path is now being beaten* to the door of McGrain, who could not convince anybody in the game to give him a job in management for five years after he left Celtic.

b. … but economic pressures may force their librarians along *a path beaten* by professional colleagues in another part of the wood.

c. Xerox Corp’s Network and Professional Services organisation has followed IBM Corp down *the well-beaten path* to Chipcom Corp’s Southborough. (all from BNC)

Thus force-transmission to the pavement is implicit in the running scene, warranting a force-dynamic representation in (39).

(39) joggers → feet → pavement

Now an entity to which a beating force is applied quite often ends up being flat or thin.

(40) The palisaded earthwork that once lay across the neck of the promontory, beside which they foregathered, was *beaten half flat.* (BNC)

(41) a. Gold leaf can be *beaten thin* enough to become translucent. (http://premiergoldservice.com/Gold_Facts.html)

b. A paupiette is a piece of veal meat, *beaten thin*, and rolled with a stuffing of vegetables, fruits or sweetmeats. (http://www.righthealth.com/topic/Paupiette)

It is no wonder, then, that the pavement ends up being flat or thin as a result of the joggers’ running over it. After all, the pavement receives a beating force.

Despite appearances, then, *run the pavement thin* is similar to resultatives like *hammer the metal flat*, in that a result state is brought about via a physical force-transmission; the sole difference being that the force-transmission which is normally “off stage” is brought to the fore via a profile shift (cf. Boas (2003)).

It seems reasonable to suppose, then, that *run the pavement thin* is judged acceptable precisely because a very essential feature of resultatives, i.e. a force which is likely to cause a result state, is present in the running scene.
5.2.2. Roll—Flat/Smooth

To appreciate the significance of this point, let us next consider (42).

(42) *During the spring thaw, the boulders rolled the hillside bare.

(Levin and Rappaport Hovav (1995: 209))

(42) is intended as a resultative sentence, where roll is followed by a non-subcategorized object (the hillside). This sentence is unacceptable, despite the fact that the intended interpretation is pragmatically plausible. In fact, (42) can be paraphrased in exactly the same way as run the pavement thin, as shown in (43).

(43) a. The boulders’ rolling caused the hillside to become bare.
   b. The joggers’ running caused the pavement to become thin.

What distinguishes between the two cases, then?

It turns out that the crucial difference is whether force is transmitted to the direct object entity or not. To see this, let us begin with acceptable resultative sentences involving roll. In the BNC, roll—smooth and roll—flat are attested.10

(44) a. It’s like a parking lot out there, rolled smooth by rocks and wave action.
   b. In three hours we managed to get the contractors to build an earth ramp, roll it flat, cover it with gravel ...

(both from BNC)

In the literature it is well-known that roll may simply convey the turning over of a round object without implicating a change of location, as in (45) (Pinker (1989)).

(45) a. The ball rolled.
   b. John rolled the ball.

Notice, however, that the resultative sentences in (44a, b) are not based on roll in this sense. In (44a, b), what appears in direct object position (active) or subject position (passive) is a flat entity, which cannot possibly undergo the turning-over motion characteristic of roll, as exemplified in (45). Rather, (44a, b) seem to be based on a different sense of roll, namely one as exemplified in (46), where a flat entity appears in direct object position.

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10 Levin and Rappaport Hovav (1995: 209) argue that (42) is unacceptable because the roll in (42) is an unaccusative verb and therefore cannot assign Case to a non-subcategorized object. But then the roll in (44a) seems to be no different from the roll in (42), and should also be an unaccusative verb. So (44a) should be unacceptable according to Levin and Rappaport Hovav’s (1995) reasoning.
(46) a. When you’ve got it reasonably level, *roll* the surface with a *garden roller* filling in any hollows that appear.

   b. *Roll* out the bread lightly *with a *rolling pin* after cutting off the crusts and spread thickly with the cheese filling.

(both from BNC)

Here a rolling entity exerts a pressing force on a surface, as described in Figure 16 (Iwata (2002: 77)).

![Figure 16. ‘Press’-rolling](image)

Notice that *roll* in the press sense expresses a motion while in continuous contact with a surface. Crucially, the force exerted on the surface is the very force that causes the roller to roll. This means that force is imparted simultaneously to both the roller and the field. Thus, the force imparted to the field has a dual role: pressing the surface and rubbing the surface. It follows, therefore, that both pressing force and rubbing force are present in the semantics of ‘press’ *roll*.

Seen in this light, then, it is quite natural that *roll* may be followed by the result phrase *smooth*. In the BNC, the following verbs are attested with the result phrase *smooth*: *rub*, *polish*, *file*, *sand*, *grind*, and *roll*, as summarized in Table 1.

(47) a. By the time he had *rubbed* the surface *smooth*, stopping periodically for a chat with Jos, his shoulder was aching.

   b. A thick tapestry hung just above the small canopied fireplace, the floor had been *polished smooth*, and the great bed was covered by a gold-tasselled counterpane.

(both from BNC)

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11 An anonymous reviewer comments that he/she sees no difference between the two *roll*’s in (44a) and (45a), for the subject entities undergo the same rolling motion in both cases. But what is crucial is whether force is imparted to the surface as well. In (44a) the sea bottom is acted upon, because the rocks’ rough rolling has a significant impact on the surface entity. However, this is not the case in (45a), where the ball’s simple rolling leaves the surface unaffected.
Table 1. BNC counts of ‘V—smooth’

<table>
<thead>
<tr>
<th>Verb</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>rub</td>
<td>8</td>
</tr>
<tr>
<td>polish</td>
<td>6</td>
</tr>
<tr>
<td>file, sand</td>
<td>5</td>
</tr>
<tr>
<td>grind</td>
<td>2</td>
</tr>
<tr>
<td>roll</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>27</strong></td>
</tr>
</tbody>
</table>

Table 2. BNC counts of ‘V—flat’

<table>
<thead>
<tr>
<th>Verb</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>press</td>
<td>17</td>
</tr>
<tr>
<td>squash</td>
<td>5</td>
</tr>
<tr>
<td>hammer, fling</td>
<td>3</td>
</tr>
<tr>
<td>roll</td>
<td>2</td>
</tr>
<tr>
<td>pound, beat, slam, crush, dry, suck</td>
<td>1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>36</strong></td>
</tr>
</tbody>
</table>

Clearly, all these verbs lexically involve a rubbing force.

Similarly with flat. In the BNC, the following verbs are attested with the result phrase flat: press, squash, hammer, fling, roll, pound, beat, slam, crush, dry, and suck, as summarized in Table 2.

(48)  
a. *Press* it *flat* with the seam you have sewn down the back of the head of the puppet.

b. If the strip becomes curled when you cut it, put it on a hard flat surface and *hammer* it *flat*. (both from BNC)

Again, most of these verbs lexically involve a pressing force.

This indicates that verbs lexically involving a rubbing force readily occur with the result phrase *smooth*, while those lexically involving a pressing force readily occur with the result phrase *flat*. Thus *roll* may be accompanied by both *smooth* and *flat* as in (44) precisely because it lexically involves both pressing and rubbing forces, from which the result states of being smooth and flat directly follow.

By contrast, in the situation intended to be described by (42), the hillside may become bare as a result of the boulders rolling off as described in Figure 17, but not as a result of a pressing force applied to the hillside.
Rather, in order for *bare* to appear as a result phrase, the verb must involve the sense of removal. In the BNC I have so far found 26 instances of resultatives with *bare*, almost all of which are with the verb *strip*.

(49)  
   a. All trees are *stripped bare*, and the sky turns to mud, clouds fall to the ground breathlessly churning.  
   b. Shops in Manila have been *stripped bare* in panic buying …

(both from BNC)

<table>
<thead>
<tr>
<th></th>
<th>NP bare</th>
</tr>
</thead>
<tbody>
<tr>
<td>strip</td>
<td>25</td>
</tr>
<tr>
<td>eat</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>26</td>
</tr>
</tbody>
</table>

Table 3. BNC counts of ‘V—bare’

(50) is the only instance of *eat—bare*. Clearly, *eat* is understood in its removal sense.

(50) In a recent widespread drought, when all pastures were *eaten bare* and it was very difficult to obtain hay …  

(BNC)

In short, only verbs involving the sense of removing something from a place may be acceptably followed by the result phrase *bare*. The lexical meaning of *roll* may involve a pressing force and a rubbing force, as seen above, but not a removing force.

Thus what distinguishes (42) from (44a, b), and from *run the pavement thin*, is the fact that the direct object entity does not receive an appropriate type of force for the result state to ensue.

To conclude this subsection, while Croft’s discussion of resultatives is mostly based on aspect-related terms and valence-related terms, the issue of what entity can appear as a non-subcategorized object seems more approachable in terms of force-transmission.
6. Conclusions

Integrating aspectual and force-dynamic representations into a single format is quite an ambitious project. The two-dimensional aspectual structure presented promises to allow for handling many aspectual distinctions that have been noted but have not received a proper representation in an intuitively-appealing way. And the force-dynamic representation advanced is also likely to allow one to uncover many generalizations governing argument realization. So the three-dimensional representation which Croft (2012) proposes has great potential in a substantially wide range of research fields. It can likely be said that this book is a must for all researchers working on aspect, argument structure, or almost any topic in lexical semantics (and perhaps linguistics at large).

At the same time, it should be pointed out that there are innumerable topics to be covered in lexical semantics relating to verbs, and that much work needs to be done in order for the real significance of the proposed event structure to be appreciated. In this paper, how resultatives are handled in the proposed theory has been examined somewhat critically. It is true that (prototypical) resultatives may be characterized in aspectual terms in the way Croft does. But there are some resultatives that clearly resist an analysis along those lines. Rather, some characteristics of resultatives seem to be better accounted for in terms of force-transmission. It remains to be seen which aspects of resultatives are to be approached in aspectual terms and which in force-dynamic terms (It goes without saying that in this regard lower-level constructions are expected to play a large role, as argued in chapter 9 of this book). Only by doing so can we further develop the three-dimensional event structure and gain real insights into linguistic phenomena.

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