

RESEARCH

Talking about the weather: Two construals of
precipitation events in English

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Weather expressions such as *It is raining* have proven challenging for linguistic researchers; not only do weather expressions often have special linguistic properties, but languages show considerable variation in the morphosyntactic expression of such events. The main claim pursued here is that, in English, precipitation happenings can be linguistically construed as events (in the sense of Levin & Rappaport Hovav 2005) in two ways: as substance emission events—the sky is construed as emitting the precipitation—or as directed motion events—the precipitation is construed as moving down towards the earth due to gravity. Each construal involves a distinct event structure and, thus, is associated with its own pattern of syntactic behavior. When a precipitation happening is construed as a substance emission event, a type of activity, the verb expressing it shows the hallmarks of an unergative. When a precipitation happening or a substance emission happening is construed as a directed motion event, a type of scalar change event, the verb expressing it shows the hallmarks of an unaccusative. This paper focuses on English, but briefly discusses how the proposed analysis of English can illuminate the diverse behavior of weather verbs across languages. The availability of two construals sheds light on the expression of precipitation events in Romance languages, particularly on the continuing controversy about whether weather verbs are unaccusative or unergative.

Keywords: argument realization; event structure; unergativity; unaccusativity; weather verbs; precipitation verbs; emission verbs

1 Introduction

As Langacker (1991: 365) aptly puts it, linguistic expressions describing weather events and atmospheric conditions, such as those in (1), “are nearly as problematic and ill-behaved as the weather itself”. Not only do they often have special linguistic properties (e.g., putatively expletive subjects such as the *it* in (1)), but languages show considerable variation in how they express such events. For example, the type of weather event may be conveyed by the predicate, as in (1), or by a nominal, as in (2) (Eriksen et al. 2012).

- (1) a. It’s raining/hailing/snowing/sleeting. (precipitation event)
 b. It’s hot/cold/freezing (outside). (temperature event)
 c. It became dawn/dusk. (stage-of-day event)
- (2) Rain fell.

In English, weather expressions as in (1) are sometimes assumed to lack syntactic arguments; that is, they are taken to be aivalent. The *it* in such expressions is considered an expletive subject by many grammarians (Kruisinga & Erades 1911: 18; Curme 1931: 7; Visser 1963: 36; Huddleston & Pullum 2002: 1482; cf. Bolinger 1977; Chomsky 1981: 323–325);

on such an analysis, the sole purpose of *it* is to fulfill the requirement that an English clause have an overt subject (Chomsky 1981; 1986).

Relatedly, weather expressions present a challenge concerning the identifiability of the participants in the event being described. Depending on the meteorological phenomenon, it can be difficult to pick out distinct participants. For example, in the temperature event description in (1b), it is not obvious which entity, if any, is being described as *hot* or *cold*.

In this paper, we focus on a subtype of weather events in English, precipitation events, as in (1a). Descriptions of such events include precipitation verbs, among them those in (3).

(3) drizzle, hail, pour, rain, sleet, snow, sprinkle, ...

The participants in precipitation events are somewhat more easily identifiable than in some other types of weather events. For instance, expressions describing precipitation events may overtly realize a postverbal noun phrase, as in (4), which names a participant in the event, the precipitation. Alternatively, the verb *rain* itself, being denominal, could be seen as referring to the precipitation.

(4) It rained **an icy rain**.

Even when a participant is expressed, as in (4), it is hard to determine its semantic role: when rain rains from the sky, it could conceivably be conceptualized either as acting or as being affected. Concomitantly, the postverbal noun phrase expressing this participant could be projected as an external or an internal argument; that is, it is not obvious *a priori* whether precipitation verbs are unaccusative or unergative when occurring with such noun phrases. A further question is whether the same verb classification carries over to weather expressions that lack a postverbal noun phrase.

Previous work shows a lack of consensus concerning the unaccusative vs. unergative status of precipitation verbs, with researchers reaching four different conclusions. Noting similarities between English weather verbs and directed motion verbs such as *fall* (Rosen 1984: 66–67; Levin 1986; Levin & Rappaport Hovav 1995), Randall (2010: 93–94) extends an unaccusative, motion event analysis to precipitation verbs. In contrast, Pesetsky (1995: 110), noting the presence of cognate objects in examples such as (4), proposes that precipitation verbs are not unaccusative. Bleotu (2012) finds that the application of unaccusative diagnostics to sentences like (1a) produces inconsistent results; she argues that such sentences have two syntactic analyses, one with an unaccusative verb and the other with an unergative verb. Finally, Paykin (2010) takes the postverbal noun phrase in sentences like (4) to be a modifier, not an argument; according to her, weather verbs are avalent and therefore neither unaccusative nor unergative.

In this paper, we show that precipitation verbs in English alternately pattern as unaccusative or unergative verbs, depending on the type of event they are used to describe. Considerable work (Van Valin 1990; Levin & Rappaport Hovav 1995; Lieber & Baayen 1997) shows that unaccusative behavior is linked to scalar change event structures and unergative behavior to activity (or nonscalar change) event structures.¹ We show that the

¹ In this paper we distinguish a verb's event structure from its argument realization options—that is, the morphosyntactic frames it is found in. However, our conclusions could be recast along the lines of the considerable current work that collapses these two representations into a single, syntacticized event structure (Borer 2003; 2005; Harley 2005; Ramchand 2008; Harley 2010; Mateu 2012). What is crucial is that this work, like ours, recognizes a root–event structure distinction, although the event structure is syntactically instantiated via a little *v* or other heads.

same correlations hold for precipitation verbs. They show unergative behavior when their root is associated with a substance emission event structure, a subtype of activity event structure, as in (5a), also shown by substance emission verbs, as in (5b). They show unaccusative behavior when the verb root is associated with a directed motion event structure, a type of scalar change event structure, as in (6a); compare the directed motion verb in (6b). These two event structures are available to precipitation verbs because precipitation happenings in the world can be linguistically construed as events (in the sense of Levin & Rappaport Hovav 2005: 19–20) in two basic ways: as substance emission events, as in (5)—the sky is construed as emitting the precipitation—or as simple (i.e. non-causative) directed motion events, as in (6)—the precipitation is construed as moving down towards the earth due to gravity.

- (5) a. It rained (a light rain/sulfuric acid).
 b. The well gushed (oil).
- (6) a. A light rain rained on my head.
 b. An apple fell on my head.

Each construal of a precipitation happening is associated with a distinct event schema—a basic event type—which when brought together with a verb root constitutes an event structure. A single verb root may be associated with two event schemas because roots lexicalize only a small number of the attributes of the happenings they are used in the description of. For instance, precipitation roots lexicalize the form of precipitation,² which is common to both construals of precipitation happenings (e.g., the denominal nature of most of the English verbs in (3); see also Eriksen et al. (2012) on other languages). Thus, in English the root of a given precipitation verb may be found in sentences representing either of two construals, giving rise to unaccusative or unergative behavior.

We also show that our analysis illuminates the diverse behavior of weather verbs across languages. Specifically, it helps resolve a controversy over whether weather verbs in Romance languages are unaccusative or unergative (Ruwet 1991; Benincà & Cinque 1992; Paykin 2010; Bleotu 2012; 2013; Fábregas 2013; Meulleman & Stockman 2013; Fábregas 2014).

The paper is structured as follows. In Section 2 we situate precipitation verbs and events in the larger context of weather verbs and events. In Section 3, by contrasting the *it* of precipitation events with the expletive *it* of raising constructions, we argue that precipitation verbs select a semantically contentful argument in sentences such as *It's raining*. With this established, in Section 4 we show that precipitation verbs pattern like substance emission verbs. Specifically, verbs of both types have two argument realization options, one with the hallmarks of having an unaccusative verb and the other an unergative verb. In Section 5, we argue that the two argument realization options arise because both precipitation happenings and substance emission happenings may be construed as events in two ways. In Section 6, we extend our analysis to precipitation verbs in Romance languages and clarify the unaccusative vs. unergative status of such verbs in Italian. Section 7 concludes.

2 Precipitation events as a subtype of weather events

As background, this section briefly discusses precipitation verbs and precipitation events within the larger landscape of weather verbs and weather events. Reference to a notion of weather verb in the literature might suggest that all such verbs show the same

² Given the figurative uses of some precipitation verbs (e.g., *Confetti rained down on the crowd*), it is possible that what the root encodes is some more abstract features of the form of precipitation, rather than the precipitation itself.

morphosyntactic behavior. In fact, Levin (1993: 276) identifies such a class in English, which subsumes verbs used in the description of a wide range of meteorological events, ranging from rain to thunder and lightning. Following considerable literature, she brings these verbs together because unlike the preponderance of English verbs, they take a putatively expletive *it* subject, a property that often holds of weather verbs in other languages (Eriksen et al. 2012).

More recent studies (Eriksen et al. 2012) suggest that several distinct types of meteorological phenomena should be recognized (cf. (1)), as they may show distinct linguistic expressions (even if, as in many languages, these expressions all have an expletive subject). These differences most likely reflect differences in the nature of these phenomena, which lead to their being construed as events in distinct ways, i.e. being assigned different event structures. For instance, brief discussions of the verbs *lightning* and *thunder* and their counterparts in other languages suggest that the associated weather phenomena are not construed as events in the same way as precipitation happenings (Benincà & Cinque 1992: 158; Meulleman & Paykin 2016: 61).

This point emerges particularly clearly in two recent studies of Spanish meteorological expressions, which contrast precipitation verbs and stage-of-day verbs (Fábregas 2013; Meulleman & Stockman 2013; Fábregas 2014). Stage-of-day verbs, such as those in (7), describe changes from one stage of the day to another, as in the dawning of a new day, thus falling under meteorological verbs broadly construed.³

- (7) *Spanish* Fábregas (2013: 7)
amanecer ‘dawn’, *atardecer* ‘become dusk’, *anochecer* ‘become night’

Both Fábregas (2013; 2014) and Meulleman & Stockman (2013) show that the morphosyntactic expression of events of entering a particular stage of the day differs in several ways from that of precipitation events. On this basis, Meulleman & Stockman (2013) propose that stage-of-day verbs are a type of verb of appearance, while precipitation verbs are a type of change-of-location verb.⁴

This paper focuses on precipitation verbs—and, correspondingly, precipitation events—because they constitute a coherent subclass of the larger class of weather verbs and include the most frequently cited weather verbs.

3 The status of precipitation *it*

To identify the type of event structures associated with precipitation verbs, we must first establish the status of precipitation *it*. Bolinger (1973) and Chomsky (1981) convincingly argue that weather *it* has some semantic content, distinguishing it from the “true expletive” *it* seen with raising verbs, which is not semantically contentful. Instead, weather *it* should be considered either a nonreferential “quasi-argument” (Chomsky 1981: 323–325; Rizzi 1986; Rizzi 1990: 86; Vikner 1995: 227–228) or a fully referential argument (Bolinger 1973; 1977; Bennis 1986; Pesetsky 1995: 111; Stephens 2007).⁵ Despite widespread and

³ In English the relevant happenings are typically expressed periphrastically (cf. (1c)). The only such verb is *dawn*, and even it is most often used figuratively to refer to an abstract transition (e.g., *It dawned on me that she must already have heard the rumor*).

⁴ Despite the agreement that stage-of-day and precipitation verbs differ in their morphosyntactic behavior, there is disagreement regarding their analysis, which we do not resolve here. Compare Meulleman & Stockman (2013), who as mentioned take stage-of-day verbs to be verbs of appearance, and, thus, unaccusative, with Fábregas (2013; 2014), who takes them to be unergative.

⁵ We do not take a position on whether precipitation *it* is a full, referential argument or a quasi-argument. What matters here is that it has some semantic content, distinguishing it from the expletive *it* of raising constructions. Although we argue in Section 4 that precipitation *it* bears the same semantic role as the (fully referential) emitter argument of core substance emission verbs, our proposal does not require precipitation *it* to be referential.

longstanding support for this proposal, the alternative proposal—that weather *it* is a meaningless expletive—persists, appearing in grammars of English, introductory syntax textbooks, and research articles (Quirk & Greenbaum 1973: 173; Hurford 1994: 227; Berk 1999: 21; Huddleston & Pullum 2002: 1482; Seppänen 2002; Carnie 2007: 228). Such an analysis reflects the intuition that precipitation events lack participants. In light of the tenacity of this alternative proposal, we believe that it is worthwhile to bring together evidence that precipitation verbs select semantically contentful arguments, as Bolinger, Chomsky, and others have argued. Some of this evidence also provides a springboard for our own larger analysis of precipitation verbs.

The relevant syntactic and semantic properties are best illustrated by contrasting precipitation *it* with the *it* found when raising verbs like *seem* and *appear* take a finite sentential (i.e. *that*) complement, as in (8).⁶

- (8) a. It seems that Tracy jogged yesterday.
b. It appears that Jordan won the game.

We take this *it* to be an uncontroversial “true expletive” as these verbs clearly select a single propositional argument. The contrasting behavior of precipitation verbs and raising verbs suggests that precipitation verbs assign a semantic role in sentences like *It’s raining* and are not avalent.

Precipitation *it* appears in what are considered to be argument positions, and specifically, positions that are typically filled by agents, volitional arguments with control over the unfolding of the event they are participating in.⁷ Subject control verbs like *try* semantically select for two arguments, an agent, realized as the subject, and an infinitival sentential complement, whose PRO subject is controlled by the subject of the matrix clause and is semantically restricted to also be an animate volitional entity, just as agents are. Although raising verbs cannot appear under *try* and other control verbs, as in (9), precipitation verbs can, as in (10) (Chomsky 1981; Zaenen & Engdahl 1994: 187; Pesetsky 1995: 110–111; Davies & Dubinsky 2004: 7–8).⁸

- (9) a. It tried [_ to seem that Tracy jogged].
b. It refused [_ to appear that Jordan won the game].

- (10) a. It tried [_ to rain today] but the sun came out!⁹
b. But it refused [_ to rain]¹⁰

⁶ We do not use the diagnostics in this section to explore whether the *it* found in other types of English weather expressions has the same status as precipitation *it*, leaving open the possibility that this *it* is not semantically contentful.

⁷ We use the term “agent” in a narrow sense and use the term “effector” from Van Valin & Wilkins (1996) to cover the range of semantic argument types that can be realized as external arguments, including agents, natural forces and other causes, emitters, and certain instruments—those instruments which can perform an action in some sense autonomously.

⁸ The same contrast appears with object control verbs like *order* and *force*. Such verbs require the PRO subject of their infinitival complement to be coreferential with their object, which is typically an animate, volitional entity; thus, the referent of PRO must also have these properties. The *it* of raising verbs cannot appear as the object of such a control verb, as in (i), but the *it* of a precipitation verb can (Davies & Dubinsky 2004: 7), as in (ii).

(i) *She ordered it [_ to appear that Jordan won the game].

(ii) He once ordered it [_ to rain]—and it did!

(<http://www.law.hawaii.edu/news/2010/12/29>; accessed 2/10/2019)

⁹ <https://www.facebook.com/U70FP/posts/552139611494847>; accessed 2/10/2019.

¹⁰ Dokey, Cameron. 2008. *Belle: A Retelling of “Beauty and the Beast”*. <https://books.google.com/books?isbn=1481479660>.

The volitionality and animacy associated with a controller seem at odds with the semantic content of the pronoun *it*, especially if it is taken to be an expletive. Yet the felicitous occurrence of precipitation verbs in the complement of a control verb means that precipitation *it* is understood as having control over the occurrence of the precipitation event. Stephens (2007) argues that this interpretation arises from a general process of coercion, which is also found when certain other inanimate arguments are the subjects of a subject control verb, as in (11).¹¹

(11) This song is trying to annoy me to death. (Stephens 2007: 25, (66a))

Stephens takes the coercibility as further evidence for the semantic contentfulness of precipitation *it*; see also Pesetsky (1995: 111), who reaches the same conclusion from control data.

The two types of verbs show a related, but less often discussed difference. Precipitation verbs can appear with infinitival purpose clauses, but raising verbs cannot, as in (12) (Ruwet 1991: 134–135). The interpretation of the unexpressed PRO subject of the purpose clause must be controlled by an argument in the matrix clause, and due to the semantics of such clauses this subject must be an agent or possibly some other type of effector which has control over bringing about the event.

(12) a. *It only seems that Tracy jogged [_ to annoy us]. (on intended interpretation)
b. *It appeared that Jordan won the game [_ to cheer her up.]

(13) a. That's why it rains [_ to sedate you]. It rains [_ to turn you numb].¹²
b. They tell us it rains [_ to make the grass and flowers grow].¹³

Precipitation *it* contrasts with raising *it* with respect to yet another phenomenon which involves showing an agent-like interpretation. Precipitation *it* can be the addressee in an imperative (Stephens 2007), as shown in (15), but raising *it* cannot be, as shown in (14).

(14) a. *Please (don't) seem that Tracy jogged.
b. *Please (don't) appear that Jordan won the game.

(15) a. Please don't rain.¹⁴
b. "Please snow tomorrow. Please ..." you whispered.¹⁵

The addressee of a felicitous imperative must be an event participant presumed by the speaker to have control over bringing about the relevant event. Thus, the acceptability of the examples in (15) also suggests that precipitation *it* has some semantic content that is being coerced in them.

Additionally, precipitation *it* and raising *it* differ with respect to their ability to occur as the genitive complement of a nominalization of a raising verb. Expletives are said to be disallowed as the genitive complement of a nominalization (Huddleston & Pullum 2002:

¹¹ As a reviewer notes, the writer appears to be consciously trying for a stylistic effect in such sentences, perhaps anthropomorphizing the weather; see also Chomsky (1981: 141, n. 40). What matters is that a comparable option is not available to raising verbs.

¹² <https://medium.com/who-i-am/f85d072f669e>; accessed 2/10/2019.

¹³ <http://www.gadzillionthings.net/Think325.html>; accessed 2/10/2019.

¹⁴ <http://yarnonthehouse.blogspot.com/2013/04/please-dont-rain.html>; accessed 2/10/2019.

¹⁵ <https://www.deviantart.com/frost-life/journal/Jack-Frost-x-Reader-The-Winter-Spirit-361187220>; accessed 2/10/2019.

1261). The *it* of raising verbs may not occur in such positions, as in (16), but the *it* of precipitation verbs may, as in (17).¹⁶

- (16) a. *its tendency to seem that Tracy jogs
(cf. Tracy's tendency to seem to jog)
b. *its ability to appear that Jordan won the game
(cf. Jordan's ability to appear to win the game)
- (17) a. But one of the most dreaded aspects of the annual fun is its tendency to rain.¹⁷
b. ... so the prevailing wind mostly just drives the moisture a long, long way into the hot Red Centre, by which time it has simply lost its inclination to rain at all.¹⁸

Whatever the explanation of this restriction, it clearly sets the two types of *it* subjects apart.

Furthermore, precipitation verbs may take nominal complements (Ruwet 1991: 108–109), as shown in (20). In contrast, raising verbs cannot when their subject is *it*; this property holds whether the object is a nominalization of a proposition or a cognate nominal, as shown in (18) and (19).

- (18) a. *It seemed Tracy's awakening.
(cf. It seemed that Tracy awakened.)
b. *It appeared Jordan's winning the game.
(cf. It appeared that Jordan won the game.)
- (19) *It appeared Jordan's appearance.
- (20) a. Then the next day it was hailing huge hail for at least 20 minutes¹⁹
b. It snowed a foot of new snow that first night.²⁰

By Burzio's Generalization (1986), which links a verb's ability to assign accusative case to its having a “thematic”—or argument—subject, this property suggests that precipitation verbs should also take such subjects.²¹

Relatedly, the *it* of a raising verb cannot be replaced by a full noun phrase when the verb takes a complement, as in (21). In contrast, the subject of a precipitation verb can be a nominal like *the clouds*, *the sky*, or *the skies* in the presence of a complement, as shown in (22).

¹⁶ Sentences analogous to (17) are cited as ungrammatical in the literature (Postal 1974: 325; Pesetsky 1995: 110; Sichel 2007: 16), but we take them to be well-formed given that they are attested. Additionally, many attested examples are ambiguous: *it* may be understood either as precipitation *it* or as having a referent in the preceding context. Such ambiguous examples, while not providing strong evidence in favor of our argument, are consistent with it.

¹⁷ <https://www.chroniclelive.co.uk/news/north-east-news/annual-hoppings-set-return-thrill-1456007>; accessed 2/10/2019.

¹⁸ <https://www.quora.com/Why-does-much-of-Australia-get-so-little-rainfall>; accessed 2/10/2019.

¹⁹ <http://inthelandofenchantment.blogspot.com/2009/02/for-hannah.html>; accessed 2/10/2019.

²⁰ <http://ldsmag.com/snowed-in/>; accessed 2/10/2019.

²¹ As a reviewer notes, more recent work reformulates Burzio's Generalization in terms of nominative case assignment to overcome certain empirical shortcomings; see Woolford (2003: 302–303) for discussion and references. Woolford herself suggests that the better descriptive generalization is that “the object gets nominative Case where there is no (nominative) subject” (2003: 303, (4)). Under this formulation too, this property of precipitation verbs suggests that they have argument subjects.

As another reviewer notes, Wood (2017: 268–273) also exploits this link. He suggests Icelandic intransitive verbs with apparent accusative subjects are actually transitive verbs with a silent weather pronoun as subject. This set includes some precipitation verbs.

- (21) a. *The supposition seemed that Tracy jogged.
 b. *The fact appeared that Jordan won the game.
- (22) a. The clouds rained blood.²²
 b. The skies rained ice on Tuesday...²³
 c. The sky snowed gray soot ashes over us and the land...²⁴

Like precipitation *it*, such nominals can control the PRO subject of a complement clause with a subject control verb, as in (23), as well as the PRO subject of a purpose clause, as in (24).

(23) The sky tried [_ to rain on us at that point] and we just laughed.²⁵

(24) And the sky rained [_ to put out the fire ...]²⁶

We take the parallel behavioral properties as evidence that these nominals are filling the same semantic role as precipitation *it*; this conclusion is reinforced by further parallels presented in Section 4.

There are significant differences then between the behavior of precipitation *it* and raising *it*, and these differences are consistent with the analysis in which precipitation verbs select arguments.²⁷ Thus, a canonical precipitation expression should not be analyzed as impersonal.

Previous proposals concerning the semantic role of weather *it*—and we use the term “weather” on purpose as this work generally does not distinguish precipitation verbs from other weather verbs—are that *it* denotes the environment and ambient conditions (Bolinger 1973: 261; 1977: 77–78), a special atmospheric role (Rizzi 1990: 86), or a natural or abstract force (Pesetsky 1995: 111); see also Davidse & Noppen (2003: 81–83) for related discussion. These characterizations, which are consistent with the types of overt subjects in (22), acknowledge the ontological nature of the subject nominal rather than its semantic role in the event. It is its semantic role that provides insight into the event structure of such verbs, as we now discuss.

4 Precipitation verbs as substance emission verbs

In this section, we provide evidence for the claim that precipitation verbs pattern with substance emission verbs. The verbs in (25) represent “core” substance emission verbs;²⁸ such verbs are used in descriptions of happenings in which an entity—the source—emits a substance.

²² <https://m.fanfiction.net/s/9381177/1/The-War>; accessed 2/10/2019.

²³ <https://welcometocenturyfarmhouse.typepad.com/welcome-to-century-farmhouse/2011/04/beyond-the-door.html>; accessed 2/10/2019.

²⁴ Danniels, Jordan N. 2003. *The North Kingdom*. <https://books.google.com/books?id=Q8VHDwAAQBAJ>.

²⁵ <http://backroadstouring.net/phpBB/viewtopic.php?p=11920&sid=cfbc346-4bbb1192-e1508e4d9-910530c1>; accessed 2/10/2019.

²⁶ Neil Young with Crazy Horse. 2012. Lyrics to “Walk Like a Giant”, *Psychedelic Pill*.

²⁷ Our findings are consistent with two hypotheses concerning the status of *it*: either *it* is a regular argument of the verb that bears a semantic role, or else precipitation verbs assign a semantic role to an unexpressed argument, perhaps one co-indexed with *it*. Depending on the implementation of the latter analysis, it could explain the intuition of many grammarians that precipitation *it*, “if it has any meaning at all” (Quirk et al. 1985: 349), does not have ordinary referential meaning. For expository purposes, we adopt the first hypothesis, and we leave the task of choosing between them to future research.

²⁸ In the following sections, we refer to the verbs that are most prototypically considered substance emission verbs, such as those in (25), as “core” substance emission verbs to distinguish them from a broader notion of substance emission verb that includes precipitation verbs and possibly also verbs of bodily excretion, such as *belch*, *cough*, and *spit*.

(25) dribble, drip, gush, leak, ooze, seep, ...

In fact, precipitation events are easily conceptualized in terms of substance emission: entities from which precipitation falls—the sky or clouds—are the source of the precipitation, and the precipitation itself is the emitted substance. That is, precipitation *it* and nominal subjects such as those in (22) are the source of precipitation.

We now argue that the conceptual parallels gain further support from striking similarities in the argument realization options manifested by verbs of the two types. Specifically, verbs of each type can appear in an unaccusative or unergative morphosyntactic frame, depending on systematic differences in their event structures.

4.1 Initial argument realization parallels

We now lay out some initial similarities in available argument realization options that support the proposal that precipitation verbs are a type of substance emission verb.²⁹

First, emission verbs in general are typically considered intransitive verbs, and, in fact, substance emission verbs are found in intransitive sentences that lack an object, as in (26).

- (26) a. The well gushed.
 b. The wound oozed.
 c. The faucet dripped.

Precipitation verbs are similar in this respect: they typically are found without an object, as in (27).

(27) It rained.

However, core substance emission verbs, unlike other emission verbs, select a second argument, the emitted substance, which may be expressed as an object, as in (28).

- (28) a. The well gushed oil.
 b. The wound oozed pus.
 c. The faucet dripped rusty water.

Again, precipitation verbs, too, may take an object, expressing a substance—the precipitation (e.g., *It rained a light rain*).

Second, precipitation verbs take a limited range of subjects, as do most core substance emission verbs. Levin (1993: 233) writes that substance emission verbs denote the emission of “a substance that is particular to some entity”, and describe “intrinsic properties of their subjects”. Precipitation verbs take this property to an extreme: they predominantly take *it* as their subject. They occasionally take explicit source subjects, as in (29), which provides examples with and without an object; see also (22).

- (29) a. It was the night when the sky rained fire.³⁰
 b. ... the clouds rained harder, and that left less water in them...³¹

Further, substance emission verbs, as observed by Levin (1993: 32–33), show the source/substance argument alternation. That is, these verbs are found in two related

²⁹ A similar point is made for Icelandic by Maling (2002: 69), who describes precipitation verbs as verbs of “heavenly emissions”. She notes that the nominal denoting the precipitation receives dative case, the same case used for the emitted substance with core substance emission verbs and verbs of bodily excretion.

³⁰ Modern Talking. 2002. Lyrics to “When the Sky Rained Fire”, *Victory*.

³¹ Modesitt, L. E., Jr. 2014. *Cyador’s Heirs*. <https://books.google.com/books?id=XamfAgAAQBAJ>.

syntactic frames that involve the same arguments but express them differently. The source can be realized as the subject, with the emitted substance optionally expressed as object, as in (30a). Alternatively, the emitted substance can be realized as the subject, with a directional prepositional phrase denoting the source, as in (31a).³² Precipitation verbs display the same pattern: in (30b), *it* or an explicit source argument serves as the subject, with the precipitation—the emitted substance—expressed as an optional object, and in (31b), the precipitated substance serves as the subject, with the source expressed in a directional prepositional phrase.³³

- (30) Source-as-subject frame
- a. The well gushed (oil).
 - b. It/the dark sky rained (a light rain/sulfuric acid).
- (31) Substance-as-subject frame
- a. Oil gushed from the well.
 - b. A light rain rained from the dark sky.

In Sections 4.2 and 4.3, we show that the parallels are even more extensive. Core substance emission verbs (the (a) examples) display unergative behavior in their intransitive uses when taking the source as subject and unaccusative behavior when taking the substance as subject. Precipitation verbs (the (b) examples) show the same pattern: they manifest unergative behavior when taking weather *it* or other source of precipitation as subject in their intransitive uses, and unaccusative behavior when taking the precipitation as subject.

To demonstrate these parallels, we apply unaccusative and unergative diagnostics. Although we recognize the myriad issues besetting the validity of certain diagnostics (see Rosen 1984; Levin & Rappaport Hovav 1995: 4–17, 215–277, among others, for discussion), what matters is that core substance emission verbs and precipitation verbs systematically show parallel patterns of behavior according to which type of subject is chosen. Whatever the ultimate status of some diagnostics, the patterns justify our larger proposal: precipitation verbs constitute a subset of substance emission verbs.

4.2 Unergative behavior and the source as subject

Levin & Rappaport Hovav (1995: 138–142) argue that all types of emission verbs, including substance emission verbs, are unergative; see also Reinhart (2002: 245). However, previous analyses are based on the source-as-subject pattern; as we show in Section 4.3, the diagnostics yield different results when the substance is the subject.

Although the source argument of core substance emission verbs is neither agentive nor animate, unlike the argument of the most typically cited unergative verbs, these verbs behave as unergative with respect to standard diagnostics in the source-as-subject pattern, as in (30a). Precipitation verbs with source subjects, as in (30b), also behave as unergative.

- (30) a. The well gushed (oil).
b. It rained (a light rain/sulfuric acid).

³² The alternation is based on having a source phrase in the substance-as-subject variant, but in fact any type of directional prepositional phrase is possible with a substance subject; see Section 4.3.

³³ We note that Gougenheim (1945: 191, 194) recognizes source-as-subject and substance-as-subject uses of French precipitation verbs, citing literary examples.

Unergative verbs are set apart from unaccusative verbs by their ability to assign accusative case (Burzio 1986). This property is manifested in their ability to take various types of objects, whether selected or not. This property has been linked to Burzio's Generalization (1986); see Rothstein (1992) for discussion. We consider two of its manifestations, cognate object constructions (Marantz 1984: 181–182; Larson 1988: 386–387; Massam 1990; Macfarland 1995; Pesetsky 1995: 110) and nonselected object resultative constructions (Simpson 1983; Marantz 1984: 182–183; Levin & Rappaport Hovav 1995), and show that core substance emission verbs and precipitation verbs behave as unergative when they take the source as subject.

Researchers (Pesetsky 1995: 110; Höche 2009: 131; Eriksen et al. 2012: 390) note that precipitation verbs take cognate objects, as well as their hyponyms and superordinates, as in (33). Although not usually included among cognate object verbs, core substance emission verbs can take such objects, as in (32).

- (32) a. My 2nd child was like a slug — oozing a **constant stream of ooze**.³⁴
 b. there seems to be 1 little spot ... that is dripping a **little drip**.³⁵
- (33) a. Then the next day it was hailing **huge hail** for at least 20 minutes.³⁶
 b. It snowed a **foot of new snow** that first night.³⁷
 c. All day long it has drizzled **cold rain**.³⁸

As noted in Section 3, this data supports our proposal that precipitation verbs have a “thematic” subject—they can assign accusative case, so by Burzio's Generalization or its descendants (see note 21), they must have an external argument.

Core substance emission verbs and precipitation verbs also pattern with unergative verbs with respect to the resultative construction. As discussed by Simpson (1983) and Levin & Rappaport Hovav (1995), among others, when unaccusative verbs occur in this construction, the result phrase is predicated of their surface subject (e.g., *The hay dried black*). When unergative verbs occur in this construction, a result phrase cannot be predicated directly of the subject without the mediation of a “fake” reflexive object (e.g., *Pat talked *(herself) hoarse*). When precipitation verbs and core substance emission verbs occur in this construction, a result phrase cannot be predicated directly of their (source) subject without a reflexive object. Example (34) shows this with core substance emission verbs, while (35) and (36) show this with precipitation verbs, with both precipitation *it* and overt nominal subjects.

- (34) a. The creature [a squid] bucks and tosses, **spewing itself** dry on the journey up, a mess of black mucus.³⁹
 b. ... it [= the vaporizer] had long ago **gushed itself** dry.⁴⁰
 c. Then four of the last bottles were so over-carbonated that they **gushed themselves** empty.⁴¹

³⁴ <https://answers.yahoo.com/question/index?qid=20120618093506AAUYuH7>; accessed 2/10/2019.

³⁵ <https://www.doityourself.com/forum/gas-oil-home-heating-furnaces/14523-fan-blower-furnace-runs-all-time.html>; accessed 2/10/2019.

³⁶ <http://inthelandofenchantment.blogspot.com/2009/02/for-hannah.html>; accessed 2/10/2019.

³⁷ <http://ldsmag.com/snowed-in/>; accessed 2/10/2019.

³⁸ Cowert, John. 2010. *A Dirty Old Man Goes to the Dogs*. <https://books.google.com/books?id=2rUQTv00aEcC&pg>.

³⁹ Hosking, Corrie. 2004. *Ash Rain*. <https://books.google.com/books?isbn=1862549842>.

⁴⁰ Birstein, Ann. 2015. *The Sweet Birds of Gorham*. <https://books.google.com/books?isbn=1497697344>.

⁴¹ “Carbonation problem”, *Northern Brewer Homebrew Forum*, February 6, 2008; <http://forum.northernbrewer.com>.

- (35) a. Thankfully it **rained itself** dry yesterday and today was a lot about the sunny times.⁴²
 b. Lots of snow beckoned Red to come and play, but we had to wait for some galoshes to arrive in the mail, or he would be drowned in the cold. Then, it **rained itself** silly for a day.⁴³
- (36) a. Hopefully the sky will have **rained itself** dry by next Wednesday and we will have a sunny warm summers evening.⁴⁴
 b. a billowing thundercloud **rains itself** to pieces on [a] sweltering day⁴⁵

More generally, precipitation verbs are found in resultative constructions with nonselected objects (beyond the “fake” reflexives) with the source as subject. Again, the source may be precipitation *it*, as in (37), or an overt nominal, as in (38). Such resultatives, too, are an unergative hallmark.

- (37) a. It is so late, it has **snowed us** into a dream.⁴⁶
 b. Needless to say, it totally **rained us** out of bridal party portraits before the ceremony, as well as the ceremony itself!⁴⁷
- (38) a. That dark cloud **rained us** into a bright new day ...⁴⁸
 b. It's like the sky **snowed them** into the stands.⁴⁹
 c. So many times you've been the field where storms **hailed the crops** flat ...⁵⁰

Two further English diagnostics involve forms of the passive. One involves the formation of adjectival passive participles of intransitive verbs. Such participles may be predicated of subjects of unaccusative, but not unergative verbs (Bresnan 1982; Hoekstra 1984; Levin & Rappaport 1986); contrast *a recently appeared book* with **a much exercised athlete*. Neither core substance emission verbs nor precipitation verbs allow such participles to be predicated of the source, as shown in (39).

- (39) a. *the violently gushed well
 b. *the recently snowed sky/clouds

Example (39b) has an overt source nominal; this property cannot be illustrated with precipitation *it*, as pronouns do not accept modification.

The ability to form prepositional (or pseudo-) passives is also diagnostic of a verb's status in English (Perlmutter & Postal 1984: 100–103). Such passives are available to unergative verbs, as in (40b), but not unaccusative verbs, as in (40a).

- (40) a. *This beach was arrived at by aliens.
 b. This bed was slept on by Abraham Lincoln.

⁴² <http://www.pinkbike.com/news/The-Course-Whisperer-vallnord-andorra-course-walk-2013.html>; accessed 2/10/2019.

⁴³ <https://www.redheadbabymama.com/here-we-go-traveling/>; accessed 2/10/2019.

⁴⁴ <https://www.vincentownersclub.co.uk/threads/local-bike-meet-kent.8283/>; accessed 2/10/2019.

⁴⁵ <https://www.pinterest.com/pin/506443920569054847/>; accessed 2/10/2019.

⁴⁶ Abu-Jaber, Diana. 2006. *The Language of Baklava*. New York: Anchor.

⁴⁷ <http://www.courtneyjonesphoto.com/jenny-and-todd-destination-wedding-photographer/>; accessed 2/10/2019.

⁴⁸ <https://www.dailykos.com/stories/2009/3/25/712900/-Silver-Linings-for-the-win>; accessed 2/10/2019.

⁴⁹ Nemeč, Phillip T. 2014. *The Chicago Syncopator*. <https://books.google.com/books?id=XX1bDQAAQBAJ>.

⁵⁰ <http://versiscape-lifesentences.blogspot.com/2011/11/>; accessed 2/10/2019.

Both core substance emission verbs and precipitation verbs allow such passives, as in (41) and (42), respectively, where they are the basis for adjectival passive participles.

- (41) a. ... a large, dirty man of about thirty, wearing a **sweated-through** T-shirt, detached himself from a nearby table ...⁵¹
 b. The man sweated [_{pp}through the T-shirt].
- (42) a. Back at Alumnae House I hung my **rained-on** clothes around my tiny room ...⁵²
 b. It/The heavy clouds rained [_{pp}on my clothes].

Next, unaccusative, but not unergative verbs may participate in the causative alternation (Hall [Partee] 1965; Burzio 1986; Levin & Rappaport Hovav 1995; Chierchia 2004; Schäfer 2009), illustrated in (43a) with an uncontroversial unaccusative verb and in (43b) with an uncontroversial unergative verb.

- (43) a. The child broke the vase.
 b. *The fire truck barked the dog.

Given the pattern described so far, neither core substance emission verbs nor precipitation verbs, when used intransitively with the source as subject, would be expected to have causative transitive counterparts with the source now expressed as the object. This expectation holds, as shown in (44).

- (44) a. *The workers/the change in water pressure gushed the fountain.
 b. *God/the high humidity rained it/the sky.

Finally, some but not all unaccusative verbs may be found in the *there* construction (Milsark 1974), so this construction too has been taken as a diagnostic of unaccusativity (Stowell 1978; Burzio 1986; Levin 1986; Deal 2009; Alexiadou & Schäfer 2010), although one that appears to be largely restricted to verbs of existence and appearance. This is shown in (45a) with an uncontroversial unaccusative verb and in (45b) with an uncontroversial unergative verb.

- (45) a. There arose a problem.
 b. *There sang a choir.

Although under certain conditions some unergative verbs are attested in the *there* construction, complicating its status as a diagnostic, core substance emission verbs are not found in this construction when the source serves as the postverbal noun phrase; neither are precipitation verbs, as in (46).

- (46) a. *There gushed a magnificent well.
 b. *There rained a heavy gray sky/some thick dark clouds.

Given the definiteness constraints on the postverbal noun phrase in *there* sentences (Milsark 1974; Lumsden 1988), precipitation *it* would not be expected in such sentences, so (46b) uses other nominals.

⁵¹ Liddy, G. Gordon. 1996. *Will*. New York: St. Martin's.

⁵² Taylor, Elizabeth Atwood. 1987. *Murder at Vassar*. New York: St. Martin's.

Precipitation verbs and core substance emission verbs when their subjects are the source of the emitted or precipitated substance show parallel behavior with respect to various diagnostics. These similarities support treating precipitation verbs as a subclass of substance emission verbs. Further, the observed pattern of behavior indicates that with such subjects, verbs of both types qualify as unergatives.

4.3 Unaccusative behavior and the substance as subject

In this section, we consider the behavior of core substance emission verbs and precipitation verbs when they take the emitted (or precipitated) substance as their subject, as in (31), repeated below. We show that verbs of both types behave as unaccusative verbs with respect to the diagnostics discussed in Section 4.2.

- (31) a. Oil gushed from the well.
b. A light rain rained from the sky.

Before showing this, we point to a further parallel between precipitation verbs and core substance emission verbs that emerges when the substance serves as the subject. With this subject choice, substance emission verbs must appear with a directional prepositional phrase complement predicated of their subject, as in (47a): it is unacceptable to omit such a phrase. Such a complement is obligatory for precipitation verbs too, as shown in (47b).

- (47) a. Oil gushed *(from the well).
b. A light rain rained *(from the sky).

Since the substance-as-subject pattern was introduced in the context of the source/substance alternation, the substance-as-subject examples have all included directional prepositional phrases that express a source, as in (47). However, other types of directional prepositional phrases are possible, as in (48). What matters is that such a complement is expressed when the substance is the subject. As we show, this requirement interacts with the application of unaccusative and unergative diagnostics to substance-as-subject uses of these verbs. We turn to these diagnostics and discuss the directional prepositional phrase requirement further in Section 5.3.

- (48) a. Oil gushed (from the well) into the river.
b. Icy water rained (from the sky) onto the parched fields.

In contrast to when they take the source as subject, when core substance emission verbs and precipitation verbs take the substance as subject, cognate objects are not possible, as shown in (49).

- (49) a. *Oil gushed a gush from the well.
b. *Icy water rained (a) rain from the sky.

This property is consistent with an unaccusative analysis of the substance-as-subject uses, which would preclude them from having an object. The surface subject of an unaccusative verb is underlyingly the internal argument; relatedly, unaccusative verbs are not able to assign accusative case and should not take a “surface” object (Burzio 1986).

There is another manifestation of the inability to take an object. When the substance is the subject, core substance emission verbs cannot appear with nonselected objects in the resultative construction; neither can precipitation verbs, as in (50).

- (50) a. *Oil gushed the well dry.
b. *Heavy drops rained the sky clear.

Rather, if the substance-as-subject uses of these verbs are unaccusative, these verbs might be expected to occur with a result phrase predicated directly of the substance subject; however, this does not seem possible. For example, *The oil gushed boiling hot* has a depictive interpretation, but does not permit a resultative interpretation. We propose that state-denoting result phrases are ruled out by an updated version of the constraint against having two results predicated of a single noun phrase (Goldberg 1991; Tenny 1994: 68): two scalar changes cannot be predicated of a single noun phrase. The substance-as-subject use requires a directional prepositional phrase complement, a hallmark of a scalar change along a path of motion, as we discuss in Section 5.3. Given this, an overt result phrase introducing a second scalar change, a change of state, is not possible.

Although core substance emission verbs and precipitation verbs do not allow adjectival passive participles to be predicated of the source, they allow them to be predicated of the substance, as in (51).⁵³ Thus, in this respect, verbs of both types behave as unaccusatives.

- (51) a. the gushed-out oil (cf. The oil gushed out.)
b. the rained-down water (cf. The water rained down.)

Next, both core substance emission verbs and precipitation verbs are found in the *there* construction with the substance as the postverbal nominal, as in (52) and (53). Evidence that such constructions involve the substance-as-subject use comes from the observation that such constructions are best in the presence of a directional prepositional phrase.

- (52) a. She passed a spring, set back deep in a hollow where the water winked and shifted like an eye, and **there gushed out into the night air the deep earth smell of black loam.**⁵⁴
b. Forthwith **there spewed out from the web a host of miniature black spiders** who promptly retreated into the myriad passageways in the stone foundation of the house.⁵⁵

- (53) ... Heard the heavens fill with shouting, and **there rain'd a ghastly dew from the nations' airy navies ...**⁵⁶

Finally, both core substance emission verbs and precipitation verbs with the substance as the subject can be causativized, as in (54), although attested examples are rare.

- (54) a. The pressure spewed water everywhere, drenching our heads, our clothes, the patio — everything, in fact, but the smoldering skillet.⁵⁷
b. He [God] rained water to wash away the filth and sin...⁵⁸

There are two reasons for their rarity. First, prototypical causatives involve an agent, but core substance emission events and precipitation events are not typically under the control

⁵³ The postverbal particle is obligatory in these examples because it represents the directional prepositional phrase complement, which is obligatory in the substance-as-subject uses, as in (47).

⁵⁴ Spencer, Elizabeth. 1984. *The Voice at the Back Door*. Baton Rouge: LSA Press. (Original work published in 1956).

⁵⁵ Muldrow, Elizabeth Smith. 2004. *Marmalade*. <https://books.google.com/books?isbn=0865344345>.

⁵⁶ Tennyson, Alfred. 1842. "Locksley Hall", *Poems*. Boston, MA: W. D. Ticknor.

⁵⁷ Ridings, Georgia. April 19, 1992. "Fire, flood, feast — but no famine in this family", *The Tuscaloosa News*.

⁵⁸ <https://sites.google.com/site/cleanlinessvrsgodliness/cleanliness>; accessed 2/10/2019.

of an animate entity. In this respect, they resemble internally caused change of state verbs (e.g., *bloom*, *decay*, *rot*): most of these verbs also rarely show causative uses (McKoon & Macfarland 2000; Wright 2002; Alexiadou 2014; Rappaport Hovav 2014b). Second, although many unaccusative verbs have causative counterparts, directed motion verbs, while generally considered to be unaccusative, resist causativization, as shown in (55).

(55) *The pilot ascended the plane to cruising altitude.

It is possible that core substance emission verbs and precipitation verbs, which like directed motion verbs take directional prepositional phrases, share this exceptionality, whatever its ultimate explanation.

These diagnostics together indicate that core substance emission verbs and precipitation verbs are unaccusative when the substance is the subject. Thus, in this section, we have shown that core substance emission verbs and precipitation verbs are strikingly parallel in their behavior, whether they take the source or the substance as subject. That is, they behave as unaccusative or unergative under precisely the same conditions.

5 Dual unaccusative/unergative behavior as a reflection of event type

We now aim to explain why precipitation verbs are found in both the source-as-subject and substance-as-subject patterns, and why the first pattern aligns with unergative behavior and the second with unaccusative behavior. We propose that the key is recognizing that the two patterns emerge from two distinct “construals” of precipitation happenings. A particular happening in the world has many properties associated with it, and some happenings may be amenable to being conceptualized as events in more than one way and, thus, given more than one linguistic description (Levin & Rappaport Hovav 2005: 19–20). As noted in Section 1, rain falling could be conceptualized in two ways: in terms of the sky emitting precipitation—a substance emission event, as in (5a)—or in terms of the precipitation moving down towards the earth due to gravity, as in (6a)—a directed motion event.

- (5) a. It rained (a light rain/sulfuric acid).
 b. The well gushed (oil).
- (6) a. A light rain rained on my head.
 b. An apple fell on my head.

We propose that English provides ways of expressing both conceptualizations of precipitation events, one using a substance emission event structure and the other using a directed motion event structure. A single precipitation verb root can be associated with either event structure because it lexicalizes material compatible with events of both types. Each event structure, in turn, is associated with its own argument realization, giving rise both to the difference in subject choice characteristic of the source- vs. substance-as-subject patterns and to the difference in unaccusative vs. unergative status of each pattern. As a result, precipitation verbs show unaccusative behavior in certain well defined circumstances and unergative behavior in others.

This approach is predicated on factoring the puzzle of the unaccusative vs. unergative status of precipitation verbs—and, as we also show, core substance emission verbs—into two parts: first, the possible event structures associated with these verbs—that is, the associations of their roots with event schemas—and second, the possible morphosyntactic frames that realize these event structures. Thus, we set out background assumptions about

event structure and argument realization in Section 5.1, before we turn to the specifics of our proposal in Sections 5.2 and 5.3.

5.1 Background on event structure and argument realization

In this section, we lay out our basic assumptions about verb meaning, event structure, and argument realization; many are shared with other current work. We build on the general approach laid out in Rappaport Hovav & Levin (1998), as updated in Levin (2017), especially in her Section 4.

We assume that a verb's event structure—its event representation as it is used in a specific context—is composed of an event schema and a root (Pinker 1989; Pesetsky 1995; Rappaport Hovav & Levin 1998; Borer 2003; Lieber 2004; Borer 2005). The root represents the verb's idiosyncratic semantic content (and phonological form), while the event schema represents a basic event type.⁵⁹ We do not lay out the specifics of event structure representations, which have often taken the form of a predicate decomposition (see Levin & Rappaport Hovav 2011; Harley 2012 for reviews). What matters is that the representation chosen can distinguish the two types of event schema relevant to precipitation verbs: the schema for events of scalar change and the schema for activities—events of nonscalar change. An event of scalar change is characterized by a change in the value of a scalar-valued attribute of an entity (Ramchand 1997; Krifka 1998; Hay et al. 1999; Kennedy & Levin 2008). The type of scalar change relevant here involves a path scale, defined by the path that an entity moves along.

The activity event schema encompasses any typically dynamic event of nonscalar change (Rappaport Hovav & Levin 1998; Levin 1999; Rappaport Hovav & Levin 2010). Events of nonscalar change lack a unique, privileged scale of change; usually, they involve multiple, simultaneous changes and correspond to the events lexicalized by so-called manner verbs (Rappaport Hovav & Levin 1998; 2010). Thus, the term “activity” is being used more broadly than in its aspectual sense since nonscalar changes encompass semelfactives as well as traditional Vendlerian (1957) activities (Levin 1999).

A verb's event structure determines its argument realization options. The event structure is associated with one or possibly more morphosyntactic frames by argument realization principles, which are sensitive to the event structure's components. In particular, a scalar change event structure is associated with an unaccusative syntactic structure, while an activity event structure is associated with an unergative syntactic structure. The precise implementation of unaccusative and unergative syntactic structures varies somewhat, particularly if event structures are syntacticized (Harley 2012; Mateu 2012). Nevertheless, there are certain common assumptions about these structures. An unergative syntactic structure is taken to have a VP- or vP-external argument. An unaccusative syntactic structure is taken to lack an external argument, but to have a VP-internal argument. In much work (Hoekstra 1984; Harley 2012; Mateu 2012), this argument is taken to be part of a small clause complement of the verb; this move is motivated by a desire to introduce a constituent—the small clause—which syntactically represents the state (change) predicated of the argument of an unaccusative verb. The small clause's predicate represents the relevant scalar change.

With this background, in the following sections we show how the key properties of the substance- and source-as-subject patterns emerge assuming distinct event construals.

⁵⁹ For expository purposes, we present the event representation from a lexical (projectionist) perspective rather than the alternative constructional perspective. For comparative discussion of the perspectives see the appendix of Rappaport Hovav & Levin (1998).

5.2 The source-as-subject pattern instantiates a substance emission event

As shown in Section 4.2, when a precipitation verb is found in the source-as-subject pattern, the source of precipitation is expressed as the subject and the precipitation itself is optionally expressed as the object; further, the verb behaves as unergative in the absence of an object. These properties are also attested when core substance emission verbs are found in this pattern. This pattern is illustrated in (5), repeated below.

- (5) a. It rained (a light rain/sulfuric acid).
 b. The well gushed (oil).

We now discuss how these properties of the source-as-subject pattern follow if it is taken to express a substance emission construal of a precipitation happening or substance emission happening in which the source is understood as the emitter.

As discussed, the availability of a substance emission construal of a precipitation happening makes intuitive sense as precipitation emerges from the sky, so the sky—the source of precipitation—qualifies as an emitter. A substance emission construal is the default construal of a substance emission happening. Emission events, including substance emission events, qualify as events of nonscalar change because there is no single scale of change inherent to them. The proposal, then, is that the roots of precipitation verbs—and core substance emission verbs—are associated with a nonscalar change event structure on the substance emission construal. This proposal receives support from some of the behavioral properties used to argue for the unergative status of the verb in the source-as-subject pattern in Section 4.2. These are the optionality of the object and the occurrence of nonselected objects in resultative constructions; Rappaport Hovav & Levin (2010: 21–22) argue that both are hallmarks of verbs in expressions of nonscalar change.

The nonscalar change or “activity” event structure includes a participant that instantiates the activity, which following Levin (2017) we refer to as an effector, adopting Van Valin & Wilkins’s (1996) term; this is the emitter (i.e. the source) for substance emission events. Effectors in the activity event structure, including emitters, are realized as underlying subjects. The unergative behavior of precipitation verbs and core substance emission verbs when the source is the subject reflects this event structure. In fact, emission verbs in general—whether substance, light, sound, or smell emission—behave as unergative verbs (Levin & Rappaport Hovav 1995: 138–142). Other subtypes of emission verbs are illustrated in (56).

- (56) a. The candle flickered/glowed. (light emission)
 b. The stream babbled/burbled/gurgled. (sound emission)
 c. The trash reeked. (smell emission)

Instances of precipitation verbs with a nominal subject and an object denoting the substance, such as *The sky rained huge drops*, fall under the substance emission construal as well. As discussed in Levin (1999; 2017) certain verb roots found in activity event structures may bring with them a second event participant beyond the effector. Examples include the roots of hitting and wiping verbs, such as *hit*, *pound*, *sweep*, and *wipe*. We propose that the substance qualifies as such an event participant. Such “root” participants, as Levin (2017) calls them, are realized as objects. Verbs with such objects are what Levin (1999) calls “non-core” transitive verbs; they contrast with “core” transitive verbs, which realize causative events of scalar change. Given their status, the objects of non-core transitive verbs are optional, a property that holds of precipitation verbs and core substance emission verbs in the source-as-subject pattern, as observed in Section 4.1.

5.3 The substance-as-subject pattern instantiates a directed motion event

When precipitation verbs and core substance emission verbs are found in the substance-as-subject pattern, a directional prepositional phrase is required; further, the verbs behave as unaccusative. This pattern is illustrated in (31).

- (31) a. Oil gushed from the well.
b. A light rain rained from the sky.

In this section, we discuss how these properties follow if this pattern expresses a directed motion construal of a precipitation happening or substance emission happening in which the substance, including precipitation, is understood as the theme of a directed motion event.⁶⁰

As noted early in this section, the availability of a directed motion construal of a precipitation happening makes intuitive sense. Directed motion events have theme and path participants; the path is expressed by a directional prepositional phrase. Such an event is illustrated in (57) with a core directed motion verb—a verb such as *arrive*, *come*, *return*, or *fall* whose root lexicalizes some facet of the path (Rappaport Hovav 2014a).

- (57) An apple fell to the ground.

In a precipitation happening, precipitation moves from the sky to the ground due to gravity—an instance of directed motion. When a substance is emitted, the emission imparts a force to the substance, setting it in motion in a direction determined by the interaction of the force and gravity. The substance, as a moving entity, thus qualifies as the theme of a directed motion event, while its trajectory qualifies as the path.

For both core substance emission verbs and precipitation verbs, a hallmark of the substance-as-subject pattern supports the directed motion event construal: the near obligatory occurrence of a directional prepositional phrase, as in (58).

- (58) a. *Heavy drops rained.
b. Heavy drops rained from the sky.
c. Heavy drops rained onto the ground (from the sky).

In general, directed motion event expressions show a directional prepositional phrase requirement unless their verb lexicalizes components of the path of motion (Rappaport Hovav 2014a) or the path is recoverable from context.

Directed motion events qualify as events of scalar change. They involve a single scale of change, the path of motion. We propose, then, that the roots of precipitation verbs—and core substance emission verbs—are associated with a scalar change event structure in expressions with the directed motion construal. This proposal receives support from some of the behavioral properties used to show the unaccusative status of the verb in the substance-as-subject pattern in Section 4.3, such as the lack of nonselected object resultatives.

The unaccusative behavior of precipitation verbs and core substance emission verbs in the substance-as-subject pattern is consistent with this event structure. Event structure

⁶⁰ As a reviewer points out, occasionally source-as-subject uses co-occur with a directional prepositional phrase (e.g., *Because the window was open, it rained into the room*). We observe that comparable uses are also found with core substance emission verbs (e.g., *The hose gushed onto the sidewalk*). Further, Goldberg & Jackendoff (2004: 556–557) note similar examples with verbs of excretion (e.g., *She spat into the sink*). What is important is that in such examples the directional prepositional phrase complement is predicated not of the source, but of an unexpressed substance argument, just as it is in the substance-as-subject pattern. There is clearly some more general process at work here, whose analysis we leave for future work.

participants that have a scalar change predicated of them must be underlying objects (Levin & Rappaport Hovav 1995: 145–148; Rappaport Hovav 2008: 24; Rappaport Hovav & Levin 2010). Thus, the substance, as it qualifies as the theme of the motion event, is realized as an underlying object and a surface subject.

Precipitation verbs and core substance emission verbs are not alone in showing unaccusative behavior when used in a directed motion event construal. Manner of motion verbs and sound emission verbs may also be used in the expression of directed motion events, as in (59) and (60). Further, with such uses a directional prepositional phrase is required.

- (59) a. Birds flew *(into the hall). (on intended interpretation)
 b. A man ran out of the store.
- (60) a. Bullets whistled *(through the window).
 b. A truck rumbled into the parking lot.

In such uses, manner of motion and sound emission verbs behave as unaccusatives, contrasting with their unergative behavior in activity uses (Hoekstra 1984; Levin 1986; Levin & Rappaport Hovav 1995: 182–196; Levin et al. 1997). Although the emitted substance is the theme of motion when core substance emission verbs are used in the description of directed motion events, when sound emission verbs are used in the description of such events, the emitter is the theme. This difference arises because the motion of a sound emitter—the bullets or truck in (60)—causes the sound emission.

5.4 Conclusion

The alternate unaccusative vs. unergative behavior of precipitation verbs and core substance emission verbs and the correlated difference in the semantic role of their subject arise because their roots can be found in two different event structures, a substance emission (activity) event structure and a directed motion (scalar change) event structure. These two event structures represent distinct construals available to precipitation happenings and substance emission happenings in the world.

6 Precipitation events in Romance languages

There is an ongoing debate over whether weather verbs, including precipitation verbs, are unaccusative or unergative in Romance languages (Ruwet 1991; Benincà & Cinque 1992; Paykin 2010; Bleotu 2012; 2013; Meulleman & Stockman 2013). Ruwet (1991) claims that in French, weather verbs are unaccusative across the board. In contrast Benincà & Cinque (1992) propose that in Italian, some are unergative, while others exhibit variable unaccusative/unergative behavior. This controversy may be resolved, at least in part, by recognizing that weather verbs do not form a homogeneous class (Meulleman & Paykin 2016), as we argued in Section 2, and that the two construals of precipitation happenings are also found in Romance languages (Benincà & Cinque 1992; Manente 2007). We posit that these two construals are responsible for the alternately unaccusative vs. unergative behavior of Romance precipitation verbs, demonstrating this for Italian. Thus, the Romance data, by showing that our analysis of English has wider applicability, provide additional support for it.

In Romance languages, weather verbs are traditionally taken to be “avalent” (Cennamo 2010). Since Italian is a *pro*-drop language, in simple tenses the analogue of *It is raining* simply consists of the verb, as in (61), which shows third person singular agreement, the default agreement found in impersonal sentences.

- (61) *Italian*
 Piove.
 rain.PRS.3SG
 ‘It is raining.’

In Italian, all weather verbs are found with the perfect auxiliary *avere* ‘have’, but it has long been noted that some are also found with the auxiliary *essere* ‘be’ (Lorenzetti 2010). Italian auxiliary selection has been used as a diagnostic for the unaccusative or unergative status of a verb: unaccusative verbs select *essere* ‘be’, while unergative verbs select *avere* ‘have’ (Perlmutter 1978; Rosen 1984; Burzio 1986; Centineo 1986; Van Valin 1990; Sorace 2004). As shown in (62), precipitation verbs, in particular, can select either auxiliary, suggesting that they can be used as either unaccusative or unergative. Further, the agreement is consistent with an impersonal use of the verb—the past participle shows masculine singular agreement and the auxiliary shows third person singular agreement—and in fact both sentences in (62) are taken to be impersonal (Cennamo 2010).

- (62) *Italian* (Benincà & Cinque 1992: 156, (3a, 4a))
- a. Ha piovuto.
 have.PRS.3SG rained.MSG
 ‘It rained.’
- b. È piovuto.
 be.PRS.3SG rained.MSG
 ‘It rained.’

Benincà & Cinque (1992: 157) note that the Italian weather verbs that show dual unaccusative and unergative behavior—and all the verbs they cite are precipitation verbs—are understood as “activity” verbs when unergative, but as directed motion verbs when unaccusative (i.e. when a directional prepositional phrase is present).⁶¹ We interpret Benincà & Cinque’s (1992) observation as implicit recognition that in Italian too precipitation verbs show activity and scalar change event structures. Two other properties of these verbs that correlate with auxiliary choice support this proposal.

First, Benincà & Cinque (1992) and Cennamo (2010) note that examples such as (63) with a postverbal noun phrase expressing the form of precipitation require the auxiliary *essere* ‘be’.

- (63) *Italian* (Benincà & Cinque 1992: 156, (3b, 4b))
- a. *Hanno piovuto pietre.
 have.PRS.3PL rained.MSG stones.FPL
 ‘It rained stones.’
- b. Sono piovute pietre.
 be.PRS.3PL rained.FPL stones.FPL
 ‘It rained stones.’

Further, their verbs show subject agreement with the postverbal noun phrase. Although not so described in the literature, we propose that these examples instantiate the Italian counterpart of the substance-as-subject pattern.⁶² We have argued in Section 4.3 that this

⁶¹ This observation has sometimes been reframed in terms of telicity (Cennamo 2010), consistent with a line of research that argues that telicity is a semantic determinant of unaccusative status (Levin 1986; Zaenen 1993; Lieber & Baayen 1997).

⁶² We are not aware of discussions of precipitation verbs in Romance languages that distinguish source- vs. substance-as-subject patterns; the exception is Gougenheim (1945), who acknowledges the two types of subjects in French. See also note 33.

pattern correlates with unaccusative behavior, so the observed restriction to *essere* ‘be’ is as expected⁶³ if our account of precipitation verbs in English carries over to Italian.⁶⁴

Second, Benincà & Cinque (1992) observe that an overt directional prepositional phrase is only possible with *essere* ‘be’ and not *avere* ‘have’, as in (64); see also (65).

- (64) *Italian* (Benincà & Cinque 1992: 156, (3c, 4c))
- a. Sei forse piovuto dal cielo?
be.PRS.2SG perhaps rained.MSG from.the sky
‘Have you perhaps rained from the sky?’
 - b. *Hai forse piovuto dal cielo?
have.PRS.2SG perhaps rained.3SG from.the sky
‘Have you perhaps rained from the sky?’

- (65) *Italian* (Melloni & Masini 2017: 235, (28c))
- è grandinata una fitta grandine su tutto il territorio ...
be.PRS.3SG hailed.FSG a thick hail.FSG on all the territory
‘It was hailing a thick hail on the whole territory ...’⁶⁵

On our analysis, directional prepositional phrases are associated with the substance-as-subject pattern, and these examples clearly instantiate this pattern: in (64), the substance is the addressee, as the verb agreement makes clear, while in (65) it is *una fitta grandine* ‘a thick hail’. Since this pattern expresses the directed motion construal of a precipitation happening and thus a scalar change event structure, we predict that, when precipitation verbs take a directional prepositional phrase, they should take *essere* ‘be’ as the auxiliary.⁶⁶ As in English, the directed motion event structure is also manifested by some manner of motion verbs in Italian, as noted by Benincà & Cinque (1992) (see also Perlmutter 1978; Rosen 1984; Centineo 1986; Van Valin 1990; Sorace 2004).

Thus, our analysis of English sheds light on why Italian precipitation verbs are found with both auxiliaries and concomitantly show both unaccusative and unergative behavior.⁶⁷ When Italian precipitation verbs show unaccusative behavior (i.e. choose the auxiliary *essere* ‘be’), they are found in the substance-as-subject pattern and show the hallmarks of a directed motion event structure. When they show unergative behavior, they pattern as activities (Benincà & Cinque 1992) (though we have not found discussion of examples with an overt source as subject).

7 Conclusion

Despite Langacker’s (1991: 365) observation that linguistic expressions describing weather events are “problematic and ill-behaved”, we have shown that there is order to be found among these apparently unruly expressions. We have argued that precipitation

⁶³ Some researchers argue that postverbal noun phrases following unaccusative verbs are still VP-internal despite triggering subject agreement (Burzio 1986: Chapter 2; Belletti 1988). Such an analysis is still consistent with the unaccusative status of the substance-as-subject pattern; see, for instance, Manente (2007: 86).

⁶⁴ Although (62b) is taken to be impersonal by Cennamo (2010), on our analysis it would instantiate the substance-as-subject pattern, so that the verb agrees with an unexpressed substance argument; Manente (2007: 86), who builds on Benincà & Cinque (1992), argues for a comparable analysis.

⁶⁵ <https://it.answers.yahoo.com/question/index?qid=20110329082148AA0NsgA>; accessed 2/10/2019.

⁶⁶ Example (63b) lacks a directional prepositional phrase, but we assume that a direction is understood and recovered from context, presumably defaulting to ‘from the sky’. This is what happens with certain inherently directed motion verbs, which may also occur without a directional prepositional phrase, as in *He arrived at 2pm*, where the goal is inferred from context; see also Section 5.3.

⁶⁷ Our account also makes predictions about Romance substance emission verbs and their argument realization options. We leave this for future work.

happenings in English can be construed as events in two ways, with each construal associated with its own event structure and thus with its own pattern of syntactic behavior. Our account identifies a source of the “variable” unaccusative vs. unergative behavior of certain verbs, and it further supports the association of scalar changes, including directed motion, with unaccusative behavior and the association of nonscalar changes—or activities—with unergative behavior.

Although we narrowly focused on precipitation events, we acknowledge that valuable insights may be gained from a closer examination of descriptions of other kinds of weather events—after all, there is more to the weather than precipitation. Additionally, although our focus has been on English and to a lesser extent Italian, this work should contribute to an understanding of the ways weather events are linguistically encoded across other languages, including other Romance languages. We hope that our study of precipitation verbs will provide a stepping stone for further investigations into the wide range of weather expressions across languages, as well as the factors affecting their manifestation.

Abbreviations

2 = second person, 3 = third person, F = feminine, M = masculine, PL = plural, PP = prepositional phrase, PRS = present, SG = singular, VP/vP = verb phrase

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Competing Interests

The authors have no competing interests to declare.

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