To appear in E. Corre and L. Sarda, eds., *Neglected Aspects of Motion-Event Description: Deconstructing Motion Events*, Amsterdam: John Benjamins.

Pounding up the stairs and slamming into the wall: Hitting verbs in directed motion event descriptions*

Beth Levin
Stanford University
June 2023

Some English hitting verbs occur in directed motion event descriptions (e.g., *The truck bumped along the trail*), as well as in contact event descriptions. Drawing on a corpus study, this paper identifies the core meaning components lexicalized by hitting verbs: an "action pattern" in which a force bearer moves into contact with and exerts a physical force on a surface. Due to the imbued force, some force bearers are in motion. This property allows a force bearer to be aligned with the theme, the key participant in a directed motion event description, allowing it to host a hitting verb. Since they inherently include a force bearer and surface, contact event descriptions can naturally host hitting verbs.

Keywords: directed motion events, lexicalized meaning, manner verbs, surface contact events

1 Manner verbs in directed motion event descriptions

Directed motion events involve a theme (Gruber 1965; Jackendoff 1971), a participant that moves along a path in some direction; the path itself is specified with respect to a reference object.[1] Studies of English directed motion event descriptions have repeatedly drawn attention to the wide range of manner verbs attested in such descriptions. Not only do they include a considerable array of verbs that fall readily under the label "manner of motion

*I am extremely grateful to Cass Kramer for collecting, coding, and organizing the corpus data that this paper draws on and for his considerable insights into this data. I thank the participants at the NAMED 2020: De/constructing Motion Events Workshop for their questions and comments. I also thank Malka Rappaport Hovav for valuable discussions of the material in this paper and Michel Aurnague for his thought-provoking comments on an earlier draft.

[1] As this paper is concerned with events that involve motion, the term "theme" is used exclusively to refer to an event participant that is in motion; however, the term itself, as introduced by Gruber (1965) and later adopted by Jackendoff (1971, 1983), can subsume the participant whose location is being specified in a static location event. The theme in the broad sense of a moving or located participant and the reference object are sometimes referred to as "figure" and "ground", respectively, following Talmy (1976), or as "trajector" and "landmark", respectively, following Langacker (1987).

verb", as in **??**, but they also include sound emission verbs, as in **??**, and substance emission verbs, as in **??**.[2]

(1) a. Kim slowly hobbled to the couch.
b. Pat sauntered into the room.

(2) a. The truck rumbled into the driveway.
b. The elevator creaked to the third floor.

(3) a. The water gushed into the gutter.
b. The grease seeped out of the paper bag.

What to my knowledge has not been noted is the presence of certain hitting verbs in such event descriptions, as in **??**. As the label "hitting verb" suggests, such verbs are typically associated with descriptions of events of coming into contact with a surface, as in **??**.

(4) a. The tired hiker pounded up the steep trail.
b. The truck bumped along the rutted track.
c. The ball slammed into the fence.
d. The runaway truck banged into the wall.

(5) a. The mugger hit the passerby.
b. The cook pounded the meat.
c. The truck bumped/banged the badly parked car.
d. The angry customer slammed the door.

This paper aims to shed light on what licenses hitting verbs in directed motion event descriptions as well as in surface contact event descriptions through a close examination of their meaning.

English figures prominently in the literature on directed motion event descriptions because manner of motion verbs such as *hobble* or *saunter*, as in **??**, occur in such event descriptions even though their meaning is unspecified for direction. Not all languages allow manner of motion verbs to be found freely in such event descriptions, leading to the much discussed distinction between satellite-framed languages, such as English, which allow this option, and verb-framed languages, such as French and Spanish, which lack it (Beavers, Levin, and Tham 2010; Slobin 1996; Talmy 1975, 2000, among many others).

[2]The presence of sound emission verbs in motion event descriptions has received some discussion in the literature (Levin and Rappaport Hovav 1991: 138, 1995: 191; Fanego 2017; Rohde 2001: Section 7.2.2); substance emission verbs have received less discussion, but see Levin and Krejci (2019).

When manner of motion verbs are found in directed motion event descriptions, the path of motion is introduced external to the verb in a PP (or particle).[3] They contrast in this respect with directed motion verbs, which lexically encode information about the path of motion (see Levin and Rappaport Hovav 2010; Rappaport Hovav 2014). Their appearance in directed motion event descriptions suggests that English has the morphosyntactic resources that allow manner of motion verbs in directed motion event descriptions (i.e. making it a satellite-framed language).

(6) Directed motion verbs: arrive, ascend, come, descend, go, ...

(7) a. Pat came into the room.

b. The express train arrived at the station.

In principle, these resources should allow verbs from other manner verb subclasses to appear in directed motion event descriptions. Indeed, members of other subclasses are attested, as already shown in **??** and **??** for sound emission and substance emission verbs. Further, these verbs too require the path of motion to be introduced in a PP.

The availability of these morphosyntactic resources, however, does not guarantee that just any manner verb can be found in a directed motion event description. Manner verbs that do not occur in such event descriptions include those in **??**.

(8) a. ∗ The clowns laughed out of the room.

b. ∗ The politician boasted onto the podium.

c. ∗ Smith muttered to the desk.

d. ∗ The dog barked over to the intruder.

This limitation is striking since, in contrast, the much discussed *way* construction (Goldberg 1995: Chapter 9; Israel 1996; Jackendoff 1992; Marantz 1992, among others) can be used with a wide range of manner verbs to express events involving directed motion as well as more abstract events that can be conceptualized as involving motion in a metaphorical space.

(9) a. The clowns laughed their way out of the room.

b. The politician boasted his way onto the podium.

[3] I do not enter into the debate concerning whether a small number of manner of motion verbs also lexicalize direction. This claim has been made for the English verb *climb* (Jackendoff 1985; Kiparsky 1997, but see Levin and Rappaport Hovav 2013), and it has even been extended to other verbs (Beavers and Koontz-Garboden 2012; Goldberg 2010). There is also controversy about whether some verb-framed languages allow a handful of manner of motion verbs in directed motion event descriptions: some argue that these are not true directed motion event descriptions and others argue that the relevant verbs, which include the counterparts of *run* and *fly*, actually lexicalize direction and, thus, are consistent with a verb-framed classification (Folli and Ramchand 2005; Mateu 2008: 246, note 29).

c. The bumped passengers muttered their way to the help desk.

An investigation of verbs from a range of manner subclasses in directed motion event descriptions should help us better understand the constraints on which manner verbs may be found in (simple) directed motion event descriptions and the factors allowing such uses. This paper takes a step towards this goal by examining those English hitting verbs found in such event descriptions. As I elaborate in Section **??**, hitting verbs lexically encode as part of their meaning the exertion of a force on a "surface", and, thus, they are usually found in descriptions of simple events of surface contact, as in **??**. However, hitting verbs are not limited to such event descriptions. Of interest here is the occurrence of some of these verbs in not one, but two types of directed motion event descriptions. In one type, the motion ends in one instance of contact with the surface, as in **??**. In such examples, contact is with a single point on the surface, and this contact qualifies as the type encoded by the verb, as in (10). In **??**, the ball moves through the air in a trajectory that ends at the fence.

(10) a. The ball slammed into the fence.

b. The run-away truck banged into the wall.

In the second type, the motion involves multiple instances of contact over a spatially extended ground, as in **??**. In such examples, as the theme traverses the ground it repeatedly makes contact with it, and each instance of contact qualifies as the type encoded by the verb. In **??**, for instance, the truck would experience multiple bumps in its trajectory down the track.

(11) a. The tired hiker pounded up the steep trail.

b. The truck bumped along the rutted track.

Thus, a further question arises: why are hitting verbs found in two types of directed motion event descriptions?

In this paper, I argue that certain facets of the meaning lexicalized by hitting verbs license their presence in directed motion event descriptions. Following Rappaport Hovav and Levin (2010: 22), by lexicalized meaning I intend those facets of meaning lexically encoded by a verb and, thus, present across all its uses.[4] Through an examination of hitting verbs in event descriptions of various types, I propose that they lexicalize an event participant imbued with a force, the "force bearer", that makes contact with an entity, the surface. Although facets of the force and force bearer vary from verb to verb, their force bearers

[4]Since I am leaving formal representational issues aside in this paper, I simply refer to a verb's lexicalized meaning, but it corresponds to what in other work I refer to as the conceptual content associated with a verb's root, that is, a verb's idiosyncratic component of meaning (Levin 1999, 2017; Rappaport Hovav and Levin 2010); in Rappaport Hovav and Levin (1998: 107) it is referred to as the "constant". The event descriptions of this paper could be seen as more narrowly specialized versions of the "event schemas" or "event types" of this earlier work.

share a common property: they are in motion by virtue of being imbued with the relevant force. I argue that this property licenses hitting verbs in directed motion event descriptions.

The paper proceeds as follows. In Section **??** I provide an overview of the various types of event descriptions that host hitting verbs, as well as the morphosyntactic argument realization patterns used to express such descriptions. I first review contact event descriptions and then directed motion event descriptions. To round out the picture, I briefly introduce putting event descriptions as in *The chef banged a dish into the rack*, as they also involve motion. Drawing on this overview, in Section **??** I identify the key components of meaning lexicalized by hitting verbs. With this established, in Section **??** I revisit contact and directed motion event descriptions, showing how facets of this lexicalized meaning license the appearance of hitting verbs in event descriptions of these two types. Section **??** presents some final thoughts.

2 Event descriptions hosting hitting verbs

In this section, I introduce, in turn, contact event descriptions, directed motion event descriptions, and putting event descriptions — three types of event descriptions that host hitting verbs. The empirical observations are based on hand-annotated data from the Corpus of Contemporary American English (COCA; Davies 2008–) for the six hitting verbs in (12), chosen as they are found in both contact and directed motion event descriptions.[5]

(12) bang, batter, bump, pound, slap, smack

For each type of event description, I set out the various morphosyntactic realizations instantiating these descriptions and the associated event participants. I call these pairings "patterns", using this word pretheoretically; concomitantly, each pattern is presented in a descriptive fashion. The goal is not to comprehensively list all patterns; rather, it is to allow the identification of the meaning components lexicalized by all hitting verbs, as these meaning components should be common to hitting verbs across event descriptions of all types. Once the lexicalized meaning components are identified, it should be possible to determine which of them allow (many of) these verbs to be found in directed motion event descriptions. Since the objective is to lay out the empirical terrain, the grain-level chosen in describing the data may not ultimately correspond to the best grain-level required in a more rigorous analysis of the data. I largely ignore examples that describe unintentional contact events, such as *I banged my elbow as I hurried through the door*; such examples figure most prominently in the *bang* and *bump* data and are less frequent in the data for the other four verbs.

In setting out the patterns, event participants are referred to by informal names inspired by the nature of the event description; these names are chosen as much as possible from the

[5]The verb *hit* is not included among the verbs under study as it apparently is not found in directed motion event descriptions. See note **??** for additional discussion.

inventory of semantic role labels most widely used in the literature. For patterns providing contact event descriptions, I refer to agent, natural force, instrument, and surface (called "place" in Fillmore (1970)); for patterns providing directed motion event descriptions, I refer to theme and path, as well as to two components of a path, source and goal. Only some combinations of participants can co-occur; instruments, for example, are only found in the presence of an agent, so they do not occur with natural forces. As I discuss in Section **??** there are some limitations regarding these informal labels. I resolve these in Section **??** after a fuller analysis of the meaning lexicalized by hitting verbs and how it licenses their distribution in several types of event descriptions.

2.1 Contact event descriptions

To begin, I lay out patterns that describe events of contact with a surface, considering those hosting transitive uses of hitting verbs and then those hosting intransitive uses. Many of these patterns are noted by Fillmore in his paper "The grammar of hitting and breaking" (1970).[6] There Fillmore recognizes that hitting verbs are found in the description of events that involve an animate entity, usually a human, bringing an instrument into contact with a surface. He notes that such events are described by transitive sentences with the animate entity, which is usually is understood as an agent, as subject. He focuses on the two morphosyntactic patterns where the surface — the contacted entity — is the verb's object:[7] one is a simple transitive as in **??**, and the other also includes a PP headed by *with* that expresses an instrument, as in **??**.[8] The notion "instrument" has been used in two ways in the literature: to refer to a particular semantic role label and to refer to physical entities of a certain ontological type, i.e. tools or implements. Here I reserve the term for the semantic role and use the term "tool" when I refer to an entity of the relevant ontological type. The semantic role instrument can be instantiated by body parts as well as by tools, which are themselves manipulated by a body part of the agent (Rissman and Majid 2019; Rissman et al. 2022).

(13) Transitive pattern: subject — agent; object — surface

a. Pat banged the drum.

b. Pat pounded the meat.

c. Pat slapped the intruder.

[6] See Levin (2015) for a cross-linguistic survey of the argument realization of hitting verbs in contact event descriptions.

[7] In some languages, such as Swedish (Lundquist and Ramchand 2012) and Dutch (de Swart 2014), only animate surfaces can be direct objects; inanimate surfaces are expressed in PPs. Some studies suggest that this is because animates are affected psychologically as well as physically and thus more strongly qualify as patients (Lundquist and Ramchand 2012: 230; see also Dowty 1991: 596; de Swart 2014). Interestingly, some English speakers I have consulted find a slight dispreference for inanimate surfaces as objects of some hitting verbs, preferring to express inanimate surfaces in PPs. The reality and extent of such a tendency in English requires systematic empirical study.

[8] As these are the first patterns introduced, I present **??** and **??** as separate patterns, although whether this is necessary depends on the ultimate, larger analysis. I have collapsed other patterns which differ only with respect to the presence of an instrument *with* phrase into one pattern, as in **??**.

(14) Transitive + *with* PP pattern: subject — agent; object — surface; *with* PP — instrument

a. Pat banged the drum with her palm.

b. Pat pounded the meat with the hammer.

c. Pat slapped the intruder with her right hand.

As Fillmore notes, contact is key in these event descriptions: they entail contact with an entity, the surface, but do not entail that it changes, even if sometimes the contact lexicalized by the hitting verb could be forceful enough to cause a change. (15) illustrates this property.

(15) a. #The ball hit the window, but missed it.

b. The ball hit the window, but luckily it didn't break.

c. The ball hit the window and shattered it into tiny pieces.

As Fillmore (1970: 33, note 11) mentions — and comes back to in a later paper (1977: 74–78) — hitting verbs are also found in contact event descriptions with an agent subject where the instrument is the object and the surface is expressed in a PP headed by *against, on,* or another locative preposition.

(16) Transitive + locative PP pattern: subject — agent; object — instrument; locative PP — surface

a. Pat banged the spoon on the table.

b. Pat pounded her feet against the railing.

This pattern represents the canonical expression of contact events in some languages (Levin 2015), such as the Caucasian languages (Nichols 1984: 188, 2011: 467–470).

Hitting verbs are generally not found in contact event descriptions with the instrument as object without a co-occurring surface expressed in a locative PP. The few exceptions, as in **??**, are collocations with connotations that go beyond the literal contact meaning. For instance, a judge or committee chair bangs or pounds a gavel to bring a room to order, while banging or pounding one's fist is a way to get attention or indicate frustration.

(17) Transitive pattern: subject — agent; object — instrument; unexpressed — surface

a. Pat banged the gavel/her fist.

b. Pat pounded the gavel/her fist.

Contact event descriptions hosting hitting verbs are also found with inanimate — and hence non-agentive — subjects. One pattern involves a bare transitive verb with the surface as object, as in **??**.

(18) Transitive pattern: subject — non-agent (see below); object — surface

a. The waves battered the cliffs.

b. The rain pounded the roof.

c. The truck smacked the sedan.

d. The shutters banged the wall.

Such examples pose a challenge: no single conventionally used semantic role label seems applicable to the entire range of subjects in **??**, nor is it easy to fit existing semantic role labels, particularly those associated with core transitive verbs such as verbs of change of state, to all the examples in **??**. The subject might qualify as a natural force or, more broadly, a cause in **??** and **??**. In **??** the subject is an autonomously operating machine. It might qualify as an instrument under a broad construal of this role;[9] alternatively, as large machines such as cars, trucks, and cranes have an autonomous energy source and, thus, are "self-energetic", the label "cause" might be appropriate. Both natural forces and machines fall under Folli and Harley's (2008) label "teleologically capable", which refers to "the inherent qualities and abilities of the entity to participate in the eventuality denoted by the predicate" (2008: 190-191); together with agents, they also fall under Van Valin and Wilkins' (1996) notion of effector.

In other instances, the subject does not seem to fall naturally under any of these labels. For instance, **??** has an inanimate subject that lacks an internal energy source so it does not seem appropriate to call it teleologically capable. Nevertheless, this subject qualifies as what Kearns (2000: 241) calls a "projectile"; see also Cruse (1973: 19–20), Grimm (2007: 187), Levin (2020: 210–211), and Wolff et al. (2010: 96). A projectile is a physical object such as a ball or a bullet which is imbued with kinetic energy from an external source, which sets it in motion. As Levin notes, such an entity may impart its force to another entity through contact, just like agents, natural forces, certain instruments, and other entities with their own energy source do. And, in fact, projectiles are treated no differently from other self-energetic entities linguistically. They pass some of the same common diagnostics, as discussed by Cruse (1973: 19–20; Levin 2020: 211), such as appearing as the "X" in the context "*what* X *did was* VP", just as agents, natural forces, and machines do.

Contact event descriptions hosting hitting verbs can also instantiate an intransitive pattern. This pattern is characterized by the same range of subjects as are found in the transitive patterns with a surface as object; the difference is that in the intransitive pattern the surface is expressed in a PP headed by a locative preposition such as *on* or *against*. Examples with animate agentive subjects are given in **??**.

(19) Intransitive: subject — agent; locative PP — surface; *with* PP or unexpressed — instrument

[9] If **??** is analyzed as an instrument, then *the truck* is what is called an "intermediary" instrument (Alexiadou and Schäfer 2006; Marantz 1984: 247; Wojcik 1976: 165), a label sometimes applied to those instruments which can perform an action independently. They contrast with "facilitating" instruments, which cannot.

a. Pat banged on the table (with a hammer).

b. Pat pounded on the table/door (with her left fist).

Again, an instrument expressed via a *with* PP is possible, but need not be expressed; when left unexpressed, it is understood that the agent is using a body part or tool to make contact with the surface. Intransitive contact event descriptions are also found with apparently the same range of non-agentive subjects as are found in the bare transitive pattern with a surface as object; examples are given in **??**.

(20) Intransitive + locative PP: subject — non-agent; locative PP — surface

a. The shutters banged against/on the window.

b. The waves pounded against the cliffs.

In these examples, the entire entity makes contact with the surface. Occasionally, there are non-agentive examples with animate subjects which are understood as unintentionally involved in the event, as when a person's entire body makes contact with the surface, as in **??**. In such an example, the person is being treated as a physical object and could be viewed as a projectile.[10]

(21) Kim banged against the display case because she wasn't paying attention to where she was going.

These examples raise the same issues with respect to the appropriate label for the event participant in subject position. Further, as the surface is expressed in a locative PP, yet another potential label for the subject might be proposed: "theme" in that the entity denoted by the subject must move prior to the contact in most of the examples. A question is whether the label "theme" should be extended to such events. As I discussed in the next section, these events do not involve true displacement, and given this, the label may be better reserved for events with true displacement and not simply motion of some kind.

2.2 Contact event descriptions do not involve displacement

In the examples expressing a contact event, there is an explicitly expressed or understood event participant which moves in order to come into contact with a surface. In the agentive patterns, it is the instrument manipulated by the agent, while in the non-agentive patterns it is the entity denoted by the non-agentive subject. Although an event participant moves, these event descriptions do not qualify as "directed motion" or "putting" event descriptions. Evidence for this claim follows.

[10] As M. Aurnague (p.c.) points out, it is sufficient in examples of this type for just a part of an entity to make contact even though reference is still made to the entire entity.

First, none of the examples describes the necessary displacement — or "translocation" in Rohde's (2001) terms — of an event participant.[11] That is, there is no entailment that the moving entity ends up in a new location at the end of the event; it may still return to another location, whether its starting point or some other location. Thus, the point of contact is not the goal of motion. For example, in **??** the shutters need not be in contact with the windowpanes at the end of the event, and in **??** the waves likely recede after each instance of contact with the cliffs.

(22) a. The shutters banged against the window.

b. The waves pounded against the cliffs.

Most often, as in **??**, the final location of the moving entity is left unspecified, even if it is sometimes inferable. Further, some of the moving entities have a fixed point of attachment to another entity, which limits their range of motion. The shutters in **??** are not truly displaceable as their attachment to the window frame limits their range of motion; the same holds of the branches of a tree, found in other corpus examples.

Next, consider transitive examples as in **??**, one with the surface as object, the other with the instrument as object. Here too the moving entity need not end up in contact with the surface: the hammer does not stay in contact with the meat, nor the fist with the table.

(23) a. Pat pounded the meat with a hammer.

b. Pat pounded her fist against the table.

Further evidence comes from the nature of the preposition and the interpretation of the PP it heads in examples where the surface is expressed in a PP. In English the prepositions *in* and *on* are locative, while their counterparts *into* and *onto* are directional (Nikitina 2008; Rohde 2001; Thomas 2004; Tutton 2009); thus, there are asymmetries in their distribution. The preposition *onto* is used only in directed motion event descriptions and other event descriptions that involve true displacement (e.g., *Pat jumped onto the table*), while its counterpart *on* must be used in descriptions that lack this property, including those that describe spatial location (e.g., *Sam sat on the bench*). Although details are not reviewed here, Rohde (2001) makes strong arguments for a distinction between locative (her "non-dynamic") and directional (her "dynamic") PPs based on corpus data. Her studies confirm that directional PPs are only found in directed motion event descriptions, and they further show that the PPs in contact event descriptions hosting hitting verbs qualify as locative. This point is illustrated by the contact event descriptions in (24); *on* is acceptable, while *onto* is not (or only on an irrelevant interpretation).[12]

[11] See Aurnague (this volume) for more on distinguishing true displacement from mere motion of an entity at a specific location as with spatial configuration verbs such as *sit* or *stand*.

[12] The preposition *in* is not often found in contact event descriptions since it indicates a relation of containment, while contact event descriptions typically involve a relation of support between a physical object and a surface (Bowerman 1996; Feist and Gentner 1998; Levinson et al. 2003).

(24) a. Pat pounded on/*onto the desk.

b. The shutters banged on/*onto the wall.

Yet if such event descriptions involved true displacement, a directional PP would be expected in **??**. This point is underscored by the pair of sentences in **??**, which includes **??**.

(25) a. The baby banged the spoon on the table.

b. The baby banged the spoon onto the table.

??, with the preposition *on*, describes a baby repeatedly hitting a table noisily; there is no implication that the spoon ends up lying on the table at the end of the event. In contrast, **??**, with the directional preposition *onto*, clearly describes a displacement scenario: here the spoon is understood to be lying on the table at the end of the event. Such examples are discussed further in Section **??**.

Probing the distribution and interpretation of PPs further, I now consider prepositions such as *across, along, over*, and *through*, which allow for either a locative or a directional interpretation. Such prepositions typically have a locative interpretation, describing the location of an entity with respect to a ground, as in *The lamp hangs over the table*, but if there is sufficient contextual support, they can be understood as describing the path of the theme in a directed motion event, as in *Pat ran over the hill*.[13] Interestingly, in the agentive transitive + locative PP pattern, such prepositions generally show a locative interpretation, as in (26).

(26) a. Lieutenant Scheisskopf smacked his hands over his eyes in exasperation. (COCA)

b. Ivan Drake slapped his palm across the offender's reedy neck . . . (COCA)

In **??**, the PPs describe the hands' or palm's configuration with respect to their possessor's eyes or neck at the end of the event and not the path traversed by the hands or palm (cf. Rohde 2001). For instance, **??** does not describe an event in which the hands move in a path from one side of the face to the other.

The preposition *against* is quite common in contact event descriptions, and descriptions with this preposition also do not typically involve displacement. Verbs that are not contact verbs, e.g. manner of motion verbs, are found in directed motion event descriptions, but are typically not felicitous with *against* PPs on the relevant meaning, that is, where the reference object bounds the trajectory of motion. Consider **??**.[14]

(27) a. Kim ran to/*against the wall.

[13] This property also holds of *in* and *on*; see Nikitina (2008), Thomas (2004), and Tutton (2009).

[14] The verb *fly* is the exception: it is found with *against*, as in *The sparrow flew against the window*. Such uses might arise because an entity in flight would qualify as a projectile.

b. Pat swam to/*against the dock.

To sum up this section, evidence from preposition distribution and interpretation affirms that in contact event descriptions it is the contact with the surface that matters and not the final position of the entity that makes contact. This observation is relevant to identifying the meaning lexicalized by hitting verbs. Further, it suggests that when a verb is hosted in a directed motion event description, the path of motion is not contributed by the verb. Finally, it is likely that the paucity of bare transitive uses with an instrument object — conventionalized uses such as *Pat banged/pounded the gavel/her fist* aside — might reflect this observation: the surface is left unexpressed in such examples.

2.3 Directed motion event descriptions

As noted in Section **??**, some hitting verbs are found in directed motion event descriptions, event descriptions where there is true displacement of an event participant and the contact is a concomitant of the motion. This section looks more closely at such descriptions, which as noted in Section **??** fall into two types. Both types involve an intransitive pattern with the theme of motion expressed as the subject of the verb and the path of motion expressed in a directional PP, and both involve contact of the type specified by the relevant verb. They differ in the number of instances of contact: one or more than one. As they involve the displacement of an event participant, their intransitive patterns are distinct from the intransitive + PP pattern discussed in Section **??**.

In the first type, illustrated in **??**, a theme moves to make a single instance of contact with the surface specified in the PP, which typically denotes the goal of motion. The theme may be an entity with its own source of energy such as a vehicle, or it might be a projectile such as a ball or other physical entity imbued with kinetic energy; see Section **??**.

(28) Intransitive + directional PP pattern: subject — theme; directional PP — path

a. The car smacked into the retaining wall.

b. The truck slammed into the pedestrian.

c. The ball banged into the basket.

The point of contact with the surface — located on the reference object expressed in the PP — is on the theme's trajectory of motion and marks the end of this trajectory; thus, these events are telic and the theme has necessarily changed location. The PPs in these event descriptions are clearly directional. For instance, *into* cannot be replaced with *in* in the examples in **??**.

The second type of directed motion event description, illustrated in **??**, involves multiple instances of contact. In such event descriptions, the theme moves along the specified path of motion in a manner that necessarily involves multiple instances of the relevant type of

contact with the path. As a consequence, the theme stays in continuous or fairly close contact with the reference object of the PP throughout the event.

(29) Intransitive + directional PP pattern: subject — theme; directional PP — path

a. The pickup truck bumped along the trail.

b. The car banged down the rutted driveway (to the house).

c. Pat pounded up the stairs.

d. The truck bumped into the courtyard.

Due to the multiple instances of contact occurring over the course of the event, the path must be spatially extended. Thus, such examples typically have PPs headed by prepositions such as *across, along, over*, and *through*, whose reference object is an entity with spatial extent; commonly attested reference objects include driveways, roads, stairs, tracks, and trails. In such examples the theme undergoes displacement and ends up further along, if not at the end of, the spatially extended reference object. PPs headed by other prepositions may also be found as long as an appropriate path can be understood. In **??**, which contains a PP headed by *into*, an extended path is inferred, which ends once the courtyard's threshhold is crossed. Multiple contact examples are necessarily durative, but may be telic or atelic depending on the PP. They contrast with examples of the first type, which involve a single point of contact, as these are necessarily telic.

2.4 Putting event descriptions

Although not a focus of this paper, some hitting verbs occur in putting — or what Rohde (2001) terms "placement" — event descriptions. Such events involve a type of caused directed motion in which an agent places a physical object at a new location.[15] The result verb *put*, which is found in such descriptions, lexicalizes precisely the content of such an event description and nothing more, but other verbs, including some manner verbs, are also found in putting event descriptions. Force exertion verbs are particularly prevalent as illustrated in **??**.

(30) Force exertion verbs: pull, push, shove, tug, yank, ...

(31) a. Pat shoved the clothes into the closet.

b. Kim pushed the trolley into the room.

Hitting verbs are another type of manner verb found in putting event descriptions as in **??**.

[15] M. Aurnague (p.c.) notes that perhaps putting events do not have to involve displacement strictly speaking as in *Kelly stood the board against the wall*, which could describe the action of putting a board that was lying against a wall upright; see also Aurnague (this volume).

(32) Transitive + PP pattern: subject — agent; object — theme; PP — path; *with* PP or unexpressed — instrument

a. The chef banged a dish into the rack.

b. Pat slapped the $5 bill onto the counter.

c. The pilots smacked the planes onto the deck.

In such event descriptions an agent, expressed as subject, puts an entity, expressed as object, at a location, expressed as a PP, making the type of contact with this location lexicalized by the verb.[16] The theme, then, has been displaced. For instance, in **??** the dish is in the rack, and in **??** the $5 bill ends up on the counter. As discussed in Section **??**, the directional *into* or *onto* must be used instead of *in* or *on* to ensure a displacement reading.

The existence of putting event descriptions hosting hitting verbs underscores what the existence of directed motion event descriptions suggests: some component of the meaning lexicalized by hitting verbs allows them to be found in event descriptions that involve displacement. I turn now to a discussion of their lexicalized meaning.

3 The lexicalized meaning of hitting verbs

In this section, I set out the general components of lexicalized meaning that characterize hitting verbs, that is, that are invariant across all uses of each verb in event descriptions of all three types and the morphosyntactic patterns instantiating them. The proposed meaning components refine on those proposed in Levin (2017). This refinement is necessary as this earlier proposal is motivated primarily by uses of these verbs with animate, agentive subjects, while this paper extends the discussion to inanimate, non-agentive subjects as it is primarily such subjects that occur in directed motion event descriptions hosting hitting verbs.

Hitting verbs are a type of manner verb (Rappaport Hovav and Levin 1998, 2010), and as manner verbs, they lexicalize what Jackendoff (1990: 34) aptly calls an "action pattern". For hitting verbs, the action pattern consists in one entity exerting a physical force at a point on a second entity by moving into contact with it (Levin 2017: 586; see also Goldschmidt and Zwarts 2016: 434). For this to happen, the first entity must be imbued with a force that is manifested in its motion. The lexicalized meaning of hitting verbs, then, involves both contact and motion; in this respect, hitting verbs contrast with the verb *touch*, which simply lexicalizes contact (and not motion). Further, as Fillmore (1970) notes, no change is entailed in the second entity in a hitting event, which is why change is not specified as part

[16] In the transitive + PP pattern, exemplified in **??**, the agent is bringing about the relevant type of contact at the end of the moving entity's trajectory. Such examples contrast with instances of true caused motion as in *Sam hit/smacked the ball into the net/over the wall*, where an agent makes contact with the ball at the beginning of the event, imbuing it with kinetic energy that sets it on its trajectory. That is, in caused motion examples the contact lexicalized by the verb causes the motion.

of the lexicalized meaning. Thus, the lexicalized meaning implicates two participants in any event that a hitting verb names; I refer to them as "force bearer" and surface, although more accurately the surface is a "force recipient" (Rappaport Hovav and Levin 2001: 786, Beaver 2010).

Levin (2017: 585) proposes that the force is applied by an "effector"; however, this proposal glosses over some details that are critical here. It fails to acknowledge that in the agentive contact event descriptions hosting hitting verbs that concerned Levin — that is, the transitive pattern with a surface object illustrated in **??** — the effector is an agent that manipulates an instrument, imbuing the instrument with a force that it applies to the surface. Thus, the instrument is the force bearer, even though the agent that manipulates it is the subject of the sentence. In contrast, in the non-agentive contact event descriptions hosting hitting verbs the non-agent subject is the force bearer, although it also qualifies as an effector, as discussed further in Section **??**. As a force bearer is necessarily present across contact event descriptions, the meaning lexicalized by a hitting verb must include such a participant.

As Levin (2017: 586) discusses, despite their shared general meaning components, English hitting verbs differ from each other with respect to the nature of the force bearer and the force that they lexicalize. Some hitting verbs specify the identity of the force bearer: the verbs *elbow, kick*, and *peck* require a particular body part as the force bearer, while the verbs *bat, club*, and *whip* require a particular tool as the force bearer. Hitting verbs also differ with respect to the characteristics of the forces they lexicalize. According to Goldschmidt and Zwarts (2016: 437), the defining characteristics of a force are its origin, magnitude, and direction. In fact, hitting verbs differ with respect to the magnitude of the force lexicalized;[17] compare *pat* and *tap*, which lexicalize the exertion of a fairly small degree of force, to *slap*, *smack*, and *whack*, which lexicalize the exertion of a greater degree of force. Some hitting verbs, including *pound* and *batter*, lexicalize repeated contact. In contrast, other hitting verbs such as *tap* and *slap* are unspecified in this respect and can be used to refer to one instance of contact or multiple instances. A subset of hitting verbs, including *bang*, *thud*, and *thwack*, lexicalize the sound accompanying the contact, and the nature of this sound provides information about the characteristics of the force, usually its magnitude (Levin 2017: 586, Richardson 1983, Stringer 2011: 18).[18]

4 How event descriptions with hitting verbs arise

With this background, I now discuss why hitting verbs can be hosted in event descriptions of certain types. Verbs can be hosted in event descriptions that are compatible with their

[17] Stosic (this volume) suggests that the notion of force may also be relevant for distinguishing among manner of motion verbs; see also Geuder and Weisgerber (2006).

[18] Alternatively, these verbs could be considered sound emission verbs; however, since they lexicalize sounds produced by contact, I include them among the hitting verbs. Only some sound emission verbs lexicalize a sound produced by surface contact; the verb *rumble*, for example, lexicalizes a sound produced by the internal operation of a machine.

lexicalized meaning (Ghomeshi and Massam 1995: 179), but what makes for compatibility is rarely discussed in any detail and is often simply attributed to a speaker's knowledge of the world. Even if such knowledge has a part to play, this issue must be addressed as it is critical to understanding why hitting verbs are found in directed motion event descriptions. I propose that for a verb to be hosted by an event description of a certain type, the critical components of meaning it lexicalizes must align with the meaning conveyed by the event description.[19] In particular, the presence of contact and motion facets in the lexicalized meaning of hitting verbs should allow these verbs to find a place in either contact or directed motion event descriptions, as each one can involve these facets of meaning.

In addition, as discussed in Levin (2017) drawing on Rappaport Hovav and Levin (1998, 2010), lexicalized material "must be 'instantiated' in an argument" (2017: 583). For manner verbs, including hitting verbs, Levin proposes that they "must realize an event participant that 'instantiates' the manner" (2017: 584) lexicalized by the verb. She attributes this to a requirement that the participant whose action allows an observer to determine the verb's lexicalized action pattern be expressed. For hitting verbs, the action pattern involves the exertion of the force, so translating Levin's proposal into the terms used here, the relevant participant would be the force bearer. Although as Levin notes, the specifics of the lexicalized meaning cannot usually be determined from the surface, the surface is nevertheless essential for contact to obtain. The upshot, then, is that the force bearer and surface must be expressed or recoverable in any event description that hosts a hitting verb.

This requirement further constrains the compatibility between a verb's lexicalized meaning and an event description. The requirement can be met if the event description allows for the force bearer and surface to be expressed or inferred. For a hitting verb to be hosted in an event description, the force bearer and surface, the participants it lexicalizes, must naturally align with participants required by the event description. That is, for a type of event description to host a hitting verb, it must include event participants whose roles are such that they can also be construed as a force bearer and surface — the participants lexicalized by hitting verbs. (See Goldberg 1995, who makes a similar suggestion in the context of when a verb is compatible with an argument structure construction.) Contact event descriptions, by their very nature, include a force bearer and a surface (or force recipient), so the participants associated with the meaning lexicalized by a hitting verb naturally align with these event participants. In Section **??** I discuss how the notions of force bearer and surface can be aligned with key participants in a directed motion event description, allowing such event descriptions to host certain hitting verbs. However, because of the different nature of contact and directed motion events, the participant that the force bearer aligns with in the two types of event description are associated with distinct semantic roles, as these roles are defined with respect to an event type. I return to this point in Section **??** since it provides a context for revisiting the difficulty identified in Section **??** with assigning a semantic role to one of the participants in contact events.

I now revisit the event description types that host hitting verbs surveyed in Section

[19] See Levin and Rappaport Hovav (2022) for a similar analysis of the English verb *sweep*, which belongs to the wiping subclass of the larger class of surface contact verbs, which also includes the hitting verbs. For an analysis in the same spirit of the verb *drown* see Rappaport Hovav (2017).

?? from this perspective. In Section **??** I return to contact event descriptions and then in Section **??** to directed motion event descriptions. Treating these two types of event descriptions is sufficient for the goals of this paper; for this reason, I do not return to putting event descriptions; however, the analysis of directed motion event descriptions in Section **??** should provide a stepping stone to their analysis.

4.1 How contact event descriptions arise

In this section, I focus on why hitting verbs are compatible with contact event descriptions both with and without an agent. As this suffices for the purposes of this paper, I do not discuss why — or how — English allows multiple morphosyntactic realizations of these events.[20] As in Section **??**, I first consider event descriptions with an agent and then those without. Most important, the two key participants in a contact event description are a force bearer and a surface. As noted above, the participants implicated by the meaning lexicalized by a hitting verb readily align with them since their lexicalized action pattern involves a force bearer acting on a surface.

In an agentive contact event description, an agent uses an instrument — a tool or body part — to make contact with a surface. As noted in Section **??**, due to the nature of such events, the instrument is a force bearer. English has two distinct morphosyntactic realizations for this scenario, as reflected in the two choices of direct object reviewed in Section **??** and repeated here: either an instrument — i.e. force bearer — as object or the surface as object, with the instrument either expressed in a *with* phrase or left unexpressed.

(33) a. The vandal banged the stick/his fist against the car.
b. The vandal banged the car (with the stick/his fist).

As discussed at the beginning of this section, given its critical role, the default expectation would be that the force bearer must be expressed in every hitting event; that is, it usually should be explicitly realized, and if not, at least be recoverable from context. The optional expression of the instrument in the surface as object pattern means that despite the central part that the force bearer plays in a contact event, English allows it to be unexpressed in the context of an agent. Although unexpressed, its existence is still inferred as an agent must use a tool or body part to carry out the event; see Section **??**. Often a hearer or reader can narrow in on the instrument's identity based on the material lexicalized by the verb and the larger context.[21] In some agentive contact event descriptions, there is the alternative option of expressing the surface in a prepositional phrase, as in (34), with the force bearer left unexpressed.

[20] See Levin and Rappaport Hovav (2022) for discussion of how multiple argument realizations arise with the wiping verb *sweep*.

[21] The inferability of a tool or body part as instrument in the context of an agentive subject might fall under the umbrella of Talmy's (2000) "metonymic clipping", also discussed in Van Valin and Wilkins (1996), where an agent is said to stand in for unexpressed facets of the action it is engaged in. Although Van Valin and Wilkins discuss the notion in the context of causative uses of change of state verbs, where the causing event is left unspecified, this notion appears to be more broadly applicable.

(34) Pat banged on the drum.

As noted in Section **??**, yet another infrequently attested pattern instantiating a contact event description involves an agent subject and an instrument — the force bearer — as in the examples repeated in **??**, with the surface left unexpressed. Such examples, as noted in Section **??**, tend to be collocations with connotations that convey more than forceful contact. It is likely that this conventionalization together with the additional nuances of meaning allows the surface to be left unexpressed.

(35) Pat pounded/banged the gavel/her fist.

I now turn to non-agentive contact event descriptions. As contact event descriptions, these too require a force bearer and surface. Such event descriptions can be realized with a transitive verb as in **??**, where the force bearer is the subject and the surface is the direct object. Again, the participants associated with the lexicalized meaning of a hitting verb easily find a place in such event descriptions.

(36) a. The car bumped the truck.

b. The hurricane pounded the coast.

As noted in Section **??**, the force bearer in such event descriptions can be natural forces, machines, or other physical objects imbued with kinetic energy, i.e. projectiles. Such force bearers are self-energetic; they contrast with the tools and body parts that are the force bearers in agentive events, which are not. The requirement that the force bearer in a non-agentive contact event description be self-energetic ensures that an entity imbued with a force participates in the event, a prerequisite for the forceful contact that characterizes such events. Further, such force bearers, being self-energetic, also qualify as effectors (Grimm 2007; Van Valin and Wilkins 1996; Wolff et al. 2010), explaining their expression as subject.

In non-agentive surface contact event descriptions, unlike in the comparable agentive event descriptions, the force bearer must be expressed. Compare the unacceptable **The coast pounded*, where only the surface is expressed, to the acceptable **??**, where both the force bearer and surface are expressed. This observation underscores that it is the presence of an agent that allows a force bearer to be left unexpressed in agentive examples such as **??** because the agent can be inferred to be using a tool or body part to carry out the actions, so a force bearer can be assumed to exist.

Non-agentive contact event descriptions can also be expressed using an intransitive verb, as in **??**, repeated here as **??**.

(37) a. The shutters banged against/on the window.

b. The waves pounded against the cliffs.

As in the transitive non-agentive contact event descriptions, the subject is the force bearer, and again it must be a self-energetic entity; however, the surface is expressed within a PP. Again, the participants implicated by the lexicalized meaning of a hitting verb readily find a place in such event descriptions.

This discussion of non-agentive contact event descriptions provides a context for a brief discussion of the type of contact event descriptions in **??** mentioned at the end of Section **??**, where an animate entity unintentionally comes into contact with a surface, a fairly common type of event.

(38) a. Pat whirled suddenly and her elbow bumped the apparatus.

b. Pat whirled suddenly, bumping the apparatus.

In **??**, the subject of *bump*, *her elbow*, which is the force bearer, is a body part of a human acting unintentionally. In **??** the subject *Pat* is a human who is acting unintentionally and, thus, does not qualify as an agent. In contrast to event descriptions in which a human is acting intentionally, the subject here may be understood to refer to the person's whole body, as noted in Section **??**; it could also be the case that only a part of the subject's body makes contact, although perhaps that is not made precise since it is the contact itself that is most salient. The body or body part falls into the projectile category and, thus, qualifies as the force bearer. These descriptions are comparable to the non-agentive descriptions in **??**.

The difficulty discussed in Section **??** about how best to characterize the semantic role of the subject in non-agentive contact event descriptions is now resolvable. In terms of the characterization of such event descriptions proposed here, the subject is the force bearer. The force bearer must be a self-energetic entity. By their very nature, natural phenomena and machines having their own energy source qualify as force bearers since they are inherently self-energetic. Certain physical entities also qualify when they are imbued with kinetic energy, that is, when they can be conceived of as projectiles. Although natural phenomena and machines are sometimes subsumed under certain fairly standardly used semantic role labels, the notion of projectile has not found a place in traditional semantic role lists; nor have animate entities that unintentionally come into contact with a surface. It is this discrepancy that is behind the semantic role assignment quandary discussed in the survey of patterns instantiating contact event descriptions hosting hitting verbs in Section **??**. Introducing the notion of force bearer provides a unified resolution to this issue. In agentive event descriptions, the force bearer can be a tool or body part that an agent brings into contact with a surface; such force bearers have been typically assigned the instrument role in approaches that use semantic roles.

To sum up, contact event descriptions by their very nature include a participant that is best characterized as a force bearer and a second participant, the surface, and these naturally align with the force bearer and the surface lexicalized by hitting verbs. Contact events may also include an agent who manipulates the force bearer; in such instances the force bearer is a manipulable entity, a tool or body part. In non-agentive contact events, the force bearer must be construed as self-energetic, a property that allows it to qualify as the subject.

4.2 How directed motion event descriptions arise

To understand why hitting verbs may be hosted in a directed motion event description, it is necessary to examine the components of such an event more closely; here I draw on the vast literature on this topic. A directed motion event description involves a moving entity, the theme, and a path of motion, which expresses where the theme is going; it may also optionally include a specification of the manner of motion. The theme is expressed as the subject in directed motion event descriptions; such event descriptions also include a PP, which provides information about the path of motion. The PP may specify the path of motion itself, as in *through the woods* or *along the trail*; alternatively, the PP may specify a key point along the path chosen to allow the path itself to be inferred. This point is most often the source or goal of motion, but occasionally it is some other point, as in *through the gate*, which seems to bound the relevant extent of the path. Although not often discussed, in order to be in motion, the theme must be able to move autonomously, that is, be self-energetic (Levin and Rappaport Hovav 2022). This property is inherent to animate entities and machines, but also holds of projectiles, which are imbued with kinetic energy.

With this background, it is possible to understand why a directed motion event can be construed as having the meaning components lexicalized by a hitting verb, contact and motion; further, the force bearer and surface, which play a part in instantiating these meaning components, can be aligned with the participants in a directed motion event. Consider first, the force bearer. As the force bearer is an entity that moves when it is inherently self-energetic, it has exactly the autonomous motion property required of the theme in a directed motion event, so the force bearer and theme naturally align with each other. However, for a directed motion description to host a hitting verb, contact with a surface must occur, and the surface must also align with a directed motion event participant. As I now show, the two types of directed motion event descriptions hosting hitting verbs identified in Section **??** reflect two ways in which the surface can find a home in such descriptions.

In some directed motion event descriptions, the theme, due to the force that keeps it in motion, comes into forceful contact with an entity in its path that impedes further forward motion; this entity, then, is construed as the endpoint or goal of motion. In such instances, the theme also qualifies as a force bearer and the privileged point on the path qualifies as a surface. Such an event description can then host a hitting verb that lexicalizes the properties of the contact that characterize that specific event. For instance, in **??**, a truck, due to the energy that keeps it in motion, moves along a path that ends at the wall. In **??**, the truck moves along a path, but in this instance the point of contact is a salient point on the path, a barrier, in that it can prevent further forward motion.

(39) a. The truck bumped into the wall.
b. The ball slammed into the net.
c. The skier smacked into the tree.
d. The truck slammed through the barrier.

In the second type of directed motion event description, the theme again qualifies as a

force bearer, but it makes multiple instances of contact with the ground specified in the path of motion as in **??**.

(40) a. A car bumped along the trail.
b. The truck bumped into the cobbled courtyard.
c. Pat pounded up the stairs.

Multiple contact arises in two situations. As the theme moves, it makes repeated instances of contact with the ground either because of the nature of the theme itself or because of the nature of the ground (or both). For instance, the ground may be uneven, as in a rocky path or a rutted road, so that any vehicle traversing it, especially if it is old or damaged, is not consistently in contact with it. In **??**, the car repeatedly makes a bumping type of contact as it moves over the imperfections in the trail. Alternatively, the theme moves in a manner that requires making contact repeatedly with the ground. When someone goes up the stairs as in **??**, they step on each stair, and each step involves an instance of contact. The force is exerted on each stair, but the energy of the theme, i.e. the person, is what propels them forward up the staircase. A hitting verb such as *bang, bump,* or *pound* that lexicalizes the type of force characteristic of each instance of contact can be used in the description of such events. As noted in Section **??**, these event descriptions often include PPs describing extended paths, a necessary prerequisite for multiple instances of contact.

In these event descriptions, the repeated contact with the ground is a necessary concomitant of the theme's motion. Thus, they are the hitting verb analogue of directed motion event descriptions with sound emission verbs as in **??**, where the sound, such as a truck's rumbling, is a necessary concomitant of the theme's motion (Levin and Rappaport Hovav 1991: 138, 1995: 191).

(41) The truck rumbled down the street.

And in fact, as noted in Section **??**, some hitting verbs lexicalize a sound characteristic of a certain type of contact, as with *bang* and *thud*.

The nature of a verb's lexicalized meaning determines whether it can or must be hosted in a multiple contact directed motion event description. Some hitting verbs, among them *batter* and *pound*, lexicalize necessarily repeated contact. Others are indifferent and may apply to one or more instances of contact; they include *bang, bump, slam*, and *slap*. Hitting verbs which lexicalize repeated contact should only be found in those directed motion event descriptions which involve multiple instances of contact. They are not expected to be found in those directed motion event descriptions that involve a single instance of contact. The corpus study confirms this: *batter* and *pound* are not attested in such descriptions.

Only some hitting verbs find a place in directed motion event descriptions: those that allow for their force bearer to be self-energetic.[22] That means that hitting verbs that lexicalize a body part or a tool as force bearer do not occur in such event descriptions, as shown

[22] As mentioned in note **??** the verb *hit* itself is apparently not found in directed motion event descriptions.

by **The ball kicked into the goal*. In order to impart a force to the body part or tool an agent is necessary, so these force bearers are never self-energetic.[23]

Hitting verbs occur in directed motion event descriptions where the theme's motion involves making either a single instance or multiple instances of contact with the ground. This raises two questions: Are there directed motion event descriptions where a theme is in continuous contact with the ground, and if so, are there surface contact verbs that can be hosted in such event descriptions? The answer to both questions is "yes"! Such descriptions are found with verbs like *sweep* and *scrape*, which lexicalize the exertion of a force on a surface while making continuous contact with it.

(42) a. A chair scraped across the floor.

b. A storm swept through the valley.

These verbs belong to the class of wiping verbs as in (43), which together with the hitting verbs constitute the larger class of surface contact verbs.

(43) Wiping verbs: rub, scrape, sweep, wash, wipe, ...

Wiping verbs lexicalize contact with a "region", unlike hitting verbs, which lexicalize contact at a "point" (Levin 2017: 586). The action patterns they lexicalize cannot be defined with respect to a single point on a surface; rather, they involve particular patterns of motion over a surface. For instance, the verbs *rub* and *wipe* denote actions which differ not only in the amount of force applied to the surface, but also in the characteristic pattern of movement over the surface: rubbing involves fairly small back and forth movements made while exerting a fairly strong pressure on the surface, while wiping involves longer, broader strokes which are more lightly applied to the surface (Levin 2017: 586). Thus, the force bearer is in contact with a spatially extended surface, allowing for the use of certain wiping verbs in those continuous contact directed motion event descriptions which involve the appropriate pattern of movement.

Although I leave a full explanation of this observation for future work, I note that *hit* lexicalizes the least specific manner among all the hitting verbs. This facet of *hit*'s meaning might seem at odds with its limited distribution since Boas (2008), drawing on Snell-Hornby (1983), uses a corpus study to argue that manner of motion verbs that lexicalize less specific manners are found in more constructions than those that lexicalize more specific manners. However, some further informal corpus searches suggest that Boas' claim does not stand up for manner of motion verbs. M. Aurnague (p.c.) suggests that the limitation on *hit*'s distribution stems from its lack of specificity about the magnitude of the force it lexicalizes. He suggests that in order for an entity to be inferred as moving through space it must be imbued with an appropriately strong force.

[23] Such verbs, however, may be found in caused motion event descriptions, including the putting event descriptions discussed in Section **??**. Such events have an agent as causer who can manipulate a body part, tool, or other physical object, so the force bearer need not be self-energetic.

5 Final thoughts

This study has shown that a wider range of manner verbs can be found in directed motion event descriptions than has been previously acknowledged. I propose that manner verbs can be found in such event descriptions when their lexicalized meaning can be aligned with the components of such event descriptions, as is possible with hitting verbs, the focus of this study, as well as wiping verbs, sound emission verbs, and substance emission verbs.

At the same time, this study has clarified the prerequisites for a verb to be found in event descriptions of different types. Some hitting verbs can be found in directed motion event descriptions and contact event descriptions because the elements of meaning critical to event descriptions of both types allow for event participants that the force bearer and surface lexicalized by hitting verbs can align with. However, from the perspective of the event descriptions themselves the participants that the lexicalized force bearer and surface align with would not be described with the same "semantic role", as these semantic roles are determined by the nature of the event type: force bearer and surface for contact event descriptions and theme and path for directed motion event descriptions.

Although this study has focused on English, it raises the question of whether hitting verbs can be found in directed motion event descriptions in other languages. The use of a wide range of manner of motion verbs in directed motion event descriptions is a property of so-called satellite-framed languages, while verb-framed languages allow few if any manner of motion verbs in such event descriptions. Whatever the explanation for this difference among languages — and there are various proposals in the literature — two predictions arise. First, hitting verbs, as a type of manner verb, would be unlikely to be found in directed motion event descriptions in verb-framed languages. Second, they would be expected to be found in other satellite-framed languages. However, such languages have been shown to differ in how large a manner of motion inventory they have and how wide a range of manner of motion verbs they allow in directed motion event descriptions. They also differ as to whether they allow sound emission verbs in such event descriptions. Thus, Acedo-Matellán (2016: Chapter 5) identifies what he calls "weak" satellite-framed languages in which the path-encoding element must be attached to the verb, giving rise to what he calls "univerbation". Interestingly, Polish, which is a weak satellite-framed language, does not allow sound emission verbs in directed motion event descriptions (Lewandowski and Mateu 2020: 15). It is possible that a weak satellite-framed languages like Polish would also be less permissive in allowing hitting verbs in directed motion event descriptions, but this is a topic for future research.

References

Acedo-Matellán, V. 2016. *The morphosyntax of transitions: A case study in Latin and other languages*. Oxford: Oxford University Press.

Alexiadou, A. & Schäfer, F. 2006. Instrument subjects are agents or causers. *Proceedings of the 25th West Coast Conference on Formal Linguistics* (40-48). Somerville, MA:

Cascadilla Proceedings Project.
Aurnague, M. This volume. Are path and manner appropriate analysis tools? Searching for the conceptual bases of motion eventualities in French.
Beavers, J. 2010. The structure of lexical meaning: Why semantics really matters. *Language*, 86, 821-864.
Beavers, J., & Koontz-Garboden, A. 2012. Manner and result in the roots of verbal meaning. *Linguistic Inquiry*, 43, 331-369.
Beavers, J., Levin, B., & Tham, S. W. 2010. The typology of motion events revisited. *Journal of Linguistics*, 46, 331-377.
Boas, H. C. 2008. Towards a frame-constructional approach to verb classification. *Revista Canaria de Estudios Ingleses*, 57, 17-48.
Bowerman, M. 1996. Learning how to structure space for language: A crosslinguistic perspective. In P. Bloom, M. A. Peterson, L. Nadel, & M. F. Garrett (Eds.), *Language and space* (385-436). Cambridge, MA: MIT Press.
Cruse, D. A. 1973. Some thoughts on agentivity. *Journal of Linguistics*, 9, 11-23.
Davies, M. 2008-. *The corpus of contemporary American English (COCA)*.
de Swart, P. 2014. Prepositional inanimates in Dutch: A paradigmatic case of differential object marking. *Linguistics*, 52, 445-468.
Fanego, T. 2017. *The trolley rumbled through the tunnel*: On the history of the English intransitive motion construction. *Folia Linguistica Historica*, 38, 29-73.
Feist, M. I., & Gentner, D. 1998. On plates, bowls, and dishes: Factors in the use of English IN and ON. *Proceedings of the 20th Annual Conference of the Cognitive Science Society* (345-349). Mahwah, NJ: Lawrence Erlbaum.
Fillmore, C. J. 1970. The grammar of *hitting* and *breaking*. In R. A. Jacobs, & P. S. Rosenbaum (Eds.), *Readings in English Transformational Grammar* (120-133). Waltham, MA: Ginn.
Fillmore, C. J. 1977. The case for case reopened. In P. Cole, & J. M. Sadock (Eds.), *Syntax and semantics 8: Grammatical relations* (59-81). New York: Academic Press.
Folli, R., & Harley, H. 2005. Consuming results in Italian and English: Flavors of *v*. In P. Kempchinsky, & R. Slabakova (Eds.), *Aspectual inquiries* (95-120). Dordrecht: Springer.
Folli, R., & H. Harley. 2008. Teleology and animacy in external arguments. *Lingua*, 118, 190-202.
Folli, R., & Ramchand, G. 2001. Getting results: Motion constructions in Italian and Scottish Gaelic. *Proceedings of the 20th West Coast Conference on Formal Linguistics* (192-205). Somerville, MA: Cascadilla Proceedings Project.
Geuder, W., & Weisgerber, M. 2006. Manner and causation in movement verbs. In C. Ebert, & C. Endriss (Eds.), *Proceedings of Sinn und Bedeutung 10* (125-137) [ZAS Papers in Linguistics 44].
Ghomeshi, J., & Massam, D. 1995. Lexical/syntactic relations without projection. *Linguistic Analysis*, 24, 175-217.
Goldberg, A. E. 1995. *Constructions: A Construction Grammar approach to argument structure*. Chicago: University of Chicago Press.
Goldberg, A. E. 2010. Verbs, constructions and semantic frames. In M. Rappaport Hovav, E. Doron, & I. Sichel (Eds.), *Syntax, lexical semantics, and event structure* (39-58).

Oxford: Oxford University Press.
Goldschmidt, A., & Zwarts, J. 2016. Force vectors in verb semantics. *Proceedings of Semantics and Linguistic Theory 26* (433-450).
Grimm, S. 2007. The bounds of subjecthood: Evidence from instruments. *Proceedings of the 33rd Annual Meeting of the Berkeley Linguistics Society: General session and parasession on multilingualism and fieldwork* (178-189). Berkeley, CA: Berkeley Linguistics Society.
Gruber, J. S. 1965. *Studies in lexical relations*. PhD dissertation, MIT, Cambridge, MA.
Israel, M. 1996. The *way* constructions grow. In A. E. Goldberg (Ed.), *Conceptual structure, discourse, and language* (217-230). Stanford, CA: CSLI Publications.
Jackendoff, R. S. 1972. *Semantic interpretation in Generative Grammar*. Cambridge, MA: MIT Press.
Jackendoff, R. S. 1983. *Semantics and cognition*. Cambridge, MA: MIT Press.
Jackendoff, R. S. 1985. Multiple subcategorization and the Theta-Criterion: The case of *climb*. *Natural Language and Linguistic Theory*, 3, 271-295.
Jackendoff, R. S. 1990. *Semantic structures*. Cambridge, MA: MIT Press.
Jackendoff, R. S. 1992. Babe Ruth homered his way into the hearts of America. In T. Stowell, & E. Wehrli (Eds.), *Syntax and semantics 26: Syntax and the lexicon* (155-178). New York: Academic Press.
Kearns, K. 2000. *Semantics*. St. Martin's, New York.
Kiparsky, P. 1997. Remarks on denominal verbs. In A. Alsina, J. Bresnan, & P. Sells (Eds.), *Complex predicates* (473-499). Stanford, CA: CSLI Publications.
Langacker, R. W. 1987. *Foundations of Cognitive Grammar. vol. 1: Theoretical prerequisites*. Stanford, CA: Stanford University Press.
Levin, B. 1999. Objecthood: An event structure perspective. *Proceedings of the 35th Annual Meeting of the Chicago Linguistic Society, Part 1: The main session*. 223-247. Chicago: Chicago Linguistic Society.
Levin, B. 2015. Verb classes within and across languages. In A. Malchukov, & B. Comrie (Eds.), *Valency classes in the world's languages, vol. 2: Case studies from Austronesia, the Pacific, the Americas, and theoretical outlook* (1627-1670). Berlin & New York: De Gruyter.
Levin, B. 2017. The elasticity of verb meaning revisited. *Proceedings of Semantics and Linguistic Theory 27* (571-599).
Levin, B. 2020. Resultatives and constraints on concealed causatives. In E. Bar-Asher Siegal, & N. Boneh (Eds.), *Perspectives on causation: Selected papers from the Jerusalem 2017 workshop* (185-217). Dordrecht: Springer.
Levin, B., & Krejci, B. 2019. Talking about the weather: Two construals of precipitation events in English. *Glossa: A Journal of General Linguistics*, 4, Article 58, 1-29.
Levin, B., & Rappaport Hovav, M. 1991. Wiping the slate clean: A lexical semantic exploration. *Cognition*, 41, 123-151.
Levin, B., & Rappaport Hovav, M. 2013. Lexicalized meaning and manner/result complementarity. In B. Arsenijević, B. Gehrke, & R. Marín (Eds.), *Studies in the composition and decomposition of event predicates* (49-70). Dordrecht: Springer.
Levin, B., & Rappaport Hovav, M. 2022. Conventionalized agentive activities and compositionality. In L. Stockall, L. Martí, D. Adger, I. Roy, & S. Ouwayda (Eds.), *For Hagit:*

A celebration [QMUL Occasional Papers in Linguistics 47]. London: Department of Linguistics, Queen Mary University of London.

Levinson, S., Meira, S., & The Language and Cognition Group. 2003. "Natural concepts" in the spatial topological domain—adpositional meanings in crosslinguistic perspective: An exercise in semantic typology. *Language*, 79, 485-516.

Lewandowski, W., & Mateu, J. 2020. Motion events again: Delimiting constructional patterns. *Lingua*, 247C, Article 102956, 1-25.

Lundquist, B., & Ramchand, G. 2012. Contact, animacy, and affectedness in Germanic. In P. Ackema, R. Alcorn, C. Heycock, & D. Jaspers (Eds.), *Comparative Germanic syntax: The state of the art* (223-248). Amsterdam & Philadelphia: John Benjamins.

Marantz, A. P. 1984. *On the nature of grammatical relations*. Cambridge, MA: MIT Press.

Marantz, A. P. 1992. The *way* construction and the semantics of direct arguments in English. In T. Stowell, & E. Wehrli (Eds.), *Syntax and semantics 26: Syntax and the lexicon* (179-188). New York: Academic Press.

Mateu, J. 2008. On the L-syntax of directionality/resultativity: The case of Germanic preverbs. In A. Asbury, J. Dotlačil, B. Gehrke, & R. Nouwen (Eds.), *Syntax and semantics of spatial P* (221-250). Amsterdam & Philadelphia: John Benjamins.

Nichols, J. 1984. Direct and oblique objects in Chechen-Ingush and Russian. In F. Plank (Ed.), *Objects: Towards a theory of grammatical relations* (183-209). London: Academic Press.

Nichols, J. 2011. *Ingush grammar*. Berkeley, CA: University of California Press.

Nikitina, T. 2008. Pragmatic factors and variation in the expression of spatial goals: The case of *into* vs. *in*. In A. Asbury, J. Dotlačil, B. Gehrke, & R. Nouwen (Eds.), *Syntax and semantics of spatial P* (175-209). Amsterdam & Philadelphia: John Benjamins.

Rappaport Hovav, M. 2014. Building scalar changes. In A. Alexiadou, H. Borer, & F. Schäfer (Eds.), *The syntax of roots and the roots of syntax* (259-281). Oxford: Oxford University Press.

Rappaport Hovav, M. 2017. Grammatically relevant ontological categories underlie manner/result complementarity. *Proceedings of Israel Association for Theoretical Linguistics 2016* (77-98) [MIT Working Papers in Linguistics 86]. Cambridge, MA: Department of Linguistics & Philosophy, MIT.

Rappaport Hovav, M., & Levin, B. 1998. Building verb meanings. In M. Butt, & W. Geuder (Eds.), *The projection of arguments: Lexical and compositional factors* (97-134). Stanford, CA: CSLI Publications.

Rappaport Hovav, M., & Levin, B. 2010. Reflections on manner/result complementarity. In M. Rappaport Hovav, E. Doron, & I. Sichel (Eds.), *Syntax, lexical semantics, and event structure* (21-38). Oxford: Oxford University Press.

Richardson, J. F. 1983. Smash bang. *Proceedings of the 9th Annual Meeting of the Berkeley Linguistics Society* (211-217). Berkeley, CA: Berkeley Linguistics Society.

Rissman, L., & Majid, A. 2019. Agency drives category structure in instrumental events. *Proceedings of the 41st Annual Conference of the Cognitive Science Society* (2661-2667).

Rissman, R., van Putten, S., & Majid, A. 2022. Evidence for a shared instrument prototype from English, Dutch, and German. *Cognitive Science*, 46, Article e13140, 1-42.

Rohde, A. R. 2001. *Analyzing path: The interplay of verbs, prepositions and constructional*

semantics. PhD dissertation, Rice University, Houston.

Slobin, D. I. 1996. Two ways to travel: Verbs of motion in English and Spanish. In M. Shibatani, & S. A. Thompson (Eds.), *Grammatical constructions: Their form and meaning* (195-219). Oxford: Oxford University Press.

Snell-Hornby, M. 1983. *Verb descriptivity in German and English*. Heidelberg: Carl Winter.

Stosic, D. This volume. Manner, telicity, and directionality: Towards an in-depth exploration of manner of motion verbs in French.

Stringer, D. 2011. Phonomimesis and directional predication in the acquisition of L1 Japanese and L2 English. *Japanese and Korean Linguistics*, 18, 16-27.

Talmy, L. 1975. Semantics and syntax of motion. In J. P. Kimball (Ed.), *Syntax and semantics 4* (181-238). New York: Academic Press.

Talmy, L. 2000. *Towards a cognitive semantics, vol. I: Concept structuring systems*. Cambridge, MA: MIT Press.

Thomas, E. 2004. On "syntactic" versus "semantic" telicity: Evidence from *in* and *on*. *Belgian Journal of Linguistics*, 18, 145-166.

Tutton, M. 2009. When *in* means *into*: Towards an understanding of boundary-crossing *in*. *Journal of English Linguistics*, 37, 5-27.

Van Valin, R. D., Jr., & Wilkins, D.P. 1996. The case for "effector": Case roles, agents, and agency revisited. In M. Shibatani, & S. A. Thompson (Eds.), *Grammatical constructions* (289-322). Oxford: Clarendon Press.

Wojcik, R. 1976. Where do instrumental NPs come from? In M. Shibatani (Ed.), *Syntax and semantics 6: The grammar of causative constructions* (165-180). New York: Academic Press.

Wolff, P., Jeon, G., Klettke, B., & Li, Y. 2010. Force creation and possible causers across languages. In B. Malt, & P. Wolff (Eds.), *Words and the mind: How words capture human experience* (93-111). Oxford: Oxford University Press.