# English Object Alternations: A Unified Account

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A hallmark of the English verb lexicon is the availability of multiple argument realization options for many English verbs. Studies of the English verb lexicon have drawn attention to one facet of this phenomenon: the availability of a range of object alternations (Levin 1993)—alternate realizations of the VP-internal arguments of apparently triadic verbs. One of the best-known of these alternations is the locative alternation, which comes in "putting" and "removing" subtypes, as illustrated in (1) and (2).

(1) Locative Alternation — "putting" subtype:

a. Jill sprayed paint on the wall.

b. Jill sprayed the wall with paint.

(2) Locative Alternation — "removing" subtype:

a. Jack wiped crumbs off the counter.

b. Jack wiped the counter.

There are many studies of object alternations, particularly the locative and dative alternations, yet few of them consider the full spectrum of object alternations, asking whether they can receive a unified account.[1]

In this paper, I revisit English object alternations in the context of recent work on the nature of verb meaning and the representation of events.[2] Specifically, I pursue the implications of the picture of objecthood in Levin

[1]Partial exceptions are Basilico (1998) and Tremblay (1991), who consider the locative and dative alternations, and Pinker (1989), who considers the locative and dative alternations in detail and says a few words about some other object alternations (1989:129); however, these studies do not confront the full set of issues addressed in this paper.

[2]This paper focuses on object alternations in English, although the proposed analysis of these alternations should ultimately be tested against data from other languages; this task, however, will have to await the more systematic documentation of the crosslinguistic distribution of object types and object alternations. Nevertheless, all of these alternations have been attested in other languages, with the locative alternation, at least, being quite

(1999) for object alternations. There I showed that certain assumptions laid out in Rappaport Hovav and Levin (1998) about the structure of verb meaning, the typology of events, and the nature of the event structure-to-syntax mapping when taken together provide new insight into the notion "object"; here I extend this account to object alternations. I argue that despite their surface diversity, almost all object alternations have a unified account. Object alternations are a consequence of the bipartite view of verb meaning that is characteristic of current projectionist and constructional approaches: a verb's meaning consists of a root—or "core" meaning—that is associated with an event structure template, indicating a verb's basic event type. Object alternations arise because having a root basically associated with a simple event structure, rather than a complex event structure, allows a verb flexibility in its choice of objects, a prerequisite to participating in object alternations. The specific alternations attested in English arise from the nature of the verb roots themselves. This paper lays out the major ingredients of such an account, though it does not provide detailed analyses of individual alternations.

## 1 What Are Object Alternations?

Pairs of sentences such as those constituting the putting or removing forms of the locative alternation in (1) and (2) are considered to exemplify an "argument alternation" because the members of each pair are felt to be near paraphrases. Thus, descriptively, such pairs can be characterized as involving the alternate realization of the VP-internal arguments of an apparently triadic verb. The verb maintains the same association of an argument with the subject, but can express either of its other two arguments as its object,

prevalent, having been attested in at least two dozen languages typologically diverse languages. To the extent that information is available, it appears that English may show more types of object alternations than many other languages, with more verbs attested in each alternation. This property is not surprising as English generally allows its verbs to take more types of objects, including nonsubcategorized objects, than many other languages (Green 1973, Hawkins 1982, 1985, Levin and Rapoport 1991, Martínez Vázquez 1998, Plank 1985). A question for future research is whether there is any correlation between the range of object alternations a language allows and where that language falls with respect to the verb-framed/satellite-framed divide discussed by Talmy under the rubric of lexicalization patterns of verbs of motion. Although the locative alternation, for instance, has been attested in languages from both sides of this divide (Kim 1999:133-140), there may nevertheless be some correlation. The limited literature on this topic suggests that for a particular alternation English may show more alternating verbs than other languages; this property might be related to English's classification as a satellite-framed language, a type of language which tends to have a rich inventory of means/manner verbs (Slobin 1996, 2004a, 2004b, to appear), and, as discussed here, it is precisely such verbs that are found in object alternations.

with the third argument usually being expressed as an oblique. It is this near-paraphrase property that has privileged such pairs, setting them apart from other sentences where the same verbs might show other alternate argument realizations.

English has a wide range of object alternations. In addition to the locative alternation, illustrated in (1) and (2), it also demonstrates the alternations below; see Levin (1993) for a more extensive list.

(3) Material/Product Alternation:

a. Martha carved a toy out of the piece of wood.

b. Martha carved the piece of wood into a toy.

(4) Image Impression Alternation:

a. Taylor embroidered peonies on the jacket.

b. Taylor embroidered the jacket with peonies.

(5) *With/Against* Alternation:

a. Sam hit the fence with a stick.

b. Sam hit a stick against the fence.

One caveat is in order. I restrict myself to what are clearly "genuine" object alternations—alternations where the objects in both variants unambiguously show "object" properties. For this reason, I leave the dative alternation outside of consideration, as it is not clear that the first object in the double object construction is a true "object" (Baker 1997, Hudson 1992, Marantz 1993, Maling 2001). Furthermore, the dative alternation presents additional complications, as not all verbs show this alternation for the same reason. Rappaport Hovav and Levin (2005) argue that verbs that inherently signify acts of giving, such as *give*, *hand*, *rent*, and *sell* maintain the same event structure, but show different realizations of the recipient argument, giving rise to a "dative alternation". For other dative verbs, the dative alternation reflects the availability of two distinct meanings, each associated with a distinct argument realization. Nevertheless, it is likely that this account can be accommodated under the more general analysis of object alternations discussed here.

Much attention has been focused on the range of verbs showing each object alternation. It is well-known that each alternation is shown by members of at most a few semantically coherent class of verbs, with distinct sets of verbs

figuring in each alternation. For example, the verbs found in the adding form of the locative alternation fall into two broadly defined sets, which Pinker (1989:125-127) calls "content-oriented" and "container-oriented", terms inspired by Schwartz-Norman (1976). The choice of label depends on whether the meaning of the verb is more about the stuff place on a surface or in a container or about the nature of the surface or container. Pinker further subdivides each of these broad sets into several subsets, as delineated below.

(6) Content-oriented verbs (Pinker 1989:126-127):

a. Simultaneous forceful contact and motion of a mass against a surface: *brush, dab, daub, plaster, rub, slather, smear, smudge, spread, streak*

b. Vertical arrangement on a horizontal surface: *heap, pile, stack*

c. Force is imparted to a mass, causing ballistic motion in a specified spatial distribution along a trajectory: *inject, spatter, splash, splatter, spray, sprinkle, squirt*

d. Mass is caused to move in a widespread or nondirected distribution: *bestrew, scatter, sow, strew*

(7) Container-oriented verbs (Pinker 1989:126-127):

a. A mass is forced into a container against the limits of its capacity: *cram, crowd, jam, pack, stuff, wad*

b. A mass of a size, shape, or type defined by the intended use of a container ... is put into the container, enabling it to accomplish its function: *load, pack, stock*

Interestingly, the members of these sets of verbs do not figure consistently in other object alternations, although *brush* and *rub* are found in the removing form of the locative alternation. Thus, each alternation has a characteristic set of alternating verbs.

In addition to this much discussed property of English object alternations, there are several other noteworthy properties, which any comprehensive account of these alternations must recognize. First, even though each alternation is associated with a particular set of verbs, there are a few verbs which show more than one object alternation and, concomitantly, take a range of objects, while many other verbs, even some that might participate in one of these alternations, do not show all of these options. The verb *sew* shows the putting form of the locative alternation, the reciprocal alternation, and the material/product alternation.

(8) a. Dale sewed bows on the costume.
b. Dale sewed the costume with bows.

(9) a. Dale sewed the lining to the skirt.
b. Dale sewed the lining and skirt together.

(10) a. Dale sewed the piece of silk into a ball gown.
b. Dale sewed a ball gown out of the piece of silk.

The verbs *wipe* and *vacuum* both show the removing form of the locative alternation, but although *wipe* also shows a form of the *with/against* alternation, as in (12), *vacuum* does not show this second alternation.[3]

(11) a. Lee wiped the counter.
b. Lee wiped the liquid off the counter.

(12) a. Lee wiped the cloth over the table.
b. Lee wiped the table with the cloth.

(13) a. Avery vacuumed the dust off the rug.
b. Avery vacuumed the rug.

(14) a. ∗Avery vacuumed dust over the rug.
b. ∗Avery vacuumed the rug with dust.

Second, verbs from some semantic classes do not show object alternations at all. For instance, it has often been remarked that verbs of putting (e.g., *insert, pour, put*) and verbs of filling (e.g., *cover, fill*) are found in syntactic frames that resemble one variant of the adding form of the locative alternation, yet they do not show the alternation (Pinker 1989, Rappaport and Levin 1988).

(15) a. Shannon put/*filled the groceries into the bag.

[3]Some verbs show even more options in that they show one variant of an alternation but not the other. The verb *wipe* shows one of the variants of the putting form of the locative alternation and of the material/product alternation (*wipe crumbs into a pile/*wipe a pile from crumbs*, *wipe crumbs onto the floor/*wipe the floor with crumbs*), but *vacuum* is not even attested in this one variant of these alternations. I do not try to explain why *wipe* might only show one of the two variants of these alternations because my focus is on the necessary conditions for showing object alternations, since it is these that underlie my contention that object alternations receive a unified analysis, rather than on the sufficient conditions, which explain the behavior of individual verbs. See section 5.3 for further discussion.

b. Shannon filled/*put the bag with the groceries.

Similarly, verbs of taking (e.g., *take, obtain*) apparently show one variant of the removing form of the locative alternation, yet they too do not show the alternation.

(16) a. Alex obtained the rare metal from Transylvania.

b. ∗Alex obtained Transylvania (of the rare metal).

Change of state verbs, such as *break, crack, dim*, and *widen*, also do not show object alternations. Although *break* is found in sentences that syntactically parallel the sentences in (5) with *hit* which constitute the *with/against* alternation, the sentences with *break* do not constitute an instance of this alternation. Unlike the sentences with *hit*, the *break* sentences are not near paraphrases. The near-paraphrase relation is found with *hit* because in both sentences in (5) it is the fence that is understood to be hit; in contrast, it is the fence that breaks in (17a) but the stick that breaks in (17b).

(17) a. Lee broke the fence with the stick.

b. Lee broke the stick against the fence.

The pair in (18) uses another change of state verb, *shorten*, to reinforce the point that change of state verbs do not show object alternations. This sentence pair represents an attempt to formulate what might be a plausible alternation semantically, though the attempt fails.

(18) a. Corey shortened the dress.

b. ∗Corey shortened an inch off the dress

To summarize, certain verbs can show one or more object alternations, and, thus, allow two or more choices of objects, while others do not.

Another much noted property of object alternations is their limited productivity. Occasionally, existing verbs that are not considered to show an alternation are found in that alternation, and nonce or newly created verbs may show an alternation. The example in (19) shows the verb *swathe*, which is normally considered to only be found in a context resembling one variant of the locative alternation (e.g., *Laura Lee swathed the canopy with flowers*), used in the other variant.

(19) Laura Lee swathed butter on her cranberry corn muffin. (A. Meyers, *The Groaning Board*, Doubleday, New York, 1997, p. 54)

The limited productivity of object alternations has received considerable attention in studies of child language acquisition since it suggests that there is more to learning alternations than learning a list of the alternating verbs (e.g., Bowerman 1982, Pinker 1989). An account of object alternations should accommodate their limited productivity.

In the following sections, I present an account of object alternations that explains why these properties are observed. I argue that a verb's basic event structure determines whether it shows object alternations: the verb must have a simple event structure. Typically, such an event structure is found with verbs such as *sweep*, *wipe*, or *sew*, which lexicalize a means/manner component of meaning. Such verbs show object alternations as a side-effect of a well-formedness condition on the event structure-to-syntax mapping, which requires simple event verbs to have a specific argument—the actor—realized as their subject. This condition does not impose a comparable requirement on these verbs' objects, so they may have a range of objects and, thus, may show alternations when they are associated with two nonactor arguments and there are two ways of expressing both simultaneously, usually because a simple event structure can be augmented to give a complex event structure, at the same time licensing alternate argument realizations.

This account takes as its starting point several assumptions concerning the structure of verb meanings, the nature of event structures, and the licensing of arguments. In the next section I present the picture of verb meaning and event structure that forms the basis for this account of object alternations; then, in sections 3 and 4 I introduce a related theory of argument licensing. With this foundation, I propose a necessary condition that a verb must meet in section 5.1, and I explore the sufficient conditions that a verb must meet to show an object alternation in section 5.2. Although I propose a unified account of object alternations, the existence of a range of object alternations needs an explanation. Section 5.3 offers such an explanation and explores some of its consequences.

## 2 The Representation of Verb Meaning

In this section I introduce the view of verb meaning that I adopt as it forms an essential component of the account of object alternations. This view is laid out in Rappaport Hovav and Levin (1998) and subsequent work (Levin

1999, Levin and Rappaport Hovav 2005, Rappaport Hovav and Levin 2001), and in its general outlines includes two assumptions that have wide currency in the recent literature on the representation of events. The first is that a verb's meaning consist of two distinct types of components: a "root"—or core meaning—and an event structure template. The second is that event structure representations have internal structure, allowing a distinction to be made between complex events, consisting of two subevents, and simple events, consisting of a single subevent. I now elaborate on each assumption.

In line with much other recent work (Grimshaw 2005, Hale and Keyser 2002, Jackendoff 1983, 1990, Marantz 1997, Mohanan and Mohanan 1999, Pesetsky 1995, Pinker 1989, Rappaport Hovav and Levin 1998), I assume that verbs have structured representations of meaning—or event structures—that consist of two types of elements: an event structure template and a "root".[4] A verb describes an event and its event structure template is chosen to capture the verb's basic event type. Its event structure template includes a position for the second type of meaning component, the "root", to use the term introduced by Pesetsky (1995). The root represents the components of meaning lexicalized by a particular verb in all the contexts it is used in. Although a verb shares its event structure template with other verbs, its root, by capturing what is idiosyncratic to that verb, represents what sets that verb apart from other verbs of the same event type.

Event structures take the form of predicate decompositions, built from a limited set of primitive predicates; thus, there is a limited inventory of possible event types defined by the possible predicate decompositions.[5] The most important distinction is between complex and simple event structures. Complex event structures are composed of two subevents, each of which is itself a well-formed simple event, as in (20), while simple event structures, consist of a single subevent, as in (21) (Levin and Rappaport Hovav 1999).

(20) [ [ x ACT$_{<MANNER>}$ ] CAUSE [ BECOME [ y <*RES-STATE*> ] ] ]

(21) [ x ACT$_{<MANNER>}$ ]

[4]In this paper I take a projectionist perspective on the representation of verb meaning, but the basic assumptions can be given a constructional instantiation. Most important, constructional approaches include an analogue of the event structure–root distinction, taking the event structure to be represented by the construction itself and the root to be the verb's meaning. See Levin and Rappaport Hovav (2005:192) for discussion.

[5]I take event structures to be instantiated by a semantic representation. Some current work, takes the event structure to be one and the same as the syntactic representation, with primitive predicates represented as different "flavors" of little-v's (Folli and Harley 2005, Harley and Noyer 2000, Ritter and Rosen 1998, 2000, Travis 2000a, 2000b, 2005).

In addition to the activity template in (21), two other types of simple event structure templates are relevant, stative and inchoative templates, as in (22a) and (22b), respectively

(22) a. [ x <*STATE*> ]
b. [ BECOME [ x <*STATE*> ] ]

Although, these simple event structures can be given aspectual definitions, I do not adopt an aspectual definition for complex event structures; see Levin (2000) and Van Valin and LaPolla (1997). Rather, these event structures describe causative events (Levin and Rappaport Hovav 1999, Rappaport Hovav and Levin 2001). As a complex event structure includes simple event structures, it is possible to build a complex event structure from a simple event structure; this possibility is exploited by object alternations; see section 5.2.

The key property of a verb's root is its ontological type, chosen from a fixed set of types, which might include state, result state, thing, stuff, place, means/manner, and instrument. Roots are integrated into event structure templates as arguments or as modifiers of predicates; the root has been referred to as the "constant" in some of my previous work precisely because it is often represented as a constant filling an argument position associated with a primitive predicate. Notationally, in event structure representations roots are italicized and in angle brackets, and notated via subscripts when they are modifiers, as in (21).

A verb's root determines the basic event structure template for that verb on the basis of its ontological type. These associations between roots and event structure templates are specified via canonical realization rules (Rappaport Hovav and Levin 1998). Examples of such rules together with some verbs relevant to each are given below; they are taken with slight modifications from Rappaport Hovav and Levin (1998:109).

(23) means/manner → [ x ACT$_{<MANNER>}$ ]
(e.g., *jog, run, creak, whistle, . . .*)

(24) thing/stuff → [ x CAUSE [ BECOME [ y WITH <*THING/STUFF*> ] ] ]
(e.g., *butter, oil, paper, tile, wax, . . .*)

(25) place → [ x CAUSE [ BECOME [ y <*PLACE*> ] ] ]
(e.g., *bag, box, cage, crate, garage, pocket, . . .*)

(26) internally caused state → [ x <*STATE*> ]
(e.g., *bloom, blossom, decay, flower, rot, rust, sprout, . . .*)

(27) result (i.e., externally caused) state →
[ [ x ACT ] CAUSE [ BECOME [ y <*RES-STATE*> ] ] ]
(e.g., *break, dry, melt, open, split,* . . . )

These rules are modeled on the meanings of denominal verbs, which demonstrate a clear association between the categorization of the referent of the base noun—roughly, equivalent to a root's ontological type—and the meaning of the related verb—that is, its event structure template (Clark and Clark 1979). For instance, nouns that name instruments have related denominal verbs whose meaning is 'use the instrument for its designated purpose', as in *rake* or *saw*. The associations specified by the canonical realization rules most likely reflect general cognitive principles and are not linguistic in nature.

The event structure template that is basically associated with a verb root is chosen to ensure that the minimal elements of meaning lexicalized by a verb and, thus encoded in its root, are given linguistic expression (Rappaport Hovav and Levin 1998). I illustrate this point by comparing two very broad semantic classes of English verbs that differ as to the ontological type of their roots and, concomitantly, in their basic event structures. These two classes also figure prominently in the analysis of object alternations. A range of work exploring the semantic basis of argument realization has pointed to a distinction that crosscuts much of the English lexicon between what have been called "means/manner" verbs and "result" verbs.[6] Result verbs inherently specify the bringing about of a result state—a state that is the result of some sort of activity; thus, the verbs *empty* and *clean* describe two different result states that are brought about from removing material from a place; neither verb is specific about how the relevant result state comes about. By their very nature, result verbs are externally caused verbs in the sense of Levin and Rappaport Hovav (1995) since the result states that characterize them must be brought about by some cause that is external to the entity that changes state; see also Hale and Keyser (2002). In contrast, means/manner verbs describe actions, which are identified by some sort of means, manner, or instrument. Thus, the means/manner verbs *sweep* and *rake* describe actions involving making contact with a surface; however, they involve different instruments, which are manipulated in somewhat different ways. Similarly, *scrub* and *wipe* also describe ways of making contact with a surface, but differ in the degree of force, the movements of the hand, and the instruments that might be used. Conceptually, a means/manner root might be encoded via the notion of "action

[6]For more on the division of the verb lexicon into means/manner and result verbs, see Levin and Rappaport Hovav (1991, 1995, 2006) and Rappaport Hovav and Levin (1998), who draw on ideas from Talmy (1975, 1985). This division has received independent support from work in child language acquisition (Behrend 1990, Gentner 1978, Marcotte 2005, Pinker 1989).

pattern" mentioned in Jackendoff (1990), drawing on the work of Marr and Vaina (1982).

What is interesting is that many apparently semantically defined classes of English verbs fall into means/manner and result subclasses. Thus, *sweep*, *rake*, *scrub*, *wipe*, *empty*, and *clean* have been lumped together as verbs of removal, but as Levin and Rappaport Hovav (1991) show, the first four verbs show significantly different behavior from the other two. The same intuition has been applied more broadly, as the following table illustrates.

| | Means/Manner | vs. | Result |
|---|---|---|---|
| Verbs of Removal: | *sweep, wipe* | vs. | *clear, empty* |
| Verbs of Putting: | *smear, spray* | vs. | *cover, fill* |
| Verbs of Combining: | *shake, stir* | vs. | *combine* |
| Verbs of Killing: | *stab, strangle* | vs. | *kill* |
| Verbs of Creation: | *carve, sew* | vs. | *construct* |

There is a reason why certain sets of means/manner and result verbs are perceived to belong together. A means/manner verb often names an action performed to bring about some conventionally associated result, even though the verb itself does not lexically entail the achievement of this result (Talmy 2000). For example, the verb *sweep* describes an action that can remove stuff from a surface and, thus, that is typically performed to clean a floor or comparable surface; however, *sweep* does not entail that cleanness was achieved: this result can be reinforced without redundancy as in (28a) or denied as in (28b).

(28) a. Sam swept the floor clean.

b. Sam swept the floor, but there were still crumbs under the desk.

To take another example, although a surface is typically wiped to clean it, the wiping need not result in a clean surface, as in (29a), and, in fact, a predicate can be added expressing this intended result, without redundancy, as in (29b).

(29) a. Though Tyler wiped the glass carefully, it still had spots on it.

b. Tyler wiped the counter clean.

In contrast, a result verb lexicalizes the achievement of a particular result state, but does not specify how this state was brought about. In fact, there may be several ways to bring about a particular result state; for example, someone

can clean a contrast by wiping, sponging, or scrubbing it. Nevertheless, there may be a conventional way of bringing about a particular result state in a given entity, even if this is not lexicalized in the relevant result verb. For example, sweeping is a conventional way of cleaning a floor, while wiping is the way to clean a counter. The perception of a unified verb class such as the verbs of removal comes from the association of the actions named by the means/manner verbs in this class with the achievement of the results associated with the result verbs in this class. Pairs of verbs that are associated in this way may be perceived as being in the same semantic class; however, these larger classes are not grammatically relevant, as discussed in Levin and Rappaport Hovav (1991) and Levin (1999).

Verbs with means/manner and result roots, then, lexicalize very different kinds of meanings and, hence, are basically associated with different event structure templates. Since a result state is brought about by a cause that is external to the entity that changes state, a result state root must be associated with a complex (causative) event structure. Such an event structure, which consists of causing and result subevents, allows both the existence of a causing activity and of a resulting change of state to be represented. In contrast, a means/manner root describes an activity with no inherent result state, so it is associated with a simple event structure, specifically one headed by the primitive predicate ACT; the root is indicated as a modifier of this predicate. Although I describe these verbs as activity verbs, this class encompasses more than the aspectual class of activities, as it includes semelfactives as well, as discussed in Levin (1999).

The bipartite view of verb meaning dovetails with one of the salient properties of object alternations. There is a strong perception that the verb lexicon of a language is organized into grammatically relevant semantically coherent verb classes (Fillmore 1971, Levin 1993), and, as mentioned in section 1, one characteristic of object alternations is that each is associated with a handful or so of these classes. The existence of such classes follows naturally if a verb's meaning can be factored into an event structure template and a root. Verbs which share an event structure template would be perceived as falling into a semantic class; this perception would be heightened if their roots are not only of the same ontological type, as they would be, but also constitute a natural subclass of the roots of this type. For instance, among the means/manner roots, there is a set of roots associated with varieties of manner of motion and another set associated with varieties of surface contact. These subsets give rise to a relatively fine-grained classification of verbs, which, as discussed in section 5, is exploited in object alternations.

## 3 The Licensing of Arguments in the Syntax

Object alternations by their very nature involve alternate realizations of arguments; thus, an account of these alternations must be built on a theory of argument licensing. In this section, drawing once again on the work of Levin and Rappaport Hovav (1998) and Levin (1999), I lay out such a theory in the context of the assumptions about the representation of verb meaning given in the previous section. I pay equal attention to the role of the event structure and the root in licensing the realization of argument NPs in the syntax. I show that the root has an important role to play in the account of object alternations, even if most previous work, including some of my own, has taken event structure to be the key determinant of argument realization.

What is critical for the analysis of object alternations is that some argument NPs in the syntax are licensed only by the verb's root, although most are licensed by the verb's event structure as well as by its root. It is not difficult to show that the root participates in determining the number of arguments of a verb, as well as their status. As means/manner verbs, *run* and *wipe* should have the same event structure, yet *run* has one argument, while *wipe* has two.

(30) a. Casey ran.
b. Jan wiped the counter.

This difference must be attributed to the verbs themselves, and, thus, reflects the nature of the associated roots. Following my own earlier work, as well as Goldberg (1995), Grimshaw (2005), and van Hout (1996), I assume each root must specify the minimum number of participants in the associated event. The verb *run*'s root would be associated with one participant, as an event of running minimally involves one participant, the runner. In contrast, the verb *wipe*'s root would be associated with two participants, as an event of wiping minimally involves two participants, a wiper and a surface.

When a root is integrated into an event structure template to form an event structure, each participant associated with the root must be paired up, if possible, with an argument position in the event structure template that is "semantically compatible" (Goldberg 1995:50).[7] The verb *run*, as a manner of motion verb, has a means/manner root, which is integrated into the activity event structure template—an event structure template with one argument position, indicated by a variable in (31).

[7]For further discussion of how the participants associated with a root are matched up with the argument positions of the event structure template see Goldberg (1995), particularly Chapter 2.

(31) Casey ran.
[ x ACT$_{<RUN>}$ ]

As just discussed, this root is associated with a single participant, the runner. This participant is compatible with the single argument position of the predicate ACT, which represents an actor, so the two can be matched up. Argument realization rules ensure that this argument in the event structure is realized as the verb's subject.

The verb *wipe* also has a means/manner root, which is likewise integrated into a simple event structure template. Its root, unlike *run*'s, is associated with two participants. One of them, the wiper, is compatible with the single actor argument position in the event structure, so the two can be matched up; however, there is no other argument position that *wipe*'s other root participant, the surface, can be paired up with. It must be integrated into the resulting event structure in some other way. Its presence, Rappaport Hovavand Levin (1998) contend, is licensed by the root alone; this property is represented by underlining such participants in the event structure, as in (32). Such participants may be realized as the object—at least, in English (Levin 1999).

(32) Jan wiped the counter.
[ x ACT$_{<WIPE>}$ $\underline{\text{y}}$ ]

The verb *wipe*, then, has two root participants, but each has a distinct status with respect to the verb's event structure (cf. Grimshaw 2005). One root participant is associated with an event structure argument position; I refer to it as a structure participant. The other is a root participant with no place in the event structure; I refer to it as a pure root participant.[8]

There are some verbs, which like *wipe*, also have roots associated with two participants, but which unlike with *wipe*, these are both structure participants. These verbs include lexically simple change of state verbs such as *break, dry*, and *open*. This class includes the verbs *clear* and *empty* mentioned in section 2, and its members, like these two verbs, have result state roots and describe bringing about an externally caused—or result—state; they have two root participants: the external cause and the entity that undergoes the change of

[8]I represent a pure root participant within the event structure although it does not have any status with respect to the basic event structure template. An alternative representation where this participant is represented with respect to the root only might be worth considering. As this issue does not bear on the question under study, I leave it for further research.

state. Due to their result roots, change of state verbs must be associated with a complex event structure, which has two variables; thus, each participant associated with the root is matched up with one of them. That is, these verbs have two structure participants and no pure root participants.

(33) Dana broke the window.
[ [ x ACT ] CAUSE [ BECOME [ y <*RES-STATE*> ] ] ]

In this respect, these verbs contrast with surface contact verbs and other two-argument activity verbs, which have a structure participant and a pure root particpant.[9]

To summarize, although both change of state verbs and surface contact verbs are realized by transitive verbs in English, they are basically associated with different event structure templates. Concomitantly, change of state verbs have two structure participants, one per subevent, while surface contact verbs have only one structure participant and one pure root participant, representing the nonactor argument of two-argument activity verbs. The consequence is that a nonactor argument of a transitive verb does not always have the same status.

## 4 The Contribution of Event Structure to Argument Realization

The different status of structure and pure root participants is reflected in the event structure-to-syntax mapping. Rappaport Hovav and Levin (1998) propose that structure participants must be syntactically realized, an idea echoed in other work (Grimshaw and Vikner 1993, van Hout 1996, Kaufmann and Wunderlich 1998).[10]

(34) The Structure Participant Condition: There must be an argument XP in the syntax for each structure participant in the event structure. (Rappaport Hovav and Levin 1998:113, (25a))

[9]The idea that the nonactor argument of a two-argument activity verb has a special status in argument realization also finds an expression in Role and Reference Grammar, where Van Valin (1990; Van Valin and LaPolla 1997) proposes that such verbs have a single "macrorole" rather than two macroroles as causative verbs do; see also Levin (1999). Wunderlich's (1997) notion of nonstructural arguments also picks up on a similar idea.

[10]In most instances, due to the nature of the inventory of event structure templates, this condition reduces to Levin and Rappaport Hovav's (1999) Argument-Per-Subevent Condition, which was used as an alternate way of constraining the event structure-to-syntax mapping, that highlighted the idea that event complexity is reflected in argument realization.

There is no analogous requirement on pure root participants. This condition means that there are different argument realization requirements on change of state verbs and on surface contact verbs. Although both have two root participants, because of the different ontological type of their roots, they are associated with distinct event structures, and, concomitantly, they differ with respect to whether they have one or two structure participants. This difference plays a central role in explaining the properties of object alternations.

I briefly exemplify the repercussions of this difference by reviewing the case study in Rappaport Hovav and Levin (1998) of these two types of verbs. Specifically, this case study shows that, as expected, there are differences in behavior of the nonactor participant of these verbs. As noted above, surface contact verbs have means/manner roots associated with two participants, which are associated with simple event structures. They have only one structure argument, the actor, which is required to be syntactically realized by the Structure Participant Condition. The distinctive properties of two-argument simple event verbs arise because their pure root participant does not fall under this condition. Consequently, these verbs can be used intransitively, with an unspecified object interpretation; this option is available because the pure root participant can be left unexpressed. Alternatively, the verb can, instead, take other "arguments", giving rise to other than "normal" objects.

(35) Leslie swept/scrubbed (the floor) this morning.

(36) a. The child rubbed the tiredness out of his eyes.

b. Cinderella scrubbed her hands raw.

This means that the objects of these verbs might bear a variety of semantic relations to the verb. This property is important to object alternations.

Change of state verbs, such as *break, dry, open*, and *split*, also have roots associated with two participants, but given the nature of their roots, these verbs have a complex event structure with two structure participants. Thus, these verbs must have two arguments by the Structure Participant Condition. Specifically, their objects must realize the structure participant of the second subevent. This means their object has a unified semantics, determined by its event structure position: it is always a patient in the sense of an entity that changes state. This means that they show less argument realization options than surface contact verbs (Rappaport Hovav and Levin 1998, Wright and Levin 2000; notwithstanding questions raised by Goldberg 2001). Concomitantly, these verbs do not allow unspecified objects or objects that bear anything but the patient relation to the verb, whether nonsubcategorized or

not, except in certain generic or repetitive contexts (Goldberg 2001).[11]

(37) ∗Kelly broke again tonight when she did the dishes.

(38) a. ∗The clumsy child broke the beauty out of the vase.

b. ∗The clumsy child broke his knuckles raw.

Object alternations, as I now show, reflect another manifestation of these differences in argument realization between simple and complex events.

## 5 The Nature of Object Alternations

In this section I present an account of object alternations that builds on the theories of verb meaning, event structure, and the event structure-to-syntax mapping proposed in sections 2-4. I show that both roots and event structures have a part to play in object alternations. Having a root basically associated with a simple event structure makes it possible for a verb to show an object alternation. In this sense, object alternations have a single source. Whether a verb actually shows an object alternation depends on whether there are two nonactor arguments associated with the verb and two ways of expressing both simultaneously. Finally, the range of object alternations attested in English can be attributed to the nature of the roots themselves. These three facets of the account are discussed in turn in the following subsections.

### 5.1 Object Alternation Verbs Have a Simple Event Structure

The same properties of simple event verbs that are at the heart of the contrasting behavior of change of state and surface contact verbs are the key to object alternations. Simple event verbs only have a single structure participant, which is realized as their subject; however, there is no second structure participants to impose a constraint on their object. These verbs have flexibility as to object choice, which makes them candidates for object alternations. That is, object alternations reflect event complexity—or, rather, "simplicity".

[11]These verbs are sometimes found with a result-like PP, as in *She broke the mirror to smithereens*. In such examples the PP further specifies the result already encoded in the verb, distinguishing them from true resultatives, where the PP introduces an "additional" event, as in (36b).

Although it is not practical to support this claim by showing that all object alternation verbs have a simple event structure, I present evidence that representative members of the classes of verbs known to alternate have a simple event structure. Listed below are members of the classes of verbs that show some of the best-known English object alternations.

(39) a. Locative Alternation Verbs (Adding): dab, smear, splash, spray, sprinkle, stuff, ...

b. Locative Alternation Verbs (Removing): rake, rub, scrub, shovel, sweep, wipe, ...

c. *with/against* Alternation Verbs: beat, hit, pound, tap, whack, ...

d. Material/Product Alternation Verbs: carve, knit, sculpt, sew, weave, whittle, ...

e. Image Impression Alternation Verbs: emboss, embroider, engrave, paint, stamp, ...

Semantically, the verbs in these classes are basically means/manner verbs, a type of verb that has a simple event structure, as discussed in section 2. I begin by discussing the verbs found in the locative alternation and the *with/against* alternation. The verbs showing the removing form of the locative alternation all describe surface contact; such verbs were already shown to have a basic simple event structure. Turning to the verbs showing the adding form of the locative alternations, many of these too describe surface contact, though what differentiates them from the verbs found in the removing form of the alternation is the reason for performing the surface contact—a difference I return to in section 5. For example, *dab* and *smear* describe slightly different ways of putting stuff on a surface, but neither entails anything about the resulting state of the surface itself. For instance, you can dab or smear moisturizer on your face, without necessarily covering it with moisturizer. Similarly, the various verbs showing the *with/against* alternation also describe various way of making contact with a surface. Again, the verbs showing this alternation differ from each other with respect to the precise nature of the surface contact. Two prominent dimensions of variation are the degree of force used (e.g., *tap* vs. *whack*) and whether the contact with the surface is necessarily iterated or not (e.g., *beat* and *pound* vs. *hit, tap* and *whack*). Again, none of these verbs entails a result: I can tap a table or kick a wall, but neither the table, nor the wall need change in any way (though they may).

Nevertheless, some of these alternating verbs, perhaps including *wipe*, *carve*, and *embroider*, might seem like they should be classified as result verbs semantically. As discussed in section 2, most likely this intuition arises because

some means/manner verbs strongly implicate the achievement of some result because they describe actions that are prototypically carried out for the purpose of achieving this result and this makes it hard to dissociate the process from the result (Talmy 2000:265-267). The intuition of an achieved result is particularly strong with some verbs showing the material/product and image impression alternations probably because they denote activities which are intended to create entities or images. Although knitting is simply a way of working with wool and carving is the use of a sharp tool to gouge bits of material out of wood, stone, or some other hard material, the point of knitting is to create clothes and the point of carving is to create an artifact or an image. Nevertheless, the achievement of the result is an implicature and not an entailment. For example, it is possible to knit or carve aimlessly. Furthermore these verbs resemble other simple event verbs in having semantically related result verbs. For example, *construct* is a result verb that describes the creation of an artifact, but leaves unspecified how its creation came about. In this respect, the verbs found in the material/product alternation are means/manner verbs.

Furthermore, object alternation verbs show key behavioral properties of simple event verbs, as would be expected given the proposal that they have such an event structure. For instance, they allow unspecified objects, as illustrated in (40) with verbs found in the removing and putting forms of the locative alternation and with verbs found in the material/product alternation. (The verbs found in the image impression alternation do not seem to easily allow unspecified objects; this may be because they do not meet the sufficient condition that the object be pragmatically recoverable from context; see Brisson 1994, Rappaport Hovav and Levin 1998, among others.)

(40) Shelly swept/scratched/hit/carved/sewed/knit.

Object alternation verbs also allow nonsubcategorized objects, as illustrated again with verbs showing various alternations. The sentences in (42) are noteworthy, as some English speakers have expressed scepticism that the verbs found in the putting form of the locative alternation can be found with nonsubcategorized objects.

(41) a. Cinderella swept and scrubbed her way to a new ball gown.

b. Cinderella swept and scrubbed herself into catatonia.

(42) a. With hot, molten drippings falling from the ceiling onto his arms and back, Tarantino sprayed his way through the debris with a fire extinguisher. ("Doctor Saves Navy Drug Operations Manager", MSNBC Newsbreak, October 26, 2001)

b. With great difficulty, he and the other two men splashed and forced their way through the rusted, barnacle-encrusted supports of the pier. (A. Lurie, *The Last Resort*, Henry Holt, New York, 1998, p. 211)

(43) a. Louisa kicked her way through the fallen leaves. (I. Daly, *Dangerous Fictions*, Bloomsbury, London, 1989, p. 22)

b. And kicked himself into contention for the league's Most Valuable Player honor. (J. Duarte, "Goal-Oriented: Rested Dougherty Has Hotshots Ready for the Title Run", Sports Section, *The Houston Chronicle*, Houston, TX, August 8, 1997, p. 6)

c. I whacked my way through juicy green kiwi, fat, ultra-red strawberries, and pineapple so sweet you wondered why they'd let it leave Hawaii. (D.M. Davidson, *Dying for Chocolate*, Bantam, New York, 1992, p. 7)

(44) a. Drew sewed her fingers sore.

b. Drew sewed her way to a job in the fashion industry.

c. ... she could, and did, knit her way serenely through all the complications which murder produces ... (P. Wentworth, *Pilgrim's Rest*, 1946; HarperPerennial, New York, 1993, p. 12)

(45) a. Embroidering her way to success! (Lisa's Doll Closet; http://www.lisasdollcloset.com/)

b. Whether you've never put a needle to cloth, or you're a tailor 'extraordinaire' you can embroider your way into a really classy piece of art ... (http://www.sfx.ac.uk/groups.html)

c. To quickly drill through glass, use the tip of the cutting bit to engrave your way through the glass. (http://www.truebite.com/drill_degrout/)

There are other observations about the distribution of verbs in object alternations that lends support to the claim that the verbs showing the alternations have a simple event structure. As mentioned in section 1, there are some semantic classes of verbs whose members consistently lack object alternations. These classes include change of state verbs (e.g., *break, crack, dim, widen*), as well as verbs of putting (e.g., *insert, put*), filling (e.g., *cover, fill*), and taking (e.g., *take, obtain*), and their members are plausibly analyzed as being inherently associated with a complex event structure. As discussed in sections 3 and 4, verbs of change of state are the prototypical complex event verbs, both in terms of their meaning and in terms of their behavioral properties.

The members of the other classes are complex event verbs too: they all have roots which specify result states, and they show behavioral properties that are hallmarks of complex event verbs. For instance, as shown with representative members of these classes, they do not allow unspecified objects, as in (46), nor do they allow nonsubcategorized objects: (47a) cannot be used to describe an event where the waiter overfills the glasses, wetting the table, nor can (48a) be used to describe an event where Sam inserts a doorstop to keep a door open.

(46) ∗Kelly broke/dimmed/filled/covered/obtained/inserted.

(47) a. ∗The waiter filled the table wet.

b. ∗The waiter filled his way to a maître d' position.

(48) a. ∗Sam inserted the door open.

b. ∗Sam inserted his way to the jackpot.

As discussed in section 3, as complex event verbs, these verbs have two structure participants. Thus, their objects have their source in a specific event structure position, so their object is always associated with a particular semantic role, so that alternative object choices and, hence, object alternations, are disallowed. This property also underlies the lack of a near-paraphrase relation in the pair in (49), previously cited as (17), which otherwise superficially looks like the *with/against* alternation.

(49) a. Lee broke the fence with the stick.

b. Lee broke the stick against the fence.

As discussed in section 4, change of state verbs require their object to be understood as the argument that changes state, precluding a near-paraphrase relation.

Still further support for the claim that object alternation verbs are basically simple event verbs comes from an examination of alternating denominal verbs. The verbs showing both forms of the locative alternation include denominal verbs whose related noun names an instrument, such as *mop*, *rake*, *shovel*, and *brush*; however, denominal verbs taking their name from things or stuff (e.g., *butter, tar*) or containers (e.g., *bag, garage*) are not found among any of the sets of object alternation verbs.

(50) a. Tracy shoveled snow off the sidewalk.

b. Tracy shoveled the sidewalk.

(51) a. Robin brushed oil on the bread.

b. Robin brushed the bread with oil.

(52) a. Tracy shoveled the car free.

b. Tracy shoveled.

This distribution supports the claim that object alternation verbs are simple event verbs since only the instrument denominal verbs, by their very nature, qualify as means/manner verbs and, thus, have simple event structures. The *butter*- and *bag*-type denominal verbs are basically associated with complex event structures and, thus, would not be expected to show object alternations. In fact, efforts to try to imagine potential object alternations with these verbs fail, as shown in (53) and (54).

(53) a. Lindsay buttered the toast with unsalted butter.

b. ∗Lindsay buttered unsalted butter on the toast.

(54) a. Devon saddled the horse with a Western saddle.

b. ∗Devon saddled a Western saddle on the horse.

Studies of argument realization have debated whether aspectual properties are the key semantic determinants of argument realization. Levin and Rappaport Hovav (2004) argue instead that event complexity is the critical factor in argument realization properties, but it is worth revisiting this question in the context of object alternations. Could the aspectual notion "activity" and the related notion "semelfactive", both of which apply to dynamic, atelic verbs and both of which also characterize means/manner verbs, be the properties that give rise to object alternations rather than the notion of simple event structure? It is not difficult to show that the key is having a simple event structure. There are stative verbs—specifically, certain experiencer subject psych-verbs—that show object alternations, as in (55), and stative verbs are also simple event verbs. Stative verbs, however, do not show the range of object alternations that means/manner verbs do, for reasons to be discussed in section 5.3.

(55) a. Tony admired them for their integrity.

b. Tony admired the integrity in them.

c. Tony admired them.

d. Tony admired their integrity.

(56) a. The slaves feared the tyrant for his cruelty.

b. The slaves feared the cruelty in the tyrant.

c. The slaves feared the tyrant.

d. The slaves feared his cruelty.

Having a simple event structure, then, is necessary for allowing object alternations.

Stative verbs, however, do not show the behavioral properties of other simple event verbs, but for reasons that are independent of their status as simple event verbs. For instance, they are known not to be found in resultatives (Carrier and Randall 19xx, Hoekstra 1992, Rapoport 1990); most likely because the addition of a result needs some kind of process leading up to it.

(57) ∗She admired her way to the front of the line

Stative verbs also do not show unspecified objects; again, this most likely is due to their stativity. First, many stative verbs are individual-level in nature, yet unspecified object sentences are typically clearly eventive, even episodic. Furthermore, unspecified objects are found precisely where the content is recoverable (Brisson 1994), yet with stative verbs recoverability is often not possible, as there are not canonical instantiations of the relevants states for which an object can be inferred. Interestingly, Noailly (1998:138) cites certain contexts in which the French verb *aimer* 'love' is found in an unspecified object use, suggesting that if the right conditions are met unspecified objects are possible.

Finally, the verbs found in the material/product alternation might appear to present a potential problem for the proposal that object alternation verbs are simple event verbs; the same question could be raised with respect to verbs found in the image impression alternation. The reason is that simple event verbs are atelic, while the verbs found in the material/product alternation figure prominently in discussions of incremental theme—a notion related to telicity, and telicity has sometimes been associated with a complex event structure (van Hout 1996, Pustejovsky 1991, 1995). However, as already discussed the verbs found in this alternation are basically means/manner verbs, both in terms of their meaning and their behavior. Specifically, these verbs show the behavior of verbs basically associated with a simple event structure, as shown in (45). If such verbs did have a complex event structure, then they

should pattern like change of state verbs, disallowing unspecified and nonsubcategorized object uses, contrary to fact.

### 5.2 The Licensing of Alternate Object Choices

Having a simple event structure is a necessary, but not a sufficient, condition for a verb to show object alternations. For instance, the verbs *push* and *drink* do not show object alternations, though they are simple event verbs, as their ability to take unspecified and nonsubcategorized objects shows.

(58) Lindsay drank/pushed.

(59) a. The guests drank the teapot dry.

b. We pushed our way to the front of the lecture hall.

In this section I turn to the sufficient conditions on object alternations—the conditions that allow a verb that is basically associated with a simple event structure to show an object alternation. First, such a verb must be associated with two nonactor "arguments"—"arguments" is in quotes since it is possible that although the alternating verb is found with three syntactic arguments, one of these is not among the verb's root participants, but could be introduced in some other way. Second, there must be two distinct ways of realizing both these "arguments" simultaneously. The verb's simple event structure means that either nonactor argument may be the object, but the other must still be licensed in some other way. Since my goal is to support the larger account of object alternations, in this section I simply sketch how this licensing could come about. I leave an investigation of exactly how the licensing is instantiated for each object alternation to future research since it will involve an investigation of the fine semantics of the verbs found in each alternation.

To illustrate how an object alternation can arise, I consider how arguments are licensed in the two variants of the removing form of the locative alternation, as it is instantiated with the surface contact verb *wipe*.

(60) a. Jack wiped the counter.

b. Jack wiped crumbs off the counter.

These two variants represent two of the many argument realization options open to many English surface contact verbs, and, thus, this account draws on Rappaport Hovav and Levin's (1998) account of how such multiple options,

including the two that comprise the removing form of the locative alternation, arise. As discussed in section 2, *wipe* has a means/manner root, which is associated with two participants: a wiper and a surface. As a means/manner verb, *wipe* is basically associated with a simple event structure; the wiper, as the actor, is a structure participant, realized as its subject, and the surface is a pure root participant, realized as its object.

(61) Kelly wiped the table.
[ x ACT$_{<WIPE>}$ y ]

The simple event use of *wipe* represents one variant of the removing form of the locative alternation.

Rappaport Hovav and Levin (1998:118-121) argue that the use that constitutes the other variant of this alternation involves a complex event structure. They propose a general process of "template augmentation", which allows a verb with a simple event structure to be found with a complex event structure if an additional predicate is available to "identify" the added subevent. The verb *wipe*'s own basic simple event structure constitutes the causing subevent in the complex event structure formed by template augmentation, so what is necessary is a predicate that can introduce a result subevent—a predicate expressing the result of a wiping event. Rappaport Hovav and Levin (1998) point out that a variety of result states are available; among them are predicates expressing an ablative relation, instantiated via one of the two English prepositions *out* or *off*. Such prepositions license the expression of an additional argument, an argument expressing the stuff removed, as their subject and take as their object the location from which the stuff is removed—that is, the argument which is the "normal" object of the verb *wipe*. The subject of these predicates is syntactically realized as the object of the verb itself, an option that is possible as *wipe* is basically a simple event verb and it takes a pure root participant, allowing it flexibility as to object choice.

(62) Kelly wiped the crumbs off the table.
[ [ x ACT$_{<WIPE>}$ y ] CAUSE [ BECOME [ z NOT AT $<PLACE>$ ] ] ]

This form of template augmentation, then, gives rise to the other variant of the removing form of the locative alternation.

The addition of the extra nonverbal predicate licenses an alternate realization of a verb's arguments, but some object alternations differ from the removing form of the locative alternation in having three arguments in both

variants. This suggests that the additional argument may not always be introduced by a nonverbal predicate. Where, then, does the third argument come from? The root of a surface contact verb such as *wipe* is inherently associated with two participants, and another nonverbal predicate introduces a third participant which may be expressed in one variant. It is possible that some verbs have roots which are inherently associated with three participants, and that another predicate is necessary to license the simultaneous expression of all three participants, in either variant. The verb *smear*, which is found in the putting form of the locative alternation, is apparently such a verb, as smearing necessarily involves an actor, some spreadable stuff, and a surface. Either the stuff or the surface may be realized as the object of *smear*, and there are prepositions available that can license whichever is not the object. English *with* can license the realization of the stuff, when the surface is the object, as in the *with* variant *smear the axle with grease*. In addition, a variety of spatial prepositions can license the realization of the surface, when the stuff is the object, as in the locative variant, *smear grease on the axle*. The locative alternation arises as a consequence. Obviously, there are more details to work out. The locative variant most likely involves template augmentation, as it does in the comparable variant of the removing form of the locative alternation. What needs further study is the *with* variant.[12]

Generalizing from these examples, my proposal is that many of the best known object alternations arise from the association of the activity described by certain types of means/manner verbs with a particular nonverbal predicate expressing a result of this activity. These predicates allow a verb's simple event structure to be augmented to a complex event structure, while also potentially licensing additional participants, if necessary; thus, these predicates play a key role in allowing the alternate realizations of a verb's arguments that are identified as object alternations.

The *with/against* alternation has a somewhat different explanation than the locative, material/product, and image impression alternations. It is not clear that either variant involves a complex event structure, and, thus, it is unlikely that template augmentation is used to provide for alternative argument realizations.

[12]The *with* variant has been attributed a complex causative event structure in much previous work (Pinker 1989, Rappaport and Levin 1988), but more recent work on event structure suggests that this assumption might need rethinking and that this variant might have a simple event structure that additionally involves an instrument. The reason is that smearing a surface is very much like wiping a surface: both can be atelic, though they are often understood as telic because the surface itself is bounded. Furthermore, *smear*, like *wipe*, is a means/manner verb and does not entail a result: just as wiping a surface need not entail cleaning or clearing it, smearing a surface need not entail covering it.

(63) a. Sam hit the fence with a stick. (*with* variant)

b. Sam hit a stick against the fence. (*against* variant)

The *with* variant, which simply differs from the basic simple event use of an alternating verb in having an instrument, is unlikely to differ from the simple use in event structure complexity. As for the *against* variant, the *against* phrase seems to simply express a location of contact and there is no evidence that this variant involves a complex event structure either, in contrast to other uses of *hit* such as (64).

(64) The batter hit the ball to the outfield.

There is no clear result state in the *against* variant: although the stick makes contact with the wall, it is not clear that the wall is now the location of the stick; compare (64), where the ball is now located at the outfield. What seems to be the most likely explanation here is that both arguments of *hit* qualify semantically for object selection, and both, thus, may be the object, as proposed by Dowty (1991). Support for this possibility comes from differences in the realization of the arguments of verbs of hitting across languages. For example, Nichols (1982:447, 1984:188) points out that in Caucasian languages the most common pattern is one that looks like the *against* variant.

Although there is more to be done to fill out the analysis of each individual alternation, I hope to have shown that there are ways to license the multiple argument realization possibilities that are open to verbs with a simple event structure, one of these being template augmentation. These multiple options give rise to the phenomenon of object alternations. Since the alternating verbs do not necessarily have the same event structures in the two variants of an alternation, strictly speaking, these are not alternations in a narrow sense of being alternate expresssions of the same set of arguments.

### 5.3 The Diversity of English Object Alternations

If object alternations have a unified source, why is there diversity in these alternations, in the semantic classes of verbs showing them, and in the alternations that a particular verb can show? In this section I show that this diversity stems from the nature of complex events.

As already discussed, verbs showing object alternations have a simple basic event structure, and typically in one variant of most English object alternations, an alternating verb's simple event structure constitutes the causing

subevent in a complex event structure. The result subevents that constitute the other part of complex event structures come in various types, depending on the nature of the result state involved: the presence of an entity on a surface or in a container, the absence of an entity from a surface or a container, the creation of a new entity, the destruction of an existing entity, or a change of state in an existing entity. Thus, complex events themselves fall into types according to the nature of their result state, and since one variant of most English object alternations involves a complex event structure, object alternations could be distinguished by the relevant type of result. In fact, the various English object alternations do reflect different types of results. The locative alternation involves a result subevent describing either the addition of stuff to a surface or a container, as with *spray* or *load*, or its removal, as with *wipe* or *shovel*. The material/product and image impression alternations involve different forms of creation: the former the creation of an artifact from a substance, the latter the creation of an image on a surface. The *with/against* alternation is the only one that does not involve a complex event structure in either variant; it apparently arises for other reasons, as discussed in section 5.2, but this in itself sets this alternation apart.

The preponderance of verbs showing object alternations have means/manner roots. Such verbs are basically associated with a simple event structure, though in one variant of most alternations, the basic simple event structure constitutes the causing subevent in a complex event structure. Thus, the verb's means/manner root is associated with the causing subevent and the result that augments the simple event structure to form the complex event structure must be one that can be naturally obtained given the type of means/manner. That is, the result is typically a conventional result of the causing subevent (even though it is not a result that is entailed by the verb) (Talmy 2000). As each type of result is brought about by particular types of action, the set of actions that give rise to a particular type of result form a semantically coherent subclass of means/manner verbs—roughly speaking, classes that describe modes of removing, adding, or creating. Thus, each alternation is shown by one or more semantically coherent classes of verbs. For example, verbs describing those modes of contact with a surface which can serve to displace stuff with respect to that surface, such as *wipe* or *sweep*, fall into the removing form of the locative alternation, while those describing modes of contact with a surface which can serve to put stuff onto the surface, such as *dab* or *smear*, fall into the putting form of the locative alternation. Some verbs describe modes of surface contact that lack the potential to displace or put stuff on a surface, such as *hit* or *pound*, and these verbs do not show either form of the locative alternation. Thus, a verb of surface contact will show one or the other form of the locative alternation if the contact has the potential to add or remove from the surface. Moving beyond verbs of surface contact, what Pinker (1989:126) describes as

verbs denoting actions where a force is imparted to a mass, causing ballistic motion in a specified spatial distribution along a trajectory, such as *splash*, *spray*, or *sprinkle*, are found in the adding form of the locative alternation because the mass can end up in contact with the surface.

It is not surprising that some simple event verbs show more than one object alternation. Although alternating verbs have simple event structures, in object alternations their simple event structures constitute the causing subevents in complex event structures, built on these simple event structures, each characterized by a particular type of result. Thus, if there were a verb whose root described means/manners that could be used to obtain more than one type of result, it would be expected to show multiple object alternations. The verb *sew* has such a root, since sewing can be used to create an artifact or, decoratively, to cover a surface with an image. Indeed, *sew* shows both the material/product and the putting form of the locative alternations, as in (65) and (66), respectively. In addition, sewing can be used to attach one object to a second, so *sew* shows the reciprocal alternation, as in (67), which has not been discussed yet in this paper.

(65) a. Dale sewed the piece of silk into a ball gown.
b. Dale sewed a ball gown out of the piece of silk.

(66) a. Dale sewed bows on the costume.
b. Dale sewed the costume with bows.

(67) a. Dale sewed the lining to the skirt.
b. Dale sewed the lining and skirt together.

In contrast, a verb whose root describes a means/manner conventionally used only to obtain a very specific result should not display a range of object alternations. Since a vacuum by its very nature is an implement designed to be used to remove stuff from a surface, the denominal verb *vacuum*, which takes its name from this implement, can only be found in the removing form of the locative alternation.

(68) a. Avery vacuumed the rug.
b. Avery vacuumed the crumbs off the rug.

Attempts to construct instances of this verb in the adding form of this alternation or in the material/product alternation fail.

(69) a. ∗Avery vacuumed the crumbs onto the rug.

b. ∗Avery vacuumed the rug with the crumbs.

(70) a. ∗Avery vacuumed the crumbs into a pile.

b. ∗Avery vacuumed a pile from the crumbs.

In this respect, *vacuum* contrasts with the verb *brush*, which not only shows the removing form of the locative alternation, as in (71), but also also shows the putting form of the locative alternation.

(71) a. Avery brushed the mud off her shoes.

b. Avery brushed her shoes.

(72) a. Avery brushed the oil over the dough.

b. Avery brushed the dough with oil.

The verb *shovel* also shows more options than *vacuum*, showing not only the removing form of the locative alternation, but also *shovel* one variant of the putting form of this alternation, as in (74), as well as one variant of the material/product alternation, as in (75).

(73) a. Tracy shoveled snow off the sidewalk.

b. Tracy shoveled the sidewalk.

(74) Tracy shoveled the leaves into the gutter.

(75) Tracy shoveled the leaves into a pile.

An explanation is needed for why *shovel*, for instance, does not show the other variant of these two alternations (e.g., **Tracy shoveled the gutter with the leaves; *Tracy shoveled the pile out of the leaves*).[13] Given the nature of their roots these verbs may not have the components of meanings necessary to license the alternate expression of the arguments. The other variant of the material/product alternation, for example, seems only to be found with verbs whose inherent meaning involves "working on" the raw material usually

[13]This property of *shovel* and semantically similar verbs raises a larger question: whether it is always fruitful to describe object alternations as alternations or whether it is preferable to analyze each variant of an alternation on its own merits, with the alternations being an artifact of verbs having meanings that allow them to be found in certain pairs of syntactic contexts with the "same" arguments.

with the intention of creating a product, which can be realized as the object of the verb, as with *carve, knit,* and *whittle*. Most of the instruments that give their name to removing verbs are not created with this function, so this may explain why they are not found in this variant. Comparably, the *with* variant of the putting form of the locative alternation may not be possible with *shovel* because it requires a mutually constraining relation between the locatum and location argument, but *shovel* really only places requirements on the locatum. What matters here, however, is that *brush* and *shovel* shows argument realization options associated with these alternations, while *vacuum* does not.

This account predicts that some simple event verbs should not show object alternations: two-argument verbs with a simple event structure that describes an action that is not conventionally used to obtain a particular result state. The verbs *drink* and *eat* are such verbs. First, the behavior of these verbs confirms that they are simple event verbs: they are found with unspecified and nonsubcategorized objects.

(76) Drew drank/ate.

(77) a. The guests drank the teapot dry.

b. The guests ate the cupboard bare.

Yet, although they are simple event verbs, neither *drink* nor *eat* is attested in object alternations, and an attempt to construct what might be a plausible alternation based on these verbs—something like the removing form of the locative alternation—fails.

(78) a. Ellis drank the coffee from the cup.

b. ∗Ellis drank the cup of the coffee.

What, then, sets them apart from other simple event verbs? This question is of particular interest as the entity denoted by their object is consumed, which might give these verbs an apparent affinity with change of state verbs. I propose that the consumption of their patient is in some sense incidental to their meaning. This proposal receives support from the behavior of these verbs: they pattern with simple event verbs and not with change of state verbs, as shown by (76) and (77); see also Rappaport Hovav and Levin (2002). The important part of the meaning lexicalized by these verbs involves their subjects, an idea captured by Saksena's (1980) characterization of these verbs as having "affected" agents. Most likely, this property explains why these verbs contrast

with other verbs with a simple basic event structure in not showing object alternations. Unlike them, verbs of ingesting do not describe actions that are intended to bring about a result state in their object, and consequently, they cannot show object alternations, as it is this result state which can introduce another nonverbal predicate, licensing the alternate realization of arguments.

The verbs *push* and *shove* present an interesting contrast to the verbs *drink* and *eat*: they also do not show object alternations, even though they might be expected to as they denote activities with conventional results: moving something to a new location. Presumably, the reason they do not show any object alternations is that displacement to a goal is not a type of result that can license an alternate argument realization. Other object alternations involve one variant which involves covering, removing, or creating artifacts and these are not the types of results relevant to pushing. The typical nonverbal predicates that are used in describing displacement are used to express the resulting location of a physical object, that is, the goal of motion; such predicates are predicated of the typical object of *push* or *shove*. To alternate, these verbs would have to allow their goal to be the subject of a preposition that takes the theme—the argument that is the "normal" object of these verbs—as its object. There is no such preposition in English. The question is why isn't there such an "inverse" predicate? The reason might be that the other "inverse" predicates, which give rise to the locative alternation, say, involve a relation of a theme with respect to a location. Also, goals, in general, rarely qualify for expression as objects; the few exceptions are with verbs such as *enter* that, unlike *push* or *shove*, take a theme subject.

The most frequently cited object alternations do not involve stative verbs. In fact, Levin (1993) documents only a few alternations involving such verbs. These alternations boil down to the four options for expressing the arguments of certain experiencer subject verbs such as *admire* or *fear*, previously illustrated in (55) and repeated in (79); these options, when taken in pairs that include at least one of the three-argument variants, could be viewed as constituting object alternations.

(79) a. Tony admired their integrity.
b. Tony admired them for their integrity.
c. Tony admired the integrity in them.
d. Tony admired them.

This observation raises the question of why stative verbs show few object alternations, although they are simple event verbs like the verbs in the more widely

attested alternations. The best known object alternations arise from the conventional association of the activity described by certain types of means/manner verbs with particular types of results, with the result predicate playing a key role in allowing the alternate realization of the verb's arguments. Stative verbs, by their very nature, describe states, which simply go on unchanging in time; thus, they are not conventionally associated with bringing about particular results. A result predicate, then, is not available to license any alternate realization of the arguments of these verbs or to introduce a third argument. Any object alternation that these verbs display must have another source.

In principle, in order to show an object alternation, a stative verb must be associated with three participants, and there must be another way of licensing the expression of all three simultaneously. Yet, stative verbs do not have three root participants. Most stative verbs only have one root participant—the participant that the state holds of; however, experiencer subject verbs have two root participants: the experiencer and the target or subject matter that the emotional state lexicalized by the verb holds with respect to. There must be another source for the third argument. In the attested alternate argument realizations in (79), the root participant associated with the targer/subject matter names a quality, and qualities are inalienably possessed. Thus, this root participant introduce a possessor, which can serve as a third participant in an object alternation. In (79d), the possessor simply is expressed as the object, but in (79b), both the possessor and quality are expressed instantiating a form of possessor raising. There is an alternative way of expressing both arguments as in (79c); presumably, this variant arises as a consequence of an alternative construal of the relation between a quality and its possessor: the quality can be construed as contained in the possessor.

Possessor ascension is, in fact, more generally available to simple event verbs in English. It is found with verbs of hitting, for example, as in *Drew tapped me on the back*. And, consistent with the larger account here, possessor raising is not found with change of state verbs (**Drew broke the cup on its handle*), which as complex event verbs necessarily require their object to be the entity that changes state. However, there is no analogue of the "inverse" argument realization found with experiencer subject verbs in (79c) with verbs of hitting; that is, there is no sentence of the form **Drew tapped the back on me.* The unavailability of this option most likely stems from differences between body parts and qualities: body parts, unlike qualities, cannot be construed as contained by their possessors, and thus the alternate argument realization is unavailable.

[**QUESTION: Can the examples like "break the branch off the tree" be considered a form of the "admire the good in him"—that is, it's not just that

the branch is possessed by the tree, but it is in some sense contained by it?]

Some verbs are said to "show" only one variant of an alternation. This point has often been made in discussions of the locative alternation and illustrated with the verb *fill*, which is found in a context which resembles one variant of the alternation, and *pour*, which shows the other.

(80) a. Ashley filled the bucket with water.

b. ∗Ashley filled water into the bucket.

(81) a. Ashley poured water into the bucket.

b. ∗Ashley poured the bucket with water.

As mentioned, the reason that *fill* and *pour* do not alternate is that they have roots of ontological type "result state", not "means/manner", as required for object alternations. Their roots, then, are basically associated with complex event structures and these verbs do not show alternations for the same reasons described in section 4 for change of state verbs such as *break*. Since *pour* and *fill*'s roots describe the same type of results as characterize one variant of the putting form of the locative alternation, there is a perception of semantic similarity with locative alternation verbs, which is why the question of why *spray* but not *fill* or *pour* show the locative alternation.

This approach to object alternations accommodates the limited productivity of argument alternations. As discussed in section 1, object alternations are not found with a rigidly delimited set of verbs, rather they show limited productivity: they may be displayed by newly coined verbs or there may be one-shot innovative uses of existing verbs. This behavior is not surprising. If new verbs have roots of the appropriate ontological type, they should show the appropriate object alternations. If an existing verb has a means/manner root associated with a real world happening that might on some occasion be the means/manner of bringing about some result, then the verb can be used to describe the appropriate derived complex event, giving rise to a one-shot innovation with respect to some alternation. What makes this approach to object alternations successful in meeting the challenge of productivity, as well as the other challenges posed by object alternations, is its inclusion of both necessary conditions stated in terms of event structure and sufficient conditions stated in terms of the root.

## 6 Conclusions

In conclusion, English object alternations have a more unified analysis than their semantic variety suggests. The proposed analysis is predicated on the root–event structure distinction, the existence of event structures with a subeventual analysis, and the notion of a pure root participant. The alternations themselves are epiphenomena of the interaction of roots basically associated with simple event structures and the principles of argument licensing. They arise because verbs whose roots are basically associated with simple event structures do not restrict their potential objects, allowing for the alternate realization of certain arguments assuming that their are appropriate licensing mechanisms. The semantic heterogeneity of object alternations reflects natural correlations between certain types of means/manner roots with certain types of results, while the semantic range of verbs showing a particular alternation reflects the range of means/manners available for achieving each result type.

This analysis underscores the complexity of the notion "object" in English. While it contributes to the understanding of the semantic underpinnings of this notion, it also highlights how much more there is to understand about it: we do not have adequate theories of the semantic determinants of objecthood for simple event verbs, though Dowty's (1991) patient proto-role entailments provide some steps in the right direction.

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