

Contact and Other Results

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***Abstract:** We consider the account of verbs of contact within the framework of Atom Theory and expand the analysis of forceful point-of-contact verbs such as *hit* and surface contact types like *smear* to plural surface contact verbs like *splash*. Atom Theory (AT) is based on the syntactic projection of atomic meaning components. Every verb's meaning reduces entirely to such atoms and all senses and all syntactic frames of a verb derive from this sole, minimal lexical representation.*

The differences among the contact verb types derive from the particular Manner and Location atoms of which they are composed. The projection and interpretation of these atoms account for the various alternations and the aspectual and thematic variations of all types of contact verbs, without recourse to multiple lexical representations, linking rules, functional categories, or movement. The result is an innovative analysis by which all contact verb structures are analyzed as result constructions.¹

1 Introduction

This paper expands the account of two different types of verbs of contact, such as *hit* and *smear*, discussed in Erteschik-Shir and Rapoport 2007, to a third type: verbs such as *splash*, *spray*, and *spatter*.

Contact verbs pose an interesting challenge for any framework in which argument structure properties and aspectual (*aktionsart*) properties are represented structurally, in syntax. We show here that within our framework, and under the classification argued for in, for example, Erteschik-Shir and Rapoport 2004, the various attributes of these verbs are accounted for and even expected. The predicate classification in this framework is not an aspectual classification in the traditional sense of Vendler 1967, but builds on that of Dowty 1979; it is better characterized as an aspectual-argument classification, in which change, not homogeneity or duration, is the relevant criterion. We thus arrive at a classification similar to that of Pustejovsky 1991, for instance, who uses ‘transition’ as a basic criterion. Our eventive predicates are thus classified as activities (agentive, non-change), accomplishments (cause + change, whether telic or atelic), and change (non-agentive, telic or atelic). The property of duration is derived from the nature of the verbal atom.

Consider the verbs of forceful contact (*hit, slap, punch, kick, smack*) illustrated by the verb *hit* in (1), for example:²

(1) *cause + change* (‘*accomplishment*’)

- a Jane hit the table.
- b Jane hit the ball to the other side of the field.

Change (‘*achievement*’)

- c The car hit the wall.
- d Jane hit the wall. (non-agentive)

We see here, from just a few examples, that a single verb can appear in more than one syntactic frame: with one or two complements, as in the examples in (1)a and b; with

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several different argument realizations: the subject can be agentive, as in (1)a and b; or non-agentive, as (1)c and d, and the object can be an affected theme (as in (1)b) or not; and the same verb can head structures with different aspectual interpretations.

Such varied behavior has been widely discussed. The alternations above, as just one example, have been analyzed by Fillmore 1970, Pinker 1989, Jackendoff 1990, Dowty 1991 among many others. The theory employed here, in which a single lexical entry projects various structures, accounts for the distribution and thematic properties of these and other types of verbs of contact.

Not all verbs of contact have the same alternations as those of forceful contact, as shown by the examples of *smear*-type verbs in (2)-(4) (from Hale and Keyser 1993 and 2005):

(2) *cause + change (matter as theme)*

- a We smeared mud on the wall.
- b They daubed pipeclay on their bodies.
- c He rubbed ochre on his chest.

(3) *cause + change (location as theme)*

- a We smeared the wall with mud.
- b They daubed their bodies with pipeclay.
- c He rubbed his chest with ochre.

(4) *change*

- a *Mud smeared on the wall/*The wall smeared with mud
- b *Pipeclay daubed on their bodies/*Their bodies daubed with pipeclay
- c *Ochre rubbed on his chest/*His chest rubbed with ochre.

Here, two different agentive readings are available, but no change reading is possible.

Yet another type of contact verb allows not only the same two agentive alternations as in (2) and (3), but also one of the change structures. The possibilities of this *splash*-verb type are illustrated in (5)- (8).

(5) *cause + change (matter as theme)*

- a We splashed mud on the wall.
- b They sprayed water on the flowers.
- c He splattered paint on the floor.

(6) *cause + change (location as theme)*

- a We splashed the wall with mud.
- b They sprayed the flowers with water.
- c He splattered the floor with paint.

(7) *change (matter as theme)*

- a Mud splashed on the wall.
- b Water sprayed on the flowers.
- c Paint splattered on the floor.

(8) *change (location as theme)*

- a *The wall splashed with mud.
- b *The flowers sprayed with water.
- c *The floor splattered with paint.

As noted, all such alternations-- all the possible versions of a verb like *hit*, or *smear*, or *splash*, for instance-- derive from one single lexical representation. In other words, we take it as a basic hypothesis that differences in complement frames, in argument structure

realizations, and in aspectual characterization are never attributable to differences in lexical representation. Rather, these same properties derive from variations in syntactic structure. Syntactic structure is itself derived directly from lexical representations consisting of meaning components: lexical atoms.

2 The theory of atoms

In Erteschik-Shir and Rapoport 1997, 2000, 2004, 2005, 2007, in preparation, we offer a lexical analysis of verbs in terms of meaning components. This is part of a framework we term Atom Theory (AT). According to AT, verbs are decomposed into atomic meaning components whose syntactic projection derives aspectual interpretation and argument selection; this without recourse to linking rules, functional projections, or movement.³ In the following paragraphs, we make use of the facts of *hit* to briefly outline AT theory.

There is a restricted universal inventory of atoms from which a verb's meaning is chosen: Manner (**M**), State (**S**) and Location (**L**). As argued in Erteschik-Shir and Rapoport 2005, each of these components also has a plural version (a property that allows the projection of scalar and iterative constructions, for instance). We return to this property of atoms in section 4 below, in which we demonstrate that the properties of *splash*-type verbs follow from their plural **L** atom.

Each atom ranges over the same set of concepts as an equivalent morpho-syntactic category. **M** is equivalent to adverbials (manner, means, instrument), **S** to adjectives, and **L** to the full range of prepositions.

A verb's meaning is composed entirely of its atoms. A verb may have one or two atoms. This is a universal constraint which follows from the fact that there are only two types of atoms, manner (**M**) and possible results (**S** and **L**).

These meaning atoms themselves are what merge to create syntactic structure, resulting in one of two possible interpretations:

Atom Interpretation

1.
$$\begin{array}{c} \text{V} \\ \wedge \\ \text{V} \quad \text{ATOM} \end{array}$$
 an atom merged with a verbal host forms a predicate
2.
$$\begin{array}{c} \text{X(ATOM)} \\ \wedge \\ \text{X} \quad \text{Y} \end{array}$$
 an adjoined element modifies the element it is adjoined to⁴

In AT, these two interpretive options are always available in principle. States (**S**), for example, can project change-of-state predicates or can modify adjectivally; Locations (**L**) can project change-of-location predicates or can modify/identify locations; Manners (**M**) can project activities or can modify adverbially. The projection possibilities are constrained only by a principle of Full Interpretation (FI). The same verbal lexical entry, that is, the same atoms, may project more than one structure type. The burden on the system, then, is not on projection, but on interpretation. What is important here is that a verb's meaning reduces entirely to its atom/s. And since verbal roots never have more than two (potentially-projecting) atoms, our system has the significant attribute of imposing an upper limit on structural complexity.

Let us illustrate with the verb *hit*. This verb decomposes into two meaning components, **M** (forceful means) and **L** (point of contact), as shown in its lexical entry:

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(9) lexical entry of the verb ‘hit’:⁵

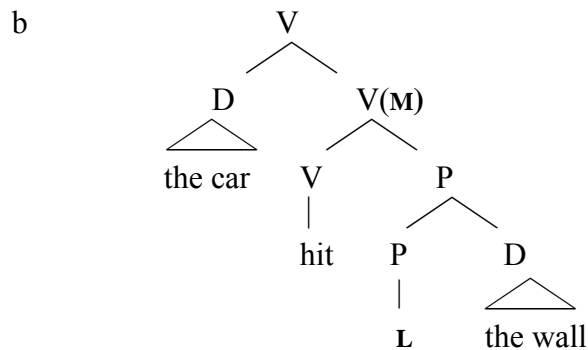
V /hit/

M ‘force’

L ‘point of contact’

One possible projection of this verb is the change-of-location structure of (1)c, repeated here:

(10) a The car hit the wall.



c The car went (with force) to a point of contact on the wall.

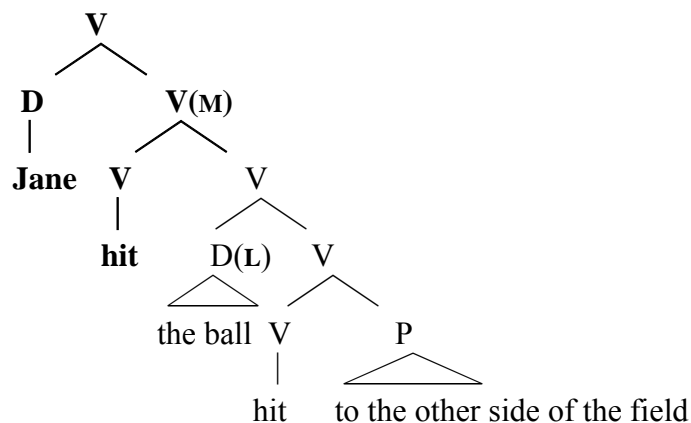
For simplicity's sake, we will assume here that all atoms have categorial realizations in syntax and represent them thus. The L atom projects as a preposition, null for forceful contact verbs in English.⁶ In addition, L of ‘hit’ is lexically unspecified, so a complement is required to provide the location of the point of contact. (This, as opposed to a verb like *shelve*, for example, in which the L atom ‘shelf’ is lexically specified.) This complement, *the wall*, and the theme, *the car*, constitute the requisite partners in a contact relation, contact defining a relation between two elements; L’s interpretation goes through. The M component is interpreted as an adverbial modifier of the change of location structure. The interpretation in (10)c follows.

Since both atoms are interpreted, the projection (10)b is licensed according to FI, which requires the interpretation of each atom within its own projection. FI thus operates as a restriction on the projection of lexical atoms as it does elsewhere in the grammar.⁷

Each projected V-atom predicate merges with a subject specifier. The interpretation of the specifier follows from the nature of the predicate with which it merges: The subject of a change predicate (e.g., (10)), is interpreted as a theme. This is why even a human subject (as in (1)d) in this structure is interpreted non-agentively. In short, AT does not include any mechanism of theta-role assignment. As in Hale and Keyser's work, the equivalent of theta-role interpretation is derived from the structure with which the specifier merges.

The same atoms of *hit* that project (10) can also project the structures from which examples such as (1)a and b are derived. The structure of (1)b is given in (11).

(11)



In this case, an overt goal predicate is projected and the interpretation is of a change of location of the theme *the ball*. The L atom modifies the D *the ball*, resulting in identification of the two elements. In other words, the theme D provides the location of the point of contact, one of the two contact elements. Interpretation of L goes through since this complex structure provides the second entity for the contact relation: the upper

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subject *Jane*. The additional merged structure containing this subject (represented in boldface in (11)) is licensed by the availability of the modifying **M** atom. In AT, projected structure requires the availability of an uninterpreted atom. Note that due to this restriction, any verb composed of **M** and **L** or **M** and **S** atoms can project a complex structure like that in (11), but single atom verbs (such as *arrive* and *appear*) cannot. (**Jane arrived her guests at the party.*/**The magician appeared a rabbit out of the hat.*)

If the upper V projection were not merged with the lower V projection, the point-of-contact **L** would remain uninterpretable since one of the two elements of the contact relation would be lacking. This is the explanation for the ungrammaticality of (12):⁸

(12) *The ball hit to the other side of the field.

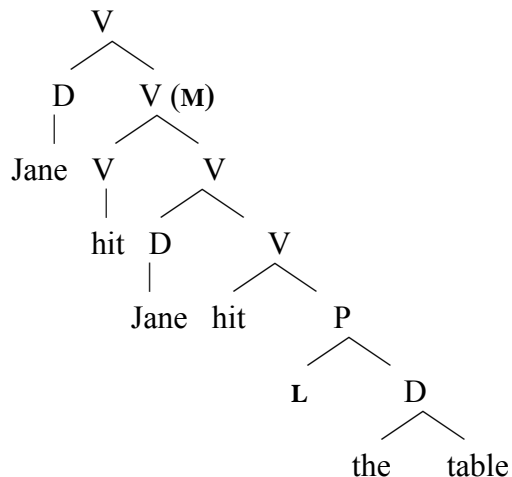
Following Hale and Keyser, we take the V-V structure such as the one projected in (11) to be interpreted as causative and the derived role of the specifier of this structure to be interpreted as a causer.⁹ The complete interpretation of the structure is therefore ‘Jane caused (with force) the ball (= the location of the point of contact) to go to the other side of the field’.

Note that the same verb is merged twice. (We can consider this the result of the operation of copy and merge.) Following accepted principles, the two verbal copies form a chain, the head of which is pronounced.

The agentive *hit* of (1)a *Jane hit the table* illustrates clearly and in surprising fashion the restrictions of the AT framework. The analysis forced by AT is not that of a typical, simple activity, but of the complex change-of-location structure. This is shown in (13).

(13) a Jane hit the table.

b



c 'Jane caused, with force, Jane to come into contact with the table.'

The main difference between the projected structures in (11) and (13) is that here, L's two contact elements are not the agent and the theme, but the theme (*Jane*) and the preposition's complement, the *D the table*.

(13) is derived by copying and merging the specifier *Jane*, operations that are always, in principle, possible. Again, the result is constrained by FI. As with the verb, the two instances of D form a chain, of which the head is pronounced.¹⁰ The same D, with the same referent, thus gets interpreted as both causer and theme, in view of the predicate types with which each specifier copy merges.

This may seem odd at first, but nothing precludes such a situation, as long as an interpretation for the apparent thematic clash is possible.¹¹ And in fact, because of the kind of verb involved, a resolution is possible. The relevant characteristic of this verb is that it has an atom meaning 'point of contact' which, when projected, yields a motion-to-goal construction. The only way in which a theme can be forcefully directed to a particular point by an agent is when that theme is identical to the agent itself, or

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equivalently, inalienably possessed by the agent. The fact that the verb is one of point-of-contact means that only a part of the theme *Jane* is in contact with only a part of the table. So the theme copy of *Jane* is interpreted as an inalienably-possessed part of Jane, and in this case of forceful contact: her hand. In this way, the same D receives two slightly distinct interpretations.

When Jane hits the table, she not only forcefully causes her hand to come into contact with the table, but directs the motion of her hand on the way there. Only something inalienably possessed, such as a hand, can have its path so directed to a goal, thus ensuring final contact. The option of having two specifier copies which form a chain is thus restricted to cases in which the second copy is interpreted as inalienably-possessed.

In fact, our analysis receives support from one of the equivalent constructions in Armenian (Michele Sigler, personal communication).

- (14) tserk-əs bad-i-n zargi
hand-1sg.poss wall-DAT-def hit.past.1sg
'I hit the wall with my hand.'
[literally: 'I hit my hand to the wall.']

As we see, the actual Armenian sentence is identical to our analysis of its English equivalent.

Returning to English: if a chain of the two specifiers is not formed, as in (15)b or its equivalent (15)c, the result is impossible.

- (15) a. Jane hit [Jane] the table.
b. *Jane hit Bill/the book the table.
c. *Jane hit Jane the table.

An obvious explanation for this is that the second noun phrase does not get case.¹² We find some evidence for this approach in the fact that when a preposition is added, the result is fine:

(16) Jane hit the book against/on the table.

As noted above, the unmarked body part in a case of controlled forceful contact is a hand. This is shown in the oddness of (17)a with the additional PP (unless understood as accidental contact) as contrasted with (17)b and c, in which the *with*-phrase adds further specification.

- (17) a Jane hit the table with her hand. (non-volitional only)
b Jane hit the table with her fist.
c Jane hit the button with her thumb.
d Jane hit the table with her foot (non-volitional only)

(17)a, with the cause + change structure would, under a volitional reading, have a complete interpretation like the redundant: ‘Jane caused her hand to come into contact with the table with her hand’. This is why the change, non-volitional reading is so much preferred for this sentence: ‘Jane went to a point of contact with the wall (with her hand). (17)b and c, on the other hand, are fine under a volitional interpretation, in which the understood forceful contact body part is specified as a fist or a thumb, respectively. And the reason (17)d cannot be understood volitionally is that this reading is blocked by the verb *kick* which means ‘hit with one’s foot’; this leaves us, then, with the change, non-volitional reading like that of (17)a. Note that *I hit the edge of the wall with my head* is fine when understood non-volitionally. A head cannot, obviously, specify the default hand body part of forceful contact that is always present in the complex structure. For a

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volitional reading, one uses the complex construction: *I hit my head against the wall (to make a point)*.¹³

The English verb *hit* thus demonstrates that it is the nature and number of the atoms and the interpretive constraints of AT that result in complex or simple structures. It is in this way that the atoms of a verb determine the variety of arguments it may take. AT therefore does not require that the argument properties of a verb be stipulated, whether once or several times.

3 Alternating contact verbs

Consider the following alternations, repeated from (2) and (3) above:¹⁴

- (18) a We smeared mud on the wall.
b They daubed pipeclay on their bodies.
c He rubbed ochre on his chest.
- (19) a We smeared the wall with mud.
b They daubed their bodies with pipeclay.
c He rubbed his chest with ochre.

The verbs in (18) and (19) are composed of **M** and **L** atoms, as *hit* is, but the **M** and **L** are of a different type and so yield different syntactic properties, as illustrated by the lexical representation of the verb *smear*:

- (20) Lexical entry of the verb ‘smear’:¹⁵

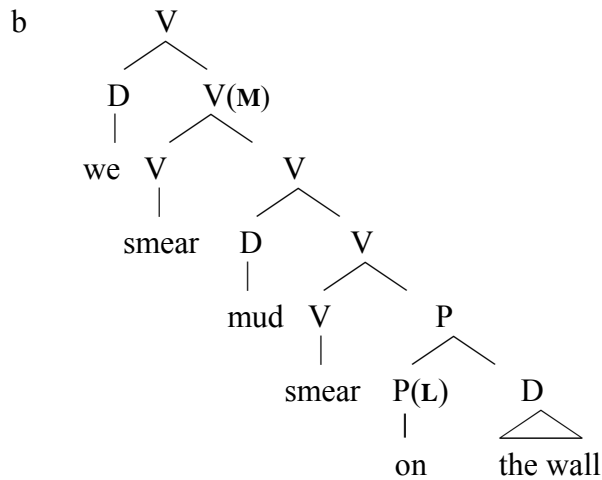
V /smear/
M smear manner
L surface contact

Here, unlike with *hit*, there is no force manner; the **L** atom of *smear*-type verbs is a surface location, not a point of contact. As we see in (18), verbs with this **L** type

generally can appear with the overt preposition *on*. In this case, the **L** atom modifies **P** (as shown in (21)), restricting *on* to surface contact; the complement, *the wall*, specifies the location of this contact.¹⁶ The interpretation of this type of **L** atom and the different **M** atom results in the surface differences between *hit*-type verbs and *smear*-type verbs.

The two atoms of *smear* allow for the projection of the complex cause structure ((18)a) on a par with *hit* (as in (11)), as shown in(21).

(21) a We smeared mud on the wall.

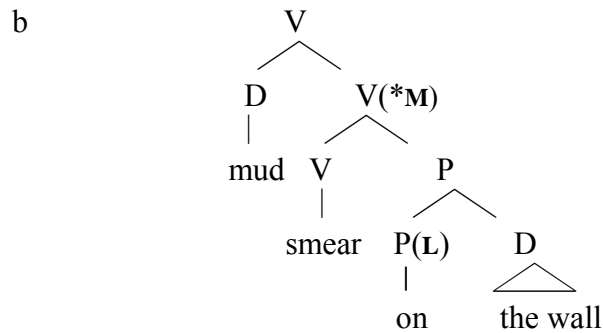


c 'We caused (with smearing) mud to go on the surface of the wall.'

The parallel change structure can also be projected, but the sentence is unacceptable, as shown in (22).

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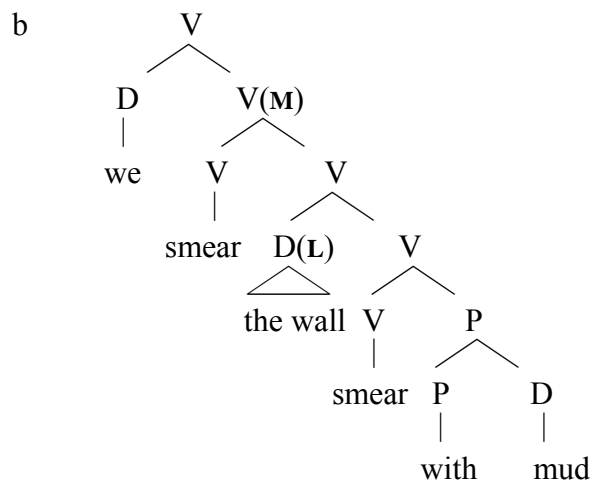
(22) a *Mud smeared on the wall



(22) violates Full Interpretation, since the **M** atom remains uninterpreted: The manner of smearing is such that it requires an agent, which is lacking in the change structure.

Since all verbs are associated with atoms rather than an argument structure, it is not surprising to find that, in addition to the surface contact structure in (21), we also find an alternate cause structure ((19)a), as shown in (23).

(23) a We smeared the wall with mud.



c 'We caused (with smearing) the wall to have mud on it.'

Like Hale and Keyser 1993, 2002: 160, we assume a possessor relation in this type of case, due to the presence of the preposition of 'central coincidence', that is, *with*. But in AT, this possession interpretation is derived by the combination of (a) the projection of

with's central coincidence predicate and (b) the modification of its theme subject *the wall* by the L atom. Specifically, we derive the possessor interpretation from the fact that the wall is the locus of the mud, i.e., the wall is (covered) with (smears of) mud.¹⁷ Note that the PP is obligatory, since without it nothing would be predicated of the possessor.

In contrast with verbs like *smear*, a verb like *hit* does not allow this alternation: *hit*'s L atom is 'point of contact', not surface contact, and so we do not get the possession relation. It follows that sentences such as *I hit the fence with a stick*, can only get the interpretation that contact is made on a point on the fence, and no possession interpretation can be derived.

However, we do find the following:

- (24) a I hit the ball to you. (as in baseball)
b I hit you with the ball.

In (24)b the D *you* does not end up possessing the ball. In this way, despite a seemingly-similar alternation, different L atom types result in different interpretations and possibilities.

This cause structure of (23), on a par with (22), does not allow the simple (change) possession structure in (25).

- (25) *The wall smeared with mud

The reason is the same as before, namely that the M atom of smearing cannot modify in the absence of an agent.

4 ‘splash’ -- similar but different

The classic contrast (noted in, for example, Hale and Keyser 1993) between *smear* verbs and *splash* verbs, as shown in (26), is also explained within AT in terms of the atoms involved.

- (26) a *Mud smeared on the wall.
b Mud splashed on the wall.¹⁸

According to Hale and Keyser 2005: 20-21 and previous work, “the difference between these two verbs lies in the semantic components of their root elements. Specifically, the difference is to be found in what might be termed the ‘manner factor’ inherent in the semantics of the root. The verb *splash*... involves a manner feature which is in a clear sense ‘linked’ to the internal argument *mud*. It represents the motion and dispersal of particulate matter associated with *mud* not with the external argument. This relation is preserved in both the transitive and intransitive alternants. By contrast, the verb *smear*... is characterized by a ‘manner feature’ linked externally, i.e. embodying a gesture or motion associated with the external argument.”¹⁹

Our explanation of the ungrammaticality of (26)a above is in essence the same as that of Hale and Keyser.²⁰ However, we differ with respect to (26)b. The difference lies in our analysis of the meaning of verbs of the *splash* type. We agree with Hale and Keyser that splashing involves ‘dispersal of particulate matter’, but we view this not as a manner, but rather as a particular configuration, the particular shape of points of contact on a surface, i.e., an L atom, as shown in the lexical representation of (27).

(27) Lexical entry of the verb 'splash':

V /splash/

L_{pl} splash-shaped surface contact

An important property associated with verbs of this type is that they involve dispersal of a plurality of particles. This is because the configuration type is such that the L atom of these verbs is plural. It is this essential property of the meaning of these verbs which provides the basis for our explanation of the alternation available for these verbs. (And note that this plurality is the property that restricts the type of matter that can end up splashed on a surface: mud or water, for instance, is fine; clumps of dirt are not.)

Before proceeding to a discussion of the plurality of atoms, we would like to point out that verbs like *splash* do not always seem to involve contact; Malka Rappaport Hovav notes sentences like: *Jane splashed water into the air*. This sentence is fine and doesn't seem to have contact with an obvious surface, but we contend that this has to do with the nature of air itself. Consider *Jane splashed water into the bucket*: It is clear that the water is coming into splashed contact with some surface inside the bucket. And note: *Jane splashed/sprayed the bucket with water* is clearly understood as resulting in the outside surface of the bucket having water on it. The fact that air doesn't have a *visible* surface does not change the contact interpretation of the verb. As further, interesting support for this view, consider: *Jane sprayed the air with perfume*. Here there seems to us no question that the air is indeed the surface on which perfume is sprayed; the air is possessed of perfume. (The reason *spray the air* is out is because, as noted above, a PP is required to be predicated of the possessor.)

To return to our analysis of *splash*-type verbs as having a plural L component: In Erteschik-Shir and Rapoport 2005, we argue that all predicates which describe a

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sequential (incremental or iterated) change have in common that they are plural. Just as a noun can be singular, denoting an individual, or plural, denoting a collection of individuals, so a verb can be singular or plural, describing an individual event, or a collection of individual events, respectively. Examples of verbs with plural atoms are *run* with its plural M, *cool* with its plural S, and *advance* with its plural L. (See also Rothstein 2008 for a similar view.)

One of the consequences of plurality, we argue, is that single-atom plural verbs themselves allow control by a causer. Crucially, this causer controls the increments or iterations and the extent of the change in addition to causing it. Consider the lexical representation in (28) and examine the alternation in (29) and (30), for example.

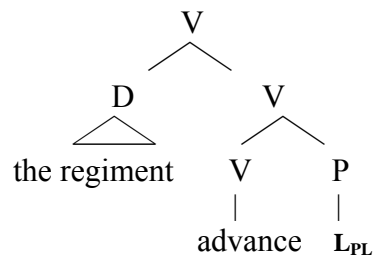
(28) Lexical entry of the verb ‘advance’:

V /advance/

L_{pl} spatial axis, forward

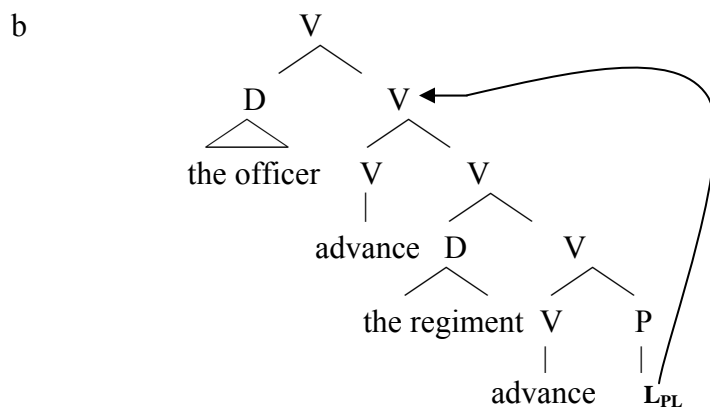
(29) a The regiment advanced.

b



c ‘The regiment went forward incrementally.’

(30) a The officer advanced the regiment.



c 'The officer caused the regiment to go forward and controlled the increments/extent of their advance.'

That a single component verb projects the change structure in (29) is not surprising. However, according to the AT requirement, mentioned in section 1, that projected structure requires the availability of an uninterpreted atom, it is surprising to find an additional projection of a verb with only one component, as in (30). Here the plurality of the component comes into play: the upper projection is licensed because the increments of the change can be controlled by a causing event. The causer thus has the additional interpretation of controlling the sum of the individual events, the increments that make up the plural change. This additional interpretation licenses the additional, upper projection. The licensing by plurality rather than by manner also explains why the causer need not do anything in particular in order to control the event, as would be the case if a manner were involved.

This analysis extends elegantly to verbs of the *splash*-type. These verbs can occur in structures completely parallel to the ones given for *advance* in (29)b and (30)b and the structures need not be repeated here. This analysis not only explains the transitivity alternation but also explains why splashing and spraying need not be done in any particular manner as long as the particular configuration specified by the verb is

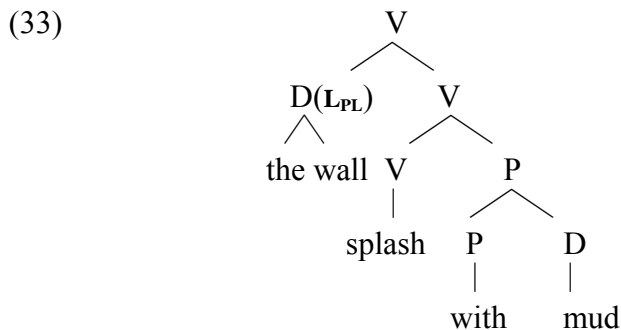
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implemented by the individual particles of the matter involved, that these verbs involve liquids which not only allow for the particular configuration, but also can be viewed as a sum of individual particles.²¹

One more puzzle remains to be solved: Although *splash*-type verbs allow for the same alternation as do *smear*-type verbs, as shown in (29), only (31)a has a change structure parallel, as shown in (32).

- (31) a John splashed mud on the wall.
b John splashed the wall with mud.
- (32) a Mud splashed on the wall.
b *The wall splashed with mud

In order to understand why (32)b is not allowed, let us examine its structure and its properties in more detail:



Recall that the interpretation of the L atom as modifying the subject forces an interpretation in which the subject is a possessor. The sentence therefore means ‘the wall, whose surface was the location of the splashed-shaped configuration, had mud on it’. This sentence, like all sentences with possessor subjects, is stative. There is no upper cause projection to make it dynamic, nor is the verb itself listed in the lexicon as dynamic-- its meaning consists solely of atoms. This stativity is in conflict with the

plurality of the L atom. In order for the wall to be splashed with mud, a repetition is involved, be it of the action itself or of the contact of the matter with (different) parts of the wall. Such event repetition is obviously not compatible with stativity. Therefore the plurality of the L atom remains uninterpreted and Full Interpretation is thus violated.

5 Conclusion

We have seen that all alternations, whether in argument number, argument type or realization, or aspectual class, ultimately derive from the type of meaning atom involved and the interpretations atoms require of the structures they project. This has been illustrated here with certain classes of contact verbs: forceful contact, such as *hit*, and singular and plural surface contact verbs, such as *smear* and *splash*, respectively.

We note that meaning components do not necessary translate from language to language. A seemingly-similar verb may have different atoms in different languages, even a slight difference allowing the projection of different structures; thus, translations are not identical cross-linguistically. However, the inventory of atoms is universal.

We trust that this brief review of the possibilities of Atom Theory is enough to demonstrate that it is possible to account for the various syntactic frames of a single verb without recourse to multiple lexical representations or linking rules. The burden for AT lies in constraints on interpretation rather than in constraints on projection, which, we feel, is as it should be.

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Notes

¹ Thanks to the audience of the Israel Science Foundation research workshop on Syntax, Lexicon and Event Structure, honoring Anita Mittwoch on her 80th birthday, and to Malka Rappaport Hovav for helpful comments.

² Our structural category ‘cause+ change’ is roughly parallel to Dowty’s 1979 accomplishment class and our ‘change’ structure includes inchoatives, unaccusatives, and Vendler’s 1967 and Dowty’s achievements.

³ In AT, meaning components project syntactic structures that are similar in many ways to those in the work of Hale and Keyser (e.g., Hale and Keyser 1993, 2005).

⁴ This representation of modifiers is for convenience only. In Erteschik-Shir and Rapoport in preparation, we hold that these and other modifiers are merged in a different plane (adapting ideas in Erteschik-Shir 1987; Rapoport 1999 and Áfarli 1997), how or precisely where is irrelevant here.

⁵ We follow Fillmore 1970, who argues that the meaning of *hit* contains a place.

⁶ This thematically-motivated step receives support from the fact that, as Levin and Rappaport Hovav 2005, 21-22, note, many languages have contact verbs that take a PP or similar complement, such as Tibetan, in which the element with which contact is made obligatorily takes a locative marker or in Armenian (Michele Sigler, personal communication, in which this element is marked with dative case).

⁷ The specifics of AT’s extended version of FI are discussed in Erteschik-Shir and Rapoport 2007, for example, and Erteschik-Shir and Rapoport in preparation.

⁸ The preposition *to* blocks its complement from functioning as a second contact element for L.

⁹ As noted above, this complex structure is not necessarily parallel to traditional accomplishments. Like the simple change structure, this cause + change structure represents telicity or atelicity, duration or an instant. These attributes are predictable from the type of atom projecting the structure.

¹⁰ We assume that chains are a phonological entity.

¹¹ As noted in Erteschik-Shir and Rapoport 2007, this situation is parallel to that of the subject's dual thematic role in *John rolled down the hill*, as analyzed in Jackendoff 1972: 32. Our analysis of such sentences is near-identical to that in (13): a second copy of *John* is merged as a theme. In this manner-of-motion case, however, this copy is understood as John's path, rather than a body part.

¹² Note that this assumes a different analysis for double-object constructions, that is, possessive constructions without the preposition *with*.

¹³ In the non-volitional *She hit her head on the table*, *on* is not the overt realization of the point-of-contact preposition. Here, the *on*-PP modifies the null point-of-contact L of a change. *On* is used, then, to signal non-volitionality as opposed to volitionality, which is why *The car hit on the wall* is unacceptable.

¹⁴ These alternations have been discussed extensively by, for example, Fillmore 1968, Rappaport et al. 1987, Pinker 1989, Jackendoff 1990, Levin and Rappaport Hovav 1991 and Tenny 1992.

Contact and Other Results

¹⁵ Because the lexical entry consists of concepts, it is rarely a simple matter to represent every entry verbally. Still, every English speaker knows exactly what a ‘smear’ manner is-- the hand motion, for instance, is the same for all speakers.

¹⁶ The constraint of brevity requires that we leave out details of this analysis, particularly in reference to the role and nature of prepositions in AT.

¹⁷ See Erteschik-Shir 2007, 202 for a similar analysis of dative verbs.

¹⁸ For some of our informants, the change sentences of (i), without the overt preposition *on*, are as good as or even better than the sentences of (26).

- (i) Mud splashed the wall.
- Water sprayed the flowers.
- Paint splattered the floor.

At this point, we have nothing to add about these cases.

¹⁹ Malka Rappaport Hovav informs us that she has seen examples in Google such as *Blood smeared on the wall*. We do not find such examples at all acceptable, but recognize the possibility that for some speakers, *smear* may be analyzed like *splash*.

²⁰ Although the theoretical nature of ‘manner’ is distinct. In AT, manner is simply one of the possible atoms, not an additional theoretical construct such as Hale and Keyser’s 1993 tag, or Harley’s 2005 ‘thought balloon’.

²¹ The plural atom is not to be confused with Jackendoff’s 1990 distributive location (roughly equivalent to our possessor location).

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