

ON THE SEMANTIC FEATURE "+ CONTACT"

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1. Inasmuch as Fillmore's (1970:125) discussion of what he termed 'surface-contact' in verbs is to my knowledge the first published discussion of this feature in a modern theoretical framework, one should perhaps adhere to his terminology. However, exclusive use of this more restricted term would obscure the fact that although there are indeed verbs which predicate surface contact between the instrument and the point of contact, there are also others which predicate penetrative contact.

2. Verbs of contact are a subclass of verbs of motion. Motion is conceived semantically as a diminishing or increasing distance between a mobile element and a stationary point, or between two mobile elements. In the latter case, each mobile element is simultaneously point and object, hence the contact is reciprocal. Leave, for example, means 'to recede from some point', the thing that changes location being the mobile element; arrive means 'to eliminate all distance between a mobile element and a stationary point'. The stationary point may be only relatively stationary, as in the case of a flying plane from which a missile moves on its way to a target, which is 'stationary' in relation to the missile, even though it is mobile in relation to points on the ground.

The next distinction to be made is between those verbs of motion whose mobile element is regarded as simply reaching a stationary point and those whose stationary point is viewed not simply as a point but as a stationary object. The latter, along with the reciprocal class mentioned above, are those which in this study will be referred to as 'contact verbs'.

If it were the case that the motion of the mobile element toward the stationary object always culminated in surface contact, then 'surface-contact' would be an

adequate term. Such is not the case, however. Consider sentence (1). Here the weapon is the mobile el-

(1) His assailant stabbed him in the chest.

ement and the person (or, specifically, his chest) is the stationary object. But there is a clear entailment that the weapon penetrated beneath the surface, as is illustrated by the ill-formedness of (2a) and

(2) a. *His assailant stabbed him, but the knife didn't penetrate his skin.

b. His assailant poked him with his knife, but the point failed to penetrate his skin.

the well-formedness of (2b). In other words, surface contact and penetrative contact are subclasses of a more general class, which we shall refer to as '+ contact'.

3. But there are still greater generalizations to be made. Consider the sentences of (3). Note the

(3) a. Lou touched the bat.

b. Lou grasped the bat.

c. Lou squeezed the bat.

d. Lou swung the bat.

e. Lou batted the ball (with the bat).

f. Lou batted the ball into the stands.

g. Lou batted the ball against the wall.

h. Lou knocked the pitcher down with the ball he batted.

several instances of contact reported in these sentences. In (3a) there is contact between the inalienable instrument (Lou's hand) and the bat. The hand is

the mobile element and the bat is the stationary object. (3b) gives us the same information as (3a), except that the contact is reported to be a gripping contact. (3c) entails¹ (3a-b) and focuses on the application of pressure (closer contact) against the bat by the fingers. Here the fingers are the mobile element and the bat is again the stationary object. (3d) entails (3a-c) and asserts that the bat as mobile element has moved on its way to some unnamed point. (3e) entails not only (3a-d) but also (3'a), which in turn

(3') a. The bat struck the ball.

b. The bat reached the ball.

entails (3'b), as well as (3''), and it asserts Lou to

(3'') The ball moved away from the bat.

be the agent and the ball to be the patient of the action. (3f) has the same set of entailments as (3e), but asserts that the ball as mobile element reached a new point--the stands. (3g) has the same set of entailments as (3f), but asserts that the ball's new point of arrival is a stationary object--the wall. Finally, (3h) has a similar series of entailments to those of (3g), but makes the assertion that the ball's point of contact (the pitcher) was set into motion toward a new point (i.e. the ground, which is the anticipated point of arrival for something which goes down). If instead of hitting the pitcher the ball struck a loose board in the fence and set it into motion as in sentence (4), then we would have still an-

(4) Lou knocked a board off the fence with the ball he batted.

other conversion of a stationary object into a mobile element. Like a row of dominoes, this process could continue almost indefinitely, but the probability declines steeply after this fourth level.

Numerous writers in recent years have dedicated chapters or articles to the question of the relatedness of instrumental verbs to instrumental adverbials.²

These theorists would argue, for example, that under normal circumstances one would question the felicity of sentence (5a), since deliberate agency is consid-

- (5) a. *The knife stabbed him deliberately.
 b. He fell and the knife in his hand stabbed him.
 c. He fell and stabbed himself with the knife in his hand.

ered the prerogative of animate beings, but we would accept (5b) as well-formed, they would point out, despite the fact that an instrument is still the subject of the verb in the second conjunct. Apparently most theorists will also accept (5c) as a paraphrase of (5b), except in regard to topicalization.

4. Such insights have led to the search for semantic relations between the verb and the instrumental adverb. It is clear, for example, that ax would not substitute for knife in (5b-c), because the result is the ill-formed sentence (6a). But if slashed replaces

- (6) a. *He fell and the ax in his hand stabbed him.
 b. He fell and the ax in his hand slashed him.
 c. *He fell and the ice-pick in his hand slashed him.
 d. He fell and the knife in his hand slashed him.

stabbed, then either ax or knife can cooccur with the verb, as in (6b) and (6d), respectively, but ice-pick, which could be substituted for knife in (5b-c), is unacceptable with slashed, as in (6c).

From this sort of data we arrive at some useful concepts. We note, for example, that there is a central notion of incision of which cut, carve, and slice

are subclasses, and that the subclasses are arrived at by predication either about the instrument, the motion of the instrument, or the patient. For example, to 'slice' is to make an incision, but it also predicts that the incision made may result in a by-product, a severed-off portion called a slice, whereas cut makes no such predictions. Carve is sometimes substituted for whittle to refer to the act of shaving off surface portions of some carvable material (wood, soap, etc.) without any predictions of an end product, while at other times the material is moved out of the direct object phrase into a prepositional phrase, and a resultant product functions as 'direct object', as in She carved a figurine out of a bar of soap.

A new perspective on instrumentality and the notion of contact as it involves an instrument and a patient is provided jointly by Fillmore's (1970) discussion of change-of-state in relation to 'hitting' and 'breaking' and Chafe's (1970) classes 'action', 'state', and 'action-state'. Fillmore and others have also touched on the relationship between the patient (variously known also as 'object', 'goal', 'target', etc.) and the locus in regard to locative predications. Nevertheless, none of these notions has been systematically tied into a coherent general theory in which they all have an interrelated part to play.

5. Let us return now to the question of the relationship between the hypothetical features [+ locative] and [+ contact]. Consider sentences (7a-h). Sentences (7a) and (7c) differ from sentences (7b) and (7d) in that the hammer is merely a locative point in (7a) and (7c), while in the other two sentences it is a stationary object. In all four sentences the hand is the mobile element. It should be added that (7c) entails (7a) and that (7d) entails (7b). (7e), which entails (7a-d), treats the hammer as the mobile element and the nail as the stationary object, whereas (7f) treats the nail merely as a point. (7g) entails something on the order of (7a-f) and treats the nail now as a mobile element and the board as a stationary object, in contrast to (7h), in which the board is treated merely as a point.

- (7) a. His hand is on the hammer.
 b. His hand is touching the hammer.
 c. His hand is around (the handle of) the hammer.
 d. His hand is gripping the hammer.
 e. He struck the nail with the hammer.
 f. He swung the hammer against the nail.
 g. He made the nail penetrate the board.
 h. He drove the nail into the board.

In other words, when a verb of motion other than a contact verb is employed, a prepositional phrase rather than a direct object follows, the sense of which is traditionally classed as locative. This can be true even when the verb employed is a contact verb if there is a focus split between the locativity and the patient of the stationary object. Consider, for example, sentences (8a-f). In (8a) the door is both

- (8) a. The ax struck the door.
 b. The ax struck against the door.
 c. An assailant with a knife cut Fred's arm.
 d. An assailant with a knife cut Fred on the arm.
 e. The knife cut the apple.
 f. The knife cut into the apple.

the patient of the verb and the stationary object of a contact relation. That is, we understand that the ax did something to the door (the door suffered something from the ax) and that the motion of the ax terminated when its trajectory was obstructed by the door. (8b)

entails (8a) but changes the focus of the door from patience to locativity by placing the NP in a PP with a locative preposition. Similarly, (8c) indicates something that was done to an arm (patient), while (8d) shows a split between Fred as the patient and his arm as the locative point. Finally, (8e) treats the apple primarily as a patient stationary object and only secondarily entails a series of contact relations, whereas (8f) treats it jointly as a locative point and a patient. In other words, when a contact verb is followed by a direct object NP, this NP doubles as patient and stationary object, but the precise point of contact is not specified. When a contact verb co-occurs with a locative prepositional phrase, the precise point of contact is specified. Contact is thus shown to be cognitively, semantically, and syntactically treated as a special class of locativity.

5.1. Before exploring further the behavior of uniquely contact verbs, we must take into account the fact that a vast number of verbs are much less uniquely or obligatorily tied to one class of instrument or level of instrument/object contact. Consider sentences (9a-h), for example. Note first of all that (9a) parallels both (10a) and (10b). That is, despite the fact that it is understood that the cigarette is held by the hand much as is a table-fork, we tend to think of it as being held in the hand. Rather than being gripped by the fingers, it is gripped in the fingers. It is understood also that the cigarette touches the lips ordinarily, but on mention of a holder as in (9b) one readjusts this conceptualization, accepting (9b) as presupposing the cigarette to be held in a holder and the holder to act as an extension of the cigarette in touching the lips.

There are pragmatic facts about the act of smoking which are programmed into the semantics of the verb smoke, such as that smoke passes from the cigarette to the throat and may induce coughing. It has been demonstrated by R. Lakoff (1971) that both presupposition and deduction are involved in grammatical operation traditionally known as conjunction. In examining sentences (9a-h) we shall see this to be true,

- (9) a. He was smoking a cigarette and it burned his finger.
- b. He was smoking a cigarette and it fell out of the holder.
- c. He was smoking a cigarette and it made him cough.
- d. He burned his finger on a cigarette he was smoking.
- e. He burned his finger with a cigarette he was smoking.
- f. A cigarette he was smoking burned his finger.
- g. *When he smokes he does it with a cigarette.
- h. When he smokes he smokes cigarettes.
- (10) a. He was sharpening his razor and it cut his finger.
- b. He was swinging the sledge and it blistered his finger.

and we shall note as well that entailments which do not test out as presuppositions are also involved. Moreover, the information which the deductions process is drawn extensively from the pragmatics of the lexical elements in question, not strictly from lexical semantics. Consider sentence (9c). Its left conjunct contains the proposition of (11a) and its right

- (11) a. X was smoking Y.
- b. Y made X cough.

conjunct contains that of (11b).³ But (11b), which on the surface appears to be the logical proposition: CAUSE [Y, Cough (x)], is rarely interpreted in the

sense that the cigarette itself made physical contact with the throat of the patient and thus induced coughing. It is clear, therefore, that the meaning one receives from the second conjunct of (9c) is achieved by a series of deductions from the pragmatics of smoking. Of relevance to the main concern of the present study is the fact that these deductions involve a series of motion and contact predications. Consider now the R. Lakoff hypothesis that conjunction must fail if the right and left conjuncts of a sentence share no semantic features. (9a-b) clearly pass the test, because the direct object of the first conjunct is coreferential with the subject of the second conjunct. In the case of (9c), however, one could argue that it was not the cigarette that made the smoker cough, but the smoke it emitted, hence the two conjuncts have nothing in common. This would not only disqualify (9c) in regard to the appropriateness of conjunction, but would also put the pronominal NP of the second conjunct in violation of the constraint in the anaphora rule that permits it to apply only when there is a coreferential NP in the higher sentence. But native speakers do not find either the conjunction or the anaphora of (9c) ill-formed, although they do have difficulty explaining why. As a tentative solution, I submit that rules such as conjunction and anaphora are not limited to strict coreferentiality, but apply equally freely to a structural description in which the coreferentiality of the second NP with the first is synecdochical coreferentiality. The NP of the second conjunct of (9c) is a typical case of synecdochical referentiality, in that the pronoun does not have cigarette as its antecedent, but rather uses the notion 'cigarette' as a referential index under which are subsumed a number of pragmatic deductions which link the smoke-emitting cigarette with the smoke-induced cough. This can be compared roughly to the class of synecdoche in which a whole is employed semantically for a part, or a class for a member of the class.

Another subject discussed by R. Lakoff (1971) is the fact that some conjunction is symmetrical (that is, the conjuncts may be reversed without either changing the meaning of the sentence as a whole or converting a

semantically well-formed sentence into one that is either ill-formed or anomalous) whereas other conjunction is asymmetrical (that is, reversing the order of the conjuncts does change the meaning of the sentence as a whole and usually leads to an ill-formed or anomalous sentence). Consider now sentences (12a-d).

- (12) a. ?He was smoking a cigarette and yesterday the sun rose at 5:20.
- b. He was smoking a cigarette and singing an aria from Verdi's Falstaff.
- c. ?He was smoking a cigarette, and he stubbed his toe.
- d. He was smoking a cigarette, and he missed the ashtray.

Following R. Lakoff we may classify (12a-b) as symmetrical and (12c-d) as asymmetrical. (12a) is probably grammatical, but the sentence as a whole is meaningless because the conjunction violates the semantic constraint against conjoining two semantically disjunct conjuncts.⁴ Under these constraints (12b) is acceptable, since the right and left conjuncts have in common the fact that smoking and singing are both activities, and that they are activities that may be performed simultaneously. Of the two asymmetrical sentences, (12c) is of doubtful acceptability because although the fact that it is asymmetrical implies that there ought to be some entailment relation between the two conjuncts, none is discernible.⁵ (12d), on the other hand, possesses such an entailment relation and is acceptable, even though it is through pragmatics rather than merely semantics and/or syntax that the speaker/hearer relates the two conjuncts, applying a deductive system on the order of that postulated by G. Lakoff (1971a).

Let us now re-examine the sentences of (9). Note the difference in meaning between (9d) and (9e). Whereas (9d) could happen by accident and without the subject's having to hold the cigarette, (9e) entails

his holding it and touching the burning coal to his finger, with a suggestion of deliberateness. (9d) is a conceivable paraphrase (apart for topicalization) of (9f), but surprisingly (9e)--despite its instrumental adjunct--is not. This is perhaps due to the fact that the reference is to 'a cigarette he was smoking' rather than, say, 'a cigarette with which he was lighting firecrackers'. That is, a cigarette can be an instrument (as in (9e)), a stationary object (as in (13a)),

- (13) a. He snapped the cigarette with his finger.
 b. His finger reached the cigarette he was fumbling for.
 c. His lips approached the cigarette with hesitation.

or a mere stationary point (as in (13b-c)), according to the type of mobile element/stationary point relation being predicated, and where the focus is placed. Smoking is perceived as an activity rather than an act, hence sentence (9g) is as anomalous as if one were to say *When he plays he does it with bridge, whereas (9h) is well-formed by the same criterion that makes a sentence like When he plays he plays bridge well-formed. Using a lit cigarette for something other than the activity of smoking, however, suspends the activity constraint and permits sentences to occur which under the activity constraint would be judged ill-formed.

There are a great number of mobile element/stationary point relations associated with the activity of smoking, many of which are entailed by the sentences of (9). Presumably this pragmatic system is shared by all native speakers, and they are capable of performing the series of deductions necessary to encode and decode instantaneously. Once it has been established that the smoker has a cigarette burning, reference can be made to his holding it, squeezing it, tapping it on the ashtray, bringing it to his lips, drawing on it, inhaling smoke, coughing, dropping it, crushing it out, etc., or to smoke getting in his

eyes, ashes dropping to the floor, the cigarette's burning a hole in his clothing, etc. As we have seen in the case of sentence (12), the relationship of the proposition 'X missed the ashtray (with his ashes)' to the general proposition 'X was smoking' is attested by the permissibility of conjunction, despite the optionality of the predicate 'missed the ashtray'. In summary, it is obvious that both conceptually and linguistically the spatial notions of motion that terminates in contact and motion that results from contact are utilized much more universally--and in a much more complex way--than they could be if restricted solely to the rather limited inventory of uniquely [+ contact] verbs (i.e., firstly, verbs in which the feature [+ contact] is part of the lexical semantics of the specific verb in question, rather than of one or more predications which are pragmatically entailed; secondly, verbs in which the feature [+ contact] is obligatory for all environments; thirdly, verbs in which the feature [+ contact] is always asserted, never merely entailed).

6. My previous work with [+ contact] verbs⁶ has led me to observe a fairly standard pattern of cognitive classifications of the phenomena that meet the senses into hierarchical sets of mobile elements and stationary objects, as illustrated above. If we wish, we may consider the mobile element and the stationary object to which it relates as an ordered pair. A verb may assert just one level of predication within this hierarchy. If the level chosen is the lowest in the hierarchy, there is only one predication in the verb. If the level chosen is not the lowest, however, then the lower predications will be automatically entailed by the assertion. Choice of level can be regarded as a focus function.

6.1. In compiling a list of [+ contact] verbs for English I chose not to restrict myself to just those verbs of 'hitting and breaking' to which Fillmore (1970) addresses himself, but to admit all verbs which either assert, entail, or presuppose [+ contact]. (For example, slap asserts [+ contact] between the mobile element and the stationary object, while presc

merely entails it, yet press would be meaningless if the entailment were absent). Furthermore, I did not restrict the list to solely those verbs whose contact involves a typical instrument, such as a hammer, and a typical stationary object, such as an anvil, but admitted also verbs whose contact involves an alienable instrument such as a hammer as the stationary object, and an inalienable instrument such as the hand as the mobile element, or--without the intermediacy of an alienable instrument--involves an inalienable instrument like the hand and such a typical stationary object as a punching bag. Since there are numerous verbs whose semantics contains entailments of contact, either directly or deductively from pragmatics, although as assertions they are not marked [+ contact], one runs the risk of making the class of [+ contact] verbs either too restrictive or too comprehensive. Although there is no entirely satisfactory way of resolving this, it seems to me that the greater danger is that we might be tempted to lean in the direction of an overly restrictive classification. To ensure that I would not succumb to this temptation, I have deliberately included classes of verbs whose [+ contact] feature, far from being assertive, is merely pragmatically entailed.

6.2. Let us now look at some of these classes.

The verb push entails contact of a mobile element with a stationary object, but it asserts that the stationary object is converted into a mobile element by the force applied. Stab entails a hand-held weapon, hence the assertion can focus only on the contact that takes place between the second-level mobile element, such as a knife, and the second-level stationary object, which is typically an animate being. These conditions would bar such sentences as (14a-c) from most normal discourse. Choke, throttle, strangle, and scrag also involve a first-level mobile element, the hand, but the stationary object is not second-level, but third. That is, except for the baseball expression 'to choke up on the bat', sentences like (15a) are anomalous, whereas (15b) is a normal sentence. It is true that these verbs require also that the patient be [+ animate], a restriction that could be used as an argument

- (14) a. ?The hunter shot an arrow and stabbed a deer with it.
- b. She stabbed him with her fingernail.
(Acceptable as hyperbole for jabbed, stuck, etc.)
- c. ??I couldn't find a knife, so I stabbed him with my hand.
- (15) a. *You may play with the hammer, but don't choke it.
- b. You may play with the kitten, but don't choke it.

to explain why (15a) is asterisked and (15b) is not, but the point is that whereas touching, grasping, holding, and swinging a hammer are all entailed by the concept of using a hammer, choking is never an entailment in relation to a hammer or any other second-level mobile element, although choke, on the other hand, may take an alienable second-level instrument, which would normally be a rope, scarf, necktie, etc., but in a rare instance could conceivably be an animate being (e.g. He choked her with a boa constrictor.), and in all respects functions as a contact relation whose stationary object is second-level, even though the mobile element of this contact relation is often a first-level one. There are other verbs, such as push, press, and squeeze, which behave similarly; that is, in the absence of an explicit second-level mobile element, a first-level mobile element is entailed. Consider the sentences of (16). (16a) is a permissible redundancy in an environment where it suits the speaker to be very graphic, but it means no more than He pushed the door, since lack of an explicit second-level mobile element entails a first-level mobile element (the hand. The same applies to (16b), whose meaning would not be changed if reduced to He squeezed her throat. (16c) is ill-formed because the features [+ gripping contact] and [+ post-contact pressure] are merely entailed in throttle, rather than asserted, as in squeeze. Therefore, to test our hypothesis that push

- (16) a. He placed his hand on the door and pushed.
 b. He placed his hand on her throat and squeezed.
 c. *He placed his hand on her throat and throttled.
 d. He placed his hand on her throat and throttled her.
 e. *He placed his hand on her throat and cut.
 f. *He placed his hand on the animal's throat and bled it.

and throttle belong to the same class of predications regarding choice of mobile element and stationary object, let us restate (16c) as (16d). To see why this is, suppose we attempt to reduce sentences (16c-d) in the way that we did (16a-b). Let us represent their respective reduced forms as (16'c-d). (16'c) is ill-

- (16') c. *He throttled her throat.
 b. He throttled her.

formed because it is made to cooccur with throat as an assertion, when in fact the predication SQUEEZE (INSTRUMENT, THROAT) is merely an entailment; in other words, throat is the patient of the entailed predication, whereas the [+ human] and [+ feminine] third person NP is the patient of the assertion with throttle. The fact that it is permissible to assert in the first conjunct of a sentence a predication which is entailed by the verb of the second conjunct, then, provides a means of verifying whether an entailment exists or not, and the fact that these assertions are redundant in the conjoined sentence reveals the second conjunct to be a paraphrase of the sentence as a whole. But we have seen, furthermore, that some verbs entail not only a variable mobile element/stationary object relation, but one in which the stationary object is

instantiated, as is throat in relation to squeeze in the SQUEEZE (X, THROAT) entailment of throttle. (16c) and (16d) reveal the existence of a constraint against the syntactic instantiation of a patient which has been lexically instantiated (in the way that throat is lexically instantiated in throttle).

On the basis of the foregoing, it is now easy to understand what is wrong with sentences (16e-f). If for these we substitute (16''e-f), which are well-

(16'') e. He placed the knife against her throat and cut.

f. He placed the knife against the animal's throat and bled it.

formed, it is clear that (16e-f) are ill-formed because the assertion of the first conjunct contradicts an entailment of the verb of the second conjunct, namely that the mobile element involved is [+ second-level], [- blunt], and [+ edged]. Since the knife of the first conjunct of sentences (16''e-f) meets these feature requirements, hence asserts the same class of instrument as the verb of the second conjunct entails, (16''e-f) are well-formed and are essential para-

(16''') e. He cut her throat.

f. He bled the animal.

phrases of (16''''e-f), differing only in that the [+ second-level], [- blunt], and [+ edged] instrument entailed in (16''''e-f) is instantiated as the knife in (16''''e-f), and the patient throat which is entailed in (16''''f) is redundantly asserted in (16''''f).

6.3. Conjunctions such as sentences (16a-b) are only one way in which the [+ mobile element] feature of an entailed predication can attain instantiation. Another way this can be achieved is by means of an instrumental with-clause which is usually adjoined to the VP. Consider sentences (17a-j). (17a) is structurally analogous to (16a). (17b) is a trifle more

- (17) a. He grabbed a hammer and hit the nail.
 b. He grabbed a hammer and hit the nail with it.
 c. *He grabbed a hammer and hit the nail with his shoe.
 d. He grabbed a hammer and hammered the nail with it.
 e. He hammered the nail.
 f. ?He hammered the nail with a hammer.
 g. He hammered the nail with a hammer that he grabbed.
 h. *He hit the nail and then he grabbed a hammer.
 i. He hit the nail and then he dropped the hammer.
 j. ?He hit the nail with a hammer and then he hammered it.

redundant than (17a), since the proposition He hit the nail entails the use of a hammer-like instrument and both sentences have a first conjunct in which it is asserted that the entailed instrument is 'a hammer that he grabbed', but (17b) additionally asserts that the nail was hit by the 'hammer that he grabbed', even though this fact is entailed by sentence (17a). As proof of this redundancy, consider the ill-formedness of (17c), where the with-phrase is unacceptable not because a shoe could not in an emergency be used as a hammer (thus fulfilling the [+ hammer-like] feature constraint), but because the first conjunct of such a sentence provides an instantiation of the entailed instrument of the HIT (X, NAIL) predication, and so does the with-phrase; obviously a single instrument, which is involved in a single predicated act, cannot be instantiated as two separate instruments without con-

tradition.

It is probably a universal of language that there exist verbs like touch, in which mere surface contact is predicated, hit, in which forceful surface contact is predicated, and hammer, in which forceful surface contact involving a hammer-like instrument is predicated. One can admit 'touching' something but deny 'hitting' it, for example, but not the reverse, or admit 'hitting' it but deny 'hammering' it, but not the reverse. I touched the punching bag, but I didn't hit it is well-formed, but *I hit the punching bag, but I didn't touch it is not, since 'hit' entails 'touch', but 'touch' does not entail 'hit'. I hit the nail, but I didn't hammer it is well-formed, but *I hammered the nail, but I didn't hit it is not, since 'hammer' entails 'hit', but 'hit' does not entail 'hammer'. The class to which the mobile element belongs may be instantiated: (1) by stating it as the subject of the contact relation (e.g. The hammer hit the nail); (2) by stating it in the first conjunct of a compound sentence (e.g. Pete grabbed the hammer and hit the nail); (3) by stating it in a with-phrase (e.g. Pete hit the nail with the hammer); (4) by naming the instrument class in the verb itself (e.g. Pete hammered the nail). Obviously, if more than one of these is used in the same sentence, they must be coreferential, but it does not seem that using types (2), (3), and (4) of instantiation all in the same sentence, as in sentence (17d), is either grammatically or semantically wrong, even though its high degree of redundancy lowers its stylistic probability. There is in fact nothing predicated in (17d) which is not either asserted or entailed in the much shorter version of (17e). It is interesting furthermore that (17d) seems more acceptable than (17f), even though the former appears to be three ways redundant, while the latter seems only two ways redundant. But note that (17g), which is also more acceptable than (17f), comes nearer being a paraphrase of (17d) than of (17f); this reveals that the with-phrase of (17f) is taken as generic--hence entirely redundant in cooccurrence with the verb hammer--, whereas in (17d) and (17g) generic hammerness is no more than an entailment of the noun hammer, since

its cooccurrence with the verb grab restricts it to a single element of the class, and the redundancy is compensated for by the new information (He grabbed a hammer).

The unacceptability of (17h) illustrates the fact that sentence (17a) is as irreversible as we found (12d) to be. Clearly, then, this sort of conjunction is asymmetrical, and we can now see more plainly why. As an illustration, consider sentences (18a-b). To cry

- (18) a. *He cried "ouch" and then he banged his finger.
 b. *He froze the water and poured it out of the bucket.

"ouch" is like crying "wolf" or "fire"--there is a definite situation in which it is appropriate, and otherwise it is inappropriate. Since a precondition for this situation is that the utterer must at the moment of utterance--not at some previous time--have just experienced a sharp pain of some sort, it is clear that ouch entails some cause of pain, such as a bang on the finger. But (18a) in its first conjunct entails that such pain had been suffered, even though an assertion to this effect does not appear until the second conjunct, hence violating the necessary precedence relations. (18b) is ill-formed because its first conjunct asserts that the water was solidified, which contradicts an entailment of the verb pour of the second conjunct, namely that the mobile element was liquid. In other words, it is impermissible to make an assertion in a left conjunct which either (a) contradicts an entailment of the right conjunct or (b) entails what is not asserted until the right conjunct. In (17h) the verb of the first conjunct entails what is not asserted until the second conjunct, in violation of constraint (b), and it furthermore contradicts an entailment of the verb of the right conjunct (since grab presupposes that the hand had not yet come into contact with the hammer, while hit entails that it has). In (17i), on the other hand, it is entailed by the verb of the left conjunct that the hammer is in hand, which is in agreement with the presupposition of drop, thus violating

neither constraint. The problem with (17j), finally, is that there is no new information in the second conjunct. It could be stated equally well as (17'j), a

(17') j. *He hammered the nail and then he hammered it.

type of sentence which is permissible only as a special type of assertion, best illustrated as (17''j).

(17'') j. He hammered the nail and then he hammered it some more.

But since symmetrical conjunctions with totally synonymous conjuncts are semantically vacuous and hence ill-formed, and since asymmetrical conjunction requires that there be an entailment relation between the conjuncts, sentences of the (17j) class are of dubious acceptability.

7. [+ contact] verbs may be classified partially according to the level of mobile element and stationary object involved, as we have seen and shall explore further. But we have been considering primarily verbs of momentary contact, such as hit, or contact which was unspecified for duration, such as touch, whereas many verbs have very complex restrictions regarding the force, repetition, and duration of this contact. Furthermore, whereas some verbs may require merely that the mobile element be either blunt or sharp, others are very restrictive in regard to class of mobile element (e.g. snip requires shears or some equivalent; kiss will tolerate only the lips of an animate being, or something metaphorically close in appearance and function). Finally, the shape, texture, behavior, etc. of permissible stationary objects is also governed by the verb.

7.1. There is a class of verbs that includes squeeze, pinch, and grasp which when used without explicit mention of an instrument are understood to involve the hand (first-level mobile element), but which cooccur frequently with such second-level mobile elements as pliers, tweezers, pincers, etc.

Saw, brush, and file all involve a prolonged iterative horizontal motion of the instrument after initial contact with the stationary object. A particular type of contact ([+ anterior] and [+ sustained]) is thus entailed, as is the class of motion involved ([+ posterior], [+ horizontal], and [+ iterative]). Shear, clip, and tweeze, in at least one reading for each, require that the stationary object be hair (either singly or as a mass); shine, polish, and buff require a stationary object with a smooth surface; wound, lacerate, and tickle require the stationary object to be some part of the body of an animate being. Any violation of these constraints leads to an unacceptable (or stylistically peculiar) sentence.

Certain objects come into contact with another object in a special way. For example, a board's being nailed to the wall entails a hand gripping a hammer, forcing it into motion and thus converting it into a second-level mobile element. It also entails a second hand gripping a nail and moving it into contact with the board. The hammer is then understood to strike the head of the nail, iteratively, thus setting the nail in motion and thereby converting it into a third-level mobile element (or instrument). The nail pierces the board, the third-level stationary object, and enters the wall behind it. This forces the board, a fourth-level mobile element, into a permanent state of contact with the wall, a fourth-level stationary object. Only this last predication is asserted by the verb nailed in sentence (19). All

(19) Ray nailed the board to the wall.

the others are entailments, whose existence is nevertheless provable by the conjoined sentence test employed above in (17).

7.2. Count nouns are more likely to function as as a second-level mobile element than mass nouns, but mass nouns do not all behave alike in this regard either. There seems to be one major subclassification into nouns that are perceived as solid masses and those that are perceived as a collection of in-

dividually mobile particles. Consider the sentences of (20). In (20a) the portion of the mass in ques-

- (20) a. Gus hit Moe on the head with a chunk of ice.
- b. *Gus hit Moe on the head with an ice.
- c. Gus picked up the ice and hit Moe on the head with it, and then he dropped it.
- d. *Gus picked up the water and hit Moe on the head with it, and then he dropped it.
- e. Gus picked up the water and hit Moe on the head with it, and then he dropped the pail.
- f. Gus picked up a handful of dust and rubbed it in Moe's eyes.
- g. ?Gus picked up a handful of water and rubbed it in Moe's eyes.
- h. ?Gus picked up the water and hit Moe in the face with it, and then he dried his hands.
- i. Gus picked up the sand and hit Moe in the face with it, and then he wiped his hand on his grimy tee-shirt.

tion is treated in the same way it would be if it were an independent count noun, as in (20'a). De-

- (20') a. Gus hit Moe on the head with a club.

spite the [+ solid] semantic feature of ice, however, (20b) is ill-formed, as ordinary selectional constraints would predict it to be. It is interesting, now, when we apply the conjoined sentence test as in (20c-d) that even though the noun in the first conjunct is the mass noun itself (not the measure term), the interpretation is obviously based on an under-

stood measure term. We see this illustrated by the consequences for the well-formedness of the sentence as a whole if the patient of the verb drop in the third conjunct instantiates the patient of pick up as a class of measure term other than that entailed by the respective mass nouns. Both sentences would be well-formed if the third conjunct were absent. In the third conjunct of (20c) we understand 'a chunk of ice' rather than--say--'a bucketful', and we find this compatible with our experience. But we do not find it compatible with our experience that water could be handled in this way, hence we reject (20d) on the basis of the false entailment of the last conjunct. On the other hand, without any previous mention of a pail, we accept (20e) as well-formed, since the container mentioned in the last conjunct properly conforms to the presupposition of the first conjunct that the water was in a container. Most other liquids seem to follow the constraints that apply to water.

But there are other mass nouns which hold a place intermediate between liquids and solids--those which are composed of numerous particles, each of which is a solid (e.g. the verb pour, as we have seen, cannot be used when the mobile element is a solid, but it is equally compatible with particulate substances and liquids). Dust can be employed limitedly as a second-level mobile element (i.e. as one which is held in the hand while in contact with a second-level stationary object), as in (20f), whereas water is even more limited (cf. (20g)). This is true even if we broaden the concept to include the possibility that the mass substances are thrown rather than retained in the hand during the second-level contact. Compare sentences (20h) and (20i). The final conjunct of (20h) seems less predictable than that of (20i), less probable. While either sand or water could be contained in a pail, it seems more natural that someone who picked up sand to throw in someone's face would use his bare hand, whereas someone who picked up water to do so would use a container of some sort.

7.3. Paint, ointment, and other viscous products

may serve either as second- or third-level mobile elements, depending on their particular characteristics. As sentence (21a) demonstrates, ointment is usually

- (21) a. The veterinarian's fingers were sticky after rubbing ointment on the horse's leg.
- b. The painter cleaned his brushes after painting the wall.

treated as a second-level mobile element, having the hand as the entailed first-level mobile element, while paint is normally treated as a third-level mobile element, having a brush as the entailed second-level mobile element and the hand as the entailed first-level mobile element, as illustrated by sentence (21b). If we substituted hands for brushes in (21b), the implication would be merely that the hand that held the brush had been reached by some paint which had run down the brush, and certainly not that the paint had been applied directly by the hand.

There is a further implication about these viscous substances as instruments, which is that their contact with the stationary object is permanent, for which we must posit a feature [+ static]. The behavior of those verbs that involve contact of a viscous mobile element with a stationary object is similar to that of those which presuppose the aid of such physical forces as gravity and inertia to maintain a continuous contact, such as cover and fill in the sentences of (22). Note the contrast between these sen-

- (22) a. The farmer covered the field with fertilizer.
- b. Fertilizer covered the field.
- c. The field was fertilized.
- d. The carpenter filled the joint with putty.
- e. Putty filled the joint.
- f. The joint was puttied.

tences and those of (23). Sentences (23a) and (23e)

- (23) a. The farmer put fertilizer on the field.
 b. *The farmer put the field with fertilizer.
 c. *Fertilizer put the field.
 d. *The field was put.
 e. The carpenter put putty in the joint.
 f. *The carpenter put the joint with putty.
 g. *Putty put the joint.
 h. *The joint was put.

are entailed by the verbs covered and filled of (22a) and (22d). The difference between the sentences of (22) and those of (23) is that in (22) the focus is on the state of the third-level stationary object (the field) after the act (i.e. the changed state), whereas in (23) the focus is on the act itself. Note that sentence (23'a) is ill-formed, even though (25a)

- (23') a. *The farmer put fertilizer on the field with manure.
 b. The farmer put fertilizer on the field with a fork.

is not, despite the fact that the verb fertilize entails 'put fertilizer on'. This is because it is the fertilizer that is the patient of put, and as such calls for a mobile element of its own level (second), such as a fork, as in (23'b). Traditional grammarians were correct in speaking of the 'object' of a preposition. In a sentence like (23'b), there is one verb but two objects. The first object is the patient of the verb, namely fertilizer. The focus of the verb is on the contact relations between the second-level mobile element (a fork) and this second-level stationary object, and the assertion is that

the second-level stationary object (fertilizer) is converted into a third-level mobile element. But the assertion is incomplete without the prepositional phrase. There is no such cliff-hanger sentence as *The farmer put the fertilizer. The fact that the second-level stationary point has been converted into a third-level mobile element implies a new contact relation ahead. The predicate of this new contact relation is the preposition on, and its patient is the field. The NP fertilizer in (23'b), then, is both the stationary object of a contact relation between it and the NP a fork, and the mobile element in a second contact relation between it and the NP the field.

Note also that (23b) is no longer ill-formed if we substitute the verb spread for the verb put, as in (23''b). What is especially interesting about (23''b)

(23'') b. The farmer spread the field with fertilizer.

is that with spread we are willing to accept a choice of instrumental levels. That is, we are inclined to accept sentence (24) as well as (23''b), although with

(24) The farmer spread the field with a fork.

a different interpretation. The reason for this is that sentences like (25b-c) are perfectly well-formed in English, and that a sentence like (25a) is ambiguous

(25) a. The farmer fertilized the field.

b. The farmer fertilized the field with a spreader.

c. The farmer fertilized the field with manure.

ous as to focus and can equally well be queried by (26a) as by (26b). In other words, we must modify our former hypothesis that (23a) and (23e) are directly entailed by the verbs cover and fill; it is now evident that there is an intermediate predicat

(26) a. What did he spread it with?

b. What did he use (as fertilizer)?

spread which may be asserted independently, as in (23''b) and (24), or taken as an entailment in verbs like fertilize, which name the third-level stationary object as the patient of the verb. Put, on the other hand, is an entailed predicate of spread, along with a string of other entailments, such as that the third-level mobile element must be [+ mass] and [- solid], that the motion of the second-level mobile element is [+ horizontal] and [+ iterative], etc.

If we return now to the viscous class, we will see that viscosity plays the same role as gravity and inertia. When a viscous substance is applied to a stationary object it is held there as permanently as if held to the earth by gravity. It is presumably for that reason that sentence (27a) is considered well-

(27) a. We're covering the ceiling with paint.

b. *We're covering the ceiling with sawdust.

c. We're painting the ceiling.

d. *We're sawdusting the ceiling.

formed and (27b) is rejected, and that (27c), which entails (27a), is acceptable, but (27d), which entails (27b), is not. Since it might be tempting to argue that (27b) and (27d) are not semantically ill-formed, but merely improbable because the process they describe is somewhat in defiance of natural laws, let me remind the reader that the point is not that a non-adhesive substance like sawdust is subject to the law of gravity, but that adhesive substances, which are not, are nevertheless treated semantically as if it were gravity that held them to, on, against, etc. the stationary object. One puts paint on the ceiling, not under it.

Let us now examine four sentences which Fillmore (1968:48) attributes to Hall [Partee] (1965):

- (28) a. [93] John smeared paint on the wall.
 b. [94] John smeared the wall with paint.
 c. [95] John planted peas and corn in his garden.
 d. [96] John planted his garden with peas and corn.

Fillmore says that "... it would be just as easy [as what Hall had proposed] to say that both on the wall and with paint were initially provided with prepositions (as L and I case elements), the verb smeared having the property that whichever of these elements is chosen as 'direct object' must fall next to it and must lose its preposition." In this there is certainly a glimmer of recognition of the sorts of mobile element/stationary object relation which we have examined in some detail above. But without getting into a debate over where and when prepositions are generated, which for present purposes would be tangential, let us take a look at his main argument. What he seems to be saying is that there are two function classes, at different levels, one of which is the case level and the other the relational level, and that the wall in (28a) and his garden in (28d) may function as direct object (relational level) without losing their locativity (case level), or--if the order of elements is as in (28a) and (28c), then it is paint and peas and corn which may serve as direct object without losing their instrumentality (case level). Thus Fillmore's Objective case, as opposed to the 'direct object' of the verb, is not involved at all.

This view of things is not extremely different from the view we have taken above, except that Fillmore fails to observe that the noun paint in (28a-b) has a dual role, that of stationary object as well as the instrumental role he assigns it, and that

the NP the wall can be viewed alternately as a stationary object or as a mere stationary point. Consider sentence (28'a). If the noun paint were invariably instrumental in its underlying case assignment,

- (28') a. John smeared paint on the wall with a brush.

as Fillmore implies, then (28'a) would present the contradiction of showing two separate instrumental NPs but only one locative. In other words, the wall would be the point of contact for both paint and brush, but one does not understand the sentence in that way. On the other hand, sentences (28a-d) can be very easily explained by following the same steps as we took in examining cover and fill above. (Since (28c-d) do not involve a viscous product, we will ignore them, although their analysis can be considered to follow from that of (28a-b).) That is, we consider (28a) to have its primary focus on paint as a second-level stationary object, with its next-remotest stationary object, the wall, taking secondary focus as the point of contact of paint in its secondary role as a third-level mobile element (or instrument). In (28b) the primary focus is on the wall as stationary object and paint as mobile element. It is taken for granted that whichever level of objectivity and instrumentality is asserted, the others must be assumed to exist as entailments (looking back) or implications (looking forward).

8. It has been mentioned above that the [+ contact] feature is subclassified into [+ penetrative]. [+ penetrative] must be further subcategorized according to the type, degree, and area of penetration, as well as the type of motion exercised by the instrument during and after penetration. Due to space limitations, we cannot expand much on this topic here, but must restrict ourselves to the following brief comments.

Firstly, although it has been convenient above to speak of binary features from time to time, while at other times it seemed more appropriate to speak of

tact predicate, and the suspension points indicate that various other features would have to be shown; [- alienable] and [+ hand] are among the features that would be necessary to identify the mobile element; the SO has the subscripts [+ handle], [+ rigid], etc. to identify it as some sort of tool, but note that it is not until (29b), where the SO of (29a) has become an ME, that it is marked for its instrumental features. In (29b) the Contact predicate is [+ anterior], [+ sustained], [+ forceful], etc. The mobile element is marked as [+ alienable], [+ edged], [+ sharp], etc. The stationary object is marked as [+ solid], [+ penetrable], [- animate], etc. Some of these features are more susceptible to rebuttal than others, but in view of the fact that (29a-b) was constructed solely for the purpose of discussing the problems involved, there is no need to discuss them individually. For the sake of argument, now, suppose we say that (29a) has been conjoined with (29b). Even if we stretch our credulity enough not to reject this outright, it can be seen that there is still something missing. If we are to get slice and saw out of the conjunction of (29a) with (29b), we have to say something about the lateral motion necessary for slicing and sawing. Now this motion involves primarily the second-level ME, but since the source of the force that moves the tool back and forth is the arm behind the hand that holds the tool, it is questionable whether we are justified in localizing it strictly to the second-level ME. Even if we do, it is not clear how we could fit it into the predications of (29a-b). However we fit it in, the [+ motion] feature must presumably be further restricted as [+ horizontal] (I prefer this to 'lateral', since the latter may be necessary to refer to contact relations where the side of the instrument is the portion involved and the motion is sidewise), [+ iterative], etc. If we allowed all these conditions, then the conjunction of (29a) with (29b) would presumably describe both slice and saw, and to allow one but not the other we would need a feature [+/- toothed] under the ME of (29b), which would then distinguish slicing from sawing.

Whether a [+ contact] verb is [+ penetrative] or

[- penetrative], it has the [\pm change-of-state] option. For example, among [- penetrative] verbs strike is [- change-of-state] and shatter is [+ change-of-state] (cf. Fillmore [1970]). Among [+ penetrative] verbs, prick is [- change-of-state] and perforate is [+ change-of-state]. There are also numerous subclasses of [+ change-of-state]. Whereas break, sever, mangle, etc. assert that the physical form of the object changes as a consequence of the entailed contact, drive in relation to nail, for example, asserts that the spatial orientation of the third-level mobile element (a nail) changes as a consequence of the entailed contact.

9. In summary, the following have been some of my arguments: (1) All contact relations involve at least one mobile element and at least one stationary object, which come in ordered pairs. (2) Most contact relations involve more than one such ordered pair. (3) When a particular level of ordered pair is selected for focus by the choice of verb, all lower-level pairs will be entailed, and a higher-level pair may be implied. (4) Locative prepositions are predicates that treat the patient of the verb as a mobile element and the 'object' of the preposition as the stationary object. In support of these arguments I have subjected numerous sentences to the conjoined sentence test for entailment, and have discussed other means by which variables of the verb may be instantiated, such as in instrumental with-clauses. Although I hope I have convinced the reader that the semantics of [+ contact] verbs is systematic and amenable to formalization, it was not my aim here to do more than to suggest some steps toward that ultimate goal.

NOTES

¹In my oral presentation of this paper, I erroneously used the term 'presuppose' here and elsewhere. I am grateful to Larry Hutchinson for calling this error to my attention.

²See, for example, G. Lakoff (1968); Fillmore

(1968; 1970); Chafe (1967; 1970).

³This is the type of conjunct often turned into a pseudo relative clause of the type that Annear Thompson (1971) discussed in her argument that all relative clauses stem from conjunction (a rather shaky hypothesis). (9c) stated as a pseudo relative would be He was smoking a cigarette, which made him cough. Such sentences are difficult to account for following the Standard Theory, since there is no head noun in the reading of this sentence that paraphrases (9c). However, if we permit relativization to operate on a more abstract 'head noun', namely the activity described, which in this case is 'smoking', then there is no further problem, and certainly no need to try to derive all relative clauses from conjunction.

⁴The terms in which this is stated themselves point up the contradiction; the notion of 'conjoining' something which is 'disjunct' is a logical absurdity. The implications of this are of great theoretical importance, because this fact about conjunction makes the notion of an independent syntactic rule of conjunction appear vacuous. Only the semantic component, however it is visualized, has access to the sort of information that is necessary in order to know whether conjunction is or is not possible, in a given instance.

⁵Note that sentence (12c) would be symmetrical if the perfective aspect in the right conjunct were changed to progressive: He was smoking a cigarette and stubbing his toe, although such a sentence is a little unusual, in that it converts a [- iterative] contact verb into one that is [+ iterative].

⁶See, for example, Gulstad (forthcoming).

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