

## ARGUMENT STRUCTURE, THEMATIC ROLES AND LINKING

Benilde Graña López

*Universidad de Oviedo*

The goal of this paper is to show that the view (generally adopted in the field of Chomskyan Generative Grammar over the past twenty years) that the semantic function of verbal arguments can be couched in terms of the traditional thematic roles (Agent, Theme, etc.) has led to unsatisfactory results and has proved to be specially faulty in predicting the syntactic realisation of arguments (linking). It is claimed that a proper semantic characterisation of arguments, above all one that can allow the *formulation of linking regularities*, must start from some theoretical position on the nature of meaning. Two alternative proposals are reviewed and compared: one endorsing the view that meaning may be reduced to conceptual structures ultimately residing in the speaker's brain, and one that assumes that meaning is in the external world of objects and events. Locative alternation verbs provide much of the empirical ground on which hypotheses are based.

### 1. OVERVIEW AND PROBLEMS

The theory of Argument Structure (A-Str) has been involved in a wide range of contexts in the field of *Generative Grammar* over the last 20 years and continues to be a fruitful area of research nowadays, an area that has important implications for the domain of lexical semantics as well as for the interface between the lexicon and the syntax. The development of A-Str theory is partly the result of a research strategy characteristic of Government and Binding Theory (GB) which derives the descriptive complexity of natural languages from the lexicon while elaborating simple (even trivial) algorithmic components. Although in principle all major lexical categories may be used as predicates, this paper will focus on the properties of verbs, which are the prototypical predicates in natural languages and of course in English. Roughly speaking, the A-Str of a predicate is an indication of its adicity, ie, the number of arguments that are needed for its correct interpretation; these are often identified by labels (thematic roles or th-roles) corresponding to the semantic function borne by each argument. A-Str is the representation of a very prominent

lexical property of verbs, in more simple terms: the participants involved in the state, activity or event expressed by the verb (see Pustejovsky 1995). Thus in the early days of GB theory (Chomsky 1981, Stowell 1981), A-Strs had the form of a list of thematic roles, like that in 1.a, which is meant to account for the interpretation of 1.b:

- 1.a. PUT: < Agent, Theme, Location >  
 1.b. [Peter]<sub>AGENT</sub> put [the book]<sub>THEME</sub> [on the table]<sub>LOC</sub>

The thematic role labels (most commonly, Agent, Theme, Goal, Location, Source, Instrument) were taken from the pioneer works of Gruber (1965), Fillmore (1968) and Jackendoff (1972), who worked at the interface between syntax and lexical-semantics and emphasised the fact that syntactic realisation can obscure the semantic relations between predicates and arguments, as happens in 2.a-b and 2.c-d, where certain Noun Phrases bearing different grammatical relations to the verb do nevertheless bear the same (or very similar) semantic relations:

- 2.a. John stuffed [the vegetables] [into the chicken]  
 2.b. John stuffed [the chicken] [with vegetables]  
 2.c. John opened [the door]  
 2.d. [The door] opened

From such an observation, those authors argued for a level of representation in which arguments are semantically identified and proposed that a small number of semantic relations (th-roles) would suffice to capture the properties of large numbers of predicates and to allow for the statement of generalisations.

In syntax-centred GB theory, nevertheless, the lexical-semantic properties of predicates in themselves have not been the main focus of interest and the view of th-roles stemming from *Lectures* (Chomsky 1981) is what Dowty (1991) has called the *Argument Indexing Approach* demanded by the Thematic Criterion (Th-Criterion), which imposes a condition of biuniqueness (a one-to-one relation) between arguments and th-roles. In this approach th-roles have two main uses: first, the distinction of real, contentful arguments from the so-called dummy elements, *it* and *there*, which are not th-marked by the verb, and second, they help to keep track of identity and distinctness of NPs with particular semantic arguments during the course of a derivation.

Subsequent developments within the GB framework proposed A-Str representations where thematic information was combined with grammatical information codifying the syntactic realisation of arguments. One of the first proposals was Williams 1981's distinction between internal and external arguments, where the former are realised internal to the maximal projection headed by the verb and the latter is the argument realised outside that projection. Marantz 1984 made the further distinction between direct and indirect internal arguments (only the former receive their th-roles directly from the verb). These two distinctions are incorporated in the A-Str representations adopted by Levin and Rappaport (1986),

where th-roles bear annotations indicating their grammatical function as represented in 3.a (the roles inside the brackets are internal and the one underlined is the direct argument). Still other researchers decided to dispense with th-labels (because of the many problems they pose, see below) and represent arguments by means of variables (sometimes annotated for grammatical realisation). This is the case of Higginbotham 1985, Sproat 1985, Zubizarreta 1987 or Rappaport and Levin 1988. The latter give the representation in 3.b:

- 3.a. PUT: Agent <Theme, Location > (Levin and Rappaport 1986)  
 3.b. PUT: x < y, Ploc z > (Rappaport and Levin 1988)

These different approaches show an evolution from simple lists of th-roles to representations that only incorporate the grammatical information associated with arguments, and that evolution, in turn, has revealed two of the most important problems that any current theory of A-Str and th-roles must face: namely, the status of th-roles and the problem of linking (ie, the syntactic realisation of arguments). Although conceptually separate, these two dimensions are so closely interconnected that dealing with one of them inevitably implies referring to the other as well.

Despite the fact that the linking of arguments to syntactic positions is taken to be part of the lexical information of verbs (and, as such, is codified in A-Strs), the existence of linking regularities was admitted long ago. For example, an often cited regularity about English is that when a transitive verb (V) takes both an Agent and a Theme, in the absence of passive morphology, the Agent is mapped to subject position and the Theme to object position 4.a, or that Source and Goal arguments tend to be realised as indirect internal arguments 4.b:

- 4.a. [John]<sub>AGENT</sub> broke [the window]<sub>THEME</sub>  
 4.b. John travelled [from Chicago]<sub>SOURCE</sub> [to New York]<sub>GOAL</sub>

If a coherent set of linking equivalences of this type could be formulated, grammatical information could be factored out of lexical entries and derived from semantic information, a desirable move. But for linking principles to rely on thematic labels, these should have a sounder basis than they actually seem to have. The serious problems posed by the use of traditional roles have led a number of linguists working within the field of lexical theory to reject the idea that they are primitives of any level of representation and to deny that grammatical generalisations (including linking regularities) can be formulated in terms of roles.

One of the main problems with the use of th-roles is the lack of criteria for determining whether a given argument bears a particular role. This results from the fact that, at least for some roles, there is no single definition, a particularly notorious feature of the Theme, which has been variously identified as the participant which moves or is located (in the Gruber-Jackendoff tradition), the entity that is affected by the verbal action (Anderson 1977), etc. Although some researchers have tried to apply definitions with care, they often mean nothing more than "the NP that is assigned its role directly by the verb", the result being the near identification of roles

with grammatical functions. In sum, the attempt to find a small set of broadly defined roles which cover arguments of a wide range of verbs means that the definition of a given role often breaks down as it is extended to larger classes of verbs, which are likely to include verbs with no common semantic characterisation, even though they may express their arguments in the same way. So, it is not clear whether there is a single all-encompassing definition that applies to all NPs in object position. If we accept, for instance, that this is the "affected" argument, it turns out that different types of affectedness have been described (Dixon 1991), ranging from the minimal contact of *touch*, where no change occurs in the object, through *rub*, where the surface may be affected, and *squeeze*, which implies a temporary change of shape, to *smash*, where the Theme loses its physical integrity (5.a, b, c, and d, respectively). Furthermore, the notion of affectedness does not seem to be easily applicable to Vs like *memorise*, *adopt* or *refuse* (5.e, f, g). Furthermore, the idea of movement or location is difficult to conceive for most of the examples in 5:

- 5.a. John touched the lamp with his toe
- 5.b. the captain rubbed the cricket ball with dirt
- 5.c. Henry squeezed the rubber duck in his hands
- 5.d. Alison smashed the ice cube with her heel
- 5.e. I memorised the list
- 5.f. I adopted the suggestion
- 5.g. I refused the offer

Besides the problems inherent in the characterisation of particular roles, a further complication is added by the fact that, whereas it is generally assumed that there is a finite set of universal th-roles, no one has succeeded in proposing a definite list, and so different authors use different labels and varying numbers of roles. Still another difficulty is that there do not seem to be th-roles for distinguishing some co-arguments which have the same semantic relation to the predicate, so that there is no apparent asymmetry in what is predicated of the two arguments:<sup>1</sup>

- 6.a. this [is similar to] that
- 6.b. this [is equal to] that
- 6.c. this [resembles] that

It has been acknowledged by some authors that many of the problems derived from the use of roles stem from the practice of representing the semantic dimension of A-Str as a simple list of th-roles which abstract away from the meaning of the V in such a way that they can only provide a partial meaning representation of the

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<sup>1</sup> To circumvent these difficulties, some GB authors have invoked individual thematic roles, instead of the traditional thematic role types (Agent, Theme, etc.), i.e. they simply call the subject of build "the builder" role, or that of kill "the killer" role, with no assumption that there is a th-role type common to these arguments (Marantz 1984, Van Riemsdijk & Williams 1986). But naturally this deprives the notion of th-role of its original interest as it does not allow for generalisations of role type across verbs nor for the formulation of grammatical principles that appeal to them.

argument-taking properties of Vs. It follows that a proper account of such properties should be grounded in some kind of independent semantic analysis of verbal meaning. In what follows I will review two recent influential approaches that start from very different (even opposing) conceptions of what meaning is and do not concede any grammatical value to thematic labels, which are merely used as descriptive tools. The first one is Levin and Rappaport's theory (Rappaport, Laughren and Levin 1987, Rappaport and Levin 1988, Rappaport and Levin 1992, Levin and Rappaport 1995, Levin 1995, Rappaport and Levin 1998), based on the postulation of a level of lexical representation called *Lexical Conceptual Structure* (LCS). The second is Dowty's theory of proto-roles (Dowty 1991, Dowty 1986, Dowty 1989, Ladusaw and Dowty 1988), in which the semantic notions of *prototype* and *entailment* are of central importance. If the latter proposal endorses a referentialist, truth-conditional view of meaning, it is the conceptualist, mentalistic position that underlies the former approach. Finally, in the last section I will discuss the implications of each view.

## 2. TH-ROLE LISTS VS. LEXICAL CONCEPTUAL STRUCTURE

Rappaport and Levin (1988) concentrate on the case of those locative verbs which display an alternation in the realisation of their internal arguments, in particular, the class of *spray/load* verbs (7), to show that a proper account of linking cannot be based on lists of th-roles and a better explanation is provided by a semantic representation based on the decomposition of predicates into smaller elements of meaning (Lexical Conceptual Structure, LCS). This representation captures aspects of meaning not captured by simple roles but which are, nevertheless, relevant for the syntactic expression of arguments (see below):

locative variant:

- 7.a. John loaded [hay] [onto the truck]  
 John stuffed [the feathers] [into the pillow]

*with* variant:

- 7.b. John loaded [the truck] [with hay]  
 John stuffed [the pillow] [with feathers]

Although the two variants seem to describe the same event and in fact the roles Agent (*John*), Theme (*hay*), and Goal (*truck*) have been used to identify the thematic relations in both cases, it is generally accepted that we are not facing perfect synonyms, since when the Goal is realised as direct object (the *with*-variant) it is understood to be wholly affected by the action (ie, the truck is full of hay), but when it appears as the object of a preposition (the locative variant), a partially affected interpretation is also possible (the truck is not necessarily full). Therefore, an adequate lexical semantic representation of these verbs should explain both the affected or holistic interpretation of the Goal in the *with* variant and the near-paraphrase relation between the two variants; it should also make it possible to formulate linking principles that account for argument realisation.

Lists of th-roles do not go very far in explaining those properties. A single list like that in 8.a will be able to capture the paraphrase relation (that is, that part of meaning which is common to both variants) and the realisation of arguments in the locative variant if used in combination with common linking rules like those in 8.b, c, and d (see Rappaport and Levin 1988: 20):

- 8.a. <Agent, Theme, Goal>
- 8.b. Link the Agent role with the external argument variable in the PAS
- 8.c. Link the Theme role with the direct argument variable in the PAS
- 8.d. Link each remaining role with an indirect argument variable in the PAS<sup>2</sup>

But the system in 8 cannot explain argument realisation in the *with* variant nor the affected reading associated with it. The positing of an additional linking rule specific to these Vs and a rule of interpretation to deal with the holistic reading can be dispensed with if we give the two patterns distinct lists of th-roles and attribute the subtle difference in interpretation between them to their different thematic analyses. To this end, the notion of Theme used in 8.a (the Gruber-Jackendoff notion of moving or located entity) can be replaced with the Anderson sense of "affected entity", so that the Goal in the locative variant (which is now the affected entity) becomes the Theme, and as a consequence the old Theme has to be assigned a different role: Rappaport and Levin (1988: 22) opt for *Locatum* (*ie*, entity whose location is at issue). In short, the th-role list for the *with* variant 9 along with the linking principles in 8 would now account for the second pattern of realisation:

- 9. <Agent, Theme, Locatum>

But of course the double list approach is problematic in that the near-paraphrase relation is no longer captured since there are two lists of roles, and furthermore, two different participants of the same basic relation (*the hay* and *the truck*) are identified by the same role, Theme, which is counterintuitive. The two lists may be regarded as just another way of ensuring that either the entity that changes state or the one that changes location can be associated with the direct object position. But neither the single list analysis nor the double list one is able to handle all the properties of the alternation.

In the Lexical Conceptual Structures (LCSs) these authors propose, arguments are indicated through the use of variables in the conceptual definition of the verb. For example, the LCS of *put* has the form in 10, and is intended to capture the fact that *put* describes an Agent (represented by *x*) bringing about a change in the location of an entity (*y*); *z* indicates the goal of the change of location:

- 10. PUT: [x cause [y to come to be at z]]

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<sup>2</sup> For our present purposes these three linking principles can be expressed as "Link the Agent role with the subject position", "Link the Theme role with the direct object position", and "Link each remaining role with the indirect object position". For some detail on the meaning of "PAS" in figure 8, see footnote 3.

The crux of the matter is that, on the decompositional approach, the participants are not identified by th-role labels, but rather in terms of variables occurring in substructures of LCS. So, in this framework, th-labels are not primitives of any level of representation, but defined notions; they are kept for ease of exposition, but they must be understood as referring to variables in LCS.

When it comes to applying decomposition to the *spray/load* verbs, Rappaport and Levin (1988: 26) assume that the locative variant denotes a simple change of location, just as *put* does, and therefore has the same LCS (that in 10). But the *with* variant has a more complex representation with an extra component of meaning given by the fact that it entails the locative variant (whereas the locative variant does not entail the *with* variant):

- 11.a. John loaded the truck with hay → John loaded hay onto the truck  
 11.b. John loaded hay onto the truck -/> John loaded the truck with hay

This entailment suggests that the *with* variant denotes the bringing about of a change in the state of the Goal (the truck changes from being empty to being full of hay; the affected interpretation is attributed to this change of state) BY MEANS of a change of location, so that the meaning of the locative variant is properly included in that of the *with* variant (it is embedded in a means clause), as shown in 12:

12. LOAD: [[x cause [z to come to be in STATE]]  
 BY MEANS OF [x cause [y to come to be at z]]  
 (z = LOCATION)

The use of the same set of variables (*x*, *y*, *z*) in both the main and the subordinate clause ensures that the participants of the embedded clause are to be identified with those of the main clause. In this way the analysis is able to capture the fact that the entity denoted by *z* both undergoes a change of state and is the goal of the change of location of the entity denoted by *y*. This duality was the source of difficulty in formulating the linking rules within the approach based on th-roles: both arguments qualified as Themes (although in different senses), so there was no principled way to choose which should be projected onto the direct object position. The decomposition approach provides a way of making this choice if we assume that, as a general convention, the main clause of the decomposition determines the basic class membership of the verb and the linking of variables.

In this approach, linking rules establish correlations between variables in substructures of LCS and syntactic positions. So the linking rule in 13, a slightly modified version of that in Rappaport and Levin (1988: 25), replaces that of the traditional Theme in 8.c):

- 13.a. when the LCS of a verb includes one of the substructures in (b), link the variable represented by x in either substructure to the direct object position.<sup>3</sup>
- 13.b. (i)... [x come to be at LOCATION] ...  
(ii)... [x come to be in STATE] ...

In short, the linking rule above accounts for the two patterns of realisation, and the two Lexical Conceptual Structures for *spray/load* verbs (in 10 and 12) capture both the difference (affected reading) and the similarity (basic paraphrase relation) in the semantic interpretation of both patterns.

### 3. THEMATIC ROLES CONCEIVED AS PROTOTYPES BASED ON SETS OF ENTAILMENTS

Dowty also discards the conception of th-roles in GB theory after a thorough examination of the many pitfalls associated with notions like Agent, Theme, etc. Truth-conditional semantics provides part of the background for his proposal, and so he adopts a conception in which a th-role is "a set of entailments of a group of predicates with respect to one of the arguments of each" (Dowty 1991: 552). By *entailment* he means the standard logical sense, in this case, implications following from the meanings of verbal predicates. More formally, A entails B if in every possible situation where A is true, B is also true. If this is to be applied to the x argument of the predicates in 14, it turns out that they share at least the entailments in 15:

- 14.a. x murders y    14.b. x kicks y    14.c. x builds y
- 15.a. x does a volitional act  
15.b. x causes some event to happen involving y (y dies, gets kicked, etc.)  
15.c. x moves or changes externally (not only mentally)

These entailments are not shared by the subjects of other predicates: volition is not shared by *kill*, for example, since traffic accidents also kill but they are not volitional; 15.b is not shared by *look at*, which involves no causation; 15.c is not shared by *understand*, for instance. These differences between predicates link up with the second notion that figures prominently in this approach: the idea of *prototype*. Dowty (1991: 571) argues that the difficulties in pinning down traditional

<sup>3</sup> In Rappaport and Levin (1988), Levin and Rappaport (1995), etc. there is a lexical level of representation mediating between LCS and syntactic realisation: Predicate Argument Structure (PAS). PAS has variables indicating the number of arguments taken by a predicate and the manner of th-role assignment (basically, the way the arguments are associated with syntactic positions). Linking rules are actually formulated so that variables at LCS are mapped to variables at PAS, but as the relation between PAS and syntactic realisation is a straightforward one, we have decided to skip this second level of representation in our presentation of the linking rule in 13. Such a simplification is of no consequence for our present purposes. Levin and Rappaport justify the postulation of this non-semantic level of representation by claiming that there are certain generalisations that can only be explained by appealing to it (Rappaport and Levin 1988: 33-35).



roles stem from the fact that these are not discrete categories, but cluster concepts or prototypical notions, which means that arguments may have different degrees of membership in a role type (some are more prototypical than others because they are associated with a higher number of entailments). In this theory possible verbal entailments about arguments are grouped into two Proto-roles, the Proto-Agent, and the Proto-Patient, and it is claimed that these are enough to describe argument linking efficiently (linking is governed by a principle that will be presented below):

16. Entailments for the PROTO-AGENT:

- 16.a. volitional involvement in the event or state
- 16.b. sentience (and/or perception)
- 16.c. causing an event or change of state in another participant
- 16.d. movement (relative to the position of another participant)

17. Entailments for the PROTO-PATIENT:

- 17.a. undergoes change of state
- 17.b. incremental theme
- 17.c. causally affected by another participant
- 17.d. stationary relative to movement of another participant

Dowty (1991: 575) claims that whereas notions like Theme, Source or Agent are not involved in ordinary reasoning and conversation in an obvious way, entailments are "more straightforwardly relevant to human life": we do worry both in everyday life and in courts of law about whether an act was volitional or not; whether somebody was aware (sentient) of an event/state; whether something really caused something or not; whether something changed in a certain way or not, etc. So the semantic distinctions conveyed by the entailments are found out there in the real world events, which, in turn, means that there is no reason to believe that the boundaries of these entailments may ever be entirely clearcut (for example, the boundary of sentience-awareness is blurred by cases of computers or animals doing certain actions or being in certain states that are in principle restricted to human participants, as in *the machine switched itself off*, or *the dog believed you were a stranger*). So Dowty is ready to accept a certain degree of indeterminacy as to whether a given entailment holds for a particular verb.

Among the entailments in 16-17, the Incremental Theme in 17.b is the only one whose meaning is not self-explanatory. An argument is an Incremental Theme when it determines the aspect of the predicate (ie, the internal time of the verbal action) in the sense that it undergoes a change of state that runs parallel to the development of the event. So if I ask John to sweep the floor, I will be able to conclude something about the aspect of the event from the state of the floor: that the event has not begun, that it is partly done but unfinished, that it is completed. By contrast, from John's state I will not be able to conclude anything about the event of sweeping the floor. *John* is the Agent and *the floor* is the Incremental Theme. The meaning of *sweep* implies that there is a proportional relation between the parts of the floor and the parts of the event. Examples of Incremental Themes are traditional effected (created)

objects (18.a), destroyed objects (18.b), and objects entailed to undergo other changes of state (18.c):

- 18.a. build a house, write a letter
- 18.b. eat a sandwich, destroy a presidential finding
- 18.c. paint a house, polish a shoe

As mentioned above, the main reason behind the ascription of entailments to the Proto-Agent and Proto-Patient roles is the need to predict the linkage of arguments to syntactic positions (what Dowty calls "Argument Selection"). This linkage is governed by an Argument Selection Principle which establishes a correlation between entailments and subject/object positions (Dowty 1991: 576):

19.a. *Argument Selection Principle*: in predicates with grammatical subject and object, the argument for which the predicate entails the greatest number of Proto-Agent properties will be lexicalised as the subject of the predicate; the argument having the greatest number of Proto-Patient entailments will be lexicalised as the direct object.

19.b. *Corollary 1*: if two arguments of a relation have (approximately) equal numbers of entailed Proto-Agent and Proto-Patient properties, then either or both may be lexicalised as the subject (and similarly for objects).

19.c. *Corollary 2*: with a three-place predicate, the nonsubject argument having the greater number of entailed Proto-Patient properties will be lexicalised as the direct object and the nonsubject argument having fewer entailed Proto-Patient properties will be lexicalised as an oblique or prepositional object (and if two nonsubject arguments have approximately equal numbers of entailed P-Patient properties, either or both may be lexicalised as direct object).

19.d. *Nondiscreteness*: proto-roles, obviously, do not classify arguments exhaustively (some arguments have neither role) or uniquely (some arguments may share the same role) or discretely (some arguments could qualify partially but equally for both proto-roles).

Of course the stronger case for the Selection Principle is that of prototypical transitive verbs like *build*, *write*, *murder*, *eat*, *wash*, whose subjects have all (or almost all) Proto-Agent entailments and whose objects show all or most Proto-Patient entailments. But it is more interesting to see how linking to subject position is predicted in classical triplets like that in 20:

- 20.a. [Mary] opened the door with a golf club
- 20.b. [the golf club] opened the door
- 20.c. [the door] opened

In 20.a the subject (a typical Agent) has all Proto-Agent properties; in 20.b it has the properties of causation and movement, and so in the absence of an entity with a stronger cluster of such properties the Instrument becomes the subject; finally in 20.c *the door* only has the property of movement, but that is enough to become the subject.

Just as subjects show degrees of prototypicality, so do objects (depending on their number of Proto-Patient properties). *The roses* in 21.a is a prototypical Patient (involving all four entailments), but *the game* in 21.b is rather marginal since it does not clearly involve any of the four Patient properties. Argument linking in this case is determined, in accordance with the Selection Principle above, by the fact that *Jane* has the Agent properties of volition and sentience and so it is linked to subject position:

- 21.a. John pruned [the roses]  
21.b. Jane watched [the game]

Dowty explores the predictions of his theory for some classes of predicates involving an alternation in argument realisation. We will only focus on the case of *spray/load* verbs (see Section 2), as it will allow us to compare Rappaport and Levin's approach with Dowty's proposal and to evaluate some practical aspects in the application of his model (see Section 4).

In this case Dowty capitalises on the Proto-Patient entailment of Incremental Theme (IT, in what follows) to explain why the two internal arguments come to be projected in direct object position: if either may function as an IT, we expect that each can determine the aspect of the sentence (and therefore condition its meaning), and so permit a correspondence between the parts of the event and the parts of the NP referent affected by the action (in other words, that a proportional relation holds between the NP and the event). In effect, the event of loading the truck with hay is partially or completely done according to whether the truck is partially or completely full of hay, and conversely, the event of loading the hay onto the truck is partially/completely done depending on whether the quantity of hay is partially or completely on the truck.

The intuition that the difference between the two patterns relates to the direct object NP being the IT and thus determining aspect is backed up by some semantic diagnostics for aspect used by Dowty -in particular, modifiers like *for an hour*, which forces an atelic or activity reading, and *in an hour/completely*, which are only compatible with a telic or perfective interpretation. Additionally, he relies on the observation that indefinite NPs (bare plurals and mass Ns) make a telic predicate into an atelic one when realised as direct objects. So sentence 22.a below is perfectly consistent with the hypothesis that *the truck* is the only IT in the sentence, since an IT (but not necessarily other arguments) must be definite for a sentence to be understood in perfective aspect, as *completely* requires; by contrast, the anomaly of 22.b comes about because, as the aspect continues to be telic, the object position should be occupied by a definite IT, and not by a mass term. In neither case is the

definite/indefinite character of the NP inside the PP relevant because it is not an IT and so it does not interfere with aspect.

- 22.a. Mary completely loaded [the truck] with hay  
 22.b. \*Mary completely loaded [hay] onto the truck

The following examples are further confirmation that altering the NP inside the PP does not interfere with telicity whereas altering the one in object position does, so that the latter is an IT and it must agree with the aspect of the sentence:

- 23.a. John stuffed [the pillow] with (the) feathers *in an hour* / \**¿for an hour*  
 23.b. John stuffed [pillows] with (the) feathers \**¿in an hour* / *for an hour*  
 23.c. John stuffed [the feathers] into (the) pillows *in an hour* / \**¿for an hour*  
 23.d. John stuffed [feathers] into (the) pillows \**¿in an hour* / *for an hour*

#### 4. COMPARISON AND ASSESSMENT

The treatment by these authors of the *spray/load* alternation shows the different nature of their approaches. For Rappaport and Levin the difference between the two variants is derived from two distinct lexical-conceptual representations (where the *with* variant implies a change of state for the Goal, and the locative one a change of location for the Theme). The same linking rule applies for mapping the variables in conceptual structure to the position of the direct object. As the conceptual variable represents different participants in each case, two different patterns of realisation result. Dowty, in turn, couches the contrast in terms of verbal entailments, so that the two patterns appear because both non-subject arguments may interfere with the aspectual dimension of the verb in the sense that the V entails that each is an Incremental Theme, which determines that both can be projected onto the direct object position. This is accomplished as a result of the way the Selection Principle is formulated: specifically, it follows from Corollary 2 (see figure 19).

But apart from this basic distinction, the two proposals differ in an important respect. Whereas Rappaport and Levin perceive an affected interpretation only for the Goal (*the truck*) in the *with* variant, and devise a conceptual structure for it which subsumes that for the locative variant –and is therefore rather more complex than it– Dowty presupposes affectedness for both Theme and Goal and attributes it to their condition of Incremental Themes. In sentences with a perfective reading the termination of the event is achieved either when the truck is fully affected (*ie*, full of hay) or when the hay is (*ie*, all of it has been put onto the truck). In his approach, then, the affectedness of one is not more important than that of the other, and so the two variants are assumed to have the same degree of semantic complexity, unlike in Rappaport and Levin's theory.

Dowty's position arguably loses ground, however, in favour of Rappaport and Levin's, if sentences with an activity reading are used. Thus, in *he loaded trucks with*

*hay for hours* and *he loaded hay onto trucks for hours*, as there is no termination for the event, no full affectedness should be expected for the entities in direct object position. Nevertheless, whereas it applies to *hay* in the second example, it does not seem to apply to *trucks* in the first one since, even though the number of trucks is indeterminate, there is no question about the full affectedness of each truck: each loaded truck is fully loaded only in the *with* variant. The conclusion is then that there are contexts (atelic sentences) which prove the asymmetric nature of affectedness, ie, affectedness holds for the Goal in the *with* variant, but not necessarily for the Theme in the other variant. This fact seems to favour Rappaport and Levin's position.

In addition to the above criticism, Dowty does not account for the intuition, captured in Rappaport and Levin's analysis, that there is a one-way implication between the *with* variant and the locative variant (the former implies the latter, but not the reverse, see Section 2).

One of the weakest points in Dowty's analysis is that his account of the *spray/load* alternation is not in accordance with the predictions of his Selection Principle, in particular, Corollary 2. It can be accepted that both non-subject arguments behave equally with respect to two Patient properties since they both undergo a change of state (Dowty 1991: 594) and are causally affected by another participant (the subject), and also both are Incremental Themes only when realised as a direct object (see end of Section 3), but there is still one Patient property in Dowty's list, stationary relative to movement of another participant, that characterises only the Goal regardless of realisation pattern: the truck is always stationary and the hay never is. This should mean that in a coherent application of the system the Goal would always have more Patient properties than the Theme, so that only the Goal should be selected for the immediate postverbal position, the result being that the locative variant would remain unexplained. Dowty's actual practice implies that some properties (Incremental Theme, in the case at hand) are more weighty than others for a certain role, but this does not follow from his Selection Principle. To recover coherence his system should include some measure of relevance for entailments, which it does not<sup>4</sup>.

Inconsistency can also be levelled against Rappaport and Levin because of the way they use the change of state component, expressed as "z come to be in STATE" in *figure 12*. This use is not entirely satisfactory since it is restricted to the Goal argument in the *with* variant, ie, the truck changes state because it changes from being empty to being full. But of course one can quite naturally claim that there is a change of state as soon as any amount of something is put onto the truck, so that it would not need to be full. In this case, the change would apply to the Goal in either variant and Rappaport and Levin would not be able to use this component to characterise the *with* variant alone. Besides, it can equally be argued that the change

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<sup>4</sup> Dowty (1991: 595) actually acknowledges that "the relative importance of each kind of entailment in a verb's meaning is also a factor in argument selection", but, as argued above, no such relativity is predicted by the mechanism of selection he proposes.

of location applying to the Theme (the moving entity) is just as much a change of state as that of the Goal, and in fact Dowty uses change of state as a Patient property that comprises a range of possibilities, including coming into existence, ceasing to exist, changing position, etc.

Leaving aside specific aspects of the two proposals, the applicability of Rappaport and Levin's theory depends on the possibility of formulating LCSs for predicates in general and deriving alternate realisations of arguments from differences at this level of representation. The feasibility of Dowty's analysis is contingent on the identification of a relevant set of verbal entailments and grouping them into the two Proto-Roles, which should ensure the natural operation of the Selection Principle. Unlike Rappaport and Levin, Dowty makes it clear that he is ready to accept a certain amount of indeterminacy, which, in his theory, is partly couched as the "non-discreteness" principle that is part of the Selection Principle. The possibilities allowed by non-discreteness –which is the negation of Chomsky's Th-Criterion-, namely, arguments with no role, a single argument with several roles and a single role for several co-arguments, may be subsumed under the idea of prototype that he uses: these are non-prototypical arguments. The important point is to ensure that such cases are reduced to a minimum and so the predictability of the theory is high. As mentioned above, this approach also depends on the elaboration of a theory of entailment prominence: as the author actually uses them, some entailments are more relevant/weighty than others –they have to be to account for the syntactic realisations of some arguments-, but the Selection Principle is not sensitive to degrees of relevance, just to the number of entailments.

On the whole, Rappaport and Levin's and Dowty's theories constitute remarkable attempts to come to terms with the semantic characterisation of verbal arguments and their syntactic realisation. They go beyond the flat view that underlies traditional thematic roles and are embedded in two radically different conceptions of the nature of meaning: the idea that meaning may be reduced to conceptual structures represented in the speaker's brain (Rappaport and Levin), and the assumption that meaning is to be found outside the brain in the extralinguistic world, a hypothesis that crucially relies on the notions of truth and truth condition (Dowty).

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