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**LEXICAL REPRESENTATION AND MODIFICATION  
WITHIN THE NOUN PHRASE**

**ABSTRACT**

Formal semanticists of natural language have traditionally worked with relatively impoverished lexical representations and have generally been conservative in drawing the line between those aspects of interpretation which are determined by lexical information and composition rules, and those which are determined contextually, leaving a substantial amount of work to context. While this strategy is justifiable if one considers the job of the semanticist to account only for what is strictly entailed, it has also in some sense greatly simplified this job, resulting in rather impoverished lexical representations and relegating many problems to the so-called pragmatics wastebasket, if in a relatively orderly fashion.

Nonetheless, in this paper I discuss two kinds of problems, both related to modification within the noun phrase, which show why richer lexical representations similar to those proposed in Generative Lexicon theory (Pustejovsky 1995) should be of interest to formal semanticists.

**KEYWORDS**

Semantics, lexicon, modification, noun phrases, Generative Lexicon.

## 1. Introduction<sup>1</sup>

Formal semanticists of natural language have traditionally worked with relatively impoverished lexical representations. They have arguably done so for two reasons. First, at least initially, the predominant concern of most formal semanticists was to account for the compositional behavior of words and phrases at a relatively general level, rather than for fine-grained details of interpretation. This resulted in an emphasis on the argument structure of lexical items and, with few exceptions, the treatment of lexical information only insofar as it interacted with phenomena like coordination, quantification, or *Aktionsart*. Second, formal semanticists have generally been very conservative in drawing the line between those aspects of interpretation which are determined by lexical information and composition rules, and those which are determined contextually, leaving a substantial amount of work to context. Contextually-determined aspects of interpretation have been handled uniformly via variables whose value is supplied by one of any number of variable assignment functions. While this strategy is justifiable if one considers the job of the semanticist to account only for what is strictly entailed, it has also in some sense greatly simplified this job, resulting in rather impoverished lexical representations and relegating many problems to the so-called pragmatics wastebasket, if in a relatively orderly fashion.

While leaving much of the interpretive work to contextual variables may be principled, taken to an extreme, it is not clear how tenable a strategy it is in the long run. First, trying to maintain a sharp distinction between the lexicon and world knowledge is probably naïve, and at some point some workable strategies for dealing with this fuzzy boundary have to be developed. Second, the ways in which context is exploited to enrich interpretation are varied, but they are not random. Semantic theory might be expected to have something to say about at least some aspects of contextual interpretation that are predictable. Third, natural language processing applications have already reached a degree of sophistication where they will soon be expected (if they aren't already expected) to provide richer information than what current formal semantics has to offer, or else semantics as a discipline will be in danger of becoming irrelevant, unable to account for all kinds of very real interpretive phenomena.

Perhaps for this latter reason, more work has been done on the formal treatment of the lexicon by computational linguists and lexicographers than by theoretical semanticists. Among this work, perhaps the most familiar to linguists is Pustejovsky's Generative Lexicon theory (hereafter, GL). GL has been criticized, most notably by Fodor and Lepore (1998), for including too much pragmatics in the lexicon, a criticism to which I have been sympathetic myself and which I have heard repeated by a number of semanticists.

Nonetheless, in this paper I discuss two kinds of problems, both related to modification within the noun phrase (NP), which show why richer lexical representations similar to those proposed by Pustejovsky should be of interest to formal semanticists. As I can only begin to sketch possible solutions to these problems at this point, my main goal is a modest one: to convince the skeptic that highly structured lexical representations are worth exploring.

The structure of the paper is as follows. In section 2 I review a class of modification phenomena which have been dealt with in some of the literature by expanding the argument list associated with nouns, and I argue that, given the choice between such an expansion or the use of highly structured representations, the latter are to be preferred. In section 3, I discuss how the scalar interpretation of adjectives is sensitive to the semantics of the nouns they modify, in ways that are difficult to account for via meaning postulates, for example, and which also argue for enriched representations. Section 4 presents some concluding comments.

## 2. Expanded argument lists vs structured representations

Adjectives such as those in (1) have are called **SUBJECTIVE**, as opposed to **INTERSECTIVE** because they license the inference that anything that is an [Adjective Noun] is a [Noun], but not that it is [Adjective]. For instance, (1a) can be understood subjectively as entailing that Olga is a dancer but not physically beautiful (alternatively, *beautiful*, can be interpreted intersectively, entailing that Olga is in fact beautiful); similarly, (1b) licenses the inference that Laia is a smoker, but not that she is occasional:

- (1)    a. Olga is a beautiful dancer.  
       b. Laia is an occasional smoker.

Larson (1998) presents a series of very strong arguments against the early formal semantic analysis of adjectives such as those in (1a) and (1b), on which the adjective is ambiguous: of type  $\langle\langle e,t \rangle, \langle e,t \rangle\rangle$ , on the “beautiful-as-a-dancer” reading, and of type  $\langle e,t \rangle$  on the “beautiful as a person” reading (see e.g. Siegel 1976). He argues instead for treating such adjectives uniformly as type  $\langle e,t \rangle$ , and also proposes systematically supplying nouns with an event argument that can be modified directly by the adjective, just as its entity argument standardly is. The two interpretations of (1a) thus correlate with whether the adjective modifies the noun’s event or entity argument: (1a) would be translated as in (2a) on the reading that Olga dances beautifully, and as in (2b) on the reading that she is e.g. physically beautiful:

- (2)    a.  $\exists e[\text{dancer}(\mathbf{o}, e) \ \& \ \text{beautiful}(e)]$   
       b.  $\exists e[\text{dancer}(\mathbf{o}, e) \ \& \ \text{beautiful}(\mathbf{o})]$

The adjective *beautiful* is thus underspecified as to whether it modifies an entity or an event. *Occasional*, on the other hand, is restricted to modifying events. Thus, (1b) would be translated only as (3):

- (3)  $\exists e[\text{smoker}(l, e) \ \& \ \text{occasional}(e)]$

McNally & Boleda (2004) extend Larson's arguments to so-called relational adjectives like that in (4), a class of subjectives not explicitly discussed by Larson.

- (4) Toni is a computational linguist.

They argue that a directly analogous account can be given for relational adjectives if we simply assume that nouns have a kind argument along the lines suggested in Krifka *et al.* (1995), with relational adjectives denoting properties of kinds rather than properties of ordinary individuals<sup>2</sup>.

- (5) **linguist**(*t*, *k<sub>i</sub>*) & **computational**(*k<sub>i</sub>*)

Larson's proposal relies on a straightforward extension to nouns of Davidson's (1967) proposal that verbs have an event argument<sup>3</sup>. McNally & Boleda's analysis is not intended to conflict with this proposal, but rather to supplement it. Thus, if both proposals are accepted (for example, to be able to account for noun phrases such as that in (6a)), the argument structure of nouns starts to look rather complex: the translation of (6a) would be as in (6b):

- (6) a. Toni is an occasional computational linguist.  
b.  $\exists e[\text{linguist}(t, e, k_i) \ \& \ \text{occasional}(e) \ \& \ \text{computational}(k_i)]$

While there is nothing technically wrong with such a long list of arguments, the longer it gets, the less attractive it looks, as it fails to distinguish between those arguments which have demonstrable syntactic manifestations (arguably the case for the event argument) and those that do not (such as, most likely, the kind argument, and others to be discussed momentarily). And just how long could such a list get?

The answer is: rather long, if we include under this general type of analysis other cases of adjectival modification which have similar properties. In particular, although (1a) is arguably ambiguous rather than vague, and (1b) and (4) are neither vague nor ambiguous, Pustejovsky (1995) offered an analysis fundamentally similar to Larson's to account for relatively fine-grained vagueness resolution involving adjective interpretation in examples such as the following:

- (7) a. a red pen (writes in red or has a red exterior)  
b. a quick meal (quickly prepared or quickly eaten)

The essence of Pustejovsky's analysis involved allowing the adjective to intersectively modify any one of several event arguments associated with the interpretation of the noun. For example, *meal* would have in its semantic representation an event variable corresponding to the typical act by which the meal is created (the value of the so-called AGENTIVE qualia feature), as well as one corresponding to the typical purpose that the meal has, *i.e.* an eating event (the value of the TELIC qualia feature)<sup>4</sup>. If we chose to represent such variables as we have represented the event and kind arguments in *e.g.* (6b), we might end up with a representation for a noun like *implementation* such as in (8).

$$(8) \quad \lambda k \lambda x \lambda e_{AG} \lambda e_{TEL} \lambda e. \mathbf{implementation} (x, e, e_{AG}, e_{TEL}, k)$$

But once the argument list for the noun starts gets this long, an alternative, more highly structured representation such as that proposed by Pustejovsky (1995) starts to look more appealing, as it easily permits distinguishing those variables which have syntactic consequences from those which do not, or those which license discourse referents from those which generally do not. A GL counterpart for (8) might be as in (9). The argument structure (ARGSTR) of the noun is represented independently of the semantics, though the two are linked. The semantics, encoded in what is termed QUALIA STRUCTURE, contains information about the basic type of entity denoted by the noun (the value of the FORMAL quale – here the implementation-kind or, alternatively, an instance of that kind); its composition (the CONSTITUTIVE quale)<sup>5</sup>; in the case of a noun denoting an artifact, the means by which it is created (the AGENTIVE quale – here, an event of implementing); and its function or purpose (the TELIC quale – here, an event of modeling whatever the implementation is an implementation of). In addition, we might add an INDEX feature as is used in the Head-Driven Phrase Structure Grammar framework (HSPG) to indicate the type of discourse referent the noun introduces, which could be either a kind or an individual, depending on the context of use (Pustejovsky's "dot" notation indicating the existence of alternatives)<sup>6</sup>.

$$(9) \quad \mathbf{implementation}$$

$$\left[ \begin{array}{l} \text{ARGSTR} \\ \\ \text{INDEX} \\ \text{QUALIA} \end{array} \left[ \begin{array}{l} \text{Arg0 } x \\ \text{Arg-of } y \\ \text{Arg-by } z \\ x \circ k \\ \text{FORMAL} \quad \mathbf{implementation} (k) \wedge \mathbf{R} (x, k) \\ \text{AGENTIVE} \quad \mathbf{implement} (z, x, y, e) \\ \text{TELIC} \quad \mathbf{model} (x, y, e') \end{array} \right] \right]$$

Representations such as that in (9) have been criticized for putting too much world knowledge into semantics: it doesn't seem plausible to maintain that the way in which some artifact is created or its purpose should be lexically encoded. Is it really the case, for example, that the lexical entry for *pen* should specify that pens are for writing? Can they not be used for other purposes, *e.g.* for pointing or stabbing? In an effort to deal with this problem, Saint-Dizier (2001) suggests an intermediate approach: associating the TELIC feature with an underspecified list of situations or events and the entailment that *x* has the ability to be used in or to participate in these situations or events. An argument in favor of this intermediate approach, and against abandoning qualia such as TELIC altogether, comes from consideration of the other examples of modification we have considered in this section, examples which do not, strictly speaking, involve vagueness resolution in a descriptive sense, and where pragmatics doesn't appear to play a significant role, but which are nonetheless amenable to an analogous kind of treatment.

Consider the interpretation of *occasional smoker*. Although Larson's analysis presupposes assigning nouns an event argument, some semanticists have argued that certain classes of stative predicates, including those systematically denoted by nouns, should not be assigned such an argument in the same way that nonstative predicates are (see *e.g.* Kratzer, 1995; Katz, 2003).<sup>7</sup> Adopting a version of the representation in (9) offers the possibility of capturing Larson's intuition that *occasional* denotes a property of events while not forcing us to encode that event variable in the noun argument structure list, given that the variables encoded in the ARGSTR feature can be a proper subset of those which appear in the semantics. For example, the representation for *smoker* could be as in (10), where for the sake of illustration I use the AGENTIVE quale to represent the intuition that one becomes a smoker via participation in smoking events, and I have not provided a value for the TELIC quale, given that smokers are not conventionally associated with any particular purpose or function.

(10) *smoker*

ARGSTR	$\left[ \begin{array}{l} \text{Arg0 } x \\ \text{Arg-}of\ y \end{array} \right]$	
INDEX	$x \circ k$	
QUALIA	$\left[ \begin{array}{ll} \text{FORMAL} & \text{smoker}(k) \wedge \mathbf{R}(x,k) \\ \text{AGENTIVE} & \text{smoke}(x,y,e) \end{array} \right]$	

The adjective *occasional* could then modify the event argument in the value for the AGENTIVE quale, via Pustejovsky's Selective Binding composition rule<sup>8</sup>, which allows an adjective to restrict the value of a variable in one of a noun's qualia, instead of restricting the variable that corresponds to the entity denoted by the noun. In an entirely parallel fashion, Selective Binding could

also permit a relational adjective to modify the kind variable in the value of the FORMAL quale. The representations in (9)-(10) thus allow for the use of a single compositional strategy to account for a wider variety of data than those initially considered by Pustejovsky, including data which do not appear susceptible to the criticism that highly structured representations are letting too much nonlinguistic information into the lexicon.

A different kind of objection to representations such as (9) and (10) might be that such highly articulated structures are unnecessary, and that knowing the lexical entailments of the adjective and the noun is sufficient for determining the available interpretations of the adjective under modification. However, rather than concluding that such structures are unnecessary, it seems more productive to view them as a tool precisely for organizing lexical entailments, grouping together or giving prominence to those entailments which play the most important roles in phenomena such as vagueness resolution.

One consequence of this structuring of lexical entailments, and one that constitutes yet another consideration in favor of embracing a feature structure representation for lexical semantics, is methodological in nature: the adoption of novel representations or formalisms can lead one to ask questions which might otherwise not have been asked, and to discover generalizations which might otherwise have not been uncovered. The analysis of vagueness resolution involving the adverb *well* in McNally & Kennedy (to appear) is a case in point. When modifying participles, *well* often can have either a degree or a manner interpretation, as in (11).<sup>9</sup>

- (11) a. well-cooked meat  
b. a well-prepared speaker

McNally and Kennedy argue that *well* is unambiguous, and that the manner reading arises when the adverb modifies an event variable in the value of the AGENTIVE quale, while the degree reading arises when it modifies an event variable in the TELIC quale – in other words, the behavior of *well* reproduces in the adverbial domain a kind of vagueness resolution first identified in the adjectival domain, an interesting parallelism which had not been previously identified but which is fully expected if participles have a lexical semantic representation similar to that of nouns.

I now turn to the second kind of modification problem, which offers a different kind of support for the use of highly structured lexical representations.



### 3. The scalar dimension of adjective and noun semantics

One of the ways in which gradable adjectives can be vague involves the scale with respect to which the properties they denote are evaluated. Kennedy & McNally (2005) present a typology of the scale structures adjectives can be associated with. In this section, I will offer some examples of how the scale structure with respect to which an adjective is interpreted can be influenced by the noun the adjective modifies. As we will see, the facts to be accounted for are complex enough to make structured representations very useful.

One of the basic parameters of scale structure in Kennedy & McNally's typology involves whether the scale (which can be understood for present purposes as a totally ordered set of points) is bounded (*i.e.* has endpoints) or unbounded (lacks endpoints). The bounded or unbounded nature of an adjective's scale is identifiable among other ways via the choice of degree modifier expressions that are felicitous with that adjective in a given context. For example, adjectives such as *partially* are felicitous only when the adjective they modify is interpreted with respect to a bounded scale. Thus, the contrast between the examples in (12) – in which the degree modifier is in one case felicitous and in the other infelicitous with the same adjective (at least in the absence of further context, about which see below) – shows that the (un)boundedness of the scale is at least sometimes a fact about the accompanying noun.

- (12) a. ??partially blue liquid  
b. a partially blue screen

A comparison of the entities denoted by *liquid* vs *screen*, along with the interpretations of the acceptable phrases, immediately clarifies the role of the noun in determining scale structure. A partially blue screen is one part of which is blue; there is no implication, for example, that the color of the screen is a shade which is something less than true blue (*e.g.* powder blue). The unavailability of this reading with *liquid* is arguably due to the fact that liquid lacks discrete proper parts which can be different colors. That is, the structure (and in particular the bounds) of the scale that licenses the use of the adverb *partially* is homomorphically related to the structure of the object denoted by the noun.

However, it is important to observe that the part structure of the denotation of a noun and its homomorphic relation to scale structure is independent of whether the noun is count or mass, and is instead a fact about the noun's fine-grained semantics. Consider the examples in (13).

- (13) a. ??a partially blue beverage  
b. partially blue sand

The noun *beverage*, though count, denotes a substance similar to that denoted by liquid insofar as it lacks a discrete internal part structure. *Sand*, in contrast, though mass, denotes a substance which does have a discrete internal part structure (the individual grains).

Clearly, these examples show that calculating the interpretation of degree modifier-adjective-noun constructions requires not only keeping track of the scalar properties of the adjective but also relating those properties to the semantics of the noun. McNally & Kennedy (to appear) propose that a very convenient way to do this is to provide adjectives with a Scale Structure (SCSTR), analogous to GL's Argument Structure, Event Structure (left out of the discussion here for the sake of simplicity) and Qualia Structure, where information which is relevant to determining scalar semantics can be encoded, and which can be inherited by successively larger phrases containing the adjective and noun. In order for a given degree modifier to be licensed, the conditions on scale structure that it imposes have to be satisfied by expression that it combines with. For example, the adjective *blue* might be represented as in (14), where the adjective has a scale structure feature which indicates the type of scale (SCTYPE), including the dimension the scale measures and whether it is bounded or not. In addition, the scale structure feature contains another feature which encodes the standard value (STD), which is a context dependent degree variable *d*.

(14) *blue*

ARGSTR	[ Arg0 <i>x</i> ]	
INDEX	<i>x</i>	
SCSTR	[ SCTYPE	[ DIMENSION blueness
		BOUNDED
		<i>d</i>
QUALIA	[ FORMAL	<b>blue</b> ( <i>x</i> ) ]

As a first approximation, I will assume that an object can have color in either (or both) of two gradable dimensions: in what I will call "trueness" (cp. *pale blue*, *very blue*, *dark blue*), or else in extension.<sup>10</sup> In the absence of additional context, it is underdetermined which of these two more specific scales the adjective is associated with. The value of the DIMENSION feature *blueness* should be understood as a supertype of these two more specific dimensions, susceptible to further specification as *BLUENESS\_TRUENESS* or *BLUENESS\_EXTENSION*. The scale corresponding to trueness does not appear to be bounded in nature – the expression *partially blue* does not refer to the trueness of the color but rather only to its extension over some entity.<sup>11</sup> In contrast, as we have seen in (12) and (13), the scale corresponding to extension can at least in principle be bounded, though whether it is bounded or not in fact appears to depend on the part structure of the entity being described.

Let us assume that the degree modifier *partially* combines with the adjective to form an adjective phrase that will then modify a noun. The lexical entry for *partially* will specify that the output of combining the degree modifier with any adjective will have to be interpreted with respect to a closed scale. The phrase *partially blue* could thus be represented as in (15). The scale has been fixed as bounded (marked via a positive value on the Boolean feature BOUNDED), which means that the DIMENSION of the scale must be fixed as blueness\_extension. The standard for being partially blue will be the minimal endpoint on the bounded blueness\_extension scale, as shown in (15).

(15) *partially blue*

ARGSTR	[ Arg0 $x$ ]		
INDEX	$x$		
SCSTR	SCTYPE	[ DIMENSION    blueness_extension ]	
		BOUNDED    +	
	STD	$d_{\text{MIN-blue}}^{\text{blueness}}$	
QUALIA	FORMAL	<b>blue</b> ( $x$ )	

Now let us consider what happens when this adjective phrase combines with a noun. As noted above, the adjective *blue* seems to be sensitive to the discreteness of the part structure of the object to which it is ascribed. This is exactly the kind of information the CONSTITUTIVE quale is designed to encode. As both screens and sand necessarily have identifiably discrete (proper) parts, I propose encoding this information under the CONSTITUTIVE feature as in (16)<sup>12</sup>:

(16) [ QUALIA [ FORMAL    **screen/sand**( $z$ ) ] ]  
           [ CONST     $\exists w[w < z \wedge \forall w' [w' < z \rightarrow \text{discrete}(w')] ]$  ] ]

In contrast, liquid and beverages, though they clearly can have parts, at least in most normal circumstances do not have identifiably discrete parts. Only under the right circumstances can their parts be discrete, for example if we imagine a beverage which consists of several ingredients of different weights which precipitate into different layers<sup>13</sup>, or if we partition a given quantity of liquid into different containers. Thus, rather than encoding in the CONSTITUTIVE quale that the denotations of these nouns do not have discrete parts, I propose simply leaving this information unspecified.

In order to complete our analysis we now need only specify via a constraint the way the adjective phrase *partially blue* is sensitive to the part structure of the noun it modifies. One last step before doing this involves asking whether all bounded scale adjective phrases are sensitive to the discreteness of the parts of the object they describe, or whether only certain such adjectives are. Intuitively, what makes *partially blue* sensitive to this property is the fact that it applies to an object in virtue of necessarily applying

However, not all adjective phrases are like this: for example, some can apply holistically to an object in different degrees, such as *awake* (if I am partially awake, it is not entailed that part of me is awake while another part is not, but rather that I as a whole have not reached a state of total consciousness). Thus, we should impose the condition that an adjective phrase select only for nouns describing entities with discrete parts just in the case of adjectives that hold of an object in virtue of holding of one or more of its proper parts. A preliminary version of such a constraint appears in (17), where the restriction to bounded-scale adjectives that apply to wholes in virtue of applying to parts is represented in the FORMAL quale ( $\alpha$  is a variable over predicate names), and the requirement on the noun is encoded as a selectional restriction (here, the path to the semantics for the selected noun – though not the semantics itself – is based on the HPSG analysis of adjectival modification, see *e.g.* Pollard and Sag, 1994).

Note that, given the way phrases are composed in unification-based frameworks such as HPSG, this constraint will not preclude the adjectival phrase *partially blue* from combining with a noun that lacks the discrete-parts entailment, but rather will only prevent it from combining with a noun which specifies the negation of this entailment. Thus, in principle, we should be able to construct interpretations for phrases such as *partially blue liquid*.<sup>14</sup> However, in the absence of context that provides a plausible referent for this phrase, it will sound infelicitous.

Although the details discussed here could be described without the use of the feature structure representations, such structures offer at least two advantages. First, they are a very convenient tool for representing those aspects of meaning which interact with or depend on the morphosyntactic context. Second, in an ideal world, precisely those entailments that best match the sort of features that lie behind Pustejovsky's qualia should be those that

natural languages make most use of, and therefore should be the best candidates for putting into lexical representations – in this sense, Generative Lexicon theory really does constitute a testable theory of which aspects of semantics are prioritized in language. Whether this ideal will turn out to be a reality or not is a question for future research.

#### 4. Conclusion

The time is long overdue for formal semanticists to take seriously the fine details of the interaction of lexical and compositional semantics, such as the modification problems discussed in this paper. Moving to a richer representation language may not be absolutely essential, but it has two methodological advantages. First, it will likely lead us to investigate important empirical domains we previously ignored. And second, it can serve as a framework for testing and developing a theoretically interesting means of organizing lexical entailments, a first step in coping with the difficult and diffuse boundary between the lexicon and encyclopedic knowledge.

#### NOTES

1. I am grateful to two anonymous reviewers and Denis Bouchard for comments on an earlier draft. This work has been supported by a grant from the Generalitat de Catalunya.
2. The reader is referred to McNally & Boleda (2004) for further details; see also Fradin & Kerleroux (2003) for a different proposal which is fundamentally similar in spirit.
3. Though Davidson posited an event argument only for nonstative verbs, subsequent authors such as Parsons (1990) extend this proposal to all verbs.
4. Familiarity with GL is not crucial for the present discussion, and therefore in the interest of space I will not present an introduction to it here. The reader is referred to Pustejovsky (1995) for details; some additional information will also be provided below.
5. Throughout the paper, only directly relevant qualia features will appear in any given semantic representation. Note also that nothing in GL requires all expressions to have values for all qualia features.
6. This and other representations used in this paper revise or extend in some respects, and simplify in others, what is proposed in Pustejovsky (1995). Pustejovsky is not very specific about how argument structure is related to syntax; in McNally & Kennedy (to appear) we propose treating argument structure as in HPSG, where it is a CATEGORY feature – closer to syntax than semantics. Information about whether argument realization is obligatory or optional is handled via a distinct VALENCE (subcategorization) feature. See *e.g.* Pollard & Sag (1994) for additional details.
7. An anonymous reviewer also points out that assigning all nouns an event argument incorrectly predicts that sentences such as (i) should be ambiguous:

- (i) This is a beautiful house.

The fact that not all nouns modified by *beautiful* give rise to the sort of ambiguity found in (1a) could perhaps be explained by positing that different types of nouns denote relations between individuals and different types of events, some of which would perhaps not admit modification by *beautiful*. Nonetheless, such an explanation raises an important further question about Larson's analysis: what determines the type of event that appears in a noun's semantics? For example, should *dancer's* event argument correspond to an event of dancing, as Larson's analysis would seem to suggest, or to the state of being a dancer? These questions point to a perhaps not entirely visible complexity underlying Larson's proposal which I think Generative Lexicon-type representations help bring to light.

8. See Saint-Dizier (2001: 177) for a formulation of Selective Binding which improves somewhat on Pustejovsky's (1995) formulation.

9. Both readings are not always available; in particular, the degree reading is blocked in a systematic set of cases (such as *a well-written novel*) because of the way in which *well's* semantics interacts with the contents of the TELIC quale. See McNally & Kennedy (to appear) for further details concerning these conditions.

10. It might seem like a simplification to try to linearize a color scale of this kind, as colors are determined by a combination of characteristics such hue and saturation. Nonetheless, the fact that it is possible to compare the colors of objects (*e.g.* His shirt is bluer than mine) indicates that we do impose the same kind of partial order on objects according to their color as we do according to other properties. Perhaps what distinguishes colors from certain other properties is the complexity of the mapping from the different shades of a given color to the partial order that makes for a linear color scale based on what I have called "trueness": for example, it might turn out that a given instance of light blue will be judged as bluer than a given instance of dark blue, or vice versa, depending on the amount of white, black and gray that is mixed in with the colors.

11. That is, my intuition is that speakers do not use *partially blue* when they are talking about *e.g.* blue-green, though they might use similar expressions such as *somewhat blue*.

12. The condition that the entity denoted by the noun have proper parts is stated very weakly here; if we assume that the domain of individuals has an algebraic structure (see *e.g.* Link, 1983), we could no doubt be much more specific, encoding, among other things, additional information such as whether the noun has the cumulative reference property or not (see Krifka, 1989).

13. An anonymous reviewer suggests a *latte macchiato* as an example.

14. Such examples can be constructed in contexts where we can imagine the liquid's color changing over time or, as noted above in relation to beverages, where we the liquid contains colored substances which precipitate into different layers.

15. In fact, quite detailed information about the (non) discrete parts of objects will be necessary to distinguish *e.g.* parts of sand, which can be called grains or particles, among other things, from parts of dust, which can be called particles but not grains, perhaps because they are not hard enough.

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#### RÉSUMÉ

En sémantique formelle, l'information encodée dans les représentations lexicales et les règles de composition est traditionnellement relativement limitée ; dans ce type d'approche, le contexte joue un rôle considérable dans l'interprétation. Ce type d'approche est justifié si l'on cherche à rendre compte seulement des implications strictes des énoncés. Cependant, une telle répartition des tâches implique une simplification des représentations lexicales, reléguant un nombre important de problèmes à la «poubelle pragmatique». Dans cet article, je discute deux types de problèmes liés à la modification du GN qui montrent que des représentations lexicales plus riches, comparables à celles proposées par la théorie du Lexique Génératif (Pustejovsky, 1995), devraient être prises en compte en sémantique formelle.

#### MOTS-CLÉS

Sémantique, lexique, modification, groupe nominal, Lexique Génératif.



