Barbara H. Partee

Compositionality and coercion in semantics: The dynamics of adjective meaning[1]

Abstract

The focus of the paper will be some aspects of the interaction of meaning and context with different kinds of adjectives. Adjective meanings are shown to be more constrained than was appreciated in earlier work. Facts about "NP-splitting" in Polish cast serious doubt on the standard hierarchy of adjectives, and the data become much more orderly if privative adjectives are reanalyzed as subsective adjectives. This revised account requires the possibility of coerced expansion of the denotation of the noun to which an adjective is applied. Compositionality can be seen as one of the driving forces in such context-sensitive meaning shifts.

0 Introduction

Starting from some widely shared common-sense ideas about meanings, we will show how some general methodological strategies can lead to the conclusion that at least one central ingredient of the meaning of a sentence must be a specification of the conditions under which it is true, and therefore that one central ingredient of word meanings must be their contribution to the truth-conditions of sentences. Truth conditions give both more and less information than the actual truth *value* of a sentence; more, because they specify truth values in all possible worlds, i.e., they tell what a state of affairs must be like for the given sentence to be true in it; but also less, because we may know the truth conditions without knowing which kind of world the actual world is. The kind of framework this leads to is known variously (with further differences on which we will

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be neutral here) as formal semantics, possible worlds semantics, model-theoretic semantics, and is contrasted with such other approaches as cognitive semantics, conceptual role semantics, and all approaches which view semantics as involving translation into some uninterpreted language of 'semantic representations'. (See Partee, 1999.) One challenge for formal semanticists is to show cognitive scientists that in spite of the nomenclature, and in spite of the antipsychologism of some of the contributors to the enterprise (Frege, Montague), linguists who are formal semanticists are very much engaged in the investigation of human language competence.

A central concern for the study of meaning is how the meanings of complex expressions are composed from the meanings of their constituent parts.

> *Principle of Compositionality, first version*: The meaning of a whole is a function of the meanings of its parts.

What are "parts"? The Principle of Compositionality requires a notion of part–whole structure that is based on syntactic structure.

> *Principle of Compositionality, second version*: The meaning of a whole is a function of the meanings of the parts and of the way they are syntactically combined.

We will sharpen this principle further below, but this is a good if informal statement of the basic principle. There have been many challenges to it of different sorts; my own view is that (a) there are so many other variables in linguistic theories that it can hardly be a straightforwardly empirical claim, but (b) it makes a good working principle: apparent counterexamples are invitations to work hard to uncover new descriptive accounts or to make revisions somewhere in the theoretical framework.

The focus of the paper will be some aspects of the dynamic interaction of meaning and context. One important challenge faced by compositional approaches such as formal semantics is how to account for context-dependent meaning shifts without abandoning compositionality. We argue here that in fact compositionality can be seen as one of the driving forces in context-sensitive meaning shifts. Our case study will be the semantics of different kinds of adjectives. The interplay of context-dependence and intensionality will be illustrated in showing why *skillful* is intensional but *large* is not, even though we may consider a large house not to be a large building. We will also take up the puzzles of "privative" adjectives like *fake* and *counterfeit* and "redundant" adjectives like *real*. The perspective we will take is how attention to the semantics of syntactic structure (compositional semantics) sheds light on the word meaning, and how compositional semantics, lexical semantics, and the context of the utterance all interact. One of the broader implications of this perspective is that there should in principle be no conflict between the goals of "formal" and "cognitive" approaches to semantics, although there are of course differences in priorities and in favored forms of argumentation.

1 Compositionality and Montague's contribution to natural language semantics

1.1 English as a Formal Language

Montague (1970b), "English as a Formal Language" begins: "I reject the contention that an important theoretical difference exists between formal and natural languages. . . . In the present paper I shall accordingly present a precise treatment, culminating in a theory of truth, of a formal language that I believe may reasonably be regarded as a fragment of ordinary English. . . . The treatment given here will be found to resemble the usual syntax and model theory (or semantics) of the predicate calculus, but leans rather heavily on the intuitive aspects of certain recent developments in intensional logic [due to Montague – BHP].".

1.2 The Principle of Compositionality

We stated above that a central principle of formal semantics is that the relation between syntax and semantics is compositional:

> *The Principle of Compositionality*: The meaning of an expression is a function of the meanings of its parts and of the way they are syntactically combined.

Each of the key terms in the principle is a "theory-dependent" term, and there are as many versions of the principle as there are ways of specifying those terms (*meaning*, *function*, *parts* (*syntax*)). See Partee (1984).

Earlier linguistic tradition: 1960s. Katz and Fodor argued for compositional semantics ("projections principles"), but with meanings as (uninterpreted) "semantic representations" in the form of bundles of "semantic features"; criteria of correctness are unclear. The emphasis is on accounting for ambiguity (deriving more than one semantic representation), anomaly (zero SR's), and some kinds of semantic relatedness.

The logic tradition: Frege, Tarski, Carnap, Montague. The basic meaning of a sentence is its truth-conditions: to know the meaning of a sentence is to know what the world must be like if the sentence is true. There are basic criteria of adequacy: get the truth-conditions and entailment relations right. This tradition was introduced into linguistics in the 1970s (as "Montague grammar") and gradually became the dominant approach to semantics (now "formal semantics").

The mental representation tradition: Fodor, Jackendoff and others. The basic meaning of a sentence is a representation in a "language of thought" or "conceptual representation". Compositionality is then compositionality of translation.

In the Montague Grammar tradition (Montague, 1970a, 1970b, 1973) the task of a *semantics* for language L is to provide truth conditions for every well-formed sentence of L, and to do so in a compositional way. This task requires providing appropriate

model-theoretic interpretations for the *parts* of the sentence, including the lexical items. The task of a *syntax* for language L is (a) to specify the set of well-formed expressions of L (of every category), and (b) to do so in a way which supports a compositional semantics. Roughly, *syntax* is an algebra, *semantics* is an algebra, compositionality is *homomorphism.*

In the basic structure we find:

(1) *Syntactic categories and semantic types*. For each syntactic category there must be a uniform semantic type. This makes a compositional syntax–semantics relationship easier to achieve, but I have argued on linguistic grounds for greater category-type flexibility (Partee, 1986), which need not undermine compositionality. (More on this below.)

(2) *Basic (lexical) expressions and their interpretation.* For basic expressions, the semantics must assign an interpretation of the appropriate type. In early formal semantics, most lexical meanings were treated as primitives. Montague regarded the analysis of lexical meaning as an empirical rather than formal matter; he treated only the *types* of lexical meanings. Below we argue for greater integration of lexical and compositional semantics.

(3) *Syntactic and semantic rules.* Syntactic and semantic rules come in pairs $\langle$*Syntactic Rule n*, *Semantic Rule n*$\rangle$: in this sense compositional semantics concerns "the semantics of syntax". The general form of these rules is as follows:

> *Syntactic Rule n*: If α is an expression of category A and β is an expression of category B, then $F_i(\alpha, \beta)$ is an expression of category C (where F_i is some syntactic operation on expressions).
>
> *Semantic Rule n*: If α is interpreted as α' and β is interpreted as β', then $F_i(\alpha, \beta)$ is interpreted as $G_k(\alpha', \beta')$ (where G_k is some semantic operation on semantic interpretations).

2 Integrating formal semantics, lexical semantics, natural language metaphysics

2.1 Formal semantics in the broader setting of natural language use

Model structures arise from the way humans schematize situations they want to describe. When we view a natural language as a formal language, we simultaneously view the world (or the set of possible worlds) as a model of it. This involves some abstraction and regimentation both of the language and of the world(s), as reflected in the type structure imposed on the language and the ontology of the model structures in which it is interpreted. Ideally, this abstraction should mirror a "real" abstraction which our "language faculty" imposes on the real world, "natural language metaphysics" (Bach, 1986) or *naivnaja kartina mira* 'naive picture of the world' (Apresjan, 1986).

We consider a sentence or a text as a *theory* describing the model of the situation (model of this theory) (Borschev and Partee, 1998). This theory is formed from several sources:

- text itself, its sentences are considered as formulas (formal semantics),
- meaning postulates corresponding to words of text (lexical semantics),
- contextual information (formal pragmatics in Montague's sense).

The interaction of these constituents may be rather complicated.

2.2 Lexical semantics in Moscow school, and meaning postulates

Lexical definitions in the Moscow school[2] are modeled as mathematical definitions, giving necessary and sufficient conditions. We believe that the "and sufficient" part is probably too strong, and unrealistic. It is usually although not essentially assumed that there are some undefined notions, semantic primitives (atoms of meaning). We are neutral but skeptical on this point. Meanings of other words are described by lexical definitions. Such a definition is a text describing necessary and sufficient conditions, distinguishing presuppositions from entailments. We represent the meaning of the word as a set of meaning postulates, the theory of this word. This is our version of the Moscow school approach. We believe that meaning postulates can capture linguistically important necessary conditions, without commitment to providing sufficient conditions. Meaning postulates can be written in such a way as to distinguish presuppositions from entailments, although we do not illustrate that here. We illustrate some properties and uses of meaning postulates below.

(ii) Meaning postulates can specify semantic properties that distinguish various semantic subclasses within a given semantic type, such as the following two classes of adjectives.

(a) $\forall x\ \forall P\ [\mathit{skillful}(P)(x) \rightarrow P(x)]$ (a skillful surgeon is a surgeon; this meaning postulate does not apply to adjectives like *former* and *alleged*).
(b) $\forall x\ \forall P\ [\mathit{former}(P)(x) \rightarrow \neg P(x)]$ (former is a "privative" adjective).

(ii) A meaning postulate with enough information packed into it may constitute a definition; if the meaning postulate specifies necessary and sufficient conditions, it can be written with an "iff" ($\leftrightarrow$) rather than just as a one-way implication.

$$\forall x\ \forall P\ \big[\mathit{former}(P)(x) \leftrightarrow \big[\mathrm{PAST}\big(P(x)\big)\&\neg P(x)\big]\big].$$

Whether such meaning postulates are possible for more than a small fraction of the lexicon of a natural language is a matter of debate.

(iii) Meaning postulates can put constraints on the interrelations that must hold among the meanings of certain words without necessarily treating one word as "more basic" than another or decomposing both of them into some common "atoms". Decompositional analyses are not forbidden but are not required; that issue can be open to

[2]The Moscow school approach to lexical semantics is described in such works as (Apresjan *et al.*, 1969; Apresjan, 1974, 1992, 1994, 1995, 2000; Mel'chuk, 1974, 1982, 1988; Mel'chuk and Zholkovsky, 1984; Žolkovsky and Mel'chuk, 1966). We emphasize the Moscow school approach here because one of the long-term goals of our joint work with our Russian colleagues is a synthesis of compositional and lexical semantics, particularly Western formal semantics and Moscow-school lexical semantics.

exploration and debate. The meaning postulate below, for instance, is a way to say that the *husband* relation and the *wife* relation are converses of each other without making one of them more basic than the other or requiring decomposition into more elementary terms:

$$\forall x\ \forall y\ \left[husband(y)(x) \leftrightarrow wife(x)(y)\right].$$

3 Introduction to adjective semantics

Montague (1970b) presented a semantic treatment of adjectives which he credited to unpublished work done independently by Hans Kamp and Terence Parsons; that work, and similar independent work of Romaine Clark, was subsequently published (Clark, 1970; Kamp, 1975; Parsons, 1970). The central claim in that work was that adjective meanings should be analyzed as functions from properties to properties. Among adjective meanings, some might satisfy further constraints such as intersectivity or subsectivity, but no such constraint can be imposed on the class as a whole, the argument goes, because of the existence of adjectives like *false*, *ostensible*, *alleged.*

The strategy of "generalizing to the worst case", followed by Montague in order to have a uniform assignment of semantic types to syntactic categories, called for giving all adjectives the type of functions from properties to properties. More restricted subclasses of adjectives, such as the subsective (*skillful*, *good*) and intersective (*purple*, *carnivorous*) adjectives, might be indicated by the use of meaning postulates. In theories which allow type multiplicity and type-shifting, the intersective adjectives might indeed be assigned the simpler type of one-place predicates; this is now widely assumed.

Kamp and Partee (1995) review the more or less standard "hierarchy" of classes of adjectives as a preliminary to arguing that arguments concerning the appropriateness of prototype theory as a part of the account of the semantics of adjective–noun combinations should be restricted to intersective adjectives. The hierarchy ranges from intersective adjectives like *carnivorous* to privative adjectives like *counterfeit*, *fake* and *fictitious.* The same article makes some proposals for coercion of adjective meanings in context, driven by certain general constraints, which help to explain a number of kinds of shifts and adjustments that take place when adjective–noun combinations are interpreted in various kinds of contexts. Some problem cases remained, especially the case of *stone lion*, where it seems that the noun rather than the adjective shifts its meaning when faced with incompatibility of the primary senses of each word.

But now I want to argue that in fact adjective meanings are more constrained than was appreciated either at the time of the work of Montague, Kamp, Parsons and Clark or at the time of the work of Kamp and Partee. In particular, I will argue that some facts about the possibility of "NP-splitting" in Polish cast serious doubt on the standard hierarchy, and that the data become much more orderly if privative adjectives like *counterfeit*, *fake* and *fictitious* are reanalyzed as subsective adjectives. Further evidence for that move comes from long-standing puzzles about what to say about sentences like *Is that gun real or fake?* The revised account requires the possibility of coerced expansion of the denotation of the noun to which such an adjective (as well as adjectives like

real, *genuine*, which were not examined in the earlier-cited literature) is applied. Such coercion can be motivated by treating the constraints on possible adjective meanings as presuppositions that must be satisfied by any use of an adjective; the corresponding coercion may then be seen as a form of presupposition accommodation.

The rest of the paper is structured as follows. Section 4 briefly reviews the adjective classification familiar since the work of the 1970s as summarized in Kamp and Partee (1995) and in Partee (1995). The Polish NP-splitting data (Nowak, 2000) and the problem they pose for the familiar hierarchy are presented in Section 5. In Section 6 I review some of the constraints on possible adjective meanings proposed in Kamp and Partee (1995) and propose further constraints that exclude privative adjectives and account for the coercion of the noun meaning in cases that would otherwise come out as privative.

4 Adjective classification

4.1 Meaning postulates for classes of adjectives

An adjective like *carnivorous* is **intersective** (Parsons: **predicative**), in that (4) holds for any N:

$$\|carnivorous\ N\| = \|carnivorous\| \cap \|N\|. \tag{4}$$

But *skillful* is not, as shown by the invalid inference pattern in (5), familiar from the work of Kamp, Parsons, Clark and Montague cited in the Introduction:

Premise: Francis is a skillful surgeon.
Premise: Francis is a violinist.
- (5)
Conclusion: Francis is a skillful violinist. INVALID.

Skillful is not intersective, but it is **subsective** (Parsons: **standard**): (6) holds for any N:

$$\|skillful\ N\| \subseteq \|N\|. \tag{6}$$

The adjectives *former*, *alleged*, *counterfeit* are neither intersective nor subsective:

$$\|former\ senator\| \neq \|former\| \cap \|senator\|, \tag{7a}$$

$$\|former\ senator\| \not\subseteq \|senator\|. \tag{7b}$$

Nonsubsective adjectives may either be "plain" nonsubsective (no entailments at all, no meaning postulate needed), or **privative**, entailing the negation of the noun property. The meaning postulate for privative adjectives is stated informally in (8).

$$\|counterfeit\ N\| \cap \|N\| = \emptyset. \tag{8}$$

Additional examples of each type are given as

(9)
(i) Intersective: *sick*, *carnivorous*, *blond*, *rectangular*, *French*.
(ii) Nonintersective but subsective: *typical*, *recent*, *good*, *perfect*, *legendary*.
(iiia) Nonsubsective and privative: *would-be*, *past*, *spurious*, *imaginary*, *fictitious*, *fabricated* (in one sense), *mythical* (maybe debatable); there are prefixes with this property too, like *ex-*, *pseudo-*, *non-*.
(iiib) Plain nonsubsective: *potential*, *alleged*, *arguable*, *likely*, *predicted*, *putative*, *questionable*, *disputed*.

The conclusion drawn by Parsons, Kamp, Clark and Montague was that the simplest general rule for interpretation of the combination of an adjective with a noun (or common noun phrase: CNP) is the following: Adjectives are functions that map the (intensional) semantic value of the CNP they combine with onto the semantic value of the ADJ + CNP combination. That is, "The denotation of an adjective phrase is always a function from properties to properties. (This was one of the proposals advanced by Kamp and Parsons.)" (Montague, 1970b, 1973, p. 211)

In terms of the type theory of Montague's Intensional Logic (Montague, 1970a, 1973), where common noun phrases are of type $\langle\langle s, e\rangle, t\rangle$, this meant that the most general type for adjectives was taken to be $\langle\langle s, \langle\langle s, e\rangle, t\rangle\rangle, \langle\langle s, e\rangle, t\rangle\rangle$. On the variant of Bennett (1974), followed in most subsequent work in the Montague grammar tradition, the CNP is of type $\langle e, t\rangle$, and adjectives are then of type $\langle\langle s, \langle e, t\rangle\rangle, \langle e, t\rangle\rangle$.

Meaning postulates specify various restrictions on these functions, characterizing various subclasses of adjectives. "Semantic features" may be seen as labels for meaning postulates which give them determinate content. Thus a lexical entry for an intersective adjective like *green* might contain the "feature" Intersective, or +INTERSECTIVE, which can be taken as labeling a semantic property of the adjective, spelled out by a meaning postulate.

Meaning postulates for the subtypes listed above are spelled out in somewhat more formal terms below. The meaning postulates are written with the assumption that the basic type for all adjectives is $\langle\langle s, \langle e, t\rangle\rangle, \langle e, t\rangle\rangle$.

(10) *Intersective* adjectives: For each intersective adjective meaning ADJ′,
$\exists P_{\langle e,t\rangle} \Box\, \forall Q_{\langle s,\langle e,t\rangle\rangle}\, \forall x_e \left[\text{ADJ}'(Q)(x) \leftrightarrow P(x) \& {}^{\vee}Q(x)\right]$.

[Alternatively, intersective adjectives (and only those) can be interpreted in type $\langle e, t\rangle$. This automatically guarantees their intersectivity and eliminates the need for a meaning postulate. Type-shifting rules of the sort described in Partee (1995) will give them homonyms of type $\langle\langle e, t\rangle, \langle e, t\rangle\rangle$ when needed.]

(11) *Subsective* adjectives: For each subsective adjective meaning ADJ′,
$\Box \forall Q_{\langle s,\langle e,t\rangle\rangle}\, \forall x_e \left[\text{ADJ}'(Q)(x) \rightarrow {}^{\vee}Q(x)\right]$.

The "plain" **nonsubsective** adjectives (*alleged*, *possible*) have no meaning postulate; this class is "noncommittal": an *alleged murderer* may or may not be a *murderer*.

Privative adjectives: For each privative adjective meaning ADJ′, $\Box\forall Q_{\langle s,\langle e,t\rangle\rangle}\ \forall x_e\ \left[\text{ADJ}'(Q)(x) \rightarrow \neg\left[{}^{\vee}Q(x)\right]\right]$. (12)

The **privative** adjectives (*fake*, *counterfeit*) have a "negative" meaning postulate; a *fake gun* is not a *gun*.

On this familiar classification, adjectives are seen as forming a hierarchy from intersective to subsective to nonsubsective, with the privative adjectives an extreme case of the nonsubsective adjectives.[3]

There are of course many questions and disputes when it comes to assigning particular adjectives to particular classes. Kamp (1975) added an important dimension to the discussion in arguing that adjectives like *tall*, which at first sight seem to be nonintersective, are actually intersective but context-dependent. Kamp's analysis found linguistic support in Siegel's analysis of long-form and short-form adjectives in Russian (Siegel, 1976a, 1976b). There has been much further work on the semantics of adjectives in the intervening years, and the context-dependence of interpretation of adjectives is central in the work of Klein (1980) and most recently of Kennedy (1997).

Among many other debated points, one which has always been troubling, and to which we will return, is the question of whether an adjective or adjectivally used noun like *fake* or *toy* is really privative. One nagging problem, to which we will return, is the evident tension between the apparent truth of (13a) and the undeniable well-formedness and interpretability of (13b).

A fake gun is not a gun. (13a)

Is that gun real or fake? (13b)

4.2 Is tall *intersective or subsective?*

In Section 4.1 we indicated that the inference pattern (5) was a test of whether an adjective was intersective. By this test, it looks like vague adjectives like *tall* and *young* are nonintersective:

Premise: Tom is a tall 14-year-old.
Premise: Tom is a basketball player.
- -
Conclusion: Tom is a tall basketball player. INVALID?? (5′)

[3] Although I believe it has been customary to treat these four classes as forming a kind of a scale, with the intersective adjectives at one end and the privative adjectives at the other, the meaning postulates do not actually conform to such a linear scale. With respect to the meaning postulates, one can make a three-class scale, from intersective (the most restricted) to subsective to unrestricted (not-necessarily-subsective). The intersective adjectives are a subset of the subsective adjectives, which are in turn a subset of the unrestricted set, i.e. of the set of all adjectives. The privative adjectives are also a subset of the unrestricted set, but one which is disjoint from the set of subsective adjectives.

Does that mean that *tall* is not intersective? No; perhaps it is intersective but vague and context-dependent. How can we tell the difference?

First argument. Keep the ADJ–N sequence constant but change other aspects of the context. That can help to show whether it is the intension of the noun that is crucial.

My two-year-old son built a really tall snowman yesterday. (5″a)

The linguistics students built a really tall snowman last weekend. (5″b)

Further evidence that there is a difference between truly nonintersective subsective adjectives like *skillful* and intersective but vague and context-dependent adjectives like *tall* was noted by Siegel (1976b): the former occur with *as*-phrases, as in *skillful as a surgeon*, whereas the latter take *for*-phrases to indicate comparison class: *tall for an East coast mountain*. (An adjective can be nonintersective and **also** vague, and then one can use both an *as*-phrase and a *for*-phrase: *very good as a diagnostician for someone with so little experience*.)

5 Privative adjectives and Polish NP-split phenomena

Nowak (2000) studied the phenomenon of "split PPs" and "split NPs" in Polish. [See also (Gouskova, 2000) for related work on Russian, as well as (Junghanns, 2000; Mehlhorn, 2000).] Ignoring PPs for simplicity, and ignoring the topic-focus structure that motivates the splitting, the facts are that an NP consisting of Adj and N in Polish may be "split", with either the Adj sentence-initial and the N sentence-final, or the N sentence-initial and the Adj sentence-final. Sequences of Adj's can be sentence-initial; only a single element can be sentence-final. Examples of NP-splits (all actually PP-splits, which combine properties of NP-splits with constraints on where the preposition can end up) are given in (14)–(15), with the relevant constituents underlined.

Sentences (14b) and (15b) are 'split' versions of sentences (14a) and (15a), which represent the unmarked word order. In (14b) the preposition and adjective are in sentence-initial position and the bare noun is sentence-final, while in (15b) the preposition and noun are sentence-initial and the adjective is sentence-final. All examples are from Nowak (2000).[4]

Kelnerki	rozmawiały	o	przystojnym	chłopcu.
waitresses	*talked*	*about*	*handsome*-LOC	*boy*-LOC

'The waitresses talked about a handsome boy'. (14a)

O	przystojnym	kelnerki	rozmawiały	chłopcu.
about	*handsome*-LOC	*waitresses*	*talked*	*boy*-LOC

'The waitresses talked about a handsome BOY'. (14b)

[4]Bożena Cetnarowska (p.c.) has informed me that the data are less black-and-white than they appear here; I will not discuss the complexities here, but only note that the generalizations made in the text still seem to hold.

Włamano się do nowego sklepu.
broke-in (one) reflex. to new-GEN *store*-GEN (15a)
'Someone broke into the new store'.

Do sklepu włamano się nowego.
to store-GEN *broke-in (one) reflex. new*-GEN (15b)
'Someone broke into the NEW store'.

What is of particular interest here is that some adjectives can participate in the splitting construction and some cannot.

Do rozległej weszliśmy doliny.
to large-GEN *(we)entered valley*-GEN (16a)
'We entered a large VALLEY'.

Do doliny weszliśmy rozległej
to valley-GEN *(we)entered large*-GEN (16b)
'We entered a LARGE valley'.

*Z byłym rozmawiała prezydentem.
with former-INSTR *(she)talked president*-INSTR (17a)
'She talked with the former PRESIDENT'.

*Z prezydentem rozmawiała byłym.
with president-INSTR *(she)talked former* (17b)
'She talked with the FORMER president'.

Those that CAN split include

(18)
(a) *rozlegley* 'large'
(b) *biedny* 'poor' in the sense of 'not rich', not in the sense of 'pitiful'
(c) (Polish translations of) *generous*, *pretty*, *healthy*, *Chinese*, *talkative* (intersective)
(d) *skillful*, *recent*, *good*, *typical* (subsective)
(e) *counterfeit*, *past (?!)*, *spurious*, *imaginary*, *fictitious* (privative [!]).

Those that CANNOT split include

(19)
(a) *biedny* 'poor' in the sense of 'pitiful'
(b) Polish translations of *alleged*, *potential*, *predicted*, *disputed* (nonsubsective, nonprivative ('modal').

Another important fact is that the ones that cannot split also cannot occur predicatively.

What is peculiar about this data in the light of the traditional classification outlined in Section 4 is that the NP-split phenomenon does not apply to a "natural class". It is

unexpected for the intersective, subsective, and privative adjectives to pattern together, while the nonsubsective adjectives that are "noncommittal" (and which can reasonably be characterized as "modal"), cannot participate in the NP-split.

6 Principles of interpretation

The hypothesis I propose is that Nowak's data tells us that adjectives *fake* and *imaginary* aren't actually privative, but subsective, and that no adjectives are actually privative. In interpreting a question like (13b) or sentences like (20a) and (20b), I hypothesize that we actually expand the denotation of 'fur' to include both fake and real fur.

I don't care whether that fur is fake fur or real fur. (20a)

I don't care whether that fur is fake or real. (20b)

In fact, even in (13a), it is reasonable to suppose that the first occurrence of *gun*, modified by *fake*, is similarly coerced, whereas the second, unmodified, occurrence is not. Normally, in the absence of a modifier like *fake* or *real*, all guns are understood to be real guns, as is evident when one asks how many guns the law permits each person to own, for instance. Without the coerced expansion of the denotation of the noun, not only would *fake* be privative, but the adjective *real* would always be redundant.[5]

Kamp and Partee (1995), in discussing the "recalibration" of adjective interpretations in context, introduced a number of principles, including the following "Non-Vacuity Principle".

> *Non-Vacuity Principle (NVP)*: In any given context, try to interpret any predicate so that both its positive and negative extension are non-empty. (21)
> (Kamp and Partee, 1995, p. 161.)

The Non-Vacuity Principle applies not only to simple predicates but to predicates formed, for instance, by combination of an adjective and a noun: these should be interpreted in such a way that the ADJ + N combination is a non-vacuous predicate.

However, Kamp and Partee (1995) also argued, in part on the basis of clear examples like (22), that in ADJ + N constructions, one first interprets the noun in the given context (ignoring the adjective), and then "recalibrates" the adjective as necessary. This principle is expressed as the "Head Primacy Principle" in (23):

(a) giant midget (a midget, but an exceptionally large one)
(b) midget giant (a giant, but an exceptionally small one) (22)

[5]This property of *real* is noticed in passing by Lakoff (1987, p. 75).

The Head Primacy Principle (HPP): In a modifier-head structure, the head is interpreted relative to the context of the whole constituent, and the modifier is interpreted relative to the local context created from the former context by the interpretation of the head.[6] (Kamp and Partee, 1995, p. 161.) (23)

In many cases, the Non-Vacuity Principle and the Head Primacy Principle cooperate to account for the observed results, including not only the examples in (22), but also the fact that the truth of (24b) is compatible with a nonredundant use of the modifier in (24a).

This is a sharp knife. (24a)

Knives are sharp. (Kamp and Partee, 1995, p. 162.) (24b)

If the Head Primacy Principle is absolute, the proposed shift in the interpretation of the head noun under coercion by a privative adjective like *fake* or a "tautologous" adjective like *real* would be impossible. But there are other examples as well that suggest that the Head Primacy Principle probably has to be seen as nonabsolute. In particular, there is a large and productive class of "constitutive material" modifiers that occur in examples like *stone lion*, *wooden horse*, *velveteen rabbit*, *rubber duck*. It is evidently so easy to shift nouns from their literal meaning to a meaning "representation/model of…" that we hardly notice the shift.[7]

The perspective of Optimality Theory suggests that we can account for this situation by saying that the Non-Vacuity Principle outranks the Head Primacy Principle. We normally try to obey both. But if there is no reasonable way to obey the Non-Vacuity Principle without shifting the noun outside its normal bounds (as in the case of *fake* and *real*), then it may be shifted in such a way as to make the compound predicate obey the Non-Vacuity Principle. (Since this is *always* necessary with privative and "tautologous" modifiers, there might even be something in their lexical semantics that particularly indicates the need to shift the head to which they apply.) And if there is an extremely productive and "easy" shift of the noun that would make it easy to satisfy the Non-Vacuity Principle, as in the case of the "representations" in *wooden horse, etc*., there too we can override the Head Primacy Principle.

And I would suggest that no adjectives are privative (Partee, in press). "Normal" adjectives are always subsective, and there should be some ways to identify "modal" adjectives as a special subclass, such that only they are not necessarily subsective.

[6] "In the simplest cases, the effect of the interpretation of a head noun on a given context will be to restrict the local domain to the positive extension of the head in the given context". (Kamp and Partee, 1995, p. 161, fn. 23.)

[7] In fact, in the literature on prototype theory, one can observe that many of the reported experiments on judgments of prototypicality are carried out with pictures of objects rather than actual objects, but all of the language of the experiments and of the discussion of the experiments refers to the corresponding objects, not to pictures of objects. And normally we don't even notice; starting with our children and their picture books, we say things like, "Where's the doggy? There's the doggy!". Presumably no normal parent would say "Where's the picture of the doggy? There's the picture of the doggy!".

One surprising piece of data that remains in the Polish facts is that the adjective corresponding to English *past* does allow NP splitting and can occur in predicate position. This calls for further investigation: perhaps Polish *past* is different from English *former* in allowing a corresponding expansion of the extension of the noun it applies to. There are certainly unclear cases in English: witness the uncertainty in classifying *retired, dead* as intersective vs. privative. Probably the line is not sharp because the extension of nouns is quite 'adjustable'.

When thinking about a question like (25a), there is in normal circumstances no temptation to include dead poets. Note that it's not that the predicate *poet* by itself presupposes that the entities it applies to are alive, since we readily talk about anthologies of works by 18th century poets, and we don't usually refer to them as dead poets or former poets or ex-poets (the movie title *Dead Poets Society* has the feel of an intentionally surprising phrase). And *be in Amherst* cannot be said to presuppose that the entities it applies to are living animate entities. Yet the combination of *poet* with an extensional present-tense predicate together carries at least a very strong implicature that we are to count "live" poets. But exactly the opposite is true for question (25b), since the predicate *are buried*, discounting ghoulish situations, when combined with a subject noun phrase that (normally) denotes an animate being, normally presupposes that the 'animate entities' it applies to are dead.

How many poets are there in Amherst? (25a)

How many poets are buried in Amherst? (25b)

The conclusion from such examples seems to be that whether the extension of a noun like *poet* at a given time includes only poets living at that time or both living and dead poets is highly dependent on the rest of the context, and easily shifts. Similar examples can easily be multiplied, and there may well be other phenomena that should be looked at in a similar light. Bennett (1974) observed that Montague's list of intensional verbs contained verbs of two different sorts. The typical intensional verb in Montague's list was *seek*, which exhibits all the classic opacity properties. But Montague's list also included *worship* and *remember*, and Bennett noted that an indefinite object with those verbs is always interpreted as "specific", not "nonspecific"; the only sense in which it is "intensional" is that the object in question need not exist at the world and time of the worshiping or remembering. It might be fruitful to consider these verbs as ones which sometimes coerce expansion of the domains in which their direct objects are interpreted rather than as intensional.

If the hypothesis proposed in this section can be maintained, then the classification of adjectives would be much more neatly constrained. Adjectives would still be functions from properties to properties in the most general case, but in harmony with the traditional notion of *modifiers*, they would normally be constrained to be subsective. We still need to allow for the 'modal' adjectives, which are not so constrained; the Polish data would provide fuel for a proposal to consider them syntactically as well as semantically distinct. I have said nothing to help with the problem of how to constrain the nonsubsective adjectives to just the kinds of 'modal' adjectives which actually occur and not allow random nonsubsective functions: this challenge is raised in Heim

(1999), and I have no solution to it. But if we can exclude privative adjectives completely, that would be one step in the direction of constraints. Of course more work also needs to be done on the detailed lexical semantics of each of the putatively privative adjectives, since they are far from identical; but that is beyond the scope of this paper.

7 Conclusions

The adjective puzzles that I have been discussing were designed to illustrate several issues. One is the need to study lexical semantics and principles of semantic composition together; decisions about either may have major repercussions for the other. More importantly for this context, I have tried to show that while contextually influenced meaning shifts pose challenges for compositionality, we can see that compositionality plays an essential role in constraining the kinds of meaning shifts that take place. We hold the principle of compositionality constant in working out (unconsciously) what shifts our interlocutors may be signaling. In the extreme case we (like children) depend on compositionality to figure out the meanings of novel words: if we can use contextual clues to guess what the whole sentence means, we can then "solve" for the meaning of the unknown word. Compositionality thus appears to be one of the most cognitively basic principles in the realm of semantics. While many of the most important foundational questions in the field remain open, I believe that the principle of compositionality has shown its value as a central working hypothesis guiding semantic research.

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