

# The Treatment of Adjectives in SIMPLE: Theoretical Observations

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## Abstract

This paper discusses the issues that play a part in the characterization of adjectival meaning. It describes the SIMPLE ontology for adjectives and provides insight into the morphological, syntactic and semantic aspects that are included in the SIMPLE adjectival templates.

## 1. Introduction

Adjectives have not been studied as extensively as have nouns and verbs in traditional lexical semantics and yet they are semantically as complex, if not more so. For example, one problem specific to adjectives is that a particular adjective can “emphasize a different property of a noun in a different context” (Raskin & Nirenburg, 1995). The terms ‘plasticity’ (Marx, 1983) and ‘non-compositionality’ (Lahav, 1989) are used to refer to this phenomenon, i.e. the capacity of adjectives to change meaning by highlighting a particular meaning component of a noun. Given this complexity and the lack of consensus between lexical semantic theorists concerning the best way to classify and describe the semantic behaviour of adjectives, we have identified common classes whose behaviour is regular and reasonably well-understood. The SIMPLE approach to adjectives is based on:

- (a) identifying three classes of adjective features (morphological, syntactic and semantic) which have been used by authors to classify adjectives;
- (b) for each feature class identifying a number of features and their values which are relevant for furthering classifying and describing adjective behaviour (e.g. gradable is a semantic feature taking the values Y or N);
- (c) defining a fixed number of templates for lexicographers, each of which is a partially instantiated feature structure corresponding to a class of commonly co-occurring feature-values found in a group of semantically similar adjectives (these typically constitute a semantic field, such as nationality adjectives).

It should be noted that in the development stage we have mainly focussed on classifying English adjectives, with some input from the Dutch, German and French languages. This is particularly important if we take into consideration (Dixon, 1991) statement that, “whereas all (or almost all) languages have major word classes that can be labelled Noun and Verb, some do not have a major word class Adjective. A fair number of languages have a small closed Adjective class”, and they express

information which in English is expressed by means of adjectives such as clever and sick, by means of nouns and verbs respectively. As the languages involved in the SIMPLE project do not differ as much from English as, for example, the Australian aboriginal language Dyirbal does, we are confident that this approach accommodates all the languages addressed by SIMPLE.

## 2. Describing Adjectives: The Issues

In this section we discuss various descriptive classification schemes that have been employed to describe adjectives and from these motivate our choice of ontological nodes and features and feature values that will appear in the adjective templates used in SIMPLE. One of the goals here is to clarify and relate the terminology different authors have used in their descriptions of adjectives.

While our principal goal is to address the semantics of adjectives, classification schemes for adjectives frequently refer to the morphological and syntactic properties of adjectives, as well as to their semantic properties, and indeed subtle interactions between morphological, syntactic and semantic behaviour of adjectives can be observed. At the highest level our discussion is therefore structured around distinguishing morphological, syntactic and semantic classifications for adjectives.

### 2.1 Morphological Issues

There are at least two morphological features of adjectives that are relevance; (a) inflection and (b) derivation.

Some adjectives can be inflected, reflecting the degree or intensity with which they hold, e.g. ‘tall’, ‘taller’, ‘tallest’. However, not all adjectives which can be intensified inflect (‘beautiful’), nor do all adjectives permit of intensification (‘atomic’). The topic of gradability is discussed further below in section 2.3.2; for now we observe only that the potential to be inflected implies gradability, though not the converse.

Furthermore, adjectives may be derived from nouns (denominal}), e.g. 'atomic', from verbs (deverbal), e.g. 'readable', or they may be non-derived. Denominals may be further distinguished according to whether they are derived from common nouns, e.g. 'atomic' or from proper nouns, e.g. 'American'.

## 2.2 Syntactic Issues

The position that an adjective can occupy in a phrase or sentence is also a clue to its semantic behaviour. The key distinction that is usually made here is that of classifying the syntactic function of adjectives as either *attributive-only*, *predicative-only* or *attributive-and-predicative* (Quirk et al., 1985). Much of the following draws on their account and examples.

An adjective is functioning attributively when it occurs before the noun it modifies, as in (1), and predicatively when it occurs as a subject complement following a noun in subject position and attached to it by a copula, as in (2), or as an object complement when postmodifying a noun in object position, as in (3).

- (1) the beautiful girl
- (2) the girl is beautiful
- (3) he found her beautiful

Notice that in these cases the same adjective ('beautiful') may function in each capacity; such adjectives are attributive-and-predicative. However, some adjectives may be used exclusively attributively. For example consider (4) and (5):

- (4) the chemical engineer
- (5) \* the engineer is chemical

Further, other adjectives may only appear predicatively:

- (6) he was loathe to admit it
- (7) \* the loathe man

Since attributive-only adjectives cannot be nominalized and predicative adjectives can, as is illustrated by (8) and (9) respectively, nominalization can provide another straightforward test for finding out what type of adjective one is dealing with.

- (8) \* the polariness of the bear
- (9) the politeness of the student

## 2.3 Semantic Issues

There are many semantic subtleties associated with adjectives. These have been addressed by multiple authors using different terminology and with differing perspectives. We start here by considering accounts by Chierchia and McConnell-Ginet (1990) and Quirk, Greenbaum, Leech and Svartvik (1985). These accounts

enable us to identify a number of semantic classifying features for adjectives. We then continue by looking at certain other semantic features that it may be helpful to record for adjectives.

### 2.3.1 Chierchia and McConnell-Ginet

Looking at the logical behaviour of adjectives, Chierchia and McConnell-Ginet (1990) divide adjectives into three types, namely *intersective*, *subsective* and *nonpredicating adjectives*. This distinction is part of the EAGLES recommendations for the semantic typology of adjectives. To avoid confusing the semantic term 'nonpredicating adjective' with the syntactic notion of predicative adjective, we will use the term *intensional* to refer to nonpredicating adjectives. Both intersective and subsective adjectives can be captured by the opposite term *extensional*.

Intersective adjectives are those for which the set of things denoted by the adjective-noun compound is the intersection of the set of things denoted the adjective and the set of things denoted by the noun. This leads to particular entailment behaviour. So, in the case of the intersective adjective 'red', we see that (10)(a) entails (10)(b) and (10)(c).

- (10)
- (a) The car is a red Volkswagen
- (b) The car is red
- (c) The car is a Volkswagen

In contrast to intersective adjectives, subsective adjectives do not denote a set of things which can be identified independently of the noun they modify, for their meaning is in some sense 'relative' to the thing they modify. And this leads to different entailment behaviour. For example, if we look at example (11), we see that (11)(a) entails (11)(c) but not (11)(b). The expression (11)(b) is only true in relation to the particular noun it is modifying.

- (11)
- (a) It is a really big spider
- (b) It is really big
- (c) It is a spider

Intersective adjectives are like subsective adjectives: they both can be used predicatively, they both express properties, and in combining with a noun they both refer to a subset of that noun. However, the properties expressed by intersective adjectives, also referred to as absolutes (EAGLES, 1998), have a more absolute truth-value, i.e. they are

less dependent on context than the subsective adjectives which are referred to as relatives (EAGLES, 1998).

The third adjectival type distinguished by Chierchia and McConnell-Ginet differs from the intersective and subsective adjectives in that intensional adjectives do not serve to select a subset of the things denoted by the noun

they modify. Formally, Chierchia and McConnell-Ginet propose that intensional adjectives should be seen as denoting functions from properties to properties. For example, former in (12)(a) maps the property of being a catholic to the property of being a former catholic.

(12)

- (a) Victor is a former Catholic
- (b) \* Victor is a former
- (c) Victor is a Catholic
- (d) Victor was a Catholic

Because of the adjective's intensional status, (12)(a) entails neither (12)(b) nor (12)(c) though it does entail (12)(d).

### 2.3.2 Quirk, Greenbaum, Leech and Svartvik

In *A Comprehensive Grammar of the English Language*, Quirk et al. (1985) distinguish three dimensions to semantically subclassify adjectives: stative/dynamic, gradable/non-gradable and inherent/non-inherent.

(a) Stative/dynamic

Where nouns encode temporally stable entities and verbs express temporally unstable entities, adjectives occupy an intermediate position on the time-stability scale (Givon, 1984). Because in English most adjectives are derived from nouns, they are primarily stative in meaning, i.e. they attribute stable properties to the referents of the nouns they are modifying. This is true, for example, for 'tall' and 'old'. However, other adjectives can refer to transitory conditions of behaviour or activity. Particularly adjectives that denote qualities that can be restricted temporally by the possessor, such as 'naughty' and 'vicious', are capable of being dynamic. Syntactically, stative and dynamic adjectives differ from each other in several ways (Quirk et al., 1985). For example, in contrast to dynamic adjectives, their stative counterparts cannot be combined with the progressive tense of 'to be', as is shown in (13)(a) and (13)(b) respectively.

(13)

- (a) She was being playful
- (b) \* He was being skinny

Also, static adjectives cannot be used with the imperative, whereas dynamic can:

(14)

- (a) Be serious
- (b) \* Be skinny

It seems that the same distinction is sometimes being referred to by the terms individual-level predicate and stage-level predicate (EAGLES, 1998), where the former stands for the stative meaning and the latter captures the dynamic variant.

(b) Gradable/non-gradable

Gradability is another property that is seen as very crucial in the description of adjectives. In English, gradation is rarely lexicalized. Examples of lexicalized gradation, taken from Miller (1998) are found below.

QUALITY: superb great good mediocre bad awful atrocious

SIZE: astronomical huge large (no neutral term) small tiny infinitesimal

More often, gradation is accomplished by means of (a) adverbs of degree, such as 'very', or by (b) morphological rules for the comparative and superlative degrees. According to Quirk et al. (1985), all dynamic adjectives are gradable, and most stative ones are. They explicitly mention technical denominal adjectives (e.g. atomic) and adjectives denoting provenance (e.g. 'British') as nongradable stative adjectives. According to Levi (1978), all intensional adjectives are not gradable.

(c) Inherent/Non-inherent

Quirk et al. (1985, page 435) distinguish between inherent and non-inherent adjectives. Inherent adjectives are said to "characterize the referent of the noun directly". Key examples they give to illustrate this distinction are:

(15)

- (a) my old friend
- (b) that old man

In (15)(a) 'old' characterises the friendship, not the referent of the noun 'friend'; hence it is non-inherent. However, in (15)(b) 'old' characterises the referent of 'man' and is therefore inherent.

This distinction is subtly different from earlier ones. Quirk first mentions the inherent/non-inherent semantic distinction in the context of the syntactic distinction between attributive and predicative use. So, while 'old' can be used predicatively in the same sense as in (15)(b) (that man is old), it cannot be used predicatively the same sense as in (15)(a) (my friend is old). However, it is not the case that non-inherent adjectives cannot be used in predicative constructions:

(16) That student is new

Furthermore, the inherent/non-inherent distinction does not map neatly onto the intersective/subjective/intensional distinction. Inherent adjectives may be either intersective (e.g. 'red') or subjective (e.g. 'large mouse') since they describe a property that inheres in the object denoted by the noun, though the scale according to which the property value is selected may vary according to the object type being

modified. Non-inherent adjectives are certainly not intersective, but they are also not subsective in the sense that 'relatives' like 'large' or 'small' are. For unlike subsectives which characterise the referent of the noun according to scale appropriate to that object's type, non-inherents do not characterise the referent *qua* its 'natural kind' but rather characterise the role in which the referent is cast by virtue of the common noun chosen to describe it. Thus, in (15)(a) it is not the person referred to by 'friend' who is old but the friendship, referenced by the role label 'friend' which is used to describe the referent. Similar remarks could be made about, e.g. 'a perfect mother', 'an ideal partner', 'a good knife', and so on. Finally, non-inherent adjectives are not intensional in that the entailment patterns predicted for canonical examples of intensionals such as 'former Catholic' do not apply here: my old friend is indeed a friend, while former Catholics are not Catholics.

As it seems to be confusing and not very straightforward distinction, we have decided not to include the inherent/non-inherent distinction in our description of adjectives.

### 3. The SIMPLE Ontology for Adjectives

We have taken the predicative type distinction between extensional and intensional adjectives as a starting point for our ontology. At the top level, extensional adjectives are separated into intersective and subsective adjectives (see sections 2.3.1 and 2.3.3). We have decided to include the division into intersective or subsective behaviour into a separate slot in the extensional template instead of making it an intrinsic part of the ontology. There are two reasons for doing so. Firstly, it is not always straightforward to decide whether an adjective is intersective or subsective. Secondly, the further subdivision of extensional adjectives into, for example, temporal property adjectives would have to be duplicated to cater both for intersective and subsective adjectives. In our opinion, this major distinction into intersective, subsective and intensional adjectives is central as it gives useful information about possible inferences that can be drawn on the basis of membership of either one of these classes. For instance, imagine a question answering system that is asked the question 'Who was US president in 1959?'. Examining news articles dated 1959 such a system might encounter the phrases 'American president, Dwight Eisenhower, ...' and 'Former president, Harry Truman, ...'. The first allows the correct inference that Eisenhower is the president at the time (assuming appropriate tense and aspect of the finite verb following); the second does not permit such an inference. Knowing which is permissible requires knowing that 'former' is an intensional and 'American' an extensional adjective. Or again, imagine a coreference resolution algorithm attempting to unify referring expressions in a text as part of the process of discourse interpretation. Intersective adjectives dealing with the same meaning component

(e.g. 'colour') are very unlikely to modify expressions which refer to the same entity; e.g. 'red car' and 'blue vehicle' most likely refer to separate entities. However, subsective adjectives do not permit this form of inference – 'large mouse' and 'small creature' may indeed pick out the same object, and a coreference mechanism must be sensitive to this distinction.

#### 3.1 Intensional Adjectives

The intensional adjectives are further subdivided into 6 semantically motivated groups. The first five subtypes are again taken from EAGLES, the sixth class added on the basis of Quirk et al. (1985). Examining these subgroups shows that intensional adjectives do not form a semantically homogenous group. However, adjectives like 'former' and 'possible' in constructions like 'former president' and 'possible candidate' cannot be interpreted as sets of entities that are 'former' or 'possible', as would be the case with extensional adjectives like 'red'. In this way, intensional adjectives manipulate the temporal or modal parameter that is relevant for the interpretation of the nouns they combine with. The subclasses of intensional adjectives are as follows:

##### I temporal

- (a) past (former president)
- (b) present (present situation)
- (c) future (future wife)

##### II modal

- (a) epistemic (certain victory)
- (b) deontic (necessary ingredient)
- (c) possibility/ability/permission (potential winner)

##### III emotive (poor man)

##### IV manner (beautiful dancer)

##### V object-related (criminal lawyer)

##### VI emphazier (outright lie)

#### 3.2 Extensional Adjectives

Extensional adjectives can be subdivided in two ways. Firstly, they are either intersective or subsective (see section 2.3.1). Furthermore, we have distinguished six basic types of extensional adjectives. Each of these types is reflected in a separate template (see 4.1) and is associated with a given subset of meaning components (see section 4.2). The lexicographer must select the most appropriate meaning component to further capture the meaning of the adjective, and is free to add other meaning components to be taken from the complete list. In determining the six basic extensional template types we have tried to have maximum overlap with the already existing noun ontology and templates. The subclasses of extensional adjectives are as follows:

##### I psychological property (crazy thoughts)

##### II social property (catholic priest)

##### III physical property (soft skin)

**IV temporal property** (sudden outburst)

**V intensifying property** (heavy rain)

**VI relational property** (similar shape)

## 4. Template Design

### 4.1 The Adjectival Templates

A project like SIMPLE presupposes that all word classes sharing particular meanings will exhibit similar behaviour. Based on this observation, a number of templates were to be designed to capture the regularities of particular Noun (e.g. Animal or Amount), Verb (e.g. Cooperative Act) or Adjectival Types. On examining adjectival behaviour in detail, it seems to be the case that, though similarities exist, adjectives belonging to the same semantic class may differ from each other in numerous ways. The semantic criterion 'gradability', for example, cuts across all adjectives (Raskin et al., 1995). Moreover, it is our belief that linguists' intuitions do not provide us with a consistent basis for building a detailed ontology and a subsequently large set of templates. Taking into account the limited amount of research done on adjectives and the restricted knowledge gained, we think that at this time it is premature to build rigid adjectival templates. In our opinion, the best way to model adjectival semantics is to identify clusters exhibiting similar behaviour in a bottom-up fashion. This would imply the use of one underspecified template, containing slots for criteria distinguished above in section 2. None of these slots would be filled with default values, leaving the complete implementation up to lexicographers. We would expect semantic adjectival types to emerge on the basis of distributional analysis of the slot values. However, as this would increase the lexicographers' workload and seems to contradict the SIMPLE approach, we have tried to create an acceptable compromise.

### 4.2 Template Types

At the top level, we have distinguished two Template Supertypes for extensional and intensional adjectives. These Supertypes provide us with two adjectival types that offer a structured profile of a cluster of characteristics.

Following the ontology, we've designed 6 templates for both intensional adjectives and extensional adjectives, resulting in a total of 14 templates. These semantically motivated classes generally exhibit consistent behaviour, but can at present not be guaranteed not to include members that display slightly diverging behaviour. Therefore, the Template Type profiles should not be regarded as rigid and unalterable units of semantic representation. In our view, template types are more like prototypical representations.

## 4.3 Meaning Components

Subsequently, the adjectival types captured by the extensional templates are further subdividable on the basis of the assignment of meaning components in the constitutive slot. The adjective 'boiling' in 'She was running boiling hot water into the tub' (Collins, 1987) would be classified as a physical property adjective, whose meaning is captured more precisely by the meaning component *temperature* (i.e. a subtype of *substance*). As there seems to be an almost infinite number of distinguishable meaning components and as it is not immediately obvious that more idiosyncratic behaviour can be captured in such a way, we have not developed individual templates for all these semantic dimensions. For an currently exhaustive list of meaning components, see SIMPLE Work Package 2 (2000). The physical property template, for example, has been subdivided with the meaning components listed below:

- body
- perception
- movement
- space
- substance

The meaning component *body* has been further subdivided into:

- life ('dead')
- constitution ('strong')
- illness ('healthy')
- bodily sensation ('hungry')
- gender ('female')

Based on Lyons (1977), MikroKosmos (Raskin et al., 1995) distinguishes scales of two kinds: the continuous scale (generally corresponding to gradable antonyms) and the discrete scale (corresponding generally to complementary and multiple antonymy). To fully capture their meaning, some continuous scale adjectives need a value. For example, if we compare the adjectives 'beautiful' and 'ugly' in 'beautiful hair' and 'ugly bloke', they both are assigned the meaning component *evaluation*. Adding *plus* and *minus* helps us to distinguish them. In the case of discrete scalars adding a meaning component value is not possible. The adjective 'orthodox' in 'orthodox party' is assigned the meaning component *religion*, but its semantics does not express any place on a scale. In this case we would assign the value *underspecified*, expressing that the distinction is not appropriate in this case because the adjective in question is a discrete scalar. Besides *plus*, *minus* and *underspecified* we use the value *neutral* to express that a particular adjective finds itself in the middle of the scale, for example 'lukewarm water'. Although meaning components can be used to further specify meaning aspects of intensional adjectives, they are particularly

useful as a descriptive tool for extensionals. It is possible to assign more than one meaning component to a particular sense.

#### 4.4 Information slots in the Adjectival Template

Based on the issues discussed in section 2 and 3, the adjectival template contains the following information:

- Template Type and Template Supertype (based on the ontology described in section 3 and discussed in more detail in 4.2),
- Meaning Components and Meaning Component Values (to avoid generation of an almost infinite number of adjectival templates, described in the section above),
- Distinction Intersective/Subsective (discussed in sections 2.3.1 and 3, contained only in the extensional templates, taking values Intersective, Subsective and Underspecified),
- Syntactic Type (discussed in section 2.2, taking values Attributive, Predicative and Attributive-and-Predicative),
- Gradability (discussed in sections 2.1 and 2.3.2, entered as a feature named Scalar, with values Yes, No and Underspecified),
- Distinction Static/Dynamic (discussed in section 2.3.2, entered as a feature named Duration, with values Persistent (corresponding to Static), Temporary (corresponding to Dynamic) and Underspecified).

It must be noted that the adjectival template contains other slots to capture, for example, synonymy and antonymy relations and systematic polysemic patterns. For a more detailed description of the complete adjectival template, see SIMPLE Work Package 2 (2000).

#### 4.5 Examples: The adjectives ‘beautiful’ and ‘wet’

In this paragraph we will have a brief look at classification of a sense of ‘beautiful’ and a sense of ‘wet’.

‘Beautiful’ in the sense “you can describe something that someone does as beautiful when they do it very skillfully” is assigned the following information:

Template Type:	Manner
Template Supertype:	Intensional
Meaning Components:	Evaluation, Plus
Syntactic Type:	Attributive
Scalar:	Yes
Duration:	Underspecified

‘Wet’ meaning “covered or soaked with a liquid such as water” is assigned the following information:

Template Type:	Physical Property
Template Supertype:	Extensional
Intersective/Subsective:	Intersective
Meaning Components:	Wetness, Plus
Syntactic Type:	Attributive-and-predicative
Gradability:	Yes
Duration:	Persistent

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