PHRASE STRUCTURE WITHOUT HEAD FEATURES*

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This paper proposes a phrase structure system for English that makes no use of value-specific category feature such as [±N, ±A] to distinguish nouns and adjectives in syntactic structure. Instead, I argue that representations at the level of the constituent—arrangements of formal content that is independently required—determine whether a substantive term is in a nominal or adjectival position in context. Aside from the simplification of the theory that comes from the elimination of category features from the grammar, this approach also offers a concrete articulation of Chomsky's (1957) hypothesis that (formal) syntax is autonomous with respect to meaning, something that has significance consequences for the design of the theory. After a brief presentation of properties that distinguish nouns and adjectives in English and purportedly justify the existence of features in formal theory, I present the analysis based on combinational arrangement, showing that the use of combinations of input content can be used to do the work of category features. I then discuss how this account provides a clear understanding of the semantic relation between adjective and nouns in the NP.

1 Nouns and Adjectives

English makes a distinction between two classes of substantive, nouns and adjectives, that reflects a correlation between their distribution and their interpretation. This section discusses basic properties of this distinction, arguing that it cannot be reduced to a difference in lexical meaning.[1]

Intuitively, the distinction is articulated around a notion of property, the adjective, that applies to a certain object, the noun. Thus, in *a large cat*, the adjective *large* is understood as identifying a certain property (a value of the attribute SIZE): in relation with *cat*, the resulting combination *large cat* identifies a subset of cats, those that have the characteristic of being large and can be opposed to those that are small. Although different classes of adjectives target different types of attributes along different, often

* If the ideas exposed here had been understood in time, this paper would have been included in the *Hommage à Denis Bouchard* that is to appear in a future issue of the *Journal of Canadian Linguistics*. Unfortunately, the picture was not clear enough then: I just did not understand what I thought I was understanding. I thus wish to acknowledge here that it is because of Denis that this paper came to be: he taught me that the easy road is never the way to really understand what is going on in linguistics. It goes without saying that anything that is not up to snuff is on me.

[1] It is generally assumed that it is not possible to provide a notional (semantic) definition for grammatical categories that would be categorical (absolute), which is why formal theory relies on independent formal features to describe them. Notional semantic definitions of grammatical categories are usually understood as prototypes. See Croft (1989), Baker (2003), Rauh (2010) and Panagiotidis (2015) for relevant discussion on this question.

Actes du congrès annuel de l'Association canadienne de linguistique 2018.
Proceedings of the 2018 annual conference of the Canadian Linguistic Association.

scalar, dimensions (more or less concrete, more or less objective, and so on), adjectives have the function of identifying a property that relates to an entity identified by a noun (the exception to this generalization is the class of intensional adjectives discussed in note 2 and briefly mentioned in section 2.3 below).

The property reading typical of adjectives occurs in two basic positions in the syntax. An adjective can be used as a modifier inside the NP, as in (1a), or as predicate outside the NP, as in (1b):

(1) a. [the large cat]
b. [The cat] [is large.]

As a modifier in (1a), it restricts the denotation of the whole NP: *the large cat* targets a subset of cats, namely the large ones. When the adjective appears outside of the NP and after the copula, as in (1b), it expresses membership of the subject argument in the class defined by the adjectival predicate. Sentence (1b) indicates that a certain entity, a cat, belongs to the set of things that have the property of being large.

Given that the adjective that restricts the head of an NP in the modification function also serves to define class membership of the subject argument in the predicative function, it is possible to construct logical equivalences (i.e. paraphrases) between sentences using the two functions, as illustrated in (2):[2]

(2) This is [a large cat]. ↔ [This cat] [is large].

That is, if the sentence on the left—where the adjective *large* modifies the head noun *cat*—is true of a certain object, then the sentence on the right—where *cat* is the head of the subject NP and *large* is the adjectival predicate of the sentence—will also be true of the same object. These two constructions thus provide a test to identify adjectives as sentences in (3) illustrate:

(3) a. This is [a blue car]. ↔ [This car] [is blue].
b. This is [a dangerous drug]. ↔ [This drug] [is dangerous].
c. This is [a good knife]. ↔ [This knife] [is good].
d. This is [a fast pace]. ↔ [This pace] [is fast].

[2] In early generative accounts of adjectives (for instance, Chomsky 1957 and Smith 1961), the paraphrase relation was taken as evidence that prenominal modification was not base-generated but related by transformation to the predicative use: *a large cat* was derived from *a cat that is large*, which contained a relative clause with a predicative adjective. Bolinger (1967) observes that a subclass of adjectives, what is now called intensional adjectives, did not allowed the predicative uses (*the presumed communist* is possible but the predicative version is not **the communist is presumed*): given that base-generation for this case is then necessary, and could apply to the regular (non-intensional) adjectives, there is nothing to gain in analyzing A-N sequence as an underlying case of predicative adjective. See Chapter 1, Part III in Alexiadou, Haegeman and Stavrou (2007) for a detailed overview of the developments of the analysis of adjectival modification in generative grammar.

All these examples naturally allow the logical equivalence discussed. Another test that identifies scalar adjectives specifically is their capacity to appear with a degree modifier such as *very*:

(4) This is [a [very large] cat]. ↔ [This cat] [is [very large]].

As (4) shows, both functions can undergo degree modification while maintaining the logical equivalence, reinforcing the correlation between position in the sentence and interpretation.

Importantly, it is the correlation between the position and the interpretation 'property of' that identifies the notion of adjectives. Thus, position alone is not sufficient to identify an adjective: it is also necessary that the term have a specific interpretation (properties associated with an attribute). For example, although *police*, *duck* and *drug* are prenominal modifiers in (5), the normal position of modifying adjective, they do not qualify as adjectives:

(5) a. a race car
b. a duck egg
c. a drug test

These constructions are noun compounds and not adjective-noun sequences, because it is impossible in these cases to construe the denotation of *race*, *duck* and *drug* as a property of *car*, *egg* and *test*. Rather, *race*, *duck* and *drug* identify special subtypes of the respective heads *car*, *egg* and *test*. Because they do not denote a property, nominal modifiers of this kind are incompatible with the degree modifier *very*:

(6) a. * a very race car
b. * a very duck egg
c. * a very drug test

Because they are not adjectives, these elements cannot appear alone in the predicate position (7a'-b'-c'), but generally require a determiner to be possible in the predicate position of copular sentences (7a"-b"-c"):

(7)	a.	This is [a race car].	a'.	* [This car] [is race].
			a".	# [This car] [is a race].
	b.	This is [a duck egg].	b'.	* [This egg] [is duck].
			b".	# [This egg] [is a duck].
	c.	This is [a drug test].	c'.	* [This test] [is drug].
			c".	[This test] [is a drug].

Notice that even with the presence of the determiner in (7a"-b"-c"), there is no logical equivalence between the modification function of the noun and its predicative function:

for instance, *this is a race car* is not logically equivalent to *this car is a race*, whereas the equivalence is typical of adjectives as shown in (2-4).

Data such as these seems to be a compelling case for the idea that the distinction between adjective and noun relates to lexical specification: clearly, terms that denote properties (e.g. *good*, *fast*, *large*, *wild*, etc.) are adjectives; and terms that denote concrete or abstract objects (e.g. *car*, *police, test*, *idea*, *drug*, etc.) are nouns. I argue here that there is an even more compelling case to be made for the hypothesis that the grammatical notions of noun and adjective cannot be reduced to lexical meaning (or to any specific feature associated with a head, for that matter), and clearly shows that the distinction arises from where a term appears in context.

Consider for instance the terms *square* and *blue* in the following examples:

(8) a. This is a square table. a'. This table is square.
b. This is a blue light. b'. This light is blue.

(9) a. This is a large square. b'. This square is large.
b. This is a light blue. c'. This blue is light.

Square and *blue* are modifying adjectives in examples (8a,b) and predicative adjectives in (8a',b'), with the logical equivalency expected of adjectives. In the (9) examples, the same terms are clearly in nominal positions, as heads of NPs, either predicative (9a,b) or subject argument (9a',b'). The crucial point is that in both uses, the semantic contribution of the lexical terms *is exactly the same*: *square* names a geometrical shape and *blue* names a colour. Whether this semantic content is understood as a property of another object or the object of discourse is a function of the term's syntactic position in the sentence—i.e. whether it appears in an adjectival or nominal position.

Many terms can appear felicitously only in adjectival or nominal positions because of their denotation. This fact masks the contribution of the syntactic position to the interpretation: the denotation of the term and the value of the position are in a way conflated, reduced to a unique notion associated with the form of the term. But examples like *square* and *blue* make clear that the difference in interpretation comes from the value of the grammatical position, and nothing else. Clearly, the correlation between being an adjective and being a noun does not, indeed *cannot*, depend on the denotation associated with the forms *square* and *blue*: the denotation of these term is constant in both uses. What is different, and correlates with the difference in interpretation, is the position where these forms appear in the sentence.

This conclusion is further supported by cases where a definite nominal use can have an adjectival antecedent. Consider, for example, a situation where a medical student, during the examination of a patient, states (10a), where the colour term *red* is first used as a predicative adjective to identify a specific property of the skin, followed by (10b), where the definite NP with the head *red* refers back to the adjectival use introduced in the first sentence.

(10) a. The skin is red around the bruise.
b. The red is brownish.

For the anaphoric relation to be successful, which it is, it must be the case that the term *red* identifies the same discourse reality in both cases. And yet, in one case the term is used as a predicate adjective, and the other it is used as a noun. It is thus clear that what *red* contributes in this sentence is only a reference to a colour, which allows the anaphoric relation, and that whether it is interpreted as a noun or an adjective is dependent on the position of the term in the syntax and nothing else.

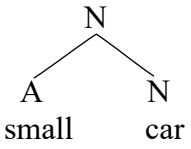
To summarize, the interpretative difference between adjective and noun cannot be reduced to a specification that would be attributed to a lexical form. It must be defined in distributional terms, as something about positions where forms appear, and as such, should be part of the phrase structure component of the grammar. The next section presents a system that captures the distinction without making use of value-specific feature. Space constraints only allows a discussion of the modifier use of adjective in this paper.

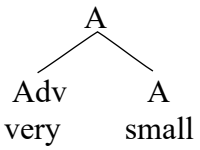
2. Adjective and Noun Values as Combinational Arrangements

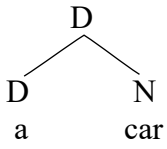
The traditional view of grammatical categories is that the distinction between noun and adjective is encoded by value-specific features like N and A. These features are associated with forms and determine the distribution of the forms in the syntax.[3]

In the earliest version of generative grammar—*Syntactic Structures*, Chomsky (1957)—category features and the distributional regularities they expressed only existed in the syntactic component of the grammar, being mapped onto words by specific rewriting rules. The architecture of the theory was top-down: in the absence of a lexicon (introduced in Chomsky 1965), features were imposed from the top by rewriting rules starting from the very top (the level of the sentence) all the way down to the terms at the bottom. With the advent of X-bar syntax (Chomsky 1970), phrase structure shifted toward a bottom-up architecture. Features were separated from the phrase structure component and associated with individual words in the lexicon: X-bar encodes the endocentric nature of constituents by repeating the variable X in the different projections of the constituent. Categorization of the whole constituent occurs when the features on lexical heads (or another abstract mediator, as in Marantz 1997, Borer 2005, and others) are inserted into the X, providing a value for the head X and the whole phrase. In Bare Phrase Structure (Chomsky 1995), only the repetition of feature remains in the phrase structure system: under this approach, *small car* and *very small* and *a car*, have the structure in (11).

[3] Although I concentrate here on the use of features to account for distribution, it is worth mentioning that after Chomsky (1970), there were many attempts in the literature to link categories to their function and interpretation in context using features such as ±subj, ±obj (Jackendoff 1977), ±ref, ±pred (Déchaine 1986), and many others (see Baker 2003, chapter 1, for an overview, and Rauh 2010, chapter 5, for an extensive discussion on this issue). Panagiotidis (2015) is a recent proposal to give interpretative content to category features in the theory.

(11) a. 

b. 

c. 

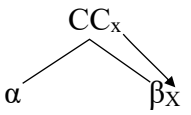
With a proper mechanism to govern the selection between these categories, it is then possible to account for the fact that *small car* and *very small car* have the same distribution as *car*, and that *very small* can be substituted for *small*: the distribution of an expression of category N or A is not affected by its internal complexity.

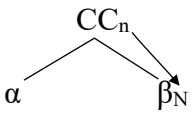
The category distinctions under X-bar and Bare Phrase Structure come from value-specific features: the object inside the constituent whose category is repeated at the level of the constituent is the head. Under the phrase structure system proposed here, repetition of a feature is not available for substantive objects: lexical terms are lexically uncategorized (as in Marantz 1997, Borer 2005, and others), and receive their value from the top, from an arrangement of content at the level of the constituent. The head of the constituent must be defined differently under this view. In section 2.1, I present a definition of the head of a constituent in a featureless system before providing the definition of the nominal or adjectival values at the level of the constituent in section 2.2. I then present in section 2.3 an analysis of prenominal modification in English and show how the elimination of features reshapes the mapping between form and meaning in the grammar.

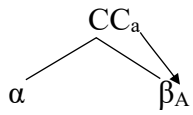
2.1 Endocentricity without features

By definition, a featureless phrase structure system cannot rely on features to define the value of a constituent and the value of its head: these values are not assumed to be represented by features but result from configurations defined at the level of the constituent. To present endocentricity in such a system, I abstract away from what distinguishes adjectives and nouns in the constituents, and concentrate on how values defined at the level of the constituent can be pushed down onto objects at different levels of the structure.

Let me define a constituent as a Combinational Configuration CC_x made up of two syntactic objects α and β, where either α or β, but not both, are assigned the value X. (12a) depicts a case where β is assigned X (order is not significant here and X could be assigned to α).

(12) a. 

b. 

c. 

For the current purpose, two configurations are needed: CC_n assigns a value N in (12b) and CC_a assigns a value A in (12). For substantive terms, then, the value is not a feature

on the term; the labels N and A in (12b,c) are the reflection of how α and β are arranged at the level of the constituent, as expressed by the arrow. I return to the representations that distinguish nouns and adjectives in the next section.

Endocentricity is defined with respect to the function of the syntactic objects in the configurations. As in X-bar, the following premises are assumed:

(13) a. Endocentricity is a defining property of a constituent
b. Endocentricity means that the value of the head is the value of the constituent.

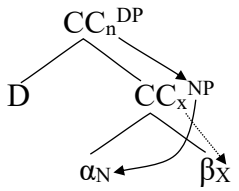
The difference with X-bar lies in the definition of the notion *head of the constituent*: rather than defining the head through feature repetition in the projection, the head is defined in (14) as the syntactic object that does not receive a value in the constituent.

(14) The head of constituent CCx is the syntactic object that is not assigned the value X in the configuration.

To state that the syntactic object that is assigned a value in a relation is *not* the head should not be surprising: in general, it is not the function of an assignee to head a constituent. Under the definition in (14), then, the head in the cases in (12) is always α because the syntactic object that receives a value is β. Given (13b), the category of the head α is also the category of CCx.

For the value of the head, there are two logical possibilities: either the head is already categorized, or it is not (because it is a featureless substantive term). Functional vocabulary belongs to the first case. Unlike substantive terms, functional vocabulary is categorized in the lexicon: a constituent CC_x with a functional head F is of the category F (noted CC_x^F). This assumption is standard since Chomsky (1986) at least: functional elements are not minor categories but head full-fledged phrasal constituent that license lexical categories. As proposed originally in Abney (1987), a Determiner is a head of a constituent that introduces a nominal value (CC_n in (12a)), that is a DP (CC_n^D). For the case of the constituent CC_x headed by a valueless substantive term, the value for the constituent must come from the top because the head has no value. An uncategorized constituent must appear in a CC_Y to be assigned the category Y; Y is then pushed down onto the head by 'inheritance' under (13b), because the constituent and the head, by definition, must have the same value. The idea is expressed in the representation in (15), where CC_n is a DP. D is the syntactic object that does not receive a value and CC_x is assigned a value NP because it is the argument of D:

(15)



The head of CC_x^{NP} by (14) is α (since β receives the value X in the configuration). Given that by (13b) the head α and the constituent CC_x^{NP} have the same value, then α has the value N.

In short, an uncategorized substantive term always receives its value from the top: it receives a value X directly when it appears in constituent CC_x, as in (12). Or it receives its value by inheritance when it is the head of a constituent that is assigned a valueà, as in (15). With this in mind, let us return to the makeup of the Combinational Configurations, the objects that will replace category features in the analysis.

2.2 Formal content and arrangements

The system proposed here must capture the distinction between two classes of distributional behaviour—summarized by the categories noun and adjective—without using value-specific features. This result is to be achieved without referring to the lexical content of the substantive terms because, as seen in section 1, the value is independent of the content associated with the form. Given this, the system uses the only content still available in the lexical representation of a substantive term—its phonological form. That is, a syntactic rule only sees the phonological form of terms when it combines syntactic objects.[4] The grammatical values N and A are thus assigned to the forms of lexical items given where the forms appear: this is consistent with the evidence seen in examples (8) and (9) that it is not what *blue* and *square* denotes that determines their status as noun or adjective, but their distribution — the place of the form in the speech stream. Thus, I assume at this point that the lexical denotation of terms is invisible to syntax; the grammatical value is directly assigned to the form, and denotation only becomes relevant at the level of discourse analysis where the mapping of the grammatical value and the denotation can occur. I return to this issue in section 2.3.

Translating this idea into the format of Phrase Structure Rules, the syntactic rule that introduces substantive terms would look like (16), which looks very much like a rewriting rule that introduced lexical terms in the *Syntactic Structures* model, minus the grammatical feature:

(16) α → square, blue, … (list of all forms arbitrarily associated with a substantive denotation)

A variable can be replaced by a word, which is a phonological form that is recognized as an input object for syntactic rules because this form is arbitrarily associated with a concept.

[4] The proposal does not deny Saussure's basic intuition that a sign is a formal object (a *signifiant*) and an abstract concept (a *signifié*) arbitrarily related to one another. The claim is that as far as the syntactic component of the grammar is concerned, only the form of a word needs to be considered for combinational purposes.

Let us then assume that α and β are the form of substantive terms, and that when they are combined, they can appear in one of two configurations shown in (17) called *Identification* and *Inclusion* (linear order is ignored at this point):

(17) a. Identification b. Inclusion

These configurations simply make copies of the input objects at the level of the constituent: Identification is the indexing of the copy of one syntactic object onto a copy of the other[5]; Inclusion is the insertion of a copy of one of the syntactic objects between two copies of the other. This means that syntax introduces a formal distinction at the level of the constituent for any expression of the form /α β/: it can receive one of two different analyses, α_β or αβα, without using independent symbols because the distinction is created out of the formal material provided by α and β.

Here are the combination definitions of noun and adjective based in these configurations (for exposition purposes, I use arrows to show the source of the labels assigned in a configuration, with the shaded label to identify assigned (non-lexical) values):

(18) a. Identification b. Inclusion

The configuration that assigns the nominal value (i.e. CCn in (12a)) is Identification, as shown in (18a) — where the value N is assigned to the β in α_β. The configuration that assigns the adjectival value (i.e CCa in (12b)) is Inclusion in (18b), where the included syntactic object (β in αβα) receives the adjectival value. In (18), then, the difference between N and A is expressed without value-specific features. With these definitions, the labels N and A name specific formal realities at the level of the constituent, made up of content already required (the form of α and β), realities that exist independently of the labels themselves. The label N reflects the indexation of a copy of a syntactic object onto a copy of the head of the constituent, and the value A reflects inclusion of a copy of a syntactic object into two copies of the head of the constituent. Let us see in the next section how this captures a set of facts usually accounted for by value specific features.

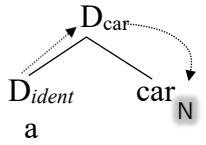
[5] By convention, the index in the Identification Configuration always appears on the side of the head that directly reflects the linear source of the objects. Thus, the index for β in α_β appears to the right of the head because β is after α at the linear level; if α is combined by Identification onto β with the same linear order, then the result is ${}_\alpha\beta$.

2.3 Prenominal modification in English

Given the definition of nominal and adjectival values in (18) and the mechanism that captures endocentricity presented in (13) and (14), a featureless account of the patterns of prenominal modification in English (modifiers that appear before the noun) is close. I first need to tackle the analysis of Determiners in the approach as well as the related question of the head parameters. The section concludes with a discussion question of the relation between the assignment of values to a term and its denotation, as well as some general consequences of the approach.

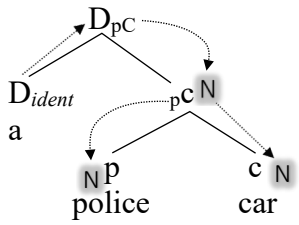
One well-established function of Determiners since Abney (1987) is that they introduce NPs (as well as quantify them, an issue I only briefly mention below). The capacity to introduce NPs in the current system is expressed by stating that a Determiner bears an instruction to apply Identification (expressed by the subscript *ident*). Once the instruction has applied (when the Determiner has been combined with a syntactic object and bears an index), *ident* disappears. Assuming that English is head-initial it comes to relation headed by functional vocabulary, then the DP that combines *a* and *car* corresponds to (19) (curved arrows identify values that are assigned by configuration; straight arrows identify values established because of endocentricity.)

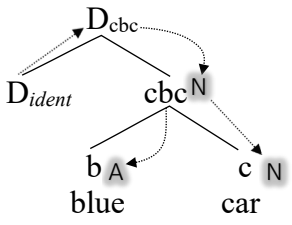
(19)



In (18), the instruction *ident* mandates the application of the Identification configuration, so that *car* is indexed onto D at the level of the constituent: *a car* [D_{car}] is a DP (D is the head by (14), since it is *car* that receives a value); and *car* is nominal because it is combined by Identification to D.

In (19), the NP is composed of one substantive term, which must be nominal because the D triggers the application of Identification. But with a sequence of two substantive terms, then two patterns are possible because syntax provides two configurations to combine them. Because nominal modification is head-final in English, I assume in the spirit of Bouchard 2002 that head-initial relations are reserved for functional heads: no other kinds of head-initial relation are admitted in the grammar, so that modification is necessarily a head-final relation. With this in mind, then, the two patterns of modification possible in English are shown in (20) (to keep the representation of configurations uncluttered, only the first letter of the substantive terms is used at the level of constituent):

(20) a. 

b. 

(20a) is a noun compound, where both the head and the modifier are nominal. The status of noun compounds in English (or of compounding in general) is not settled: some argue that compounding is a morphological process, while others treat it as a syntactic process (see Lieber and Štekaue 2011 for an overview of the different issues). Under the phrase structure system proposed here, where the nominal value is the result of a specific Combinational Configuration, noun compounding in English is resolutely a syntactic phenomenon: a nominal value is defined in a Combinational Configuration, and noun compounds reflect one of the two values that can be assigned to a substantive head in a modifier position. The other configuration is the adjectival configuration in (20b): in this case the modifying term is included in copies of the head noun.

The values N and A are assigned to the forms of terms without reference to their denotations. But clearly, whether a term can appear in a given position relates to its denotation: that is why we cannot assign the analysis A-N in (20) to the sequence *police car*. Given that syntax only sees the forms, and that syntax must apply rules so that forms receive a grammatical value, denotation can only become relevant at the output of syntax, once forms have a value. It is thus at the interface between syntax and discourse analysis that we can establish what is a possible output, so that *police* can be ruled out of an adjectival position but allowed in a nominal position.

At the syntax-discourse interface, syntax is understood as a labelling system for *discourse realities*: the nominal system specifically labels *discourse entities*.[6] The key issue is the domain of application of labels. In the nominal system, the domain of application of labels depends on the content of the DP: the substantive terms in the NP provide labels to identify the kind of reality that is assigned to discourse entities; the functional content provides the domain of application of the label in the context, indicating which discourse entities can be labelled, whether labels need to be quantified, and so on. For example, the indefinite DP *a car* would apply to an individual discourse entity, labelling it with *car*. When in an argument position (*a car drove by*), the entity is understood as a new participant; when in a predicate position, it qualifies a participant already identified (*this is a car*).

As seen in section 1, when a prenominal modifier appears in the NP, the resulting expression is restricted to a subset of the entities denoted by the head label. This follows from the presence of two labels in the NP: the domain of application of the NP is not only restricted by the denotation of the head label, but also by the denotation of the modifier

[6] The verbal system could be seen as labelling *discourse state of affairs*, a topic that is clearly beyond the scope of this paper.

label. The difference in interpretation between the two modifying labels (N or A) depends on how the different configurations affect the domain of application of this extra label.

Inclusion of a label inside copies of the head (adjective value) restricts the application of the included label to the domain of the head: this label cannot apply to anything outside this head. This is why terms that typically appear in adjectival position, those traditionally called adjectives, denote properties: properties are denotations that belong to the domain of entities and can be used to contrast entities along different dimensions (small-large, heavy-light, bright-dark, etc). Only labels that denote properties can be included in copies of a nominal head because only those apply to the heads and nothing else. Concretely, we say that *blue car* [cbc] is *valid* because *blue* denotes a reality that can be interpreted as a property.

In contrast, the configuration *police car* ‡[cpc], with inclusion of the modifier, is invalid (marked with ‡) because the application of *police* as a property of *car* is non-sensical: there is no way of understanding the denotation of *police* as a property of the denotation of *car* (or any entity for that matter). The valid configuration for *police car* is the noun compound [$_{p}$c], where the modifier is combined by Identification to the head noun. In this case, the domain of application of the modifier label is not restricted in any specific way. In essence, the structure simply adds a label onto another label. This construction is useful to refer to realities that already exist, such as *police car*. But the interpretation of noun compounds is notoriously malleable because there is no specific instruction that limits the application of the label to the domain of the head (as is the case with inclusion). This is why *tomato basket* is a perfectly acceptable form to refer to a basket that contains tomatoes, that is specifically designed for tomatoes, that was just used to carry tomatoes, and so on. World knowledge determines what is a possible or probable interpretation of the compound given the denotation of the two terms combined.

As an aside, note that Identification also provides a configuration for intensional adjectives like *future* in *future president* (see note 2). Analyzing these adjectives as a case of Identification on the head—i.e. [$_{f}$p]—is consistent with the fact that this interpretation is impossible in the predicative context (‡*the president is future*): they are not interpreted as properties of entities. And given that no specific interpretation is imposed on terms that undergoes Identification on a head noun, the interpretation of *future* and *president* in combination is based on the type of connection that can be established between their denotation in the domain of discourse given the type of knowledge implied. The fact that an intensional term can sometimes have a predicative interpretation (‡ *the communist is presumed* is impossible, but *his communism is presumed* is valid, Higginbottom 1985) is not surprising under the proposed analysis. This depends on the circumstances that determines whether *presumed* can be understood as a property of something or not (the chapter 2 of Bouchard 2002, section 2.2, presents many examples of adjectives that can have both predicate or intensional uses and the conditions under which this is possible).

This discussion of adjectival and nominal interpretation in context only scratches the surface of significant questions and issues that cannot be dealt with here. For instance, the facts just discussed will require a model of the world in the theoretical sense, a space where we can establish the kind of objects lexical forms denote. But even without such a

model, the overall perspective should be clear: under a system where the nominal and adjectival values are defined using combinational arrangement of forms rather than value-specific features, the denotation (lexical content) of substantive terms plays no role in syntax. Denotation only becomes relevant once the formal part of the terms has received a grammatical value in context, at the output. The validity of an output at the level of discourse is dependent on considerations relative to the interplay between denotation and grammatical value. The key notion that governs this interplay from the grammatical side of the equation is how label application to the discourse is affected by Combinational Configurations. This last point highlights the main difference between the proposed approach and any other analysis of adjectival modification proposed in the literature, namely that the distinctions between nouns and adjectives in the current system is not stated in semantic term at all, but only in formal terms: the difference depends on how formal labels relate to one another in a configuration, and how this relation affects label application in the domain of discourse.

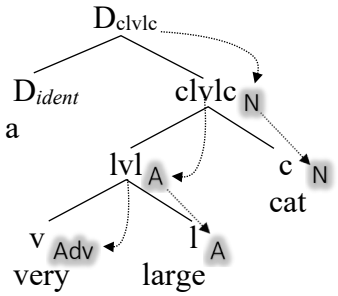
I shall conclude this section by briefly discussing a few predictions that are direct consequences of the design of the model. First, recall that a term like *blue* can easily appear as a noun and an adjective: this is predicted by the model because in principle, a term receives a value given where it appears in the NP. It is an adjective in *a blue square* [D_{sbs}] and a noun in *a light blue* [D_{blb}], given where it appears and how it is combined. A second related prediction is that *blue* should also be possible as the modifier in a noun compound, which is indeed the case. Imagine for instance a situation where the expression *blue file* refers to the file that contains the chemical formula used for the colour blue in a paint company. In this case, it is not necessary for blue to be a property of the file, which means that *the blue file is white* is not contradictory. And if the file in question were blue, the sentence *the blue file is the blue file* could be true without being tautological when one of the *blues* is understood as a noun modifier, i.e. [$_b$f], and the other as an adjective modifier, i.e. [fbf]. Account of this fact under any feature-based model requires additional statements, namely, different symbols to express the two values and something that indicates that the value has changed in context. Type-shifting rules (Partee 2002) in formal semantics exist precisely for this purpose. In the model proposed here, where value is assigned in syntax as a result of the configuration where terms appear, the difference of values follows from the design of the structural component: values are properties of different configurations. For reason that have to do with how we perceive and conceptualize colours in the world, *blue* is valid in either adjectival or nominal position, even with a constant denotation.

A second prediction of the model concerns what is a possible prenominal pattern. As we just saw, the combination of two substantive terms predicts two types of prenominal modification (nominal or adjectival). If three substantive terms are combined, the system then predicts the existence of eight different patterns of prenominal modification, all attested in English.[7] One of these is of particular interest because it

[7] The reader can verify that when three terms are combined by recursive application of Identification and Inclusion on two terms at a time, the following eight sequences are possible: [Starbuck$_N$ [coffee$_N$ mug$_N$]], [[Starbuck$_N$ coffee$_N$] promotion$_N$], [large$_A$ [egg$_N$ carton$_N$]], [[large$_A$ egg$_N$] carton$_N$]], [Ontario$_N$ [red$_A$ wine$_N$]] , [[ice$_N$ cold$_A$] beer$_N$] [large$_A$ [black$_A$ cat$_N$] and the case discussed in (21).

provides a combinational definition for adverbial elements that modify adjectives. This pattern is the outcome of Inclusion of a term inside of an adjective configuration in (21):

(21)



The expression *very large cat* [clvlc] is nominal by Identification with the Determiner, the nominal head being *cat*. The expression *very large* [lvl] is adjectival—with *large* as the adjectival head—by Inclusion in the nominal head *cat*. The adverbial position occupied by *very* results from the Inclusion of *very* in copies of the adjectival head *large*. Now, recall that Inclusion restricts the application of the label to the domain of the head. What is specific to an adjectival denotation is the extent to which it applies, that is, the degree of application of the property. This is why *very* is valid in this position. One of the output of the system (Inclusion into an adjective configuration) thus corresponds to a natural definition of the adverbial position for adjectival modification.

Note that by defining categories in combinational and relational terms, the traditional notion of category selection— alluded to in the discussion of (11)—is encoded in the combinational definition of the values. There is no need for statements to indicate that adjectives select adverbs, that nouns select adjectives, and so on. The reason the adjectival value is embedded in the nominal constituent, and that the adverbial value is structurally embedded in the adjectival constituent, follows from the application of Combinational Configurations. The system produces identifiable patterns that provide a definition for nominal, adjectival and adverbial positions in the NP.

3. Conclusion

This paper has shown that it is possible to account of the grammatical notions of noun and adjective without relying on value-specific features. Using formal content independently required, values are defined in the phrase structure system using two different configurations at the level of the constituent, configurations that push down values onto uncategorized substantive terms at the linear level. Aside from the simplification of the theory that comes from the elimination of value-specific features, this approach has desirable theoretical and empirical consequences. For instance, the approach suggests an autonomous view of formal syntax with respect to conceptual meaning in the nominal system, as well as a novel articulation of the mapping between meaning and form in natural language.

Reference

Abney, Steve. 1987. The English noun phrase in its sentential aspect. Doctoral dissertation, Massachusetts Institute of Technology, MA.

Alexiadou, Artemis, Liliane Haegeman and Melita Stavrou. 2007 *Noun Phrase in the Generative Perspective.* Berlin: Mouton de Gruyter.

Baker, Mark C. 1996. *Lexical Categories: Verbs, Nouns and Adjectives*. Cambridge: Cambridge University Press.

Bolinger, Dwight. 1967. Adjectives in English: attribution and predication. *Lingua* 18: 1-34.

Bouchard, Denis. 2002. *Adjectives, Number and Interfaces: Why Languages Vary*. Amsterdam: Elsevier.

Borer, Hagit. 2005. *Structuring Sense*. *Volume 1.* Oxford: Oxford University Press.

Chomsky, Noam. 1957. *Syntactic Structures*. The Hague: Mouton. 2nd ed. (2002).

Chomsky, Noam. 1965. *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press.

Chomsky, Noam. 1970. Remarks on nominalization. In *Readings in English Transformational Grammar*, ed. Roderick A. Jacobs and Peter S. Rosenbaum, 184–221. Waltham, MA: Ginn.

Chomsky, Noam. 1986. *Barriers*. Cambridge, MA: MIT Press.

Chomsky, N. 1995. Bare phrase structure. In *Evolution and Revolution in Linguistic Theory: Essays in Honor of Carlos Otero*, eds. Héctor Campos and Paula Kempchinsky, 51–109. Washington D.C.: Georgetown University Press.

Chomsky, Noam. 1986. *Barriers*. Cambridge, MA: MIT Press.

Croft, Williams. 1991. *Syntactic Categories and Grammatical Relations: The Cognitive Organization of Information*. Chicago: Chicago University Press.

Déchaine, Rose-Marie. 1993. Predicates across Categories. Doctoral dissertation, University of Massachusetts, Amherst.

Higginbottom, James. 1985. On semantics, *Linguistic Inquiry* 16: 47-94.

Jackendoff, Ray. 1977. *X'-syntax*. Cambridge, MA: MIT Press.

Lieber, Rochelle and Štekaue Pavol. 2011. Introduction: status and definition of compounding. In *The Oxford Handbook of Compounding*, eds. Rochelle Lieber and Štekaue Pavol, 3-18. Oxford: Oxford University Press.

Marantz, Alec. 1997. No escape from syntax: don't try morphological analysis in the privacy of your own lexicon, *University of Pennsylvania Working Papers in Linguistics* 4.2, eds. Alexis Dimitriadis and Laura Siegel, 201-225. Philadelphia: University of Pennsylvania Working Papers in Linguistics.

Panagiotidis, Phoevos. 2015. *Categorial Features: a Generative Theory of Word Class Categories*. Cambridge: Cambridge University Press.

Partee, Barbara. 2002 (1987). Noun phrase interpretation and type-shifting principles. In *Formal Semantics: The Essential Readings*, eds. Paul Portner and Barbara Partee, 127-147. Oxford: Blackwell.

Rauh, Gisa. 2010. *Syntactic Categories: their Identification and Description in Linguistic Theories*. Oxford: Oxford University Press.

Smith, Carlota. 1961. *A class of complex modifiers in English*. Language 37: 342-365.