GRAMMATICAL VALUES AS LABEL ALIGNMENT*

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This paper presents an analysis of nouns and adjectives in English where their distributional and interpretative properties in context are calculated using their *form,* that is, their phonological matrixes. I take the position that Chomsky's *I-language* (Chomsky 1986), where "I" stands for *internalized, individual* and *intensional* (see Scholz et al. 2022), the non-social individual's internalized knowledge of structural patterns of their language under some idealization, cannot include lexical meaning, and can only refer to the formal (audible) part of linguistic expressions. The reason for taking this position is that the mapping of meaning and form in the lexicon is *arbitrary* and, as such, is subject to *social conventions*: this puts the lexical mapping of form and meaning squarely at the level of pragmatics, that is, when I-language is used in *social contexts*. Lexical content that is appropriate for the theory of I-language should thus be based on the *Word as Label* hypothesis (WaL): a word in the lexicon is simply a *label*, a name tag if you will, that is recognized as a word of a language because it applies to a notion defined independently of formal analysis in the domain of general semantics. A grammar is thus a sophisticated labeling system that takes the forms of words, labels, as input to generate constituents, complex labels, which can be applied to an infinite number of objects and situations in the world. Unlike lexical labels, which relate to meaning arbitrarily, constituent labels contain grammatical values: under WaL, these values are *labeling patterns*, that is, formal objects that target specific kinds of realities in the world. Using an operation of *alignment with heads* that manipulates the forms of substantive words without reference to abstract features or lexical meaning, composition embeds lexical forms into endocentric constituents that target unique individuals, instances of stuff, properties, and so on. Labeling patterns thus constrain what the lexical forms they contain can apply to, that is, their denotations in the world. Only compatible denotations will be targeted by a given labeling pattern, which provides the criteria for the categorization of words as nouns and adjectives.

The objective of this paper is to outline the labeling patterns of English found with *bare (uninflected) form* (the patterns for proper nouns, mass nouns, adjectives, and degree adverbs). The first section provides an overview of the labeling perspective and presents the two alignment operations (even and uneven alignment) behind grammatical distinctions, illustrating the consequences of a grammar based on WaL with an analysis of

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the morphological plural in English (which labels sets, that is, multiple objects) and the singular DP (which targets an individual member of a set). Section 2 discusses the proper noun pattern, the result of *even* alignment of a singular label with a "discourse-place", which is, I argue, the content assigned to *be* in English. Section 3 discusses patterns associated with *uneven* alignment, the patterns for mass noun and adjectival values. The final section summarizes the patterns presented and briefly discusses the potential significance of this approach for linguistic theory.

1. A labeling grammar

The position taken here challenges the traditional assumption of linguistic theory that compositionality operates on the abstractions associated with heads (whether arbitrarily associated with words in the lexicon or directly in morpho-syntax).[1] Discussing the patterns that relate to substantive terms in English, I develop a model that accounts for the distribution and grammatical interpretation of nouns and adjectives that requires only a reference to the formal part of the word, which is understood as a label.

A lexical form relates to meaning arbitrarily, but when it is part of a constituent, it is part of what I call a labeling pattern, which is a formal construct that targets specific kinds of realities in the world. The plural morphology is used to introduce this perspective (section 1.1). In section 1.2, I present an analysis of the determiner and the alignment operations that account for grammatical values in a labeling grammar.

1.1 Plural morphology in English

The account of the plural in a language like English, where bare lexical forms without morphological alternations apply to individual notions, relies on a general principle, call it the One Label Principle (OLP): a unique Form can only apply to one Reality at a time in the discourse space. While one label (form) alone can identify one individual (e.g., a proper noun), a unique label is not enough to label a multitude of individuals of the same sort. The assumption is that the plural form of a label provides copies of the label. To illustrate the analysis concretely, let me flesh out how the labeling grammar interacts with the lexical meaning and the reference of substantive terms.[2]

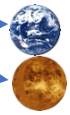
First, let's establish a distinction between two levels of analysis, the Internal level and External level: the Internal level corresponds to the notion of Individual; the External

[1] To my knowledge, all formal linguistic frameworks, regardless of their specific affiliations, rely on abstractions that are independent of form to account for distribution in natural language. Unlike functionalist linguists, formal linguists assume these abstractions are language specific, although they might disagree regarding their place in the grammar. For instance, after the adoption of X-bar syntax (Chomsky 1970), lexicalism assumes that abstract features are part of the lexicon. Others assume that these features are merged with roots in the morphological component of grammar (Marantz 1997 in Distributive Morphology) or directly encoded on heads in syntax (e.g., Borer 2005).

[2] My position is that it is the separation of the form from meaning in general that is significant for grammatical analysis, not the nature of lexical meaning and reference, which can thus be ignored. The analysis only needs to assume that lexical meaning and reference exist, as they provide targets that formal labels can apply to.

level is the World where the Individual is, where interactions with realities and with other individuals occur. The labeling grammar requires two types of internal knowledge: the knowledge of Notions, which is traditionally called lexical meaning; and the knowledge of grammatical Forms (phonological matrixes), which are essentially articulatory instructions. These have parallel components at the External level: in contact with Realities in the World, individuals gather the Notions part of their knowledge of the world; the External level also contains a Discourse Space, an interface where Forms are "sent" when they are uttered.[3] Through interaction with others, an individual can establish how phonetic forms are used to designate Realities: knowing the word *planet*, for example, means that the individual has been exposed to (at least) one instance of [plænət] in the Discourse Space, which was used to designate an instance of a Reality "planet". Individual speakers can then establish a lexical association between their understanding of the Notion [PLANET] and the formal object /plænət/, the articulatory instructions that reproduce the perceived acoustic signal. Row (a) in Table 1 is a simple illustration of what all this entails for the word *planet:* the form [plænət], which is represented as a label in the Discourse Space to illustrate the effect of plural morphology, is uttered to designate a Reality "planet". This reflects the Individual's memorization of the association between the phonological form /plænət/ and the Notion [PLANET]:

Table 1. Internal and External levels, and plural morphology.

	Internal (The Individual)		External (The World)	
	Knowledge Notions	Grammar Forms	Discourse Space	Realities
a.	[PLANET]	/plænət/	planet	
b.	[PLANET]	/plænəts/	planet planet …	

Assuming that Grammar operates on Forms means that the difference between the singular *planet* and the plural *planets* corresponds to the number of labels available in the Discourse Space, as shown in rows (a) and (b) of Table 1: when the singular form *planet* is used, what is sent into the discourse is one label *planet*, which can at most apply to one Reality, one planet (application is expressed by the blue arrows in Table 1). In contrast, pluralizing the form means that multiple labels *planet* can be sent into the Discourse Space, so that potentially, more than one Reality "planet" can be labeled with the Form.[4]

[3] The notion of discourse space is, evidently, not new. Discourse representation theory (Kamp 1981), for instance, explicitly assumes a discourse space to account for the semantics and pragmatics of pronouns and tense. The Discourse Space in a labeling grammar defines a place outside of the Internal level (the Individual), where the forms of language become manifest so that they can conventionally be associated with external realities.

[4] Whether all the labels sent into the Discourse Space are actually applied to a Reality in the world is not an issue that concerns formal grammar. The grammar provides labels, and plurality indicates that copies of a

In addition to the OLP, label use is also governed by pragmatic conditions of the kind introduced in Grice (1975), to ensure that the labeling of objects in language use is consistent. One condition is that speakers must use labels in a truthful manner: that is, speakers need to respect the conventions of the language so that the form *planet* is not used to label anything that is not a planet. Another condition, call it *exhaustivity* or *completeness*, is the understanding that if a Form applies to a Notion that has many instances in the world, then all instances of the Notion also receive this label. Respecting these conditions means that the default labeling pattern for what is traditionally called a count noun in English, like *planet* – a form that applies to multiple Realities – is the morphological plural. In contrast, the only kinds of Reality that can be truthfully and exhaustively labeled with a unique form are individual entities: this is the grammatical pattern for proper nouns, which is discussed in section 2. Before turning to this, however, I discuss the role of the determiner in English, which is to isolate a form so that it can apply to a unique entity in the discourse.

1.2 Determiners: Isolating and categorizing a label

1.2.1 Isolating a label

To apply a label to a unique member of a multitude (for example, to apply *planet* to a unique planet), the formal context requires a determiner. The reason is that the domain of application of the form *planet* (what it can potentially apply to in the world) depends on the characteristics of a planet, that is, whatever information the Individual has gathered about planets and formalized by the Notion [PLANET] in their knowledge. A unique Form is never enough for truthful and exhaustive labeling because there can always be another object with the proper characteristics. The label needs to be isolated to indicate that it only applies within a restricted discourse space, as opposed to the "open" discourse space where the whole world is accessible. One of the roles of the determiner is precisely to isolate a label to ensure that it targets only a subpart of the world.

Isolating the label is the result of embedding the form inside a DP by introducing it with a determiner head. Although this is certainly an oversimplification, I assume for our current purposes a simple division of the discourse space into two spaces: a space that contains the information that is considered old/identifiable/familiar by the discourse participants; and a space where new information is added to the discourse (see chapter 1 of (Lyons 1999) for relevant discussion). Because it is imbedded in the DP, the form is directed to a specific part of the discourse, where it can be interpreted as providing a label for an old/identifiable/familiar object (if the determiner is *the*) or to introduce a new object (if the determiner is *a*). The expression *the planet* with the definite determiner *the*, for instance, sends a unique form *planet* into the part of the discourse that contains information that is known, shared, or identifiable by discourse participants: if one form *planet* is sent into that space, the expectation is that there should only be one planet there if truthful and

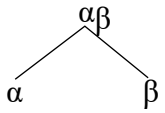
label are made accessible in use: how labels are applied depends on many contextual factors, some grammatical, others not, that are not addressed here given the scope of the paper.

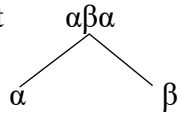
exhaustive labeling is respected. The discourse role of determiners is outside the scope of the present paper, and I now concentrate on the determiner's function as a nominalizer.

1.2.2 Constituents and alignment

The complement of a determiner is always nominal. This nominal value, however, is *covert* in that it has no formal manifestation on the noun itself (unlike the plural marking, which is an *overt* indication of nominal value). Covert values are assumed to arise from *alignment of forms with a head*, the operation behind composition in a grammar that manipulates forms. Alignment of forms means that even though two formal objects are presented at different points in time at the linear level, they are understood as occupying the same point in time when they form a constituent. Aligned objects in a constituent can apply to a unique Reality in discourse.

At the center of covert grammatical values is an ambiguity arising from the notion of alignment. Two formal objects α and β can be aligned with one another in two different ways: first, they can be interpreted as *evenly aligned* that is, coextensive with one another, occupying the same temporal position; second, they can also be understood as aligned if one is occupying a smaller temporal space within the temporal space occupied by the other. Let me call this alignment *uneven alignment*. These two alignment possibilities are represented as in (1), where (1a) represents even alignment (e-alignment) and (1b), uneven alignment (u-alignment):

(1) a. e-alignment 

b. u-alignment 

These structures express that even if the terms α and β are presented at different points in time in the speech stream, with α preceding β, they are temporally aligned at the level of the constituent. E-alignment in (1a) is expressed by having the two input forms slightly shifted with respect to the horizontal axis: this is to indicate that α and β are understood as completely aligned (i.e., coextensive). U-alignment is expressed by copying one of the objects, α in (1b), at the level of the constituent, with the other object, β in (1b), inserted between these copies (whether the first or second term is duplicated/inserted depends on factors to be discussed in section 3, where the patterns that results from u-alignment are discussed).

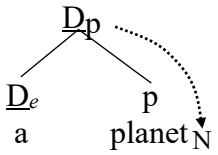
In both cases, the aligned objects are part of a constituent, and must be applied to a unique discourse reality. Exactly what the constituent can apply to depends on which of the two objects is the *head* of the constituent, and which is the complement. The object that is the head determines what the constituent applies to. The complement of the head, call it the *restrictor*, restricts the application of the constituent according to what the form applies to. Consider for instance the DP *the planet:* the determiner, being the head, indicates that the constituent applies within the old discourse space: the restrictor *planet* narrows down the application of the DP to whatever reality in that space can be labeled *planet*.

1.2.3 E-alignment and the nominal value

The grammatical value of a restrictor depends on how it is aligned with the head: as a first hypothesis, I assume that grammatical patterns that introduce nominal values result from e-alignment with a head, as defined in (2):

(2) Definition of value N: a restrictor β has a value N if is it e-aligned with the head α

Determiners are assumed to include an instruction *e*, to indicate that determiners impose e-alignment on their restrictor (this instruction will be erased at the level of the constituent after e-alignment of a form with the head). The determiner *a,* for example, can be analysed for the current purposes as in (3a) (where D corresponds to the category determiner, and the subscript *e* to the right is the instruction to apply even alignment to the label that follows the determiner):

(3) a. Determiner a : D_e b. 

When the determiner, the head of the constituent (underlined here for clarity), is combined with a form by e-alignment (and the e-instruction is erased) the result is the well-formed constituent *a planet* in (3b) (to keep the representation of the constituent uncluttered, only the first letter of lexical forms is copied at the level of the constituent). Given the configuration at the level of the constituent, where *planet* is e-aligned with the head D, *planet* is then in a nominal position under the definition in (2). The value defined at the level of the constituent is imposed on the form in the restrictor position: the dotted arrow in (3b) indicates that the tag N(oun) depends on the configuration at the level of the constituent (to avoid confusion, the term *tag* is used to refer to the grammatical value imposed by the structure instead of the term *label*). Given that the head is the determiner *a*, the constituent is directed to the part of the discourse space where new information is introduced, where there should be at least one reality that can be labeled with the restrictor form *planet*.

2. The copula: Introducing a discourse individual

Grammatical patterns are properties of complex expressions. A simple form cannot encode a grammatical value (in our terms, a labeling pattern) because it relates to meaning arbitrarily. Composition of forms is needed for the introduction of grammatical values. I assume that proper nouns in English get their value from e-alignment with a head that contains a *discourse-place*, the labeling-grammar equivalent of an argument position.

I assume that in a language like English, the verb *be* is a head that has the role of introducing the labeling pattern for one individual, a subject. As introducing a subject is

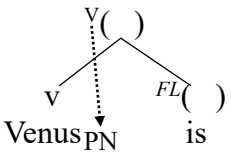
also the function of the inflectional head of the sentence, *be* is then analyzed as a bare inflectional head, a verb that has no morphological root.[5]

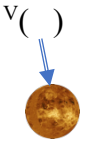
2.1 A place to label an individual

To introduce a labeling pattern with the bare inflectional head *is*, let me assume that:[6] (i) from an abstract point of view, *is* corresponds to a *discourse-place*, an abstract place that, once labeled, can be sent into the discourse; (ii) a discourse-place has a numerical value of "1" to indicate it is a place for *one* individual; (iii) this place needs to be *fully labeled* by a subject, creating a minimal sentence (identification of a subject in a discourse space). The discourse-place is formalized as the set of parentheses in (4), which bears the superscript *FL* to the left to indicate it must be *fully labeled* by a subject that precedes it:

(4) is: $^{FA}(\ )$ (with a value of 1)

Full labeling occurs when *is*, the head of a minimal sentence, is e-aligned with a form. With these assumptions, the derivation of an expression like *Venus is* looks like (5a):

(5) a. 

b. 

E-alignment of *Venus* with *is* fulfills the requirement that the discourse-place be fully labeled, thus erasing the *FL* instruction. As a result, the form *Venus* gets a nominal value (it is e-aligned with a head) at the level of the constituent (a sentence, in this case). Since e-alignment implies coextension between the label and *is*, and *is* has a value of 1, the form *Venus* also has a value of 1 after alignment: the assumption is that this configuration targets an individual. E-alignment of a bare (singular) form with *is* is the labeling pattern of proper nouns, which is expressed with the tag PN (proper noun). The situation in (5b), where the label *Venus is* is applied to the Reality "Venus" exemplifies this use of the form (the arrow indicates application of the representation to *Venus* in the World).

Pragmatically speaking, this construction is of limited use: it applies to a unique object in the world, thus implying its existence. For a constituent headed by *is* to be more informative and useful, it needs to be made more complex by the addition of a complement.

2.2 The symmetrical copular construction

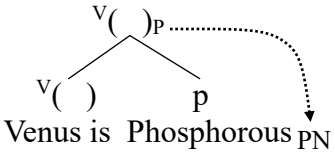
The inflected form *is,* in this analysis, "selects" a subject and nothing else (via the FL instruction). To make a sentence headed by *is* more informative, it needs a complement.

[5] Analysing *be* as a bare INFL means that its contribution occurs in every sentence of English, giving the impression it has no contribution, which I think is likely the intuition behind the traditional analysis of *be* as a contentless copula.

[6] I leave aside issues related to the Tense identification to concentrate on the labeling pattern itself.

Concentrating here on bare simple forms, I show that the value of a bare form in complement position is dependent on its alignment with the complex head *subject + is*.

A complement can be introduced by e-alignment to create a symmetrical expression, often called the identity or equative construction. (6a) shows its derivation:

(6) a. 

b. 

It starts with the output of the derivation in (5a) – the representation of *Venus is* – analyzed as the head of the construction:[7] the restrictor label *Phosphorous* is e-aligned with this representation, so it has the tag PN, leading to a complex label where both the subject and complement are understood as a proper noun for an individual. This means that the individual *Venus* also has the name *Phosphorous.* The notion of equality here does not come from the equal operator "=" that Frege (1892) uses in his discussion of this construction; it arises because both the subject and the complement are combined with the head by the same rule of e-alignment.

3. Uneven alignment

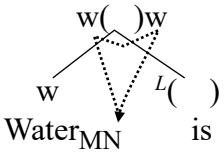
Covert grammatical values arise from alignment of a form with a head. I discuss here how the second alignment rule, uneven alignment (u-alignment), relates to two other covert values associated with singular bare forms in English: the mass noun and adjectival values. When two formal objects α and β are aligned unevenly, the result αβα implies an asymmetrical relation where one (α) is wider than the other (β) or, conversely, where one (β) is narrower than the other (α). Section 3.1 discusses the wide alignment (w-alignment) of a label with a discourse-place, the labeling pattern for mass nouns. Section 3.2 discusses narrow alignment (n-alignment), which results in the adjectival patterns. Section 3.3 briefly discusses other prenominal modifiers that the system distinguishes, and the last section (section 3.4) presents predictions the theory makes for patterns of prenominal modification.

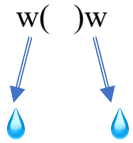
3.1 Labeling mass nouns: Wide alignment with an argument position

I have assumed that a discourse-place is well-formed when it is fully labeled with a restrictor. Let me assume that, generally, full labeling occurs when a discourse-place is aligned with a restrictor that has a value that is equal to or greater than 1 after composition (at the level of the constituent).

I analyze an expression like *water is* as in (7), where the subject *water* is aligned widely (w-alignment) with the discourse-place provided by the head *is*:

[7] Whether all verbs in English use the structure proposed here for *be* (where the linear sequence *is Phosphorous* is not a VP constituent) is an open question: verbs that have a root might be different in this respect.

(7) a. 

b. 

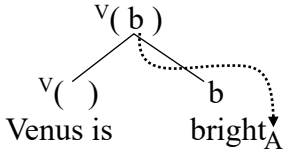
To express wide alignment at the level of the constituent, the label *water* needs to be copied for the insertion of the content of the head *is*. In the result, then, there are two formal objects *water*, two *w*s, which are separated by a discourse-place, the space of an individual. These copies can then be applied to different instances of what the word applies to. I call this the *covert quantification* of a label, and it gives rise to the labeling of "stuff", as expressed by the tag MN (mass noun). At a certain level, this pattern is like a plural: multiple copies of the form are created at the level of the constituent and can be applied to different instances of a Reality. But it is unlike a true morphological plural, however, since the copying is covert, which is only possible with mass nouns: a unique form *water* is sufficient to label all the water in the World, given the knowledge that mass realities have cumulative reference (Quine 1960). A plural reference, in contrast, requires multiple labels for exhaustive labeling: a plural necessarily provides more than one label, with a value > 1. The mass labeling can be construed as ≥ 1, since one label is sufficient despite the possibility of covert quantification associated with cumulative reference.

3.2 Narrow alignment

I assume that the rule of e-alignment is the basic (default) grammatical rule. The intuition is that aligning a form evenly with a head identifies this head fully. E-alignment is the syntactic equivalent of the operation behind the lexical association of a form with a piece of knowledge: the form then identifies the notion. U-alignment can be understood as the special case alignment, and it leads to two kinds of asymmetric labeling. W-alignment with a discourse-place, discussed in section 3.1, provides the means to "scatter" a form as it is quantified and separated by a discourse-place. I now turn to the case of n-alignment with a head form, which leads to adjectival values for a form.

3.2.1 Predicate adjective

Narrow alignment with a head introduces the adjectival value: when a form is n-aligned with the copular label (e.g., *Venus is*), the result is a predicative adjective. At the level of the constituent, the complement form is simply inserted in the discourse-place. N-alignment of the form *bright*, for example, gives the representation in (8a), where *bright* has a tag A at the linear level that reflects its alignment at the level of the constituent:

(8) a. 

b. 

This means that the form actually targets a simple property, in the sense of Bhat (1994), which is generally understood to be the denotation of standard attributive adjectives. The reason that n-alignment targets a simple property, as opposed to, for example, a meronym (which also is a subpart of what the head label applies to), is that n-alignment never leads to a label that can be referential. Narrowly aligning a form with *Venus is* makes the discourse individual labeled *Venus* the background of what is targeted by the adjectival label. A meronym, in contrast, is nominal and can have a reference outside of the whole it is a part of: an arm is a part of a human, but it can be defined and referred to independently of its host. Narrow application is an "inward" application of a label, allowing the form to be used to oppose individuals of the same type (say planets) along whatever Notion the form denotes – luminosity, in the case of *bright*.

In the case of grammatical values constructed around *be*, it is possible to distinguish singular forms with respect to the value 1: whereas the mass noun pattern has a value of ≥ 1, the proper noun pattern has a value = 1 and the adjective pattern a value < 1. The grammar then makes the prediction shown in Table 2 for sentences constructed with *is* with singular bare forms, with or without a complement label:

Table 2. Possible derivations for input *x is (y)*.

comp →		A	B	C	D
↓subj		Ø	< 1	= 1	≥ 1
1	= 1	^{V}( )	^{V}(b)	^{V}( )$_{P}$	w^{E}( )w
		Venus$_{PN}$ is	Venus$_{PN}$ is bright$_{A}$	Venus$_{PN}$ is Phosphorus$_{PN}$	Earth$_{PN}$ is water$_{MN}$
2	≥ 1	t( )t	w(c)w	* w( )w$_{E}$	ag( )ga
		time$_{MN}$ is	water$_{MN}$ is clear$_{A}$	* water$_{MN}$ is Earth$_{PN}$	gin$_{MN}$ is alcohol$_{MN}$

Cells in Table 2 are referred to as T2(ROW_NUMBER:COLUMN_LETTER). Each cell contains: i) the label constructed by subject alignment and complement alignment (column A for no complement Ø; < 1 for n-alignment in column B; = 1 for e-alignment in row 1 and column C; ≥ 1 for w-alignment in row 2 and column D); and ii) an example that illustrates the pattern, where substantives bear a tag indicating their grammatical value (A for adjective; PN for Proper Noun; MN for Mass Noun).[8] The patterns in cells T2(1:A), T2(2:A), T2(1:B), and T2(1:C) have already been discussed, in examples (5), (7), (8) and (6) respectively. The pattern T2(2:B) (*water is clear*) indicates that the property *clear* applies to the MN *water* while T2(2:D) (*gin is alcohol*) means that labeling of the MN

[8] It should be noted that the tags PN, MN and A used here are not primitives of the theory: they are the names of the configurations that result from different alignments of a singular form with constituents headed by *is*, which are built up from the same input content.

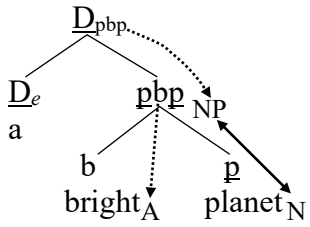
complement (*alcohol*) also implies labeling of the MN subject (*gin*). The reverse, *alcohol is gin*, is grammatical, but factually false.

Cells T2(1:D) and T2(2:C) deserve a discussion. The first, *PN subject is MN complement* (*Earth is water*) is *grammatical*, that is, predicted as an output of alignment rules: the interpretation is that the labeling of stuff with the complement (*water*) implies labeling of the individual (*Earth*) given that a significant part of the surface of planet Earth is water. Its mirror image T2(2:C), **water is Earth* is rejected under the reading *MN is PN*: the reading is *ungrammatical* as this pattern *cannot be generated by the rule system.* When the subject is w-aligned with *is*, the head *water is* ends up wider than 1: this prevents an alignment where the result of the complement value equals 1, the value needed for a label to apply to an individual. To put it differently, once a MN subject is introduced, the construction is too wide to allow a complement with a value of 1.

3.2.2 Modifier adjective

Narrow alignment of a form to a nominal head creates a complex label that distinguishes between members of the "kind" that the head applies to. The derivation of *a bright planet* is shown in (9): the form *bright* is first aligned narrowly with the head *planet*, and gets its tag A from the top (again, expressed with the dotted arrow):

(9)



As discussed above, the A value of *bright* targets a simple property (a value of attributes) of whatever the head applies to: the constituent *bright planet* that can be opposed to realities of the kind *planet* along the attribute dimension of luminosity.[9] Observe that the head *planet* of the constituent *bright planet* receives its nominal value by endocentricity, given that the head of a constituent, by definition, has the same category as its constituent. So when the constituent *bright planet* is e-aligned with the determiner head and gets an NP value, its head *planet* receives an N value. A tag assigned by endocentricity is indicated by a double-headed arrow in (9).

Before turning to the other modification patterns found in prenominal position in English, let me assume that the reason why n-alignment in the NP occurs in head-final constituents in the language, that is, before the noun, is tied to the head-initial parameter of Bouchard (2002).[10] The assumption is that syntactic constituents that are head-initial

[9] Observe that if a DP label like *the bright planet* can be applied to a discourse reality because it has the property *bright*, the sentential label *the planet is bright* will necessarily also apply to the same entity. This effectively provides a formal test for narrow alignment of a form in grammatical context.

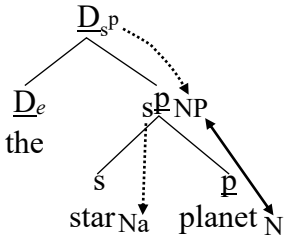
[10] I use a simplified version of Bouchard's analysis as an initial hypothesis for the limited scope of this paper, with the understanding that it will require refinements to account for cross-linguistic variation.

introduce restrictors that can apply to referential realities, that is, forms with a nominal value. As we just discussed, n-alignment applies inwardly, and as such never leads to a label that can apply to a referential entity. Inside the NP, then, n-alignment can only occur when the restrictor precedes the nominal head.[11] Adjectives that appear after a head noun in English NPs (e.g., *the student present* or *the man proud of his son*) are thus not narrowly aligned with the preceding head: they are combined by the default rule of e-alignment. This is why such adjectives are never exclusively about a property of the head noun they align with: their interpretation always implies another referent in the context, sometimes expressed by an overt PP (*the man proud of his son*) or implied (*the student present (at the meeting)*).[12]

3.3 Compounding and degree adverbs

As I mentioned previously, e-alignment is the default rule, which makes n-alignment the *marked* alignment. I assume that if the marked n-alignment is possible for a restrictor position, then the default e-alignment should also be possible for a restrictor in the same linear position. As a consequence, grammaticalized adjectival positions should alternate with restrictors aligned by the default rule of e-alignment, which is exactly what we see in prenominal position in English. In a nominal compound like *star planet*, *star* is an e-aligned restrictor, as shown in (10):

(10)



Although this configuration involves e-alignment, I reserve the tags N and NP (Noun and Noun Phrase) for forms that can have a (potential) referential value (that are e-aligned with a syntactic head or licensed by the head of the sentence, for example *is*). In a modifying position before the head, I use the tag Na (Name) to identify the position that results from e-alignment. A form in the Na position simply *names* the head, creating a head of a new kind. The grammar provides a means to apply a form to the head noun without imposing labeling constraints on that form. A constituent that contains an Na position is, in a sense, sent into the discourse "as is", so that the constituent's interpretation is dependent on the denotation of its parts. I assume that non-attributive readings of adjectives (e.g., the

[11] Narrow alignment is possible for the predicative adjective position because this position doesn't need to introduce a referent: a referent is already provided by the constituent *subject + is*.

[12] Bolinger (1967) assumes that an adjective like *present* is after a noun (as in *the student present*) because it has a transitory interpretation. Today, this would be called stage-level predication, see Part III, Chapter 1 of Alexiadou et al. (2007) for discussion. My position is that this reading, which indeed implies reference to a situation defined outside the denotation of the head noun, is imposed on the adjective *because* it is placed after the noun, and not the other way around as is generally assumed in a theory where semantics determines compositionality.

intensional reading *a future president* or the relational reading of *a nuclear plant*) also appear in Na positions, since they do not apply to a simple property of the head.

The last labeling pattern to be discussed here, the n-alignment of a restrictor with an adjectival head, targets degree adverbs like *very*. The expression *the very bright planet* is thus analysed like this: first, *very* is narrowly aligned with the head *bright*, giving *bvb*; this result is then narrowly aligned with the head *planet*, for the result *pbvbp,* this constituent is eventually aligned with the D in the DP. The head *bright* of *very bright* gets its A value by endocentricity when the constituent is n-aligned with the head *planet*. Narrow alignment of a head that applies to a simple property then imposes a further restriction on the whole NP, the property being applied to the degree identified by the adverb.

3.4 Structure of pre-nominal modifiers in English

The degree adverb labeling is only possible when three forms are combined. With three labels, the grammar predicts eight labeling patterns in head-final constituents, shown with illustrative examples in the derivational Table 3:[13]

Table 3. Possible Sequences of Prenominal Modifiers with Input *Det + x y z*.

	A						B					
	[1st		[2nd		3rd]]	*Label*	[[1st		2nd]		3rd]	*Label*
1	plastic$_{Na}$	e	egg$_{Na}$	e	carton$_{N}$	p<u>e</u><u>c</u>[14]	goose$_{Na}$	e	egg$_{Na}$	e	carton$_{N}$	g<u>e</u><u>c</u>
2	table$_{Na}$	e	red$_{A}$	n	wine$_{N}$	twrw	ice$_{Na}$	e	cold$_{A}$	n	beer$_{N}$	bicb
3	large$_{A}$	n	city$_{Na}$	e	house$_{N}$	chlch	small$_{A}$	n	person$_{Na}$	e	car$_{N}$	psp^{c}
4	large$_{A}$	n	red$_{A}$	n	car$_{N}$	crclcrc	very$_{Adv}$	n	small$_{A}$	n	car$_{N}$	csvsc

Column A contains expressions where the 1st linear term is combined with the result of the combination of the 2nd and 3rd linear terms; column B contains the reverse order (1st and 2nd terms combined first, with result combined with 3rd term). The shaded columns show all the possible applications of the alignment rules (e = even and n = narrow), and the *Label* columns show the representation of the final constituents, reflected by the tags Na, N or A for each form in the examples of each cell.

4. Conclusion

In this paper, I have presented a model of grammar in which the distribution and interpretation of nouns and adjectives in English is calculated using their formal parts (their phonological matrixes). By excluding lexical meaning of nouns and adjectives from the

[13] The tag N for the head of these constituents would come from the constituent alignment with another head (e.g., a determiner) not shown here for reasons of space.

[14] The heads are underlined in column *Label* for the cells T3(1:A) and T3(1:B), otherwise these representations would be identical. Identification of the heads is omitted for the other cases since their differences are directly visible in the representation.

theory of I-language because of its conventional relation to form, grammar is understood as a labeling system, with grammatical values interpreted as labeling patterns that target specific kinds of realities in the world. Using endocentric principles and two alignment rules, the approach generates the labeling patterns summarized in Table 4:[15]

Table 4. Summary of patterns generated by the model.

Sentence	Pattern	Target of α	DP	Pattern	Target of α
Plural (> 1)	α*	set of αs	NP	D_α	one α (of set of αs)
MN (≥ 1)	α( )α	stuff α	Mod A	-βαβ-	property α of kind β
PN (= 1)	$^{\alpha}$( )	individual α	Na	-$_\alpha$β-	No restriction on α
Pred. A (< 1)	-(α)-	property α of individual/stuff	Deg Adv	-βαβ-	degree α of property β (β modifier A or predicate A)

The analysis is parsimonious, symbolically speaking, as it relies on the minimum apparatus necessary: first, the formal part of substantive terms; and second, a uniform content for *is* across all its uses, namely, the notion of discourse-space. All of the differences between patterns result from the two possible alignment rules given the input content provided. Letting the rule system apply freely, the system predicts the sequences of grammatical values found with sentences of the form *x is (y)* (Table 2) and DPs of the form *D x y z* (Table 3), where *x, y* and *z* are all bare uninflected heads, and all NP constituents are head final. All of the predicted sequences are possible in English, and the sequence that cannot be generated by the grammar (cell T2(2:C)) is judged to be impossible by English speakers.

The constraints of space have prevented me from a full exploration of many of the consequences of the approach presented here, but it should be clear from the design of the model that it implies a level of autonomy of formal analysis with respect to semantics and general cognition. The relation between grammar, general semantics, and cognition/knowledge is still the subject of intense debates in linguistics, as seen in the Philosophy of Linguistics entry in the Stanford Encyclopedia of Philosophy (Scholtz et al. 2002). The entry exposes different and sometimes opposite positions on just about any aspect of linguistic theory one can think of, from its subject matter and objectives, its relation to semantics and general cognition, its methodology and its data, language acquisition and evolution, and so on. This paper brings a novel perspective on some these questions: it suggests that grammar, understood as a labeling system, is autonomous from semantics, as assumed in Chomsky (1957), but relies on the cognitive knowledge of individuals and social interaction to define its atomic elements, the formal part of words. Through composition of these atoms, grammar creates labeling patterns that can target specific kinds of Realities in the World (the domain of general semantics) based on their formal complexity and how their parts are combined. The objects that grammar constructs

[15] Notes on Table 4: α is the form at the center of the labeling pattern, and the column *Target of α* should be interpreted as "realities that can be labeled with α under the conventions of English'. The dash is used in the table where information is omitted for reasons of space. The morphological plural is expressed with the star operator * from Link (1983): α* indicates application of * (quantification) to form α.

at the level of sentences express meaningful distinctions, much like traditional logical formulas. However, these objects are not born out of abstraction like logical formulas; rather, they reflect a logic specific to natural language that is rooted in linguistic form.

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