On a class of syntactic bracketing paradoxes and its consequences*

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Under which conditions does grammar allow the licensing of verbal or clausal properties inside a nominal context? The goal of this article is to address this question through the analysis of two classes of adjectives that, in their semantics, seem to scope outside of the DP: frequency adjectives and modal adjectives. Such cases pose an initial problem for the hypothesis that there is isomorphism between syntax and semantics, and bring up the question of how different in their internal endowment nouns, verbs and clauses really are. We argue that licensing can take place in two ways: first, in accordance with Ross's category squish, some nouns share non trivial properties with verbs or clauses. Second, when the noun cannot license the verbal or clausal properties of the adjective, the adjective is licensed DP-internally thanks to the external relations that D establishes with verbs and the CP domain.

Keywords: *frequency adjectives, modal adjectives, bracketing paradoxes, isomorphism*

1. The problem: DP internal properties that scope over the sentence

One of the cornerstones of a structural approach to syntax, semantics and morphology is the expectation that there is a simple correspondence between the structural configuration defined by (morpho)syntax and the interpretation that a sentence receives –perhaps leaving aside the effect of conceptual and contextual accommodation and enrichment. This expected simple relation between structure and meaning has different manifestations, one of which is compositionality – the expectation that the interpretation of a combination of units is a function of the meaning of each unit and the configuration in which they appear, sometimes complemented with independent constraints of what the legitimate structures are, such as Frege's Conjecture–; divergences from compositionality are expected to be exceptional, and marginal in the sense that, if they emerge, they are the effect of information stored in external systems that overwrites the predictable information of the units (see Harley and Noyer 2000, Acquaviva 2009, Borer 2013, inter alia). It is well-known that in recent times, and with a strong empirical base, this situation has been questioned, most significantly from the Construction Grammar side (Goldberg 1995, 2006; Booij 2010; Janda 2011, among others), where structures are substituted by templates to which compositionality does not apply.

However, in this paper we will be concerned with a second prediction of the structural account, namely isomorphism between (morpho)syntax and semantics. The isomorphist hypothesis, as we will refer to it in this article, proposes that the same structure of constituent and hierarchical relations that are necessary to capture the formal syntactic relations between items is the one that is also interpreted by semantics to obtain its meaning. The interface between (morpho)syntax and semantics is thus expected to be quite simple: some authors propose a device that translates hierarchical relations into scope relations or head-dependent relations into theta roles (e.g., Beghelli and Stowell 1997), while others go as far as to say that there is no need to posit that independent interface, because (morpho)syntactic structures define simultaneously the semantic output, excluding the definition of concepts that connect to our world knowledge (Hinzen 2006, Ramchand 2008, Svenonius 2010). Sometimes learnability is presented as an argument in favour of isomorphism. The argument goes that if

the translation to semantics was able to rearrange constituents, add operators ad libitum or reverse hierarchical relations, the operations that the child has to learn during acquisition would be multiplied by three: one structure for syntax, a different structure for semantics and a set of rules or constraints that relate syntactic structures to semantic structures.

In morphology, cases that in principle argue against isomorphism have been well-known and relatively well studied for a while: they receive the name of bracketing paradoxes, cases where the formal properties of a complex word require a segmentation that is at odds with what we require to interpret them (e.g., Beard 1991). Unsurprisingly, bracketing paradoxes have been taken as one of the arguments to deny the existence of word-internal structure (Anderson 1992), again showing the strong commitment that a structural account of linguistic utterances makes to principles like isomorphism or compositionality.

The empirical aspect of this paper is the study of a number of cases that on the surface could argue against isomorphism in syntax, and specifically cases where a DP-internal modifier has to be semantically interpreted as having scope over the verb or even higher constituents in the structure of the clause. This class of 'syntactic bracketing-paradoxes' are actually more pervasive than we could initially expect. As we will see, this phenomenon has consequences that go beyond isomorphism, and which relate to the following set of questions:

a)   Under what conditions can we license verbal or clausal properties inside DPs?
b)   Are there cases of nouns that license verbal or clausal properties?
c)   If the noun does not license these properties, how are they licensed?
d)   What does this tell us about the relationship between grammatical categories and the problem of isomorphism?

The structure of the article is as follows. The rest of this section is devoted to presenting some patterns of data that provide prima facie evidence for the proposal that some adjectives must be interpreted at a VP or at a sentential level. Section 2 presents some theoretical background, and in particular Ross's proposal about the category squish, which will be relevant to the set of data discussed. Section 3 explores the causes that make the adjective extend its scope, while section 4 asks the question of how the scope is extended. We close the article with some conclusions.

1.1 *Frequency adjectives*

Consider the sentences in (1), from English.

(1)   a. John smokes two daily cigarettes.
      b. His three monthly payments were returned by the bank.

Syntactically, it is quite clear that the adjectives *daily* and *monthly* –which we, following Bosque (2007), will call 'frequency adjectives'– are internal constituents of the DPs *two daily cigarettes* and *his three monthly payments*, respectively. Linearly, they appear between the noun and a numeral –or a possessive and a numeral–, and trying to place them before the numeral or possessive gives ungrammatical results (2), in the same way that English rejects the anteposition of any other adjective before a numeral-determiner (3).[1]

(2)   a. *John smokes daily two cigarettes.
       b. *Monthly his three payments were returned by the bank.

(3)   *Mary visited well-read two girls.

In Spanish, a language where adjectives are differentiated from adverbs by gender and number inflection, the fact that frequency adjectives agree with the noun is also evidence for their syntactic constituent structure. From now on, we will use in this article Spanish data in order to take advantage of this morphological test.

(4)   a. Juan fuma dos cigarrillos diari-o-s.
          Juan smokes two cigarettes daily-masc-pl
       b. *Juan fuma diari-o-s dos cigarrillos.
          Juan smokes daily-masc-pl two cigarettes

Now, consider its semantics. To begin with, *two daily cigarettes* does not speak of two cigarettes, but of two cigarettes per day. Its semantic interpretation, roughly, is the one in (5).

(5)   For $\forall x$, x=day, $\exists 2y$, y=cigarette, that John smokes.

Or, in prose, every day there are two cigarettes that John smokes, which means that at some point the frequency adjective must take scope over the numeral 2, precisely the order that is impossible in the syntactic linearisation, as suggested by *daily two cigarettes*.[2]
       But things get worse for isomorphism. Bosque (2007) notes that –if the noun inside the DP is not eventive, a fact to which we will get back soon– sequences where the verb is stative produce ungrammatical results. Here 'stative' has to be interpreted as referring to a non-dynamic configuration, or a set of properties possessed by an entity across an unbounded time span. Contrast in this sense the two sentences in (6) and the two sentences in (7).

(6)   a. *En el bolsillo Juan tiene dos cigarrillos diarios.
           in the pocket Juan has   two cigarettes daily
          Intended: 'Every day, Juan has two (different) cigarettes in his pocket'
       b. En el bolsillo Juan esconde dos cigarrillos diarios.
          in the pocket Juan hides   two cigarettes daily
          'Every day, Juan hides two (different) cigarettes in his pocket'

(7)   a. *Aquí hay tres especies diarias de escarabajo.
           here are three species daily of beetle
          Intended: 'Every day, here there are three different species of beetle'
       b. Se descubren tres especies diarias de escarabajo.
          SE discover three species daily   of beetle
          'Every day, three (new) species of beetle are discovered'

(6b) is particularly natural in a context where, say, Juan's wife does not want him to smoke, so he has to hide two cigarettes every day in his pocket to smoke them when he is at work. (7a) should be natural in a context where someone is talking about the lab of a Science

museum, noting that every day three different species are brought for analysis and stay there for the whole day.

Now, how should we interpret this restriction? The pattern of data shows that a frequency adjective can only be licensed if the main clause contains an eventive verb. One way of interpreting this is the following: a sentence like *John smokes two daily cigarettes* does not talk about one event involving two cigarettes per day, but about two daily events that involve a cigarette each. Roughly, the semantic interpretation would be as in (8), where *e* is an event variable (Parsons 1990).

(8)   For $\forall x$, x=day, $\exists 2y$, y=cigarette, $\exists e$ and smoke' (e, John, y).

That is, for every day there are two separate events of John smoking a cigarette –assuming a distributive event reading, where in each event one single cigarette is smoked, versus the less natural collective reading where there is one single event where two cigarettes are smoked–. Put more simply, the frequency adjective (and the numeral) take scope over the event variable of the verb *smoke*.

From this perspective, the ungrammaticality of a sentence with a frequency adjective and a stative verb is an instance of Vacuous Quantification (Partee, ter Meulen and Wall 1990, Kratzer 1995): the frequency adjective is an operator in search of an event variable, and if the verb does not contain an event variable, the operator does not find a variable. The reason for the ungrammaticality would be the same as in (9), where an operator cannot find a variable to bind because it has already been bound by the superlative form.

(9)   *bastante grand-ísimo
         quite   tall -superlative
        '*quite biggest'

But then we have a problem with isomorphism: the semantic constituency required for the interpretation should be roughly as in (10), which goes against the syntactic requisites because the adjective has to take scope outside of the DP where it is contained.

(10)   [diarios]$_i$ Juan fuma$_i$ dos cigarrillos.

Several questions come to mind at this point: (i) why does a frequency adjective need an event variable in a constituent that it does not occupy?; (ii) why don't other classes of adjectives, especially temporal adjectives –or even temporal prefixes– take scope over the verb? Consider (11): here we have cases where an adjective carries temporal or aspectual meaning, but still we do not interpret that temporal meaning with respect to the verb.

(11)   a. Aquí está el antiguo presidente.
            here is the former president
            'Here is the former president'
         b. Luis lleva a su futura esposa de vacaciones.
            Luis takes A his future wife of holidays
            'Luis takes his future wife on holidays'

Why cannot we interpret (11a) as 'Here was the president', or (11b) as 'Luis will take his wife on holidays', that is, with the temporal adjectives *former* or *future* taking scope over the verb?[3] What makes them different from frequency adjectives?

1.2 *Modal adjectives*

The situation is replicated by some modal adjectives. Consider (12), which could be a sentence in the set of rules that a school sends parents on the occasion of a graduation ceremony:

(12) Cada estudiante vendrá a la fiesta con un acompañante obligatorio.
     each student will.come to the party with a companion compulsory
     'Each student must attend the party with a companion'

(12) is equivalent to 'Each student must attend the party with a companion', again with the modal adjective apparently taking scope over the verb. And again, the verb has to be eventive, as the ungrammaticality of (13) shows.

(13) *Aquí habrá un acompañante obligatorio.
      here will.be a companion   compulsory
     Intended: 'Here there will have to be a companion'

The same happens with *voluntario* 'voluntary'. Again, if (14) is a sentence from the information that students get from the teacher at the beginning of the course, the natural interpretation is 'Students may write an essay'.

(14) Los estudiantes escribirán un trabajo voluntario.
     the students   will.write an essay   voluntary
     'Students may write an essay'

Additional evidence that these modal adjectives are interpreted at the level of the sentence, and not DP-internally, comes from modality clashes: (15), where the verb has an obligation modal and the DP contains an adjective expressing will, is impossible. In the same way, (16) is impossible, and it is plausible to think that in both cases the problem is that we cannot interpret an event as being compulsory and voluntary at the same time.

(15) *Los estudiantes deben escribir un trabajo voluntario.
      the students   must write   an essay voluntary
      *'Students must write an optional essay'

(16) a. *Los estudiantes pueden deber escribir un trabajo.
         the students   may   must write   an essay
      b. #Los estudiantes deben poder escribir un trabajo.
         the students   must may write   an essay
         (Avoid the interpretation 'Students must be able to write', which is irrelevant here)

Epistemic modals also produce the same kind of effects.

(17)   He encontrado un posible tumor.
       have found   a possible tumor
       'I might have found a tumor'

The difference is that epistemic modals do not require an event in the verb. Contrast (13) with (18):

(18)   Aquí hay un posible tumor.
       here is a possible tumor
       'Here is a possible tumor'

Here, again, we have a set of questions: (i) why do modal adjectives, apparently in all cases, leave the DP and take scope over the verb?; (ii) why don't epistemic modals, unlike frequency adjectives and deontic adjectives, require an event variable?

2. Relevance of the problem: the category squish

Ultimately, the pattern of data that we are observing is relevant to two other problems beyond isomorphism –and as we will see, these other two problems are central in the analysis of the phenomenon we will propose–:

   a) Under what conditions does grammar allow non-nominal properties licensed in what seems to be a nominal context?
   b) In such cases, is the licensing direct or indirect?

The first question refers to the difference between a noun and a verb, or more generally to the differences between any two grammatical categories. Do categories share a basic vocabulary of notions –boundedness, for instance– that get instantiated in different ways (as Jackendoff 1997 has recently argued), or are grammatical categories completely different entities that in a sense correspond to primitive conceptual or formal notions which are deeply rooted in our cognition? If the first answer is correct, we could expect that some prototypical verbal properties are licensed in a nominal context, provided that they are licensed by the primitives that nouns and verbs share. If the second answer is correct, then we do not expect the licensing of verbal properties inside a noun at all, because whatever is licensed by a verb should not be licensed by a noun –by hypothesis–; then, when it seems that we have nominal licensing of something like event structure, we would be compelled to consider matters more carefully and take a closer look: either the noun is actually derived from a verb –it contains a verb, then– or the element we thought was being licensed has actually escaped from the noun, or was not licensed as we thought.
       This takes us to the second question: assuming licensing of this kind is possible and indeed verbal properties get licensed in a nominal context, how is this performed? Two clearly different options suggest themselves: it could be that nouns contain pieces of information that directly license those properties –thus supporting the existence of a shared vocabulary of primitive notions shared by nouns and verbs, perhaps also prepositions and adjectives, etc.–, but it could also be that DP structures establish external relations with verbs (and other categories) that allow them to license, indirectly, those internal constituents that

need to be linked to the verb. Licensing would, then, proceed through transitivity: if D established a relation with V, and the adjective inside DP establishes a relation with D, then V and A establish an indirect relation with each other.

These are, next to isomorphism, the questions that we will keep in mind when presenting our proposed analysis.

2.1 *The category squish*

If we go to an even further level of abstraction, what we are asking ourselves here is whether grammatical categories are atomic entities or not. Is our notion of what a noun is correctly represented through one single label N, or should we completely give up the label N – perhaps, keep it only for expository convenience– and replace it with a set of properties that might be, in principle, distinct from each other?

The second option directly connects with the idea that there is a shared vocabulary of properties that combine in different ways inside each category. This reasoning has been pursued in the literature for a while. One of the first and best known proposals in this sense is Ross's (1972, 1973) Category Squish. In his original article, Ross analysed a number of constructions that have been labelled as nominal, and showed that putting them all together under one label, N, missed a lot of partial generalisations and failed to account for obvious differences, as different transformations would tease apart subclasses of N-like constructions. The head N, then, emerged as a convenient label that we can use to refer to some entities that can act as arguments, but that, when details are considered carefully, had very little in common with each other beyond this. This led Ross (1972: 316) to the following claim:

(19) Traditional grammatical categories are cardinal points in a quasi-continuous category space

That is, labels like N, V or A are arbitrary cuts traditional descriptions make in a space defined by several properties, as represented in (20).

(20)
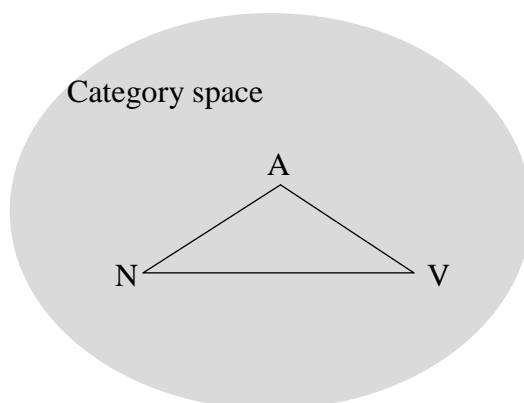
This view is the starting point of the influential prototype-periphery distinction in Cognitive Linguistics (e.g., Langacker 1990), where traditional categories are constellations of entities that show some family resemblance, as opposed to the formal account proposed in Chomsky (1965), for instance, where grammatical categories are defined by sufficient and necessary features. However, the core intuition of Ross does not necessarily argue in favour of this

approach: it could be, also, that each property corresponds to a formal feature and features combine in different ways inside heads or configurations that collectively define a grammatical category.

Independently of this, three consequences follow from Ross's view of grammatical categories:

a) It is possible that properties are shared by several grammatical categories. Given property X, identifying it as one of the components that can be in a category C does not imply that categories C' and C'' will not have X. This does not exclude that we can identify some X as only associated to one category, but situations where X will be shared by several categories are expected to be attested.

b) The boundaries between any two categories will be fuzzy: determining to which grammatical category a constituent belongs will be defined by the accumulation of properties X, Y, Z... that the constituent contains, rather than by a single feature. Inside any given traditional category, we will find different members, each one of them containing a different set of properties, and those properties might make us classify it as a prototypical member of the category or as a member which shares properties with two or more categories.

c) As a corollary of the previous two characteristics, we expect different members belonging to the same (traditional) category to license different elements. This is so because belonging to a category does not determine, per se, all the properties of the member, and because the properties that the member has will allow it to license constituents that are associated with these properties.

Put differently, and going back to our specific examples: the category squish predicts that verbal properties might be licensed inside a nominal context if the 'nouns' contain properties that are close to a verb or that in some way can connect directly with those of a verb. In the following section, we will see that some nouns can license frequency and modal adjectives on their own, precisely because, even though they are nouns, they contain properties that in some sense are verbal. Whenever this is not possible, the adjective needs to establish a relation with another element inside the DP in order to widen its scope and if there are no appropriate elements outside from the DP that license them, we obtain ungrammatical results.

3. Why do they move?

In this section we will try to answer the question of what the reasons are that underlie this surprising pattern of scopal properties.

3.1 *Frequency adjectives and the quest for an event variable*

First let us consider the case of frequency adjectives. The question that we have to answer as a necessary condition is why (21) is interpreted as 'Every day there is an event of Juan eating three apples' –with the adjective taking scope over the event– but (22) is never interpreted as 'Juan knew the director of his company', with 'past' taking scope over the verb.

(21)   Juan come tres manzanas diarias.
        Juan eats   three apples   daily
        'Every day, Juan eats three apples'

(22)   Juan conoce al antiguo director de su compañía.
        Juan knows A-the former director of his company
        'Juan knows the former director of his company'

In order to answer this question, let us include some other data. Consider the contrast in (23).

(23)   a. *Esto es un cigarrillo diario.
            this is a   cigarette daily
        b. Esto es una conferencia anual.
           this is a   conference annual
           'This is an annual conference'

The ungrammaticality of (23a) is not surprising. We have already seen that frequency adjectives take scope over the verb's event variable, and the main verb in (23a) is *ser* 'be', an individual-level copula in Spanish. Kratzer (1995) showed that individual-level predicates do not provide frequency operators with a variable, as shown by the ungrammaticality of (24a), in contrast with (24b), a stage-level predicate that does provide the operator with a variable.

(24)   a. *Whenever John is tall, he is the best player of the team.
        b. Whenever John is sick, he is the worst player of the team.

Thus, (23a) is ungrammatical, as expected: *diario* 'daily' does not find an event variable in the main verb. The surprise is why (23b) is also not ungrammatical, even though it also contains an individual level predicate.

The reader might have already noted what the minimal difference between (23a) and (23b) is: the type of noun we have in each one of the examples. The noun in (23b) belongs to the class of so-called simple event nouns (Grimshaw 1990): a set of nouns that, although underived from verbs, denote entities that are categorised as actions and therefore are interpreted as 'events', at least as a conceptual level. With nouns belonging to this class, frequency adjectives are grammatical even if they are in a sentence with an individual-level predicate that does not provide an event variable:

(25)   a. Sundance es un festival anual.
            Sundance is a   festival annual
            'Sundance is an annual festival'
        b. Luis odia los exámenes semestrales.
           Luis hates the exams   six-monthly
           'Luis hates six-monthly exams'
        c. Luis teme los monzones anuales.
           Luis fears the monsoons annual
           'Luis fears annual monsoons'
        d. Juan adora tus fiestas semanales.
           Juan adores your parties weekly
           'Juan adores your weekly parties'

It is clear that an example like (25d), for instance, does not mean 'Once every week, Juan adores your party', showing again that the frequency adjective does not take scope over the verb in such cases. Nouns like *terremoto* 'earthquake', *tsunami* 'tsunami', *clase* 'class', *accidente* 'accident', *fiesta* 'party' or *cumpleaños* 'birthday', among many others, follow the same pattern. In the same way, complex event nouns derived from verbs show the same pattern: with them frequency adjectives are comfortably licensed without help of an event variable in the verb.

(26)　　a. Esto es una celebración anual.
　　　　　this is a　celebration annual
　　　　　'This is an annual celebration'
　　　　b. Juan odia sus observaciones diarias.
　　　　　Juan hates her observations　daily
　　　　　'Juan hates her daily observations'
　　　　c. Juan teme la intervención anual del FMI.
　　　　　Juan fears the intervention annual of-the IMF
　　　　　'Juan fears the annual intervention of the IMF'

What this suggests, compared to the previous minimal pair, is that a principle such as (27) applies to frequency adjectives.

(27)　　A frequency adjective will widen its scope until it finds an event variable

Consider from this perspective the three examples below:

(28)　　a. Juan fuma dos cigarrillos diarios.
　　　　　Juan smokes two cigarettes daily
　　　　　'Juan smokes two daily cigarettes'
　　　　　[For every day, there are two events where Juan smokes a cigarette]
　　　　b. Sundance es un festival anual.
　　　　　Sundance is a　festival annual
　　　　　'Sundance is an annual festival'
　　　　　[No scope above DP]
　　　　c. *Esto es un cigarrillo diario.
　　　　　　this is a　cigarette　daily
　　　　　*'This is a daily cigarette'

In (28a), the adjective does not find an event variable in its DP, so it has to take scope outside of it. It finds an event variable in the main verb that selects the DP as direct object, however.
　　　Now, consider (28b): this time the adjective finds an event variable in its DP, because the noun is a simple event noun. Thus there are no reasons for the adjective to take scope outside the DP.
　　　What goes wrong in (28c), then, is that the noun denotes an object and the verb does not provide an event variable, because it is an individual-level copula. The frequency adjective unsuccessfully looks for an event variable inside the DP and when it takes scope over the verb, there is still no event variable to link to. Thus, we get a case of vacuous quantification, which triggers ungrammaticality.

3.2 *Temporal adjectives*

So, why don't temporal adjectives move? The main difference between frequency and tense from a semantic perspective is that frequency is linguistically captured through an operator that requires an event variable, while tense is quite content without event variables. (29) shows that, beyond the specific case of frequency adjectives, the principle that frequency requires events is well-grounded empirically: *often, whenever* or *twice a day* all give ungrammatical results with individual-level predicates.

(29)   a. *Juan tiene miedo de las arañas frecuentemente.
           Juan has   fear   of the spiders frequently
          '*Juan fears spiders frequently'
        b. *Cada vez que Juan es español, ve un partido de fútbol.
            each time that Juan is Spanish, sees a match of football
          '*Whenever Juan is Spanish, he watches a football match'
        c. *Juan odia las alcachofas dos veces al día.
           Juan hates the artichokes two times at-the day
          '*Juan hates artichokes twice a day'

Such restrictions do not apply to tense.

(30)   a. Juan tenía miedo de las arañas.
           Juan had   fear   of the spiders
           'Juan feared spiders'
        b. Juan será español cuando apruebe este examen.
           Juan will-be Spanish when passes this exam
           'Juan will be Spanish when he passes this test'
        c. Juan odió las alcachofas toda su vida.
           Juan hated the artichokes all his life
           'Juan hated artichokes his entire life'

Roughly speaking, what tense needs semantically is to find a situation that one can place with respect to the utterance time. Thus we can propose the following descriptive generalisation:

(31)   A temporal adjective requires a situation under its scope

In order to have a situation, one just needs to have a set of properties that are possessed by some entity, a human, an object, etc. Clearly, this restriction is satisfied by any noun, assuming a predicative view of nouns –as the one advocated in traditional Montaguian semantics, where nouns have type <e,t> and the determiner, possibly a generalised quantifier (Barwise and Cooper 1981), is the one that turns them into type <e>–. In fact, note that temporal adjectives are fine with a wide range of nouns, independently of whether they denote humans, social relations and roles (the most frequent class with them, though), places or objects.

(32)   a. Juan es mi antiguo supervisor.
           Juan is my former supervisor

b. Este restaurante es un antiguo matadero.
    this restaurant is a former slaughterhouse
c. Toledo es la antigua capital de España.
    Toledo is the former capital of Spain

Some combinations produce infelicitous results, but this seems to be a conceptual restriction that rather has to do with our knowledge of the world, and specifically with how much we allow some sets of properties to be acquired or lost in the course of time periods. A few years ago, we probably would have judged a sentence of the form (33) as weird, but this was just because we would have assumed that being a Pope is a situation one does not lose until death. After Benedict XVI resigned, though, one started seeing (33) in corpora (as well as the prefixed version *ex-Pope*).

(33)   Ratzinger is the former Pope.

Similarly, other combinations of temporal adjective + noun that sound odd at first improve when given a more specific context:

(34)   a. These metal bars are part of my future house.
        b. These seeds are future apples, you will see how they germinate when we plant them.
        c. This Ph.D. dissertation is my former life, when I was writing it I did not have time for anything else.

Now, consider from this perspective why temporal adjectives do not take scope outside the DP: the temporal adjective requires a situation where a set of properties hold of an entity, and places that situation with respect to a temporal reference point. As nouns are predicates, nouns satisfy this requirement, and therefore temporal adjectives have no reason to scope above the verb or any other material outside the DP.

It is perhaps necessary to remind the reader at this point that here we are describing a semantic, not a syntactic restriction: having a situation is sufficient for the semantics of a temporal adjective to satisfy its requisites, but obviously additional morphological and syntactic principles must prevent other forms of temporal expression from being licensed inside noun phrases.

3.3 *Modal adjectives*

The opposite of temporal adjectives are modal ones; those must always escape from inside the DP in order to be interpreted. The question is why, and an important hint comes when we consider the semantic view of modality that is most widely accepted in the literature: quantification over possible worlds. Since the work of Kripke (1959, 1963) and Lewis (1968, 1973) –among others–, it has been proposed that modals are operators that take under their scope sets of worlds. Indeed, the force of a modal can be existential or universal. *John might have killed the emperor* means that there is at least one world that is similar enough to our actual world where John has killed the emperor, while *John must have killed the emperor* says that in every world that is similar enough to our actual world John has killed the

emperor, or in a clearer way of putting it, that the only conceivable worlds that are compatible with the information we have are those where John is the murderer.

This leads us to propose the following generalisation:

(35) A modal adjective must take under its scope a variable ranging over possible worlds.

Now, if nouns and DPs never contain variables ranging over possible worlds, then it follows that a modal adjective will have to be interpreted outside the DP, triggering the modality clashes we described in §1.3, among other effects. This suggests that the structure that we label as 'N' or as 'D' cannot include a possible world as its denotation. This is consistent with the current syntactic analysis of mood and modality, as presented for instance in Giorgi's (2009) analysis of *de se / de re* distinction with mental representation verbs, where a complete world semantics requires the contribution of several of the highest clausal functional projections, such us Finiteness and possibly a designated projection to represent the speaker and the addressee in the utterance. If a world semantics involves these high clausal projections, then nouns are expected to exclude those projections, because they are smaller than utterances, and consequently they should be unable to denote a world semantics. And, following our reasoning, if DPs do not contain a world semantics, then modal adjectives will have to escape from there in one way or the other.

The exception that confirms the rule in Spanish is a kind of infinitive structure. Stowell (1981) noted that under the morphosyntactic label of 'infinitive' we can differentiate several syntactico-semantic classes differing in factivity. The position was refined and further analysed by Zucchi (1993), who distinguished among several big classes of infinitives depending on their semantic contribution: from infinitives that denoted pure events (such as those selected by perception predicates) to those that denoted whole propositions and those equivalent to inflected subordinate clauses. The class of infinitives that is interesting for our purposes is precisely this last one: if they denote propositions and are equivalent to whole subordinate clauses, they might also be able to denote worlds, and thus license a modal adjective.

The problem is that infinitives that denote whole propositions are not always compatible with DP structures. However, in Spanish some verb classes which presuppose the truth of their complement (such as verbs of emotion) do allow DP structure over a subordinate clause. The reasons for this are not clear, but here we are simply going to take advantage of this fact in order to build a test.

(36) Me entristeció el que no vinieras.
      me saddened the that not come.you
      'It made me sad that you did not come.'

Similarly, the equivalent infinitives –preferred when the subject of both propositions is the same– allow D and denote propositions:

(37) Te entristeció el no venir.
      you saddened the not to.come
      'Not coming made you sad'

Now we can run a test: using one of these infinitives that allow D and denote propositions, we can build an example like (38).

(38)   Tal vez no te entristezca el seguro haber sido eliminado de la competición.
        perhaps not you saddened the certain have been eliminated of competition
        'Maybe your certain elimination from the competition does not sadden you'

Not all native speakers accept this sentence as perfectly natural, we must note. As it is because they would prefer a modal adverbial, and not an adjective, we will not comment on this fact. What concerns us here is the semantic interpretation. The elimination is presented as certain, but the feeling denoted by the main verb is presented as only possible. If the modal adjective escaped the DP headed by *el*, we should have a modality clash, but there is no clash, so the adjective does not escape in this case.

Given this example, the next question is whether there are deverbal nouns that can express possible worlds and therefore license the modal. The answer seems to be yes, because of the grammaticality (and interpretation) of the following sentence:

(39)   Tal vez no te entristezca tu segura eliminación.
        perhaps not you sadden your certain elimination
        'Maybe your certain elimination does not make you sad'

3.3 *First preliminary conclusions: the internal structure of licensing Ns*

Let us consider what the patterns shown up to now can tell us about the category squish and the deconstruction of what a noun is. If we look at the big picture, two contrasts seem to be prominent:

  a) Underived nouns are different from deverbal nouns or nominalised infinitives (remember the behaviour of modal adjectives)
  b) Simple event nouns are quite different from other classes of underived nouns (remember the behaviour of frequency adjectives)
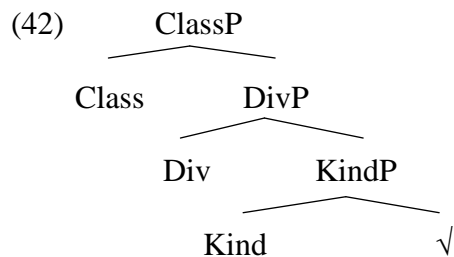
If we look at underived nouns first, what the result suggests is that what we call a noun (N) has to be decomposed in several layers. The crucial property of a noun seems to be that it is a predicate. Thus, the core of a noun is that it denotes a set of properties, something that we can represent in several ways, but that following standard practice in semantics we will call a kind (cf. Chierchia 1998, Zamparelli 2000). A kind denotes a set of entities defined by some (non scalar) properties (Kamp 1975).

(40)   KindP
           ⌒
       Kind   √

Many other heads would combine to express distinctively the other properties that are associated with a noun, but are not necessarily present: countability / mass distinctions could be distinguished, as proposed in Borer (2005), by a separate head, Div(isor), that dominates the head Kind and determines whether the set of entities are bounded or not.

(41)

```
          DivP
        /      \
    Div        KindP
              /      \
          Kind        √
```
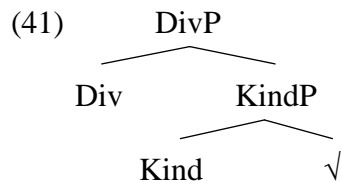
Gender or noun class, another prominent feature of 'nouns' in several languages, can be accounted for through a head Class (Picallo 2008) dominating Div.

(42)

```
          ClassP
        /       \
   Class        DivP
              /      \
          Div        KindP
                    /      \
                Kind        √
```

Now, simple event nouns would have to contain an event variable, which we will represent through another head, Ev. What is the position of Ev? One crucial property of simple event nouns is that their event reading is only possible in count contexts. Note the following pair, taken from Fábregas (2012):

(43)   a. Una guerra tuvo lugar en 1936.
            a   war   took place in 1936
        b. *Mucha guerra tuvo lugar en 1936.
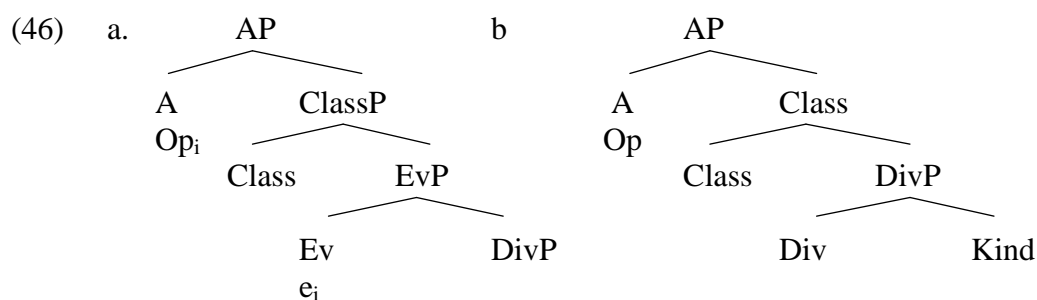   much   war   took place in 1936

Tener lugar 'take place' is a verb that selects as its subject a noun, derived or not, that denotes an event (*A table took place yesterday*). Note that the sentence is ungramatical when *guerra* 'war' combines with the singular quantifier *mucho* 'much', which forces a mass noun reading. The reason for the ungrammaticality is not that *mucho* cannot combine with *guerra* in other meanings, as witnessed by (44):

(44)   Ha habido mucha guerra en Europa.
        has been   much   war   in Europe
        'There has been much war in Europe'

Rather, what seems to be the reason is that the mass reading forced by *mucho* is incompatible with the count reading associated with the event interpretation required by *tener lugar*. Consequently, given this and the rest of the data discussed in Fábregas (2012), we conclude that eventive readings must be linked to countability. This can be expressed if Ev is a head that selects Div, which triggers the count reading. We can thus have (45a), a simple event noun, necessarily count; (45b), a count noun without an event reading; (45c), a mass noun without Div, but never (45d), a mass simple event noun, because Ev selects Div.[4]

(45) a. EvP   b. DivP

     Ev   DivP   Div   Kind

         Div   Kind

   c. Kind   d. *EvP

                Ev   Kind
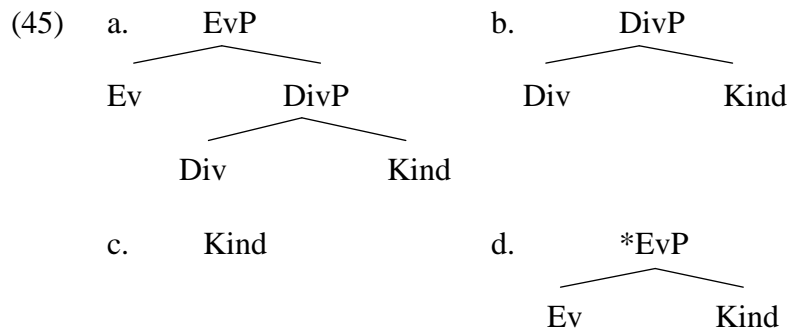
Now, let us introduce the frequency adjective into the picture. We assume, with Cinque (2005, 2010), that such adjectives are introduced above the structure that tradition has called N. There are two possibilities: either it dominates a structure with Ev or not.

(46) a. AP   b   AP

    A   ClassP   A   Class
    Op_i Op

       Class   EvP   Class   DivP

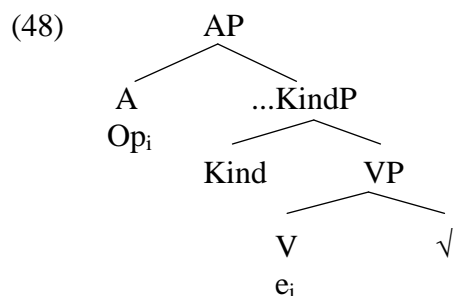   Ev   DivP   Div   Kind
        e_i

In the first case (*war, party, festival...*) the adjective, an operator, finds a variable of the adequate type under its scope, so it does not need to extend its scope. In the second case (*cigarette, cookie...*) there is no event variable, so the adjective will have to extend its scope outside of DP.
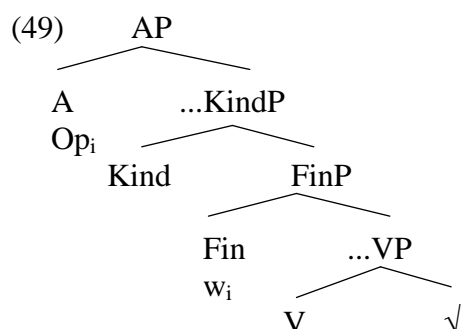
      Temporal adjectives just require a situation, a set of properties, and Kind satisfies it. If all nouns denote kinds (meaning, if all nouns are predicates), then the temporal adjective will not have any problem in situ, independently of the presence of any other head.

(47)   AP

    A   KindP
  former

      Kind   √
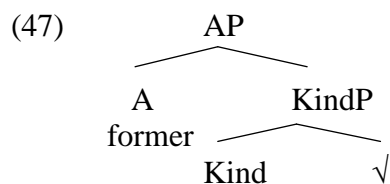
Consider now derived nouns and infinitives. The fact that they license modal elements suggests that they must have a richer structure. This is presumably due to the fact that they are derived from verbs, at least. At a minimum, they can carry with them, then, the aspectual and argumental positions that define verbs (see Ramchand 2008 for a proposal about how V is decomposed into smaller heads; for expository convenience here we will just use the label V), and with them, there will be both event variables and situations that will license in situ frequency and temporal adjectives.[5] In (48), we adopt Ramchand's proposal, where Init represents the head that codifies causation; Proc represents the head that encodes dynamicity and Res, the result state. This verbal structure can be then subordinated to Kind.

(48)

```
              AP
            /    \
          A      ...KindP
         Op_i    /    \
              Kind     VP
                      /   \
                     V     √
                     e_i
```

But the case of modal adjectives tells us that the verbal structure carried with the infinitive, which can be subordinated to Kind, can be considerably larger, including projections that codify world semantics –which we will represent as Fin–.

(49)

```
           AP
          /    \
        A      ...KindP
       Op_i    /    \
            Kind     FinP
                    /    \
                  Fin    ...VP
                  w_i    /   \
                        V     √
```

The conclusion, for the time being, is the following: in line with Ross's category squish proposal, if we take a traditional category like N as an object with linguistic reality, we will see that under the same heading we are classifying entities that have very little in common with each other: some include structure that is associated with verbs, if not whole sentences, while some simply denote a Kind. The differences between one subclass and the other have to do with which heads are contained inside the structure of each 'noun', thus capturing the family resemblance without the need to give up a structural account. Finally, which heads are contained in the representation of each noun affects the behaviour of some classes of adjectives, like frequency or modal ones: if the adjective does not find an adequate operator, it has to take scope outside the nominal structure in order to get it.

4. How do they extend their scope?

Now that we have made a proposal about why some adjectives take scope outside of the DP, why some don't and what this tells us about the category squish, we will discuss briefly what procedure grammar uses to obtain the extended scope relation. The proposal we are going to argue for is that in all these cases, and despite the preliminary conclusions that could be drawn from their semantics, the adjective does not need to leave the DP in order to extend its scope. This, in a way, explains the apparent problem of the isomorphism that we noted at the beginning of this article.

The configuration that we will argue for explains the extended scope is the one in (50), which we claim is obtained after non-phonological movement of the adjective inside the DP.

(50)

```
              DP
           ╱      ╲
      APᵢ           D
                 ╱     ╲
              D         ...tᵢ...
```
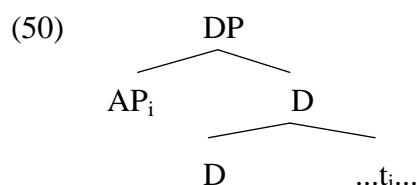
This configuration produces as a result that AP and D establish a formal relation. The scope extension that we have identified is due to AP taking advantage of the relations that D establishes with other components of the sentence, such as the verb and the CP layer that defines the contextual parameters of the sentence. Therefore, A connects to D, and D establishes relations external to DP –because it is selected by some verbs and because it establishes formal relationships with C–. Thus, by transitivity, A also connects with these constituents without leaving the DP.
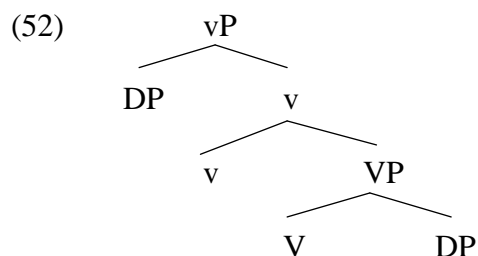
4.1 *Frequency adjectives*

Our analysis is that the frequency adjective takes scope over the event variable without leaving the DP, just by establishing a formal relation with the head D which indirectly is going to allow it to extend its scope.

We have seen cases where the frequency adjective takes scope over the event, but note that the cases that we have seen up to now are always cases where the DP is the internal argument of an eventive verb. The question is whether frequency adjectives can also be licensed when they are located in a DP that acts as an external argument. Consider the following piece of data (and see Bosque 2007 for a similar observation):

(51)   *Dos soldados diarios interrogan a un criminal de guerra.
          two soldiers   daily   interrogate A a criminal of war
         Intended: 'Every day, two soldiers interrogate a (different) war criminal'

If the DP that contains the frequency adjective is an external argument, the adjective does not seem to be able to take scope over the event. Why would this be the case? Even though we will show evidence that the adjective does not leave the DP, let us consider also, for the sake of clarity and exhaustivity, the analysis where the DP escapes the DP; this will allow us to make the empirical advantages of our analysis explicit.

Two potential explanations can be imagined: the first is that the frequency adjective literally takes scope outside of the DP by moving outside. We know that external arguments are specifiers of a verbal head (52), and we also know that specifiers are closed domains which normally do not allow extraction of their internal complements (the Condition of Extraction Domains of Huang 1982). Thus, one possible explanation is that external arguments do not let frequency adjectives take scope over the verb because in order to do so they should be extracted, and specifiers do not make this possible.

78

(52)

```
                    vP
                  /    \
               DP        v
                       /   \
                      v      VP
                           /    \
                          V      DP
```

However, there is a second possible explanation that does not take into account whether extraction is possible or not: that external arguments do not establish an aspectual relation with the event in the same way as internal arguments. Since Krifka (1989) –see also Tenny (1987), Verkuyl (1993), Ramchand (2008), among many others– we know that there is at least one class of internal arguments that map their denotation to that of the event that introduces them. These internal arguments are called incremental themes and are exemplified in (53).

(53)   a. to eat a sandwich
        b. to eat rice

In (53a), the event is interpreted as telic, and because of the comparison with (53b), where the event is atelic, we know that telicity is not an internal property of the event, but a reading that emerges in combination with the internal argument. What happens in (53a) is that the internal argument is an incremental theme, and this means that it is used to measure the event. *A sandwich* is a count nominal expression, that is, it denotes an entity with precise boundaries. Each moment in the progression of the eating event is matched with a part of the sandwich, and when the sandwich ends, the event ends. In (53b) the event is atelic because *rice* is a mass noun, a substance without precise boundaries: each part of the event is matched with a part of the rice which is consumed, but as the rice does not have boundaries, the event does not have boundaries because at no point can we say that the rice is finished.

External arguments do not have this property of being able to measure the event. Thus, we can explain the ungrammaticality of our interrogation example as follows: the frequency adjective never leaves the DP. Its scope over the event is caused by the semantic properties of the DP where it is included: if it is an internal argument that measures the event, the DP establishes a tight relation with the event, and the adjective, just by establishing a relation with D, the highest head in the argument, can access that relation with the event, therefore being semantically interpreted as scoping over the event. Thus, no movement outside of DP is necessary and isomorphism is more closely abided by.

How can we decide between these two options? We should take a look at internal arguments that are not incremental themes. If a frequency adjective is fine in such cases, then we know the extraction theory is better: in the internal argument position, the adjective can be extracted. In contrast, if the frequency adjective produces ungrammatical results with a non-incremental theme internal argument, then we know that the second explanation is better: there are no reasons to prevent extraction, but the DP does not establish a mapping with the event. The data support the second theory; consider (54), where the internal arguments are rhemes, entities that are displaced or affected in some way but whose referential properties are not mapped to the event.

(54) a. ??Juan conduce tres coches diarios.
          Juan drives three cars   daily
      Intended: 'Every day, Juan drives three cars'
      b. ??Juan empuja tres carritos diarios.
          Juan pushes three carts   daily
      Intended: 'Every day, Juan pushes three carts'

The direct object of verbs like *drive* and *push*, as noted for instance in Tenny (1987), are not incremental themes. As the second theory would predict, the frequency adjective is not licensed in that context, because the DP, even though it is an internal argument, does not measure the event, and thus does not establish a relation with the event that allows the frequency adjective to extend its scope.

   If this explanation is on the right track, then we expect that constituents which are not internal arguments but measure the event –that is, constituents that act as incremental themes of sorts– should license frequency adjectives inside them. If the adjective is not extracted, whether the constituent is an adjunct or an internal argument should not matter, because what the adjective cares about is whether the constituent that contains it establishes a direct measuring relation with the event or not. Consider the following data, which confirm this prediction.

(55) a. Juan conduce este coche veinte kilómetros diarios.
         Juan drives   this car   twenty kilometers daily
         'Every day, Juan drives this car for twenty kilometers'
      b. Juan empuja este carro durante tres horas diarias.
         Juan pushes this cart   during three hours daily
         'Juan pushes this cart for three hours every day'

The sentences are grammatical even though the adjective is inside what arguably is an adjunct constituent that measures the event through space (55a) or time (55b). This confirms the proposal that what counts here is whether the constituent is mapped to the event, and thus suggests an analysis where the adjective does not abandon the constituent and just gets linked formally to the highest head.
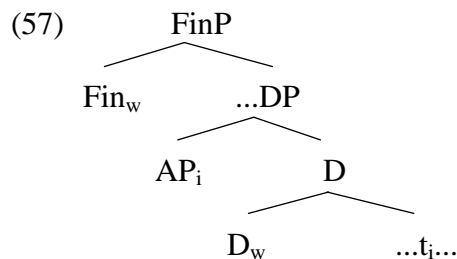
4.2 *Modal adjectives*

Consider now modal adjectives. As we noted previously, there is general agreement that modality is defined in a high clausal projection that is connected to the CP area, that is, the area where the proposition is anchored to a particular context of utterance. The question is, again, whether the modal adjective can be licensed inside a DP without escaping from it and moving to the CP area. That is, can we support for this case also an analysis like (56)?

(56)   DP
          ╱   ╲
      AP_i D
              ╱   ╲
           D   ...t_i...
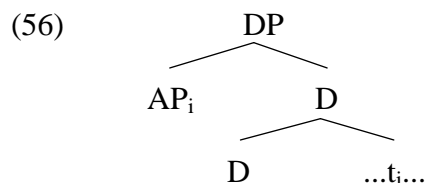
The full analysis of modal cases would take us further afield than the limits of this article allow us, so what we will do is to show that a structure like (56) is a good potential candidate to also explain the case of modal adjectives, rather than discarding all the other options (as we tried to do in the case of frequency adjectives).

The idea that we will argue for is that D gets anchored to the same contextual situation that is necessary to license the modality of a sentence. If D gets anchored to the context, and modality is also anchored to the context, the resulting configuration would be the one in (57), where the subindex w represents this anchoring. If AP, as we propose, establishes a relation with D, then by transitivity AP will access w, licensing its modality, without the need to abandon DP.

(57)

```
            FinP
           /    \
        Fin_w   ...DP
               /     \
            AP_i       D
                     /   \
                  D_w    ...t_i...
```

Consider first in what sense modality has to be anchored to the context of utterance. As Kratzer (2012) notes, modals must have other ingredients in addition to the modal force mentioned earlier: at a minimum, epistemic modality has to access the background assumptions of the discourse (roughly, 'what is known at a particular point') and there must be an ordering relation that arranges possible worlds according to their accessibility –that is, according to how similar or different they are from the present world, given certain parameters–. The accessibility of possible worlds changes dramatically depending on the background assumptions one makes at the point something is uttered, and thus clearly modals must be anchored to the context.

Consider now in what sense determiners must also be anchored to the context. Let us take something like the definite article *el* 'the', which impose a unicity presupposition –all and only the entities that satisfy a particular predicate–. It is quite clear that determining if the unicity requirement is fulfilled crucially requires access to a specific discourse context. A sentence like (58) is acceptable in a context where the set of entities in the world has been restricted to only those relevant in a particular discourse situation: obviously, in our world there is more than one entity that we can call 'umbrella', but the unicity is satisfied provided there is only one relevant object of this kind in our context –one we just mentioned, or the only one that is in the room where we utter this sentence–.

(58)   Recoge el paraguas.
        collect.imp the umbrella
        'Collect the umbrella'.

Thus, linking D to the context of utterance is necessary independently, and not just for the licensing of modal adjectives –see Elbourne (2005) for a detailed account, with many more pieces of evidence for this–. If D links to the context, then a modal adjective –which also needs to satisfy the accessibility relation of possible worlds– can take advantage of this anchoring and get licensed inside DP, without having to go any further.

5. Conclusions

This article started with the question of whether the syntactic bracketing paradoxes involving frequency and modal adjectives can be analysed in a way that does not lead us to give up the isomorphist hypothesis. We noted that the problem was actually wider than it seemed at first sight: the question is why we would expect that verbal properties can appear, at all, in a nominal context. This led us to Ross's category squish proposal, where our traditional grammatical categories are simply cardinal points in a space of properties that, in principle, different categories can share, and where single members can occupy a space that is intermediate between two or more traditional categories.

Now it is the time to see what our proposal and our data mean for the set of questions that we have been discussing in this article.

a) With respect to the category squish, we have seen that some nouns are actually able to license frequency and modal adjectives in situ, without requiring that they will extend their scope and interact with the interpretation of the clause. This offers support for the category squish: not all nouns behave in the same way, and it is possible to find different patterns that have to do with the number and nature of the internal projections that each member of the class of 'noun' contains.

b) With respect to the question of isomorphism, we have seen that whenever the adjective is not licensed in situ, we have not been forced to propose that it escapes the DP and takes scope in the semantics over a constituent which is different from the one where it belongs in the syntax. At least for the two cases that have been analysed in more detail here –frequency and modal adjectives– we have seen that the data and the observed restrictions are better captured by a proposal where the adjective stays in the DP and the widening of its scope or access to the higher clausal structure is due to the relations that the DP as a whole establishes with the external elements, specifically the verb that selects it as an incremental theme and the CP layer that anchors D to a context.

Notes

1 As noted by an anonymous reviewer, to whom we are grateful, other standard constituency tests support the proposed analysis. *Two daily cigarettes* can be substituted by a pronoun (*John smokes them*), move as a unit (*Two daily cigarettes John can smoke without a problem*), allow coordination (*John smokes two daily cigarettes and an occasional cigar*), etc.

2 An anonymous reviewer correctly points out that there are some classic cases where one could find, potentially, the same kind of mismatch between linear order and scope. One such case is the scope of negation. Take the sentence in (i) as an example (Huddleston and Pullum 2002: 794-795):

(i) Liz didn't delete the backup file intentionally.

Abstracting away from intonation, there are two readings: in the first the negation scopes over intentionally (Liz deleted the backup file, but it was not intentionally); in the second, the negated constituent is the VP (Intentionally, Liz did not delete the backup file). Of course, intonation –and

potentially other prosodic cues– disambiguate between the two readings. It is true that such cases are classically problematic for a one to one mapping between (some level of) syntactic representation and the interpretation. We will leave them aside, noting however that theories about focus –where the focus of negation is possibly one subcase– have traditionally discussed whether focus can be treated as a syntactic configuration, triggered by some feature, or should be rather understood as an emergent property at the interfaces with phonology and semantics –each one of them would determine differently whether (i) is indeed a syntactic bracketing paradox or not.

3 One could think that in some cases *former* or *future* take scope over the verb, particularly with a copulative verb: in a sense, one can think that *He is the former prime minister* is semantically equivalent to *He was the prime minister*, or that *She is my future wife* is the same as *She will be my wife*. However, there is evidence that it is not the case that the adjective escapes the DP. The reason is that there are no temporal clashes in any direction: any temporal value of the adjective is compatible with any temporal value of the verb:

(i)   a. In May, he will be the former Prime Minister.
      b. In May, he was the future Prime Minister.

Even though some have analysed conditionals as a past form of a future (e.g., Oltra-Massuet 1999), note that (ia) does not mean the same as *In May he would be the Prime Minister*, reinforcing the idea that the adjective does not escape the DP. Moreover, (ia) has a reading that unambiguously shows that the temporal adjective is interpreted within the DP: we talk about a future time where the person will have left the position of Prime Minister.
Possibly, the reason why *He is the former Prime Minister* is equivalent to *He was the Prime Minister* is the (absence of) conceptual input associated with a copulative verb: it establishes the syntactic relations necessary for predication (e.g., Den Dikken 2006), but the semantic content of that predication is contributed by *Prime Minister*, so a temporal modifier that affects this NP will necessarily affect the semantic content of the predication.

4 An anonymous reviewer notes that, despite the heterogeneity of the class, there are still some morphosyntactic properties that might grant the label N, at least in some discussions. I agree with this, but I would like to note that the shared properties of objects classified as N are extremely vague, even if we just consider one single language. Take, for instance, gender (of course, in a language like Spanish, where nouns are marked with gender and noun class). There are reasons to think that infinitives lack gender, at least in the sense that they do not display a gender marker, and that whenever combined with an adjective a form that can be analysed as neuter is used to satisfy the adjective's agreement. However, and beyond specific properties whose consideration will depend on specific analyses we are not in a position to develop right now, note that whatever the shared core properties of N turn out to be, in this proposal they would have to be expressed as properties of the lowest defining head in the hierarchy, in our case KindP. Admittedly, much more would have to be said about this.

5 An anonymous reviewer points out a potential problem of this analysis: the fact that derived nominals, among other asymmetries with their inflected versions, are unable to assign accusative case to their object.

(i)   John murdered Peter.
(ii)   the murder of Peter
(iii) *the murder Peter

This is admittedly a problem. There are already some solutions in the literature. Recently, Borer (2013) has analysed the contrast between (i) and (ii) as a language-specific (not universal) PF effect: the verb still has the capacity to case license its internal argument, but the morphophonological component dictates that in a nominal context that case licensing must be expressed through genitive rather than accusative. This would imply that case materialisation is not a syntactic phenomenon –while case licensing might still be–, and is thus performed either in a morphological component or as an effect of the spell out principles of a language. Our analysis,as it stands now, would have to accept this core idea.

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