37. Arguments and adjuncts

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Abstract

The article discusses analytical options for arguments and adjuncts in syntax and semantics. Selection and non-suppressibility are identified as two core properties of arguments. Adjuncts are shown to be open to a whole array of modeling options, both in syntax and semantics. The overall trend in Generative Grammar and other frameworks diminishes the territory of adjunction proper and extends the reach of analyses which treat most traditional adjuncts as arguments.

1. Introduction

Few dichotomies in linguistics are as underdetermined as the dichotomy between arguments and adjuncts. The basic intuition underlying the opposition is that two different kinds of dependence may be observed between two linguistic expressions E_1 and E_2. If E_1 is an argument of E_2, then the presence of E_1 in the construction together with E_2 satisfies a need or requirement of E_2 to become complete, or less incomplete; if E_1 is an adjunct of E_2, then, according to this intuition, the presence of E_1 in the construction together with E_2 has no import on the (in)completeness of E_2. (Many researchers would add that if E_1 is an adjunct, the presence of E_2 has an import on the (in)completeness of E_1.) On either construal, E_2 is the head of the construction, which means that it determines the category and distribution of the resulting structure (Bloomfield 1933: 195). A general consequence of all this is that arguments should, in some sense, be obligatory in a construction, and adjuncts optional. A competing term for "argument" is "complement" unless the argument is a subject, and a competing term for "adjunct" is "modifier". In some traditions, the terms argument and adjunct are restricted to the syntax, and complement and modifier are restricted to the semantics.

The research paradigms of Dependency and Valency Theory center around this basic contrast, leading to frameworks in which the dependency types of argumenthood and adjuncthood have a more basic status than the part-whole relation of constituency (Tesnière 1959; Engel 1983; Ágel et al. (eds.) 2003, 2006). Theories relying on constituency as the fundament of linguistic structure building will, by contrast, assign the two dependency types a somewhat secondary status in comparison with constituency.

The present article focuses on the constituent-structural implementation of the argument-adjunct dichotomy, and it does so with an eye on current developments in Generative Grammar and, to a limited extent, in Head-Driven Phrase Structure Grammar (HPSG). Notwithstanding this orientation, it will be made clear in numerous places what the general analytical options are irrespective of the particular framework chosen here.

Argumenthood may be an ambiguous notion (more on this in a moment), but it is uncontroversial as such. One of the most general modeling tools that science has at its disposal are functions, and functions take arguments. The arguments in linguistic theories are just this: arguments of functions in the mathematical sense (3.4.). There is an ambiguity in the use of the linguistic term argument, though. It lies in the contrast between syntactic and semantic arguments. Syntactic arguments are arguments of syntactic functions, which map syntactic

categories onto other syntactic categories. On an incremental reading of X-bar Theory (Jackendoff 1977), a constituent of category V taking an NP/DP argument will, for instance, be mapped onto a category of category V′. Semantic arguments are arguments of semantic functions, which map denotations onto other denotations. The CAPITAL-OF function, for instance, if it takes Italy as its argument, will yield Rome as output. The ambiguity does not seem to do much harm; we will often use the term "argument" without the adjunct "semantic" or "syntactic" if the context is sufficiently specific.

By contrast, the problems with adjuncthood are numerous. First, there is no single uncontroversial modeling tool for adjuncts. This holds both in semantics (4.2.) and in syntax (4.3.). Second, there is a trend to level out the difference between arguments and adjuncts such that adjuncts, too, are increasingly seen to be just arguments of a special kind of function morphemes with abstract content (4.3.2.). For uncontroversial arguments, at least for the non-internal ones, it is similarly argued (in Generative Grammar) that they are arguments of functions/heads of the same general kind that also accommodate adjuncts (3.1.). The combined effect of these trends is that the difference between arguments and adjuncts disappears. The effect is further strengthened by a variety of observations that intuitive adjuncts do influence the syntactic distribution and the semantic type of the categories in which they occur (4.3.2./4.3.3.), thereby threatening one of the hallmark properties of adjuncts, viz. endocentricity. Other researchers aim at giving the adjunct notion positive content by splitting it up into several sub-notions ordered along a scale of argumenthood or adjuncthood. Storrer's (2003: 774) work belongs in this tradition, with its six different categories operationalized by an algorithm of four tests with two to three output values each. Jacobs (1994) was the first to emphasize on a principled basis that the problems with the argument/adjunct dichotomy can be seen as a consequence of the fact that the dichotomy actually captures a multitude of contrasts to be analyzed independently. We will introduce important components of Jacobs' (1994) proposal in the section which deals with basic theoretical concepts (sect. 2.) and relate back to them throughout the text.

The article uses mostly data from the domain of attributive/adnominal adjunction for exemplification (as opposed to adverbial/clausal adjunction). The reader is referred to Maienborn and Schäfer (2012) and Article 10 of the present handbook for more discussion of adverb(ial)s.

The so-called cartographic tradition is given much space in our survey. The term *cartographic* characterizes proposals which aim at universal syntactic hierarchies for a multitude of fine-grained syntactic categories instead of relying on traditional endocentric adverbial or adnominal adjunction; cf. 4.3.2. for basic assumptions. Two outstanding works in the cartographic tradition dealing with adverbial and adnominal adjunction/modification are Cinque's (1999, 2010) books. While the present overview aims at compatibility with Cinque's proposals, it cannot reach their finegrainedness. Moreover, our survey article aims at a combined syntax-semantics perspective which maps distributional regularities onto options for semantic composition, and requirements of semantic composition onto options for syntactic implementations.

A note on terminology: the use of the term argument in this article always signals that, in the discussion at hand, a syntactic or semantic function/predicate is assumed which takes the respective argument, if only for expository reasons; the use of the term adjunct, by contrast, is agnostic. It just signals that the phenomenon at hand was classified as adjunction, or modification, by some author.

2. Two basic properties of arguments and adjuncts

2.1. (Non-)Suppressibility

As noted in the introduction, theories of argument structure assume that arguments are, in some sense, necessary constituents; deleting them should lead to ungrammaticality or some

kind of deviance. This diagnostic is clear for the object in (1a), but it fails with the object of verbs like *eat* in (1b), and it yields no contrast between (1b) and (1c/d).

(1) a. *Mary reached* *(***Estonia***).
b. *Paul is eating* (***a pizza***).
c. *Eddie made* (***Lisa***) *a cake*.
d. *Eddie made a cake* (***for Lisa***).

Despite the omissibility contrast between (1a) and (1b), and the non-contrast between (1b) and (1c/d), most researchers will aim at a theory which categorizes both *Estonia* and *a pizza* in (1) as arguments, and not just *Estonia*. At the same time, (*for*) *Lisa* in (1c/d) would, for many researchers, be adjuncts even though these constituents behave no different from *a pizza* if syntactic omissibility is the criterion. However, if the non-omissibility criterion of argumenthood (cf. Jacobs' 1994 *obligatoriness*) is conjoined with a second, semantic, criterion as in (2) (cf. Jacobs' 1994 *participation*), then we may arrive at a better diagnostic.

(2) Non-suppressibility of arguments
A constituent C of a simple declarative non-negated sentence S is an *argument* iff
(i) S is ungrammatical without C, or
(ii) S is grammatical without C, but entails the C relation
(where "the C relation" is the semantic relation that links the content of C to the eventuality described by S).

(2) will declare (1a) an argument, because (i) is fulfilled. It will declare (1b) an argument, because (ii) is fulfilled; *Paul is eating* entails that there is something that Paul eats. It will, finally, declare (1c) an adjunct, because (ii) is not fulfilled; *Eddie made a cake* does not entail that there is someone who is made a cake. Similarly, (1d) may be an adjunct, because (ii) is not clearly fulfilled; *Eddie made a cake* does not straightforwardly entail that some other eventuality was tied to it (a person's intended benefit or detriment, for instance). To be sure, (2) contains a disjunction, but this is the price to pay if non-suppressibility is to be criterial both in the syntax and in the semantics, as appears to be desirable. The defect of the criterion lies elsewhere. We will see throughout the article that it is not at all easy to decide whether a given lexical item or construction "entails the C relation" or not.

The complementary criterion for adjuncts, which is to be regarded with the same reservations as (2), will then come out as in (3).

(3) Suppressibility of adjuncts
A constituent C of a simple declarative non-negated sentence S is an *adjunct* iff
(i) S is grammatical without C, and
(ii) S without C does not entail the C relation.

2.2. Selection

The second property that is almost invariably put to use to distinguish arguments from adjuncts is what I call *selection* here. The term selection is to capture the potential of a linguistic expression E_1 to impose certain restrictions on a co-occurring expression E_2. Traditionally, a verb governs the case of its object, i.e. it imposes a morphosyntactic restriction on a co-occurring expression. Hence, case government is an instance of morphosyntactic selection (Jacobs' 1994 *formal specificity*). At the same time, a verb will also impose semantic subcategorization requirements that its object must fulfill. Referents of objects of *eat*, for instance, must be tangible, whereas referents of objects of *think through* may not. These are instances

of semantic selection or presuppositions/subcategorization requirements (Jacobs' 1994 *content specificity*; cf. 3.4. for its formal implementation).

Adjuncts, by contrast, may be said not to fulfill selectional requirements. On the face of it, nothing in *make a cake* requires the presence of a PP, or a PP with a specific semantic content, as is adjoined in (1d). As such, adjuncts may be said not to be selected. Instead, one may say that adjuncts themselves select the type of their host. In the case of *for Lisa* in (1d), for instance, the constituent to which the PP adjoins must be one which describes a volitional action.

Just like (non-)suppressibility, the notion of selection has problems tied to it. While no grammar theory that I know of makes do without selection, the direction of selection may be a matter of debate for a single co-occurrence of two linguistic expressions. This blurs the distinction between arguments and adjuncts again, and it does so in a fundamental way, as can be seen throughout the article.

Selection leads to structure building, or defines relations within an existing structure, in all sufficiently formal grammar models, among them Mainstream Generative Syntax, mainstream type-driven formal semantics, Categorial Grammar, Head-Driven Phrase Structure Grammar and unification-based grammars.

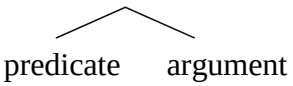
3. Dimensions of the argument notion

3.1. discusses the tree-geometrical regularities of argument taking. 3.2. illustrates the content of 3.1. with the help of two case studies. 3.3. deals with the semantic modeling of predicate-argument relations.

3.1. Syntactic positions of arguments in constituent structures

It would seem that, in a constituent structure, sisterhood should be the natural tree-geometrical relationship between a predicate and its argument. A predicate combines with an argument (restricted by selection), and the resulting structure assembles the two sister nodes of predicate and argument under the mother node. This is schematically depicted in (4) (linearization is irrelevant here and in the following).

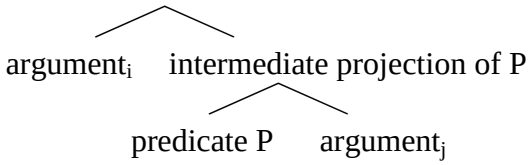
(4) Predicate-argument constituent I



While it is true that sisterhood remains indispensable for the complementation of predicates, certain developments in the Generative tradition, especially the cartographic approach, have led to a downgrading of sisterhood as the privileged tree-geometrical configuration of complementation, and to an upgrading of the specifier-head relationship (i.e. a relationship that shares more tree-geometrical properties with prototypical modifier constructions than with complements that are sisters of heads). This development is ultimately a consequence of Generative Grammar's quest for a universal syntactic and semantic decomposition of natural languages, and it will have similar repercussions in other frameworks. For these reasons the upgrading of specifier-head relationships to model complementation is a feature of Generative Grammar that we will look at in some detail. Its discussion will, moreover, provide necessary background for the treatment of the different ways in which adjuncts can be accommodated.

Predicates with more than one argument are a domain where specifier-head relationships (or their notational variants) have always played a role in complementation (provided binary branching is assumed). Thus, a typical way to represent the syntax of a transitive verb, or the syntax of a ditransitive VP, is as in (5).

(5) Predicate-argument constituent II

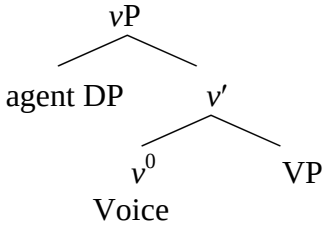


In a structure as in (5), argument$_i$ is the subject of a transitive verb, or one of the objects of a ditransitive verb. Argument$_j$ is the direct object, or the other object of the ditransitive construction. Argument$_i$ is in a specifier position. To sum up, predicates with more than one argument have always given rise to arguments in specifier positions. The two case studies to follow illustrate why the specifier implementation of arguments has gained in importance in current stages of Generativism.

3.2. Case study I: transitive agentive-causative structures

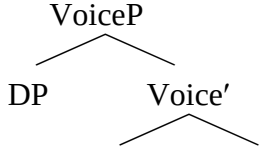
Chomsky (1993, 1995) introduced little *v*, i.e. a functional category to mediate between VPs and the functional structure above VP (chiefly Tense/TP, formerly IP). With little *v* in place, subjects were no longer introduced as specifiers of V (or of I, if no VP-internal subject analysis is adopted), but of *v*. Kratzer (1996; inspired by earlier work by Marantz 1984) delivered a semantic interpretation of little *v* (cf. Horvath and Siloni 2002 as opponents of the Little-*v* Hypothesis). In sentences with an agentive semantics it is a voice head which introduces the agent theta role of the event at hand. As such, it selects the agent DP as its specifier. The denotation of the VP itself no longer takes recourse to an agent argument. For this reason, Kratzer's theory leads to agent severance – the agent is cut off the VP. The resulting structure is depicted in (6). (I often use X-bar notation in this article; this is done to ensure recognizability across frameworks, but I assume those representations to have notational variants in Bare Phrase Structure.)

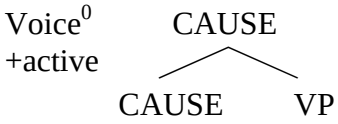
(6)



In (6) the agent/subject DP in Spec*v* is no longer selected as an argument of the same predicate as the direct object in VP. It is the outer argument of *v*, and *v*'s inner argument is VP. Agent severance thus constitutes a first example of what is meant by the upgrading of specifier-head relationships to accommodate arguments in the structure in recent Generativism. Part of the meaning and part of the syntactic selection potential of former V heads have been sourced out to a functional projection of its own. As a consequence of this move, the single DP argument of *v* is in Spec*v*. The sister position of *v* accommodates the VP argument, or complement, of *v*. Kratzer (2005) further radicalizes the structure of agentive causative predications by disentangling *v*'s causative and agentive semantics. A tree as in (7) will then have a denotation as in (7′) with the VP only denoting resultant states.

(7)





(7′) ‘The referent of DP is the agent of an event e & e causes a state s & s is of the VP type.’

As said above, cascades of functional projections with binary branching render specifier positions the norm for classical arguments. The sister constituent of such functional heads will host the next lower phrasal category. To be sure, these sister constituents are arguments, too, but they are so in a more theory-dependent way than the specifier arguments. Functional heads like Voice/*v* or CAUSE will be called F-heads henceforth (F for *functional*). Only at the bottom of a given projection line does sisterhood in a current Generative tree signal a more traditional predicate-argument structure as in (4) (an example would be the [$_{PP}$ P DP] constituent in a structure like [*Paul* …[+active [CAUSE [*jumped* [$_{PP}$ *onto* [$_{DP}$ *the table*]]]]]]). Heads taking such traditional arguments as sisters/first arguments will henceforth be called L-heads (L reminiscent of *lexical*).

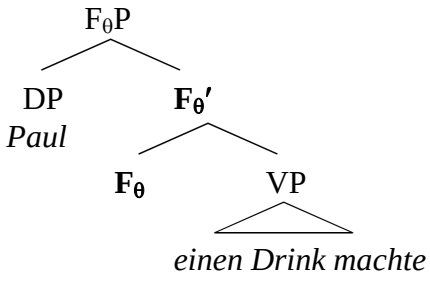
Summing up, the ongoing (and controversial) proliferation of functional categories in Generative Grammar reverses the prototypical tree-geometry of complementation. While sisterhood is still a possible configuration to form predicate-argument constituents with L-heads, most arguments (in a traditional sense) are accommodated in specifier positions of F-heads. Section 4.3. below will address the proliferation of F-heads in more detail and will aim at linking it to empirical generalizations.

3.3. Case study II: German free datives vs. beneficiary PPs

Consider the examples in (8) and (9) for exemplification of the contrast between predicates on and off the main projection line.

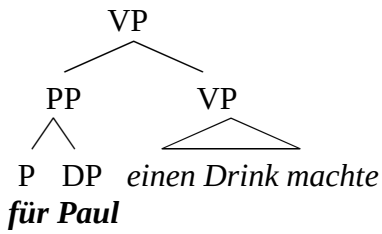
(8) a. … *dass* *er* [***Paul*** [**F$_\theta$** [*einen* *Drink* *machte*]]]. [German]
that he Paul.DAT a drink made
‘…that he fixed Paul a drink.’

b.



(9) a. … *dass* *er* [[***für*** ***Paul***] [*einen* *Drink* *machte*]]. [German]
that he for Paul a drink made
‘…that he fixed a drink for Paul.’

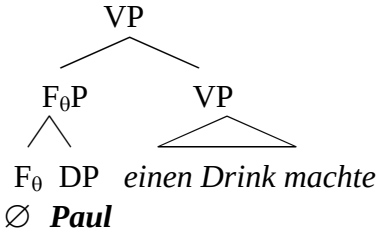
b.



(8) is a German example with a dative not subcategorized-for, or selected, by the verb. (9) is a structure with a similar denotation, but the DP that was coded as a free dative in (8) has been replaced by a PP. The verb has been chosen so as to allow for a parallel contrast in English. Either structure entails that (the speaker thinks that) the subject referent considered Paul to have a benefit of (the fixing of) the drink. (8) has an F-head on the main projection line which licenses the argument position of the dative DP and denotes its thematic relation (beneficiency according to Pylkkänen 2002, a modalized experiencer relation according to Hole 2008, with the beneficiency entailment stemming from purposive structure inside the VP). Now, while both the preposition *for* and the thematic role head F_θ denote the predicate which selects Paul in the event described by the complete structure, F_θ is an F-head, and *für* is an L-head (3.2.). One interesting detail about the structure of (8) is the different syntactic form that adjunct-thood takes here if compared with (9). The adjunct construal in (9) is "self-contained" in the sense that the presence of the adjunct makes no difference on the main projection spine; the lower VP is dominated by another VP. Things are different in (8). Here the adjunct-like dative DP is, syntactically speaking, not an adjunct at all. It is dominated by the F category headed by the F-head introducing a thematic role. Therefore, at the level of F′, the DP *Paul* is a clear argument, and not an adjunct. Only if one takes the VP level as the point of reference may the complete F-structure on top of the VP count as an adjoined structure. But then again, this purported adjunction takes the form of a headed structure which determines the category of the highest category, i.e. FP, thereby defying the definitional adjunct property of endocentricity.

Given that the functional element licensing the DP *Paul* in (8) has no phonetic content, how can it be decided whether it sits on the main projection line, or whether it forms a constituent with *Paul* just like the preposition in (9)? The latter option is depicted in (8b′).

(8′b)



An argument in favor of (8b), and against (8′b), comes from the linearization options that free datives have in comparison with other *bona fide* dative arguments and in comparison with PPs. It turns out that the bare dative DPs pattern with other bare DP arguments, and not with PPs. This is shown in (10) and (11).

(10) …*dass er* ***(für den Gast/ dem Gast)*** *einen Drink machte*
that he for the guest/ the.DAT guest.DAT a drink fixed
(***für den Gast/ *dem Gast***) [German]
for the guest/ the.DAT guest.DAT
'…that he fixed a drink for his guest.'

(11) … *dass er* ***(dem Gast)*** *half* ***(*dem Gast)***. [German]
that he the guest.DAT helped the.DAT guest.DAT
'… that he helped his guest.'

Just like other dative arguments not suspected for being hidden PPs (the dative with *half* 'helped' in [11]), the free dative may not surface in postverbal position in embedded clauses. This extraposed position is a natural position for PPs as in (10), especially for heavy PPs.

A second argument for the analysis involving F_θ on the main projection line comes from languages that have overt thematic morphology in translational counterparts of (8). Bantu and Kartvel/South Caucasian languages have such verbal markers (the traditional category name is *applicative* in Bantu linguistics, and *version* in Kartvelian linguistics). Since this verbal morphology is affixed to the verb just as other verbal categories like aspect or tense are, it can be concluded that the tree-geometry is likewise analogous: since aspect and tense are projections on the main projection line, F_θ is, too. Two examples are given in (12). (The Georgian example features additional complexity; F_θ is spelled out as the character vowel *-i-* for the objective version/voice on the indirect object person marker *-m*(*i*)- adjacent to the verb stem.)

(12) a. *Chitsiru chinagul-**ir**-a* ***atsikana*** *mphatso.* [Chichewa; Bantu]
fool bought-APPL-FINAL.VOWEL girls presents
'The fool bought the girls presents.' (Marantz 1993: 121)

b. *man mo-**mi**-p'ara* (*me*) *vašli* [Georgian; Kartvel]
(s)he has-1SG.OBJECTIVE.VERSION-stolen to.me an.apple
'He stole an apple for me.' (Boeder 1968: 94; my gloss, D.H.)

3.4. Functions and arguments I: Basic modeling tools

The reason why arguments are called arguments is because they are viewed as arguments of functions in the mathematical sense. On the semantic side such functions may, depending on the phenomenon at hand and the theory used, have different kinds of entities in their ranges: individuals (in the case of definite descriptions); truth values (with sentences in those branches of formal semantics subscribing to a Fregean program; Heim and Kratzer 1998 and many more); events or situations (with sentences in some branches of event and situation semantics in the tradition of Kim 1966); and whatever a given semantic theory assumes to be a semantic type primitive. On the syntactic side an argument may be seen as an input to a function which maps one syntactic category onto another such that a function f (say, V) which takes an argument of a specific category as input (say, DP) yields an output of the kind determined by f (say, V′). Further details depend on what precise syntactic framework is chosen. Within Generative Grammar, the most important difference at the time of writing is whether a version of X′-theory is assumed (Jackendoff 1977), or whether Bare Phrase Structure is given preference (cf. Art. 24).

Over the past decades, the lambda calculus (Church 1936) has widely gained ground in the representation of lexical entries for functions and arguments in composition. This holds true not just in semantics, but also in morphology and formal pragmatics. For this reason, the conventions of the lambda calculus in the variant used by Heim and Kratzer (1998) are briefly introduced here. (13a) is the general format (to be explicated below), and (13b) presents an example, the lexical entry of *red*; the interpetation brackets symbolize the function from linguistic expressions to denotations, which applies at the interpretive interface. (13c) illustrates lambda conversion/Functional Application, i.e. how the function applies to an argument; the copula is ignored for ease of exposition, but could easily be rendered functional. (14) is an example with mathematical content for comparison.

(13) a. λ<variable> : <domain restriction> . <truth-conditions/description of the value>

b. $[\![red]\!] = \lambda x : x \in D_e$ & x is visible . x is red

c. $[\![The\ rose\ is\ red]\!] = [\![red]\!]([\![the\ rose]\!])$
$= \lambda x : x \in D_e$ & x is visible . x is red(the rose)
= 1 if the rose is red, and 0 otherwise

(14) $\lambda x : x \in |R^{+} . \sqrt{x}(25) = \sqrt{25} = +/-5$

(14) represents the square root function as a lambda-term. The domain of the function is restricted in that portion of the term which follows the colon and precedes the full stop. The domain is restricted to the real numbers. A shorthand for the notation of such a domain restriction is $\lambda x_{|R^{+}}$. Since the range of the (reverse) square function only has positive numbers in it, the domain of the root function must fulfill the same condition. In a similar vein, the domain of the *red*-function in (13b) is restricted to the domain of individuals which are visible – x must be from the intersection of D_e, the subset of the domain of entities D which has all and only the individuals in it, with the set of visible entities. The truth-condition to the right of the period delivers a truth-value for each member of the domain so restricted, either 1 for true if the visible individual is red, or 0 for false if it is not. With the domain of ⟦*red*⟧ restricted to the visible entities, a sentence like *Love is red* will, on a literal reading, not be true or false, but its truth-value will be undefined. The mapping to truth-values is a convention which is not made explicit in (13b); just the truth-conditions themselves are stated. This is different in the mathematical example (14). In that example, the part to the right of the dot features the value description. If one were to render (13b) more similar to (14) one would have to write ⟦*red*⟧ = $\lambda x : x \in D_e$ & x is visible . 1 if x is red and 0 otherwise. The general term in (13a) comes out as follows in natural language (for functions with truth-values in their range): *that function which maps every* <variable> *such that* <variable> *fulfills* <domain restriction> *to 1 if* <variable> *fulfills* <truth-conditions>*, and to 0 otherwise*. The domain restrictions in (13) are the general way to write down presuppositions or subcategorization requirements (semantic selection). They are really just that: domain restrictions, in the sense that the whole function only delivers a value if the argument is taken from the set singled out by the domain restriction (Heim and Kratzer 1998, implementing a philosophical tradition going back to Frege [1892] 1994 and Strawson 1950).

There is a useful and widespread notational convention to write down the semantic type of a given one-place function as an ordered pair of input and output types. A function of type ⟨e,t⟩, for instance, is a function from (the domain of) individuals (type e) to (the range of) truth-values (type t). This way of writing down semantic types is a good way to render the argument-taking potential of complex lambda terms visible at a glance.

(15) Examples of lambda terms and argument saturation with different categories

	TYPE OF PREDICATE	EXAMPLE	LAMBDA TERM	PARAPHRASE	EXEMPLIFICATION OF ARGUMENT SATURATION BY FUNCTIONAL APPLICATION
one argument/type ⟨e,t⟩				‘that function which maps every x such that x is an element of D_e (the domain of individuals) to 1 (true) if x …, and to 0 (false) otherwise’	
	adjectival I	*The rose is **red**.*	λx_e . x is red	…is red…	λx_e . x is red(the rose) $= \left\{ \begin{matrix} 1 \text{ if the rose is red} \\ 0 \text{ if the rose is not red} \end{matrix} \right\}$ = 1 iff the rose is red
	nominal	*The flower in the vase is a **rose**.*	λx_e . x is a rose	…is a rose…	λx_e . x is a rose(the flower in the vase) = 1 iff the flower in the vase is a rose

	verbal I	*Paul* ***sleeps.***	λx_e . x sleeps	…sleeps…	λx_e . x sleeps(Paul) = 1 iff Paul sleeps
two arguments/type ⟨e, ⟨e,t⟩⟩				that function which maps every x such that x is an element of D_e (the domain of individuals) to that function which maps every y such that y is an element of D_e to 1 (true) if y …x, and to 0 (false) otherwise	
	adjectival II	*Mary is proud of Paul.*	λx_e . λy_e . y is proud of x	…is proud of…	λx_e . λy_e . y is proud of x(Paul)(Mary) = λy . y is proud of Paul(Mary) = 1 iff Mary is proud of Paul
	verbal II	*Mary loves Paul.*	λx_e . λy_e . y loves x	…loves…	λx_e . λy_e . y loves x(Paul)(Mary) = λy_e . y loves Paul(Mary) = 1 iff Mary loves Paul

Frequently, a predicate takes n-many arguments, with n>1. In this case there are two ways to go ahead. Either the function written down as a lambda-term takes an n-tuple as its argument. The other option is to apply one argument after the other, which means that the first function is, after the first instance of Functional Application, mapped to one intermediate function (in the case of two arguments), before the application of the second argument leads to the final output. This piece-meal kind of saturation with, as it is called, schönfinkeled, or curried, functions (Schönfinkel 1924), is the way to go in a binary branching syntax in which each syntactic node is to have a denotation. The semantic type of a transitive verb, for instance, will then come out as ⟨e,⟨e,t⟩⟩, a function from individuals to [a function from individuals to truth-values]. Exemplification is provided for the transitive adjectives and verbs in (15). Domain restrictions that go beyond those which are commonly represented as indices are left out.

4. Dimensions of the adjunct notion

There is a confusing array of proposals to get a theoretical grip on the adjunct notion. This holds both in syntax and semantics. For this reason the present section assembles discussions of dichotomies (and one four-way distinction) which all divide the class of adjuncts into complementary subclasses. Which of these modeling tools are made use of is a matter of theoretical persuasion, desired granularity for the discussion of the issue at hand, and taste. Not all of the empirical phenomena discussed in this section are classified as adjunction phenomena by all researchers. But each dichotomy has figured in the classification of (subclasses of) adjuncts in the literature.

4.1. The major split: attributes vs. adverb(ial)s

The dichotomy of attributes vs. adverb(ial)s is probably the best-known partition of the adjunct or modifier class. Simplifying somewhat, one may say that attributes are adjuncts of nominals; adverb(ial)s are adjuncts of non-nominals. The second-level dichotomy of adverbs vs. adverbials usually concerns the phrasal status of the adjunct: adverbs are words/terminal nodes, whereas adverbials are phrases (this does not preclude adverbs from being analyzed as being dominated by non-branching phrasal nodes in a given theory). English and Romance are among those languages that distinguish adverbial uses of predicative adjectives from at-

tributive uses by suffixation of an adverbial marker (*-ly* in English, *-mente* in Italian). Examples are given in (16) and (17).

(16) a. *a* [***wise*** *reply*]
b. *She* [*replied* ***wise-ly***].

(17) a. *una* [*risposta* ***sapiente***] [Italian]
a reply wise
'a wise reply'
b. *Lei* [*ha* *risposto* ***sapiente-mente***]. [Italian]
she has replied wise-ly
'She replied wisely.'

It was stated above that characterizing attributes as adjuncts of nominals involves a simplification. The simplification lies in the fact that not each adjunct within a nominal is an attribute, which can easily be seen from an example like *the frequently useless purchases*, where *frequently* is an adjunct inside the larger nominal, but an adverbial adjunct (as opposed to an attributive adjunct). The reason for this is, of course, that *frequently* is an adjunct of *useless*. As such it is an adjunct inside a nominal, but not an adjunct of the nominal proper, but an adverbial adjunct of *useless*. In terms of binary branching constituent structures this means that an adjunct of a nominal is an attribute if and only if it, or its maximal projection, is on the main projection line of the nominal.

4.2. Modes of semantic construal for adjuncts

The four-way distinction dealt with here is one concerning principles of semantic composition. If one aims at a close syntax-semantics fit, the differences in composition principles may lead to syntactic reflexes and *vice versa*. A summary of the possible matchings of composition principles and syntactic categories is deferred until 4.10.

4.2.1. Functions and arguments II: implementations for adjuncts

The first possible semantic construal for adjuncts is to have one of the two elements to be combined denote a semantic function or predicate, and the other one its argument. This is no different from the situation with syntactic predicates and arguments discussed in section 3. What is different in the case of adjuncts is that the adjoined element may, on the semantic side, easily be either a predicate or an argument, depending on the construction at hand and the construal chosen.

The first option is to construe the adjunct as the semantic predicate, and its sister as its argument; cf. (18). This the traditional view in Dependency Theory and Categorial Grammar which holds that modifiers or adjuncts are predicates, but a kind of predicate which, after it has combined with its argument, results in an expression of the type of the argument, and not of the type of the predicate (endocentricity). It is also the standard treatment of adjuncts in HPSG (Pollard and Sag 1994); but see 4.3.3; scenario 1 below. A consequence of this view is that the adjunct selects its sister constituent in the sense of 2.2. On this view, *red* in *red ball* is a predicate which has an argument position for a (nominal) predicate and yields a (nominal) predicate as its outcome.

(18) a.	example	***red***	*ball*	(construal A)
b.	predication	predicate	argument	
c.	types	$\langle\langle e,t\rangle,\langle e,t\rangle\rangle$	$\langle e,t\rangle$	
d.	denotations	$\lambda f_{\langle e,t\rangle} . \lambda x_e . red(x) = f(x) = 1$	$\lambda x . ball(x)$	
e.	composition by Functional	$\lambda f_{\langle e,t\rangle} . \lambda x_e . red(x) = f(x) = 1[\lambda x . ball(x)] = \lambda x_e . red(x) = ball(x) = 1$		

	Application	'that predicate which is true of all and only the red balls', i.e. that characteristic function from individuals x to truth-values which yields 1 iff x is red and a ball, and 0 otherwise

The second guise of predicate-argument construals for adjunction is the reverse of the first one: The adjunct is the argument now, and the category that it adjoins to is the predicate (selection originates in the syntactic sister of the adjunct now). This is exemplified for the same example as in (18) above, and for two more examples in (20) and (21). The likely concern of some readers that this appears to make less sense for (19) than for the other examples will be addressed shortly.

(19) a.	example	***red***	*ball*	(construal B)
b.	predication	argument	predicate	
c.	types	$\langle e,t\rangle$	$\langle\langle e,t\rangle,\langle e,t\rangle\rangle$	
d.	denotations	λx . red(x)	$\lambda f_{\langle e,t\rangle} . \lambda x_e$. ball(x) = f(x) = 1	
e.	composition by Functional Application	$\lambda f_{\langle e,t\rangle} . \lambda x_e$. ball(x) = f(x) = 1[λx . red(x)] = λx_e . ball(x) = red(x) = 1 'that predicate which is true of all and only the red balls', i.e. that characteristic function from individuals x to truth-values which yields 1 iff x is red and a ball, and 0 otherwise		
(20) a.	example	***Canadian***	*national anthem*	
b.	predication	argument	predicate	
c.	types	$\langle e,t\rangle$	$\langle\langle e,t\rangle,\langle e,t\rangle\rangle$	
d.	denotations	λx . Canadian(x)	$\lambda f_{\langle e,t\rangle} . \lambda x_e$. x is the national anthem of the country of which f is the corresponding property of individuals	
e.	composition by Functional Application	$\lambda f_{\langle e,t\rangle} . \lambda x_e$. x is the national anthem of the country of which f is the corresponding property of individuals[λx . Canadian(x)] = λx_e . x is the national anthem of the country of which 'being Canadian' is the corresponding property of individuals		
(21) a.	example	*speak*		***rudely***
b.	predication	predicate		argument
d.	denotations	$\lambda m . \lambda x$. x speaks in the m-manner		m is rude
e.	composition by Functional Application	$\lambda m . \lambda x$. x speaks in the m-manner[m is rude] = λx . x speaks in the rude manner		

This construal of adjuncts as semantic arguments is certainly pertinent for cases of relational nouns, or nominals, whose arguments may be adjectives. *National anthem* in (20) is such a relational nominal, because each referent which is a national anthem is an anthem of a single particular state. As is the case in (20), an adjective derived from a state name, or a corresponding *of*-phrase, may saturate this argument slot. Somewhat less intuitively, the adverbial adjunct in (21) is construed as a manner argument which saturates a postulated manner argument slot of the verb *speak* (on the construal of [21]). If one wants to argue seriously for such a construal, the assumption of a specific type primitive m for manners will have to be justified; cf. Dik (1975) or Maienborn and Schäfer (2012) for implementations. Turning to *red ball* in (19), we must ask ourselves whether anything can be said in favor of construal B as opposed to construal A in (18). Is there anything to support the idea that *ball* has a denotation which is unsaturated for an additional (color) predicate? In fact, Morzycki (2005) claims that this is one way of modeling modification or adjunction quite generally. Since the different

options in this domain are complex and require closer scrutiny, we will return to the contrast between adjuncts as semantic arguments and adjuncts as semantic predicates in a separate subsection (4.3.). The present subsection 4.2. continues to provide an overview of the different possible composition mechanisms for adjunction phenomena. So far, we have looked at the predicate-argument costrual. We shall now turn to the second general option: Predicate Modification.

4.2.2. Predicate Modification

Predicate Modification is a rule of composition which allows one to derive denotations of sisters in a tree which are of the same (predicative) type. As such these sisters could not be combined by Functional Application, because Functional Application requires a difference in semantic type, or argument structure, between the two constituents to be combined (cf. 3.4.). Predicate Modification leads to the conjunction of the truth-conditions of the combined predicates. (22) is Heim and Kratzer's (1998: 65) definition of Predicate Modification designed for predicates with a single argument slot for individuals. A rule with this function was first introduced by Higginbotham (1985) under the name of *theta-identification*. (23) is an example.

(22) Predicate Modification$_{\langle e,t\rangle}$
If α is a branching node, $\{\beta, \gamma\}$ is the set of α's daughters, and $[\![\beta]\!]$ and $[\![\gamma]\!]$ are both in $D_{\langle e,t\rangle}$, then
$[\![\alpha]\!] = \lambda x_e . [\![\beta]\!](x) = [\![\gamma]\!](x) = 1$

(23) Composition by Predicate Modification$_{\langle e,t\rangle}$
$[\![$ [[***red***] [*ball*]] $]\!]$
$= \lambda x_e . [\![red]\!](x) = [\![ball]\!](x) = 1$
$= \lambda x_e . \text{red}(x) = \text{ball}(x) = 1$
$= \lambda x_e .$ x is red and a ball

(22), due to the reference to the (unordered) *set* of daughters of α, is not sensitive to linearization, i.e. it can deal with adjuncts preceding and following heads. The rule has no symbol of conjunction in it, as one might expect if one looks at its natural-language paraphrase in the last line of (23), which conjoins truth-conditions. The reason for this is the general (Fregean) decision to have sentences refer to truth-values. If $[\![red]\!](x)$ has either 1 or 0 as its output, it makes no sense to write $[\![red]\!](x)$ & $[\![ball]\!](x)$, since this would amount to the undefined and nonsensical conjunction of truth-values, i.e. to 1&1, or 1&0, or 0&0.

It depends on features of the desired theory whether one finds Predicate Modification stipulative and too crude, or usefully versatile and even parsimonious. Some factors which play a role in this decision are whether uniformity of composition rules is aimed at (minus point for Predicate Modification), how coarse (plus) or finegrained (minus) the type distinctions are to be and to which degree higher-order types are tolerated in (minus) or banned from (plus) the desired theory.

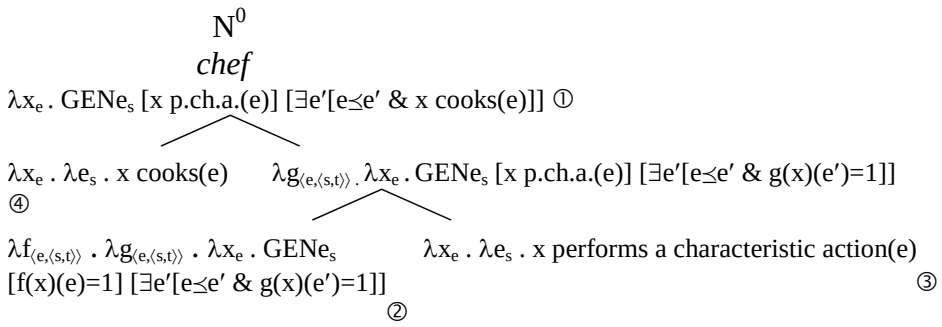
4.2.3. Subsection: partial Predicate Modification

Bouchard (2002) argues that certain meaning contrasts in the domain of nominal adjunction structures should be analyzed by having the adjunct predicate intersect with only part of the denotation of its sister constituent. Even though it is assumed here that not all of the examples discussed by Bouchard (2002) in this context should be given such an analysis, we will develop an implementation of his general idea for the paradigmatic example in (24). The analysis sketched here is not standard and relies on the syntax-semantics interaction of a sub-lexical meaning component with the adjunct.

(24) *a **good** chef*
‘a person which is good as a chef’ (partial intersection)
‘a person which is good and a chef’ (intersection)

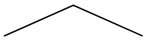
A good chef may either be a person who is good as a chef, or a person who is good and a chef. This is a real ambiguity. It becomes obvious when we use the adjective once, but try to interpret it differently for different referents, as in: #*Mary and Pepe are good chefs, because Mary has one Michelin star and Pete donated a million euros last year.* There is no way to derive this difference in meaning with simple and constant lexical entries for *good* and *chef*, and by sticking to simple Predicate Modification or Functional Application. The reason is that if we do not want to assume an ambiguity for *good*, we will always end up with the conjoined truth-condition ‘x is good and x is a chef’, no matter if Functional Application (4.2.1.) or Predicate Modification (4.2.2.) is applied. What we want is one reading where x is good *as a chef*, and one where x is *a chef and good independent of being a chef*. We will assume for our implementation that *chef*, as a lexical item, can be decomposed, and that the parts of this decomposition can be syntacticized. (25a) gives the assumed denotation of *chef* in (i) λ-notation; (ii) natural language (less detailed); (iii) natural language (more detailed). (25b) is a proposal for a syntacticized entry of *chef* (morphosyntactic features are disregarded).

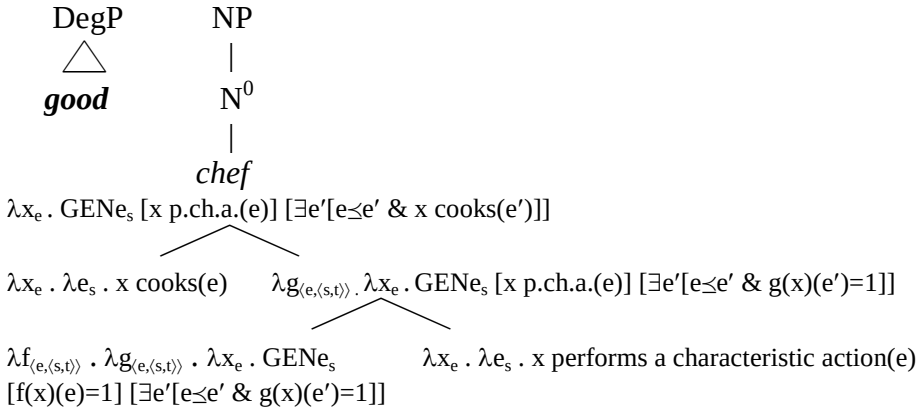
(25) A decomposed and syntacticized lexical entry of *chef*
a. denotation of the N^0 *chef*
(i) $[\![chef]\!] = \lambda x_e . GEN e_s [x \text{ p.ch.a.}(e)] [\exists e'[e \preceq e' \& x \text{ cooks}(e')]]$
(ii) ‘the property of an individual x such that, if x performs a characteristic action, x typically cooks’
(iii) ‘the property of an individual x such that, if e is an event of x performing a characteristic action, then there typically is an event e′ such that e is a part of e′, and e′ is an event of x cooking’
b. N^0 *chef*: syntacticized denotation



① marks the topmost N node of the syntacticized version of *chef*. Its denotation is the result of combining a suitable version of the genericity operator (cf. Krifka et al. 1995) in ② with its restrictor argument ③, and the nuclear scope argument ④. The result in ① is the same as the denotation in (25a). Importantly, it features the predicative node ④ with the denotation ‘$\lambda x_e . \lambda e_s$. x cooks(e)’ in an interesting position. If we adjoin the adjective *good* in the next step as in (26) we have *good* and the cooking predicate in adjacent positions (since *better chef* with the reading ‘person who cooks better than someone else’ is not deviant I favor the view that *good* is inside a degree phrase; cf. 4.3.3.).

(26)





The terminal node closest to the one hosting *good* is the one with the denotation '$\lambda x_e . \lambda e_s$. x cooks(e)'. The idea now is to say that Predicate Modification may combine an adjective and a nominal subpredicate if and only if the nominal subpredicate is the outermost predicate/is on the leftmost branch of the syntacticized nominal denotation. If we assume an event semantics denotation of *good* as in (27a) and combine it with the denotation of the top left branch of *chef*, we arrive at the denotation in (27b).

(27) a. $[\![\textbf{\textit{good}}]\!] = \lambda x_e . \lambda e_s$. x is good to a high degree d(e)
b. $[\lambda x_e . \lambda e_s$. x is good to a high degree d(e)$]$ $[\lambda x_e . \lambda e_s$. x cooks(e)$]$ [PM]
$= \lambda x_e . \lambda e_s$. x is good to a high degree d and x cooks(e)

In this representation, the individual's being good holds as part of the events in which the individual cooks. This yields a reading which may be good enough as an accurate paraphrase of the subsection reading. The denotation of *good chef* will come out as 'the property of an individual x such that, if e is an event of x performing a characteristic action, then there typically is an event e′ such that e is a part of e′, and e′ is an event of x cooking and of x being good to a high degree d'.

Needless to say, it is a daring step to destroy the lexical integrity of lexemes as is necessary for this account to deliver the right results. But note that syntactic evidence can be adduced to demonstrate that the respective readings are only available under strict adjacency (a good bad chef must be a chef who cooks poorly, but may be a nice person, and not *vice versa*). Moreover, with the adjacency requirement in place (interaction with the topmost terminal node of the lexical item), the tool to modify parts of lexical predicates from without is kept highly constrained, and is reminiscent of phases.

4.2.4. Special rules of interpretation

The composition rules discussed in the previous subsections each have a wide array of uses, or at least their use is not restricted to a few lexical items, or a small distributional class. They are not item-specificic or – with the possible exception of the subsection cases of 4.2.3. – construction-specific. By contrast, the composition principles discussed here have an extremely limited domain of application. Consider, for instance, Ernst's (2002) interpretation schema for agent-oriented adverbs like *cleverly* or *stupidly* in (29). (29a) is cited after Morzycki (2005: 17); (29b) inserts linguistic material; (29c) spells out the resulting truth-conditions.

(28) *Paul **cleverly** used his options.*
(29) agent-oriented adverbs
a. ADV $[_E \ldots] \rightarrow [_{E'} [_E \ldots] \ldots \& P_{ADJ}([_E \ldots]$, Agent)],
where the designated relation in P_{ADJ} between the event and the Agent is $[_{REL}$ warrants positing], and the comparison class for P_{ADJ} is all relevant events in context.

b. ***cleverly***$_{\text{ADV}}$ [$_{\text{E}}$ *Paul used his options*] → [$_{\text{E}'}$ [$_{\text{E}}$ *Paul used his options*]
& 'clever'([$_{\text{E}}$ 'Paul used his options'], Agent)],
where the designated relation 'clever' between the event and the Agent is [$_{\text{REL}}$ warrants positing], and the comparison class for P_{ADJ} is all relevant events in context.

c. 'Paul used his options & this event warrants positing more cleverness on the part of the agent of this event than is the norm for events.'

It is not fully clear how this would have to be spelled out in more detail to be fully explicit, but the idea is clear; whenever an adverb of a given syntactic-semantic class combines with an eventive constituent, the structure to be interpreted is enriched by a certain interpretive template so as to keep the denotation of the adverb very simple and put the load of mediating between the adverbial predicate and the rest onto the rule, or the template.

The trend in mainstream formal semantics, inasmuch as it follows, e.g., Heim and Kratzer's (1998) research program, leads away from rules like this. More and more things that used to be analyzed with the help of specialized interpretive principles in the early days of Montague Grammar have been restated as syntactic constituents with the necessary functional potential and the required truth-conditions. This is not to say, though, that it is in any sense wrong to assume interpretive rules that are loaded with truth-conditional content as, e.g., Bittner (1999) propagates them. Moreover, frameworks like Construction Grammar as inspired by Goldberg (1995) or Culicover and Jackendoff (2005) will naturally assume that constructions, i.e. syntactically and morphologically complex expressions with meanings and functions that are attributed to the expressions as wholes, can be primitives at some relevant level of language analysis. As said above, the trend identified above to make do without construction-specific interpretive rules is mainly found in that branch of formal semantics which couples up with mainstream Generativism.

This completes the overview of modeling tools for adjunction phenomena. The immediately following subsection returns to the idea that adjuncts may, quite generally, be viewed as semantic arguments of their sister constituents and that the adjunct's sister selects the adjunct.

4.3. Generalizing the argument construal of adjuncts

4.3.1. Construing adjuncts as semantic predicates or arguments

Adjuncts may, on the semantic side, either be predicates or arguments of predicate-argument structures. This was discussed in 4.2.1. Examples (18) and (20) are repeated here as (30) and (31) in a simplified way (i.e. without the semantic analysis).

(30)	a.	example	***red***	*ball*	(construal A)
	b.	predication	predicate	argument	
	c.	types	⟨⟨e,t⟩,⟨e,t⟩⟩	⟨e,t⟩	
(31)	a.	example	***Canadian***	*national anthem*	
	b.	predication	argument	predicate	
	c.	types	⟨e,t⟩	⟨⟨e,t⟩,⟨e,t⟩⟩	

It was stated in 4.2.1. above that *red ball* (on Construal A) is analyzed as involving *red* as a predicate which has an argument slot for the nominal category to its right. Still the adjective does, at the relevant level of granularity, not determine the syntactic distribution of the larger constituent (see 4.2.2./4.2.3. for a closer look). This makes it an endocentric adjunct. The example in (31) has the reverse semantic predicate-argument configuration, but a similar syntax. Since each national anthem is the anthem of a particular state, *Canadian* may be said to saturate the respective argument position of *national anthem*. (Note that this does not mean that

Canadian is itself not a predicate; *national anthem* simply selects an argument of a predicative type.)

More examples that can be given an adjunct-as-predicate analysis are provided in (32). (33) assembles further examples which probably require an adjunct-as-argument construal because the sister constituents of the adjuncts are semantically relational. (This holds despite the possibility to use, e.g., *behave* without *well* in (33b). The important point is that if *behave* is used without an adverb pronounced, it still means the same thing as if *well* was there.)

(32) Adjuncts as predicates
   a. attributive
      long *log*, ***heavy*** *suitcase*, ***bright*** *colors*, ***American*** *tobacco* (intersective)
      former *president*, ***alleged*** *murderer*, ***future*** *husband* (non-intersective; cf. 4.4.)
      …
   b. adverb(ial)s
      wisely, rudely, quickly, allegedly, fortunately, tomorrow
      with mellow words, for three hours, the next day
      …

(33) Adjuncts as arguments
   a. attributive
      Italian *invasion* ***of Albania***, ***German*** *defeat* (with event nouns/nominals)
      my *father*, ***his*** *ruin, victory* ***of the Spartans*** (possessor adjuncts with relational nouns)
      …
   b. adverb(ial)s
      behave ***well***, *reads*$_{\text{MIDDLE}}$ ***easily***

4.3.2. Generalizing the argument construal of adjuncts in the syntax

As mentioned repeatedly, the construal of adjuncts as predicates has a competitor even for cases like *red ball*, *swim for three hours*, or the first row of examples of (32a). The best-known syntactic proponent of such a theory is Cinque (1999). Morzycki (2005) delivered a semantic underpinning of Cinque's proposal, unifying the perspective for the nominal and the clausal, or sentential, domain.

Cinque's (1999) book is among the first attempts at syntacticizing all adverbs and adverbials in such a way that each adverb or adverbial is a specifier of a designated functional phrase/F-head in a syntactic tree constructed in accordance with X′-Theory (Jackendoff 1977) and Anti-Symmetry (Kayne 1994); cf. Alexiadou (1997) for a study in the same vein. The gist of Cinque's (1999) proposal can be summarized as in (34).

(34) a. There is a universal hierarchy of functional projections F_1,…, F_n hosting adverbs and adverbials in clauses. The idea can be extended to the internal structure of nominal arguments.
   b. The F^0 categories of these projections are either phonetically empty, or are spelled out as affixes on verbs, or as particles.
   c. Adverbs and adverbials have phrasal status and are merged in SpecF as arguments of F^0.

Adverb(ial)s and, more generally, adjuncts thus saturate an argument position of the argument structure of an F^0 category/F-head (3.2.). Cinque himself (1999: 134−136) addresses the possible objection that his proposal syntacticizes many things that might follow from the semantics. According to this objection there are semantic reasons why, say, *allegedly* scopes over *quickly*. Cinque admits that there may be such relationships which render part of

his syntacticization redundant, but he presents arguments to the effect that not all observed ordering restrictions between adverb(ials) can be made to follow from the semantics.

(35) is Cinque's (1999: 106, 130) proposal for the universal cascade of F-heads in the clausal domain. Each head is assumed to have a default value and one or more marked values. The unmarked value of Voice is, for instance, [active]; the marked value is [passive].

(35)
a. $Mood_{speech\ act}$
b. $Mood_{evaluative}$
c. $Mood_{evidential}$
d. $Mod_{epistemic}$
e. T(Past)
f. T(Future)
g. $Mood_{irrealis}$
h. $Mod_{aleth\ necess}$
i. $Mod_{aleth\ possib}$
j. $Mod_{volition}$
k. $Mod_{obligation}$
l. $Mod_{ability/permiss}$
m. $Asp_{habitual}$
n. $Asp_{repetitive(I)}$
o. $Asp_{frequentative(I)}$
p. $Asp_{celerative(I)}$
q. T(Anterior)
r. $Asp_{terminative}$
s. $Asp_{continuative}$
t. $Asp_{perfect}$
u. $Asp_{retrospective}$
v. $Asp_{proximative}$
w. $Asp_{durative}$
x. $Asp_{progressive}$
y. $Asp_{prospective}$
z. $Asp_{completiveSg}$
a′. $Asp_{completivePl}$
b′. Voice [≠Voice of 3.1.]
c′. $Asp_{celerative(II)}$
d′. $Asp_{repetitive(II)}$
e′. $Asp_{frequentative(II)}$
f′. $Asp_{completive(II)}$

4.3.3. Generalizing the argument construal of adjuncts both in syntax and semantics

Morzycki (2005) delivers a semantic underpinning of Cinque's proposal and elaborates the general idea for most types of adjuncts (modifiers, in his terminology), where Cinque has a clear bias towards adverbial relationships (but cf. Cinque 1994, 2010). The proposal is not semantic in that it would reduce the universal ordering of modifier projections to requirements and impossibilities of semantic scope taking.

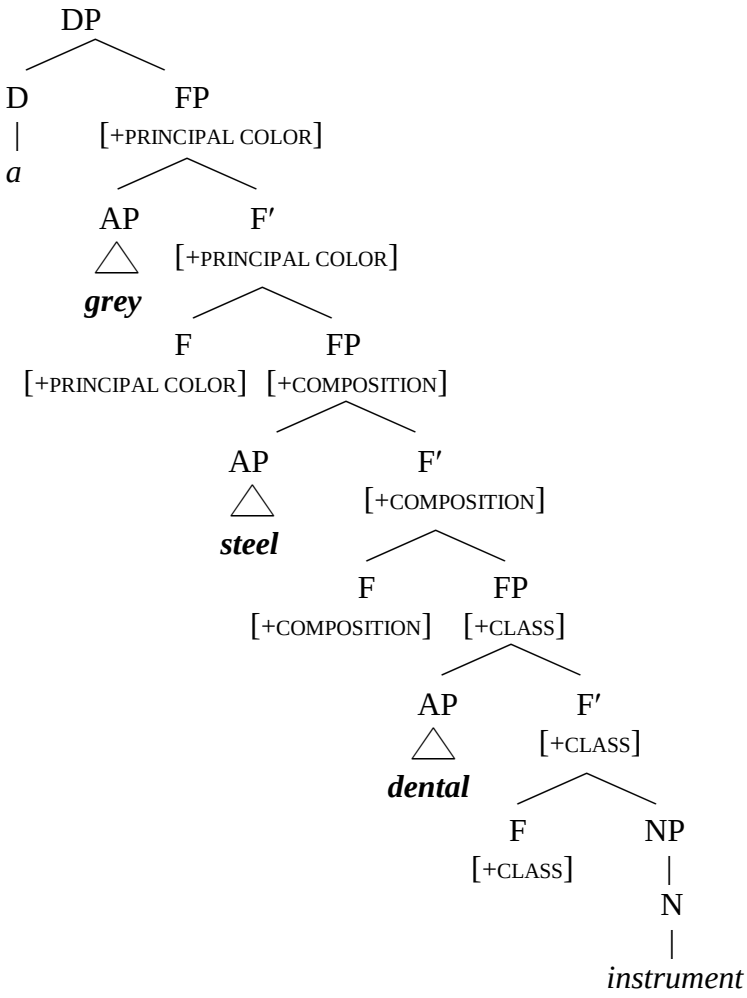
The general idea is that many more adjuncts can be construed as semantic arguments of predicates than is typically assumed. The predicates taking these arguments either form part of the feature bundles of nouns or verbs, or they project their own F projections outside the lexical category proper. We will first look at such features in their lexeme-internal guise (scenario I); we will then look at the fully syntacticized variant (scenario II). Finally we will discuss mixed cases and cross-linguistic variation (scenario III). The discussion concentrates on attributes, but the arguments carry over to the adverbial/clausal domain.

Scenario I – features as part of X^0. Nouns and verbs have feature bundles as denotations, each feature is a predicate, and as such nouns may have argument position for property-denoting adjuncts. One might, for instance, say that nominal concepts may have a source feature as part of their feature bundle. *Energy*, for instance, could be said to denote not just 'λx . x is energy' ('the property of being energy'). It might also have as part of its denotation the predicate '$\lambda f_{\langle e,t\rangle}$. λx . the source of x has property f'; this would be an argument slot for a source adjective like *solar* or *nuclear* (with denotations 'λx . x relates to the sun' and 'λx . x relates to atomic nuclei' such that the denotation of *solar energy* would come out as 'λx . x is energy & the source of x relates to the sun'). Another example would be a dimensionality feature. A feature like 'λf . λx . f specifies x's extension in (a) dimension(s) in space', if applied to the denotations of *plate* or *stick*, might accommodate adjectival adjuncts like *thin* or *short* (none of these examples are discussed by Morzycki 2005). In a modification of HPSG proposed in the last decade (Bouma, Malouf and Sag 2001; Sag 2005), a very similar implementation has been proposed. It leads to argument-structural extensions of lexical heads to accommodate modifiers, i.e. lexical heads are furnished with argument slots for modifiers in a productive fashion. Morzicky (2005) does not implement the respective features as productive extensions of argument structure, but the resulting structures are probably comparable to the HPSG analysis.

Scenario II – features fully syntacticized as F^0s. Depending on theoretical choices and phenomena to be described, the features may also be severed from their lexical categories (like N^0 or V^0) and be syntacticized, in bundles or one by one. An example without bundling, which merges two of Morzycki's examples (2005: 58, 63) and dispenses with semantic types, is given in (36).

(36) a. *a grey steel dental instrument*

b.



In the representation in (36b) each adjunct is licensed by a functional head of the semantically appropriate kind. That the information-structurally unmarked order between these adjuncts (the order with the largest contextualization potential) is fixed may then, in the Cinquean fashion, be tied to the fact that an $F^0_{[+\text{PRINCIPAL COLOR}]}$ will, for instance, select $FP_{[+\text{MATERIAL}]}$ as its internal argument. The proposal for a maximal cascade of attribute categories made by Sproat and Shi (1988, 1991) is found in (37). Cinque (1994) proposes the two variants in (38). With Seiler (1978) it should be added that anaphoric adjectives like *aforementioned* scope over all non-intensional attributive categories.

(37) ordinal > cardinal > subjective comment > evidential > size > length > height > speed > depth > width > temperature > wetness > age > shape > color > nationality/origin > material

(38) a. poss > cardinal > ordinal > speaker-oriented > subject-oriented > manner/thematic
b. poss > cardinal > ordinal > quality > size > shape > color > nationality/origin

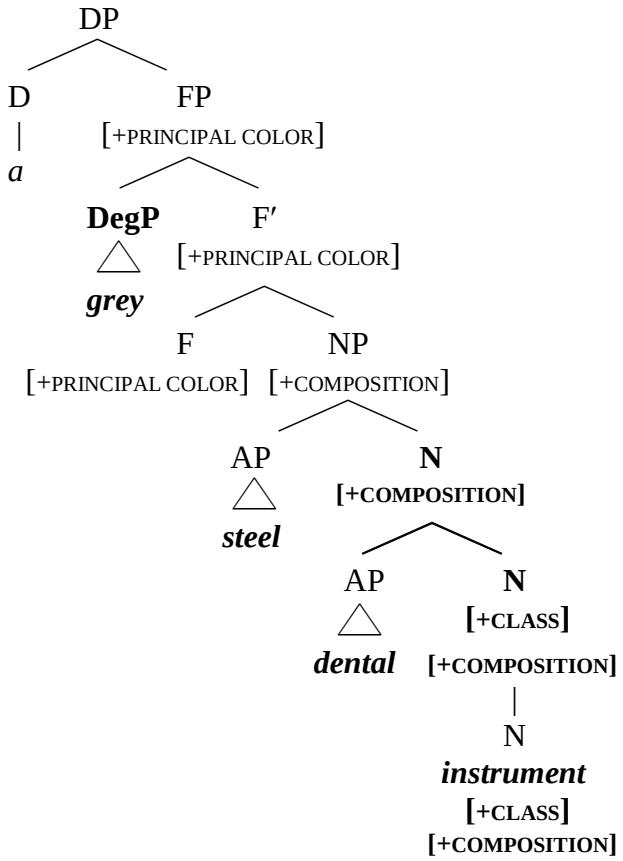
Scenario III – mixed cases, cross-linguistic variation, and compounding. Classificatory adjuncts, as opposed to, e.g., color adjectives, are not gradable. We thus get the pattern in (39) (unless some recategorization has occurred).

(39) *a* **(*very*) *white* (**very*) *steel* (**very*) *dental*** *instrument*

If it is assumed that gradation morphemes project DegPs (degree phrases; Kennedy 1998), which take maximal adjectival projections (APs) as complements, and that such DegPs are also projected with positive uses of gradable adjectives, then (*very*) *white* in (39), and also *grey* in (36), should be DegPs (and not just APs, as Morzycki 2005 has it). *Steel* and *dental*, with their lack of grading options if no recategorization has occurred, may, on the other hand, be mere APs (a categorization which is compatible with the word category of *steel* being N if empty structure is assumed within the adjunct). The contrast between gradable *white* and non-gradable *steel* and *dental* invites us to map it onto the contrast between Scenario I and Scenario II, i.e. adjunct-licensing features as parts of X^0 categories vs. adjunct-licensing features as projecting F-heads in the syntax. *Plastic* and *dental* will then be said to saturate argument slots of features that are bundled up with the noun; (*very*) *white* and *grey* will saturate F-projections above N^0 as in (36b). (This and what follows constitutes an extension of Morzycki's 2005 theory).

(40) is a revised and reduced version of (36b) which incorporates the results of the preceding discussion. Changed portions have been highlighted.

(40)



In this revised representation, [+CLASS] and [+COMPOSITION] are in-built features of *instrument*, taking *dental* and *steel* as arguments within NP. *Grey*, by contrast, has been recategorized as a DegP, and is selected by an F-head of its own.

There is at least one more construction type with a third, highest, degree of closeness between Ns and adjuncts that is relevant in our context – compounds. German, for instance, makes more use of compounding than English. *Dental instrument* comes out as *Dentalinstrument* with clear compound properties (single lexical accent on *Dental-* for the string *Dentalinstrument*). The syntax is most likely [$_{N^0}$ A^0 N^0]. I will leave it open what the compositional relations are at the lexical compounding level. What matters in the context of our discussion is that German mostly resorts to compounding with low feature specifications of nominal categories where English has both compounding and classificatory AP adjuncts.

At the next higher level of the [+COMPOSITION] feature, German has both a compounding and a phrasal [$_{NP}$ AP N] option: *stählernes* N 'steel-ish N' vs. *Stahl*-N 'steel-N'. At this higher level of noun-related features, English makes even less use of compounding than at the lower classificatory level. With *steel* in (40) being an N^0 inside an AP, it is not part of a compound, because it is followed by an undisputed syntactic word (*dental*). But even if it were not (as in one reading of *steel instrument*), pronominalization facts would still deliver the same non-compound result for the compound suspect *steel instrument* (Morzycki 2005: 52–53). *Steel instrument* allows for head noun pronominalization (*The steel one, not the plastic one!*), whereas analogous pronominalizations are unavailabe for heads of compounds (*Which instrument can you play?*I can play the string one, he can play the percussion one.*)

Color adjectives are typically adjuncts in German as in English, but still many compounds occur in German, e.g. with names for plants and animals; English does have compounds in this domain, but fewer than German (*Gelbwurz* 'turmeric, lit.: yellow-spice', *Schwarzspecht* 'black woodpecker').

The interesting point to be emphasized here is that the compounding tendency of German is strongest for the lowest exemplified F shell [+CLASS], and weakest for the highest exemplified F shell [+PRINCIPAL COLOR]. This would follow from a generalization which assumes a universal feature hierarchy in the nominal domain which may be part of, or severed from, lexical categories, but which, as a result of its inherent order, generates implicational hypotheses of the type found for German and English above; for instance, if a language allows [+PRINCIPAL COLOR] compounds in the N domain to a certain extent, it will allow [+CLASS] compounds to a larger extent.

Such crosslinguistic comparisons can be multiplied if languages are taken into account which disfavor compounding to the advantage of adjectival adjuncts even more than English does. Russian is such a language. Concepts like *fishing settlement*, *horse market*, *mousehole* (arguably all compounds in English), come out as adjective-noun sequences in Russian: *rybac-kij posëlok* 'fisherman-ish village', *kon'-skij bazar* 'horse-ish market', *myš-inaja nora* 'mouse-ish hole'.

The value of uncovering such cross-linguistic differences is that they provide a testing ground for hypotheses about universal feature hierarchies that is independent of the unmarked word order criterion. This is so because we expect the hierarchies in (41) to match in non-random ways. Generally, mappings from one category in $Hierarchy_1$ to categories in $Hierarchy_2$ should only target adjacent categories of $Hierarchy_2$; where each hierarchy in (41) may be $Hierarchy_1$ or $Hierarchy_2$.

(41) a. Hierarchy of nominal features
… > PRINCIPAL COLOR > … > COMPOSITION > … > CLASS > …

b. Hierarchy of adjunct categories
…> gradable DegP adjuncts >…> non-gradable AP adjuncts >…> A^0 compound parts

4.4. Intersective vs. non-intersective adjuncts

The dichotomy of intersective vs. non-intersective adjunction delivers a partition of the relevant domain into one class which allows for a paraphrase in terms of two conjoined propositions, and one which does not. Examples typically analyzed as intersective adjunction structures are given in (42), examples of non-intersective ones in (43). The examples in (44) are problematic in a way to be discussed shortly. (A note on terminology: the term *intersective* makes recourse to the set-theoretical construal of predicates as sets. If the denotations of *red* and *ball* are identified with the set of red things and the set of balls, respectively, then the set of red balls is the intersection of these two sets. The set construal of predicates is an ultimately equivalent alternative to the construal in terms of functions from individuals to truth-values; cf. 3.3.).

(42) a. *x is a **red** ball* 'x is red and x is a ball'
b. *e was a **frightening** experience* 'e is frightening and e is an experience'
(43) a. *x is the **former** president* $^{\#}$'x is former and x is a president'
b. *x is a **frequent** customer* $^{\#}$'x is frequent and x is a customer'
c. *e is a **mere** chance meeting* $^{\#}$'e is mere and e is a chance meeting'
d. *x is the **other** person* $^{\#}$'x is other and x is a person'
(44) a. *x is running **fast***
(i) 'e is an event of x running and e is fast.'
(ii) 'e is an event of x running in the m-manner, with m=fast.'
b. *x is a **good** chef*
(i) 'x has the property such that, if e is an event of x performing a characteristic action, then there typically is an event e′ such that e is a part of e′, and e′ is an event of x cooking'
(ii) 'x is good and x is a chef'

As is evinced by the paraphrases making use of conjunctions in (42) and (43), the conjunction criterion delivers clear distinctions in many cases. The problem with the cases in (44) is that it is theory-dependent whether an adjunction structure comes out as intersective, or not. If, for instance, both verbs and adverbs are construed as predicates of events (as is done in paraphrase (i) of (44a), then the structure is an example of intersective adjunction. If, however, the adverb is seen as an argument specifying the manner in which the running is performed, then (44a) will not come out as intersective; this option is paraphrased in paraphrase (ii), where *fast* fills an argument slot of an appropriately derived lexical entry of *run* (first proposed in explicit form by McConnell-Ginet 1982). The problem with (44b) is slightly different. The different paraphrases in (44a) were supposed to be paraphrases with identical truth-conditions. The paraphrases in (44b) are supposed to have different truth-conditions. If, for instance, x cooks lousily, but donates for the poor, then (i) is false and (ii) may be true. The decision whether *good chef* is intersective or not is highly theory-dependent: *good chef* will come out as intersective in reading (i) if, as in 4.2.3, the denotation of *good* just targets the cooking component of the meaning of *chef*. If the lexical item *chef* is opaque in the formalism, a non-intersective construal is going to be the result. Reading (ii) will be construed intersectively on all accounts that I can think of.

Since the composition rule of Predicate Modification is stated in intersective terms, Predicate Modification is a natural candidate to model intersective adjunction structures. But this is not a necessary tie-up. 4.2.1., for instance, has provided examples of an intersective semantics in terms of Functional Application. Conversely, however, the tie-up between (non-subsective) non-intersectivity and composition principles other than Predicate Modification is without exception.

4.5. Intensional vs. extensional adjuncts

The terminology of intensionality vs. extensionality, if discussed in the domain of adjuncts, is frequently used synonymously with the terminology of the preceding subsection. i.e. of intersective vs. non-intersective adjuncts. However, the empirical domains of the two dichotomies just overlap.

Intensional, on its most widespread contemporary understanding, means that the semantics of the expression in question is modeled with recourse to modality or temporal semantics. The standard tools in this domain are a possible worlds semantics with world variables as parts of denotations, and a semantics of time with variables for points in time or intervals of time. *Extensional* means that no recourse to this kind of machinery is made.

Consider construal (ii) of (44a) once more to see that a non-intersective adjunct need not be intensional. If manner adverbs are construed as arguments of V(P)/*v*(P) denotations, then the construal is non-intersective; it does not involve reference to, or quantification over, worlds or times, though. The standard examples in (45) and their (simplified) paraphrases make it immediately clear why intensional machinery is needed to interpret these expressions.

(45) a. *the **former** president*
   (i) 'the person which was the president at some point in time t′ before the reference time t'
   (ii) *'the x that is former and president'
b. *the **alleged** murderer*
   (i) 'that person x which is the murderer in all those possible worlds w′ which are compatible with the evaluation-world w beliefs of the relevant source of information about the murderer property of x in w'
   (ii) *'the x that is alleged and a murderer'

The modeling of intensional adjuncts always involves tools other than Predicate Modification, typically Functional Application. We will not enter into any details here. The interested reader is referred to von Fintel and Heim (2005) and the references cited there for details.

4.6. Adjuncts as specifiers vs. adjuncts as modifiers

In contemporary Generative syntax, adjuncts are typically accommodated in specifier positions in X′-structure, or in adjoined modifier structures. A theory like Cinque's (1999) (and no less Alexiadou 1997 or Morzycki 2005) will license most adjuncts as specifiers of functional projections of the nominal or clausal/sentential domain because (most) adjuncts are construed as arguments of these projections in these approaches (4.3.2./4.3.3.). In more traditional theories, and in theories which do not make use of the specifier concept, adjuncts will be construed as expansions of a category which do not change the category of the expanded structure (i.e. they are treated, or defined, as endocentric constructions in the traditional sense of the term; cf. sections 1 and 2).

Given the results arrived at by Cinque (1994, 1999), Sproat and Shi (1988, 1991), or Morzycki (2005), it has become less clear than before what endocentric behavior really is. It is not the case that adverb(ial)s and nominal attributes are freely ordered within nominal and clausal/sentential constituents once the level of finegrainedness is adjusted sufficiently, and therefore the distribution of a structure with a given adjunct is most often not the same as the distribution of the same structure without the adjunct. This renders implementations of adjunction that rest on true endocentricity less attractive.

There seem to be some structures, though, that may, even under the circumstances of many adjuncts nowadays having a plausible argument analysis, survive as true endocentric modifiers. Such structures include DPs with gradable adjectives that are separated from each other by a comma intonation; cf. (46a).

(46) a. *the green, Italian, aforementioned, heavy, stylish, long table*
b. * *the green Italian aforementioned heavy stylish long table* (neutral intonation)
c. *the aforementioned stylish long heavy green Italian table*

(46a) is good because each non-final adjective bears a high right boundary tone. In this setting, the order of adjectives plays no role (Alexiadou, Haegemann and Stavrou 2007: 322–323). The same order of adjectives under a neutral intonation contour as in (46b) is deviant. (46c) provides the corresponding unmarked sequence. The data in (46a/b) may be interpreted in such a way that $A_n \ldots A_1$ N sequences with boundary tones on adjectives $A_{m>1}$ lead to truly endocentric modifier constructions.

4.7. Frame adjuncts vs. event adjuncts

A frame adjunct restricts the domain within which an assertion is claimed to hold true; whatever the syntactic implementation looks like, the position of a frame adjunct must be higher on some hierarchy than the position of an event adjunct. An event adjunct, by contrast, forms part of a potentially assertive part of a declarative sentence. The notion of frame adjunct used here is meant to cover the same empirical domain as Chafe's (1976: 50–51) frame-setting topics and Maienborn's (2001) and Maienborn and Schäfer's (2012) frame-setting modifiers. The notion of event adjuncts used here coincides with Maienborn's (2001) event-external modifiers. Examples of frame adjuncts and event adjuncts are provided in (47) through (49).

(47) a. ***In Argentina**, Eva is still popular.* (frame)
a′. ***In Argentina**, Eva signed a contract.* (frame)
b. *Eva signed a contract **in Argentina**.* (cf. Maienborn 2001) (event)
(48) a. ***On few summer evenings**, he had each friend come over.*(*few>each*, **each>few*) (frame)
b. *He had each friend come over **on few summer evenings**.* (*few>each*, *each>few*) (event)
(49) a. ***On Paul's$_i$ evenings off**, he$_i$ had friends come over.* (frame)
b. * *He$_i$ had friends come over **on Paul's$_i$ evenings off**.* (event)

In (47a), *in Argentina* restricts the place for which the claims made by *Eva is still popular* and *Eva signed the contract* are supposed to hold. In (47b), *in Argentina* straightforwardly contributes to the truth-conditions of the sentence. The sentence would be false in a context in which Eva signed a letter of intent, but not a contract, in Argentina, and it would likewise be false in a context in which Eva signed a contract in Paraguay, but not in Argentina. The information provided by the direct object and by the event adjunct are thus on a par in terms of potential truth-conditional import (modulo information-structural foregrounding or backgrounding). Things are different in (47a). A person uttering (47a) presents the facts in such a way that *in Argentina* is related to the currently relevant discourse topic. As such, it is not in the scope of assertion. If the hearer wants to refute the information that the reported situations hold/held in Argentina, presuppositional information would have to be extracted from what the speaker presented as common ground.

A declarative sentence with an event adjunct always entails its counterpart without the event adjunct; this renders event adjuncts veridical (*Eva signed the contract in Argentina* entails *Eva signed the contract*). A declarative sentence with a frame adjunct as in (47a) does not entail its counterpart without the frame adjunct, or it only does so under specific contextual conditions (*In Argentina, Eva is still popular* will only entail *Eva is still popular* if the adjunct-less sentence is contextually restricted to be true of the situation in Argentina, or involves a contextually understood existential closure: 'There is a country in which it holds true

that Eva ist still popular in it.') But not all frame adjuncts are like this. With the episodic example in (47a′), veridicality holds again, because this sentence entails 'Eva signed a contract'. Consequently, frame adjuncts may be non-veridical or not, depending on whether a stative or habitual/generic state-of-affairs is described, or an episodic one.

If a frame adjunct contains a quantifier, as *on few summer evenings* in (48a) does, it always scopes over quantifiers in the event description. (48b) features the same string *on few summer evenings*, but as an event adjunct this time. As such, it may scope over or under co-occurring quantifiers in the event description.

(49c) illustrates the different hierarchical positions of frame and event adjuncts with the help of a Principle C effect (cf. article 16 in this volume). Given that proper names may not corefer with c-commanding antecedents, the contrast in acceptability in (49) shows that frame adjuncts as in (49a) scope above subjects, whereas event adjuncts scope underneath subjects, i.e. inside the event description (Maienborn 2001: 206–207). (Note that *Paul* in (49a) does not c-command the pronoun and hence does not bind it. Still *Paul* and *he* may corefer; cf. Büring 2005: 125.)

The exact syntactic implementation of the dichotomy between frame adjuncts and event adjuncts will depend on the theory chosen. If one assumes syntactic projections designated to host (restrictors of) topics, or (restrictors of) topic situations (cf. Rizzi's 1997 Topic Phrase and the cartographic tradition kicked off by that article), then frame adjuncts will be accommodated there. If no such designated positions are assumed, frame adjuncts will be expansions of high sentential categories. Event adjuncts will be accommodated underneath subjects (Maienborn 2001); in all likelihood, event adjuncts are not restricted to occurring in a single syntactic position. Further syntactic details will depend on how adjuncts are licensed in a given theory (cf. 4.3.2.).

Intensional clausal adjuncts like *frankly* (*speaking*), *allegedly*, or *fortunately* are frame adjuncts with the additional property of implying a speaker-commitment (as with *frankly* (*speaking*); cf. Maienborn and Schäfer 2012) or an evidential status.

4.8. Restrictive vs. non-restrictive adjuncts

The restrictive/non-restrictive dichotomy known from relative clauses is also found with adjectival adjuncts. (50) has two readings depending on whether the Britons are characterized as flegmatic in their entirety, or whether just a proper subset of them is characterized in that way. The parallelism of the contrast with relative clauses is used to paraphrase the readings in (50a) and (50b) (from Alexiadou, Haegeman and Stavrou 2007: 335).

(50) *The **flegmatic** Britons will accept his recommendations.*
   a. 'Those Britons that are flegmatic will accept his recommendations.' (restrictive)
   b. 'The Britons, {inasmuch as they are/which are} flegmatic, will accept his recommendations.' (non-restrictive)

In Romance the contrast between restrictive and non-restrictive uses of adjectival adjuncts is reflected by the prenominal (non-restrictive) vs. postnominal (restrictive) position of the adjective; the examples in (51) are from Bouchard (2002: 94–95).

(51) a. *Les* [*britanniques* ***phlegmatiques***] *accepteront ses recommendations.*
   the Britons flegmatic will.accept his/her recommendations
   'The Britons that are flegmatic will accept his/her recommendations.' [French]
   b. *Les* [***phlegmatiques*** *britanniques*] *accepteront ses recommendations.*
   the flegmatic Britons will.accept his/her recommendations
   'The Britons, {inasmuch as they are/which are} flegmatic, will accept his/her recommendations.' [French]

It is a matter of debate how the contrasts in (50) and (51) are to be represented and derived syntactically; more on this below (Demonte 1999; Bouchard 2002; Givón 1993: 268; Lamarche 1991; Ralli and Stavrou 1997). In terms of semantics it appears to be the case that the non-restrictive readings should be analyzed so as to treat the adjective as denoting a property which is definitional for, or at least characteristic of, referents with the head noun property. Put differently, the adjective in non-restrictive readings redundantly spells out one property of the set of properties contributing to the N meaning (as assumed by the speaker in the context at hand). The speaker chooses to mention this presupposed information because there is some relation tying the proposition uttered to the property in question (the Britons in [51b] will accept his recommendations because they are flegmatic). This can be implemented compositionally in at least two different ways. Either implementation treats the meaning of the adjective as presuppositional. To put it differently, either implementation construes the adjective as providing information which is presented as a non-negotiable meaning component of the nominal denotation. Option (a) will assume an F-head mediating between the nominal and the adjunct category. This head will shift the entailment of its second argument, the adjunct category, to a presupposition. The entailment of the adjunct will vanish and reduce to the identity function. On this account, the F-head between *phlegmatiques* and *britanniques* in (51b) will take *britanniques* as its first argument and will check, on taking its second argument *phlegmatiques*, whether 'being a Briton' entails, or characteristically goes along with, 'being flegmatic' in the context at hand. If this is the case, the resulting expression will denote exactly what *britanniques* alone means. If it is not the case, the resulting expression will fail to have a denotation, because the presupposition of the F head is not fulfilled. The lexical entry for the required F-head is spelled out in (52a). Option (b) will assume a type-shifted variant of the adjunct category which takes the nominal category as its complement. Moreover, the entailment/assertion of the basic adjectival denotation is shifted to the presupposition. This option is spelled out in (52b).

(52) a. F-head mediating between non-restrictive ADJ-NP structures
   i. [ADJ [F [NP]]]
   ii. $[\![F_{\text{NON-RESTR}}]\!] = \lambda f_{\langle e,t\rangle} . \lambda g_{\langle e,t\rangle} : \forall x[f(x)=1 \rightarrow g(x)=1] . \lambda y . f(y)=1$

b. Type-shifted adjective with assertive content shifted to the presupposition
   i. [ADJ [NP]]
   ii. $[\![\textit{flegmatiques}_{\text{NON-RESTR}}]\!] = \lambda f_{\langle e,t\rangle} : \forall x[f(x)=1 \rightarrow \text{flegmatic}(x)=1] . \lambda y . f(y)=1$

b′. Generalized version of b., where *A* is a variable over truth-conditions of adjunct denotations
   $[\![\text{ADJ}_{\text{NON-RESTR}}]\!] = \lambda f_{\langle e,t\rangle} : \forall x[f(x)=1 \rightarrow A(x)=1] . \lambda y . f(y)=1$

Both $[\![F_{\text{NON-RESTR}}]\!]$ and $[\![\text{ADJ}_{\text{NON-RESTR}}]\!]$ check whether all individuals having the nominal/f property also have the AP/DegP property. If so, the resulting expression has the same denotation as the nominal category alone. If not, the resulting expression has no denotation. If universal quantification in the presupposition/domain restriction turns out to be too strong, a genericity operator could regulate the relationship between the truth of f(x) and g(x)/A(x) in (52) instead. Since the semantic outcome of both analyses is the same, either can be chosen. In the context of the present article with its bias towards F-head implementations, (52a) is the natural choice.

With this semantic background about non-restrictive modification in mind, the following tentative conclusions concerning syntactic detail can be drawn. Since on either account the nominal category is an argument of the F-head/the adjunct, it must be a maximal projection (unless semantic arguments of syntactic heads can be non-maximal projections, an option which is not entertained here). On the F-head analysis, the adjunct categoy must, for the same

reason, be an XP, too. Within the type-shift account, the adjunct category can be either a head or, more generally, a non-maximal projection, simply because it takes an argument (the nominal category). I will leave the matter open at this point, hoping to have clarified what the syntactic options may be in the light of what the semanticist would like to see as input. The readers are invited to check for themselves how these general thoughts relate to syntactic reasonings found in the literature, especially in Bouchard's (2002) work, in Alexiadou, Haegeman and Stavrou's (2007) overview and in the works cited underneath (51). Upon consulting those writings, one should keep in mind that the level of syntactic sophistication of some authors in this domain outranks their semantic explicitness and reliability.

Another thing that I will leave open here is how our proposal relates to the standard treatment of the difference between restrictive and non-restrictive relative clauses. Non-restrictive relative clauses are typically analyzed as (high) DP-adjuncts, whereas restrictive relative clauses are (low) NP adjuncts.

In the clausal domain, parallel phenomena of non-restrictiveness with adjuncts do not seem to exist, or at least they are not discussed in a parallel fashion. Upon closer scrutiny, it would be attractive to map the restrictive vs. non-restrictive contrast of the nominal domain onto the frame adjunct vs. event adjunct contrast of the clausal domain (4.7.). What both contrasts have in common is that they draw a dividing line between material that is presented as presuppositional (frame adjuncts/non-restrictive attributes) and material that contributes to the truth-conditions of a predicate (event adjuncts/restrictive attributes). It is beyond the scope of this survey article to delve deeper into explorations of this parallel.

4.9. Generic adjuncts vs. episodic adjuncts

The contrast between the stacked adjuncts in (53) and (54) can be described as one between generic and episodic properties.

(53) a. *the* [**(*in*)*visible*$_{\mathbf{E}}$** [**visible**$_{\mathbf{G}}$ *stars*]]
b. *the* [[**visible**$_{\mathbf{G}}$ *stars*] **visible**$_{\mathbf{E}}$]
'the [usually visible]$_G$ stars that are [(in)visible at the reference time]$_E$'

(54) a. *the* [**(*non-*)*navigable*$_{\mathbf{E}}$** [**navigable**$_{\mathbf{G}}$ *rivers*]]
b. *the* [[**navigable**$_{\mathbf{G}}$ *rivers*] **navigable**$_{\mathbf{E}}$]
'the [usually navigable]$_G$ rivers that are [(not) navigable at the reference time]$_E$'

This type of contrast goes back to Bolinger (1967), and it has been given different names, including *reference modification*$_G$ vs. *referent modification*$_E$ by Bolinger himself and *individual-level*$_G$ vs. *stage-level*$_E$ by Larson (1999); subscripts cross-reference the terms with the uses in (53) and (54). Here the terms *generic* vs. *episodic* are preferred because on a strict reading of the stage-level/individual-level terminology, all the examples given ought to be contradictory. By contrast, the notion of genericity allows for the leeway that can account for a referent being visible in principle and under normal circumstances, but not necessarily all the time (cf. Krifka et al. 1995).

The contrast probably boils down to a dichotomy of adjectival modification in a phrasal lexeme for the generic uses ([A^0 N^0]) vs. (gradable) adjectival modification for the episodic ones (with constituency and semantics mediated by F-heads or noun-internal features, if one of the analyses in 4.5.2 is adopted).

4.10. Syntactic categories of adjuncts

There is a confusing multitude of proposals to map individual adjunct types to syntactic categories. This is not much of a surprise, given that the adjunct notion is highly underdetermined. Instead of reviewing different proposals made for small subdomains of our field of interest, I

will use the results of the preceding subsections 4.1. through 4.9. to state what our general options are.

The basic principles to allot adjunct types to types of syntactic categories are simple.

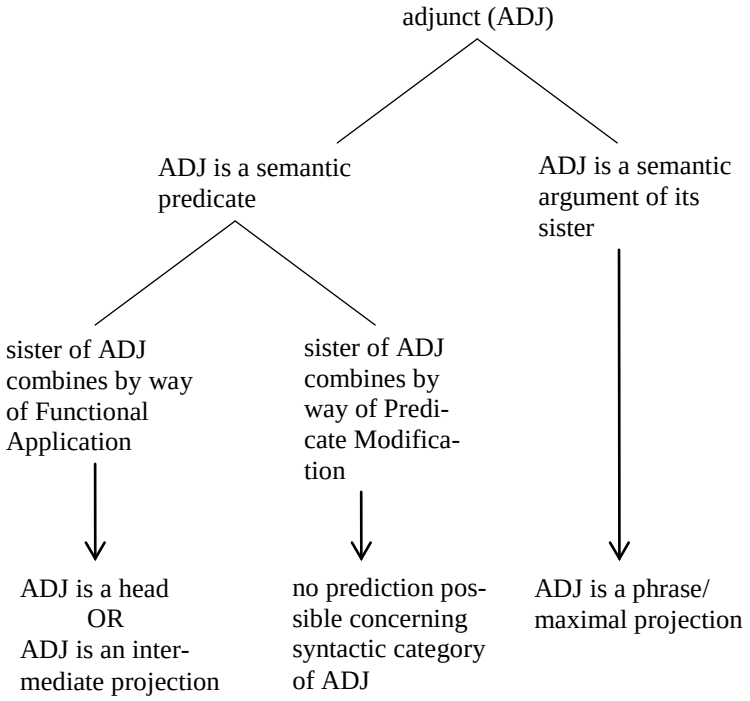
An adjunct that is a single word (and not a phrase) and is given a semantic predicate, or function, analysis such that its sister is its semantic argument must be a head/X^0 category. This is so because predicate-argument relations between sister nodes hold between heads and arguments. Univocal examples of such adjuncts would be the intensional adjuncts like *former* or *alleged* in the nominal domain, and their adverb counterparts like *formerly* or *allegedly* in the adverbial domain (unless F-head mediation is assumed).

An adjunct that consists of more than a word and is given a semantic predicate analysis such that its sister is its semantic argument must be a non-maximal, intermediate projection/X′ category. It must contain an L-head, or be construed as having a PP-like overall argument structure. Clear examples include adverbials like *according to* X and *in an* X *fashion/manner*.

An adjunct that is given a semantic argument analysis such that its sister takes it as its argument must be a maximal projection/XP category (maybe with some empty material) no matter if the adjunct at hand is a word or a string of words; at least this holds in those theories that assume that complements/arguments always correspond to maximal projections. If no such regularity is assumed, argumental adjuncts may be mere words/X^0, or X′, categories. Examples would be adjectival arguments of relational nouns like *Canadian* in *Canadian national anthem* or, in Morzycki's (2005) generalized theory of adjuncts-as-arguments, all attributive/adverbial complements of N/V/*v*-internal features or N/V/*v*-external F-heads. Depending on the categorial granularity of head types assumed in such adjuncts, adjuncts may, in the nominal domain, be sub-classified at least as DegPs (with gradable/graded attributes), APs (with non-gradable attributes), or CPs (with tensed/clause-worthy attributes, or if a CP origin of most attributes is assumed; Kayne 1994). An analogous reasoning is possible for adverbial adjuncts.

The regularities just outlined are tentatively summarized in (55). Meaningful mappings to concrete syntactic categories would, however, only be possible within theories that are explicit as to the available composition principles and the set of functional and lexical categories. Therefore, no category names are mentioned in (55). A theory-dependent assumption underlying the right half of (55) is that syntactic arguments are always phrases. (The branches in [55] represent the following logical relations: a node immediately dominated by a branching node fulfils the conditions of all the nodes dominating it; a node immediately dominated by a non-branching node [= a terminal node] corresponds to an entailment of the conjoined conditions dominating it.)

(55) Syntactic categories of adjuncts and composition principles



5. Conclusions

If a linguistic expression or category is classified as a syntactic or semantic argument, this will allow for straightforward predictions concerning syntactic structure and semantic composition, provided the theory in which the generalization is stated is sufficiently explicit. In grammars relying on constituent structure, arguments are sisters or specifiers of heads on the syntactic side. On the semantic side, an argument is what the function denoted by the/a sister category in the constituent structure applies to.

The pretheoretical intuition underlying the adjunct notion has it that adjuncts are optional expansions of syntactic structures and semantic denotations. No unified treatment of adjuncts has been proposed to date, and it may be concluded with Jacobs (1994) that what has been called adjunct in the literature comprises a multitude of phenomena that are more or less similar to argumenthood. We have seen that adjuncts can be analyzed as arguments or functions/predicates both in syntax and semantics. On the other hand, our theories also have modeling tools to represent adjuncts as endocentric expansions in the syntax (if the category of the complete adjunct+head+complement category equals that of the head) and as predicates that combine with other predicates of identical type in the semantics (if Predicate Modification is assumed). It is an open question whether the variety of analytical options in the domain of adjuncts mirrors a variety of different adjunct types in the language, or whether the majority of these different options is just a reflex of our insufficient understanding of what we call adjuncts.

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