

Adverbs and the Syntax/Semantics Interface

Denis Delfitto

In this contribution, we offer a survey of some of the canonical topics in adverbial syntax, examining the challenges posed by the ambiguous status of adverbs and adverbial phrases to syntactic theorizing. The challenge consists especially in the fact that many of the most fertile notions elaborated by the theory of syntax within the generative paradigm appear to be resistant to a straightforward extension to the domain of adverbial syntax, ranging from the notions of syntactic category and of placement in a hierarchically organized syntactic structure to the issues of syntactic movement and of a compositional mapping between syntactic structures and interpretation. In this way, reflection around adverbs is likely to play a central role for the determination of the boundaries of syntax with respect to the other components of linguistic knowledge. The result of our discussion is that the theory of adverbs will largely benefit from the interaction between the restrictive syntactic formats which are being developed and a more interdisciplinary approach to language, focusing on the nature of the interfaces among different linguistic modules. At the same time, it is fair enough to conclude that the inquiries within generative syntax in the course of the last thirty years have considerably enhanced our ability to formulate problems and options about the formal nature and role of adverbs in an intelligible and interesting way.

1. Introduction

Adverbs are one of the familiar categories of traditional grammar. Traditional terminology suggests that adverbs are modifiers of the verb (lat. *adverbium*, gr. *epírrhema*). The traditional view has to be improved in at least two respects. First, adverbs modify not only verbs, but also predicates belonging to other syntactic categories (adjectives, as in *very smart*, other adverbs, as in *very soon*, etc.). Second, and even more importantly, not all adverbs can be interpreted as predicate operators (see section 3 for a discussion of this point). Sentence adverbs (for instance 'modal' adverbs such as *probably*), are better conceived of as sentence operators, whereas subject-oriented adverbs such as *rudely* roughly correspond to two-place relations between individuals and events.¹ Temporal adverbs of frequency (such as *often*, *always*) have been interpreted as unselective operators (starting from Lewis's (1975) seminal work) and as generalized quantifiers (cf. de Swart 1991). The unescapable conclusion is

therefore that different adverbs are projected into different semantic objects: the interpretive notion of 'predicate modifier' does not provide us with a criterion of classification sufficient to understand what all adverbs have in common.

Morphologically, matters are certainly not less intricate. Descriptively, adverbs can be classified into lexical and derived adverbs. Lexical adverbs can be morphologically related to adjectives (as witnessed by English *hard*, *fast*, etc.), to nouns (*yesterday*, *tomorrow*, etc.), to prepositions (*downstairs*, *before*, etc.) and arguably even to determiners (*now*, *there*, etc.).² Derived adverbs (-*ly* adverbs in English, adverbs formed by means of the latin suffix *-mente* in Romance) are all adjectivally related adverbs, but they belong semantically to distinct classes (*probably* is a sentence operator, whereas *rudely*, at least in one of its possible readings, is a predicate operator). Therefore, it is difficult to see how morphological criteria could be helpful in our attempt to find a unitary characterization for adverbs.

Adverbial syntax, on the other hand, is notoriously a fairly complex domain. Traditionally, the parallelism with adjectival modification in the nominal domain and the possibility for adverbs to occur 'stacked' (*John repeatedly viciously attacked Mary*), as adjectives do, has been held to imply that adverbs give rise to 'adjunction' structures.³ The view that (adjectival and adverbial) modification essentially involves adjunction is still widely shared, as we will see in the following sections. However, at least two problems should be immediately mentioned in this connection. First, many adverbs are clearly selected/subcategorized by the verb (as in *The job pays us handsomely*, *John worded the letter carefully*), and this fact has often been assigned a central theoretical relevance. Second, it is far from obvious that the complex facts characterizing adverbial syntax can be derived by means of principled constraints on adjunction.⁴ A careful examination of the literature shows in fact that the issue of adverbial modification fairly exceeds the domain of base-generated adjunction and significantly overlaps with issues concerning the status of implicit and optional arguments and the parallelism with optional oblique arguments such as benefactives, instrumentals, locatives, and so on.

These first considerations about the syntax of adverbs acquire a particular importance if viewed in the light of their ambiguous categorial status (which will be widely discussed in section 2). It has been observed in the literature (cf. especially Larson 1985) that the distribution of adverbs can be hardly made dependent on some common set of syntactic features, corresponding to a well-defined syntactic cate-

gory, as is arguably the case with the other lexical categories (N, V, A and presumably P). Adverbs may be characterized as a collection of phrasal categories exhibiting similar distribution (and being hopefully assigned some common semantic function, such as that of 'modifier'). However, it is far from obvious that CPs (as in *because I am sleepy*), PPs (as in *at 4 o'clock*), APs (as in *hard*) and NPs (as in *that way*) constitute a natural class under any generally accepted set of syntactic features. This makes hard to understand why they tend to be distributionally equivalent when occurring as adverbials, under common assumptions concerning the relation between semantic and categorial selection.

These considerations might be amended to interesting general conclusions among the following lines. Adverbs (and more generally 'adverbials', that is, phrasal categories of different sorts roughly performing the same function as lexical adverbs) constitute a still largely unsolved puzzle concerning the form of mapping between syntactic and semantic categories. The problems are more serious than those that arise with other lexical categories (the fact, for instance, that the very same syntactic category may be mapped into two or more distinct semantic categories, or the related fact that different syntactic categories may be mapped into the very same semantic object). The additional problem concerns here the difficulty to understand which set of syntactic features is involved in the mapping (as we have seen, the distributional evidence does not provide us with the desired answer), and the lack of agreement among scholars as to the precise definition of the co-domain of the mapping function (adverbials have to be assigned to a large variety of semantic objects, ranging from individuals to sets of sets). Given this state of affairs, it is really not surprising that the syntax of adverbs (and, more generally, the syntax of modification) still represents one of the most controversial domains of research, posing essential challenges to core modules of syntax such as the theory of categorial constituency, so that "...we still have no good phrase structure theory for such simple matters as attributive adjectives...and adjuncts of many different types" (cf. Chomsky 1995, p. 382, fn. 22).

Nevertheless, we hope that the following sections will show to the reader that research in formal linguistics has greatly contributed, over the past thirty years, to our understanding of important properties of adverbs and adverbial phrases. Our discussion will be fairly interdisciplinary, partly reflecting the different perspectives from which the issue of adverbial modification has been approached along the years. In section 2, the categorial status of adverbials will be

discussed, in the attempt to clarify whether the presence of adverbs in the lexicon of a given language requires the enrichment of the commonly assumed set of syntactic categories and/or the commonly accepted set of categorial features. Section 3 deals with the main attempts to classify adverbials into several distinct classes, mainly based on interpretive criteria and revolving around the mapping from syntactic representations to 'logical' forms which provide a suitable 'compositional' input for interpretation. In section 4 it will be shown that the issue of syntactic placement of adverbials is largely undetermined by their partition (on semantic grounds) into different classes. Section 5 will face the issue of movement (how it relates to adverbial syntax): we will discuss the peculiar properties of wh-movement when applied to adverbs/adjuncts of several types and the status of the argument/adjunct asymmetry, the possibility that adverbs undergo other sorts of movement and the use of adverb placement as a diagnostic for the application of different sorts of syntactic processes, with special reference to head-movement processes. In section 6 the issue of adjunction and some related theoretical issues will be handled. Finally, in section 7, an attempt will be made to illustrate the range of semantic ambiguity of adverbials by examining the behavior of different sorts of temporal adverbs.

2. The categorial status of adverbs

As emphasized in the introduction, this is one of the long-debated issues in adverbial syntax. It is easy to observe that handbook-level classifications of syntactic categories generally tend to overlook the presence/role of adverbs, under the (often) implicit assumption that lexical adverbs are relatively easily amenable to the most common syntactic categories (A, N and P). A necessarily condensed survey of the relevant literature reveals that this attempt has been pursued along two main directions.

On the one hand, adverbs occurring in sentence-final position (as in *John ran downstairs*) are easy to interpret as 'intransitive' (that is, objectless) prepositions, as confirmed by the fact that many of them can behave as normal prepositions (*down the stairs*) and/or are morphologically related to prepositions (Klima 1965, Jackendoff 1972). This strategy is at first sight corroborated by the parallel treatment of postverbal particles (as in *John carried up the trunk*) as transitive prepositions also admitting an intransitive use, in terms of 'directional' adverbs with virtually the same meaning as when they

have an object (Emonds 1985:252ff.). However, it is hard to see how adjectival adverbs such as *long* or *fast* might be inserted in this category (Jackendoff 1972:63). Similarly, the issue arises of *-ly* adverbs occurring sentence-finally as selected by the verb (as in *John dresses elegantly*): are they to be added to the inventory of (intransitive) prepositions or are they transformationally related to the sentence-initial position, where they are normally generated if not selected by the verb (as in *John elegantly solved the problem*)? Either solution does not appear particularly natural, even though the transformational analysis is more readily discarded on strictly theoretical grounds (it would unnecessarily increase the complexity of subcategorization rules, Jackendoff 1972). The variety of interpretations and the complex distribution of *-ly* adverbs has constituted in fact the main source of evidence against the attempts to reduce adverbs to more primitive syntactic categories, as we will see in a moment.

The case of adjectivally related adverbs such as *fast* and *hard* has led some scholars to the hypothesis that even non-selected adverbs are uniformly categorized as A(djectives), say with a defective distribution (Emonds 1985). In other words, *-ly* is considered a suffix inflectional on A (tentatively accounting, under the assumption that English admits only one inflection per word, for the fact that comparative/superlative affixes cannot be added to *-ly* adverbs: **ellegantier*), the crucial evidence being provided by the cases where the adverb is morphologically undistinguishable from the related adjective. As for the case of underived adverbs (such as *seldom*, *often*, etc.) which do not occur in noun-modifying position, it has been argued that they may be A's as well, on the grounds of the observation that they exhibit the same specifier system as adjectives, as can be seen in *very seldom*, *how often*, etc. The position that unselected adverbs are uniformly A's from a categorial perspective, is somehow reminiscent of the hypothesis (dating back to at least Katz 1964) that alternations such as *good/well* constitute suppletive pairs of the abstract underlying form (A, EVALUATIVE), the different surface realization being the result of case-assignment to the adjectival member of the pair (the comparative/superlative forms *better* and *best* are actually undistinguishable). A natural development of this basic insight would be to assume that APs and adverbial APs differ in that the former, but not the latter, are case-marked. It has been observed that there are cases where adjectival and adverbial realization appear to be in free alternation (Emonds 1985:58, fn. 30). Pursuing this line of research would obviously require versions of theta and case theory which are able to correctly derive the fact that caseless APs are inter-

pretable only in some well-defined positions (the adverbial use being strictly confined to these positions). Alternatively, one might simply consider some extension of the case-filter to true APs, with adverbs belonging to a syntactic category other than A. This possibility leads us to examine the radical alternative to the 'reductionist' approaches considered so far, based on the assumption that Adverbs constitute a primitive syntactic category.

This alternative is explicitly developed in Jackendoff (1972), where Adverbs are assumed to be lexical categories performing, within the verbal domain, the same function performed by adjectives within the nominal domain. The parallelism between Adverbs and Adjectives is particularly striking on distributional grounds: adverbs surface between subject and main verb (in the so-called 'auxiliary-position', identified with the underlying position for *-ly* adverbs, as in *John easily won the race*), exactly as adjectives surface between the determiner and the noun (*the easy solution*). Derived nominals and gerunds provide the most suitable context for the parallelism to be detected (*John's rapid reading of the letter vs. John's rapidly reading the letter*). The leading hypothesis is that there are two distinct base rule schemas for adjectives and adverbs, roughly assigned the following form (Jackendoff 1972:60):

- (1) N' → (Adj) - N - Complement
- (2) V → (Adv) - V - Complement

The rule admits a more abstract formulation, in which the categorial labels N/V are replaced by the common symbol X (referring to the sets of syntactic features shared by N and V), and Adj/Adv are replaced by the common symbol Y (referring to the set of features shared by adverbs and adjectives): in this way it is possible to capture the distributional similarity emphasized above by simply expressing the generalization that whenever the feature +V is assigned to X the feature +Adv will be assigned to Y (yielding the base rule schema in (2)). It is worth noticing that these distributional facts (whose theoretical relevance is confirmed by the observation that adjectives that only occur prenominal are paralleled by adverbs exclusively occurring in auxiliary position, as in *the mere truth vs. John merely said the truth*) could not be easily given formal expression in a grammar where adverbs are derivative categories transformationally related to adjectival sources (as was the case, in the sixties, for the approaches inspired by the Katz-Postal

hypothesis, according to which all semantic information is encoded in underlying structure). The fact that a sentence such as *John easily won the race* be assigned an underlying structure roughly equivalent to *It was easy for John to win the race* does not offer any clue as to why adjectives and adverbs should exhibit the distributional symmetry tentatively captured in (1-2). Criticism of the idea that adverbs and adjectives are transformationally related is also based on the observation that adverbs of certain classes (such as *merely, readily, actually* etc.) cannot be derived from adjectival sources (*Albert is merely being a fool* → **it is mere that Albert is a fool*) and on the hopeless variety of the adjectival sources arguably involved (to be reviewed in section 3 while discussing the variety of interpretations assigned to different classes of adverbs). It seems reasonable to conclude that adverbial syntax constitutes one of the domains of research in which the complex and idiosyncratic rules resorted to in generative semantics (typically involving deletion of the superordinate clause and insertion of lexical material in the lower clause) proved not only difficult to handle but also severely inadequate empirically. A case in point (beyond the general difficulty of attaining a real simplification of the lexicon due to the unavailability of adequate adjectival sources for many adverbs) is provided by the analysis of adverbials such as instrumental PPs. The attempt to link sentences such as *John sliced the salami with a knife to slice the salami* in the deleted higher clause (*John used a knife to slice the salami*) has been argued at least as early as in Bresnan (1969) to be problematic in view of cases such as *John used a knife to slice the salami with*.

It might be argued that 'derived' adverbs and a subset of 'lexical' adverbs are adjectival, with other adverbs distributing over various syntactic categories, as is the case for prepositional adverbs occurring in sentence-final position (see above) and for bare NP adverbs, like the *now/then* and *here/there* pairs discussed in Emonds (1985) and the temporal, locative, directional and manner bare NP adverbs discussed in Larson (1985) (*sometime, someplace, that direction, that way*). However, this analysis would still be in need of explaining the central fact of adverbial syntax, that is, the distributional symmetry observed among 'adverbial' constituents belonging to several syntactic categories. Bare NP adverbs, for instance, certainly exhibit distributional peculiarities, in that they can occur in specifier positions which are restricted to NPs (as in *yesterday's refusal*, Larson 1985:598). They also exhibit, however, a distributional behavior quite similar to that of other 'adverbial categories': they occur in

subcategorized position (as in *Peter worded the letter that way / tactlessly / in a thoughtful manner*), cooccur with the intensifier *right, then / near the door / after you did*) and can be easily coordinated with adverbial categories of a different syntactic category (*They will be arriving Thursday and / or subsequently*). The obvious expectation is that constituents sharing, to a significant extent, the same distributional behavior, will also be endowed with the same categorial feature(s). On the other hand, as already emphasized, CPs, APs (or AdvPs), PPs and NPs hardly constitute a natural class under any generally accepted set of syntactic features. As observed by Larson, the temptation might be strong to postulate 'hidden' categorial structure for which it is difficult to find independent evidence, as in Bresnan & Grimshaw's (1978) account of English free relatives, where bare NP adverbs are analysed as PPs headed by an empty head. A better solution consists in the assumption that distribution is not an exclusive function of category membership, as was the case in structural linguistics and in earlier phases of generative linguistics. Distribution is rather the product of the interaction of different modules of syntax (essentially, theta-theory and case-theory). This approach is particularly natural if it is assumed that predicates may assign 'adverbial theta-roles' to arbitrary categories and that distributional constraints affecting certain adverbial categories (like bare NP adverbs) essentially depend on case considerations.⁵ Potential problems for this approach concern the feasibility of the notion of 'adverbial theta-role' (based on the analogy with the theta-roles assigned to other optionally selected constituents such as benefactives), especially in view of the fact that adverbial categories are arguably mapped into a relatively large variety of semantic objects (section 7), and that the nature of the mapping is largely independent of their categorial specification.

Summarizing, there seems to be agreement that the notion 'adverb' is largely dependent on thematic and case-theoretic considerations and cannot be simply reduced to a categorial primitive. Phrases belonging to different syntactic categories (NPs, PPs, CPs) are easily assigned the same semantic function and the same syntactic distribution as 'lexical' adverbs. As for the latter, there seems to be some consensus that the 'reductionist' approach (all adverbs are Ps, As or Ns) cannot be pursued up to its extreme consequences, and that mention of the category 'Adverb' might well be unavoidable. Interestingly, reductionist approaches tend to discharge the burden of explanation on specific versions of theta and case theory.

3. Adverb Classes

Descriptively, adverbs of different sorts are distinguished on intuitive meaning grounds. In the literature, reference to adverbs often makes use of such primitive labels as manner adverbials, locative adverbials, temporal adverbials (further distinguished into punctual, durative, frequency adverbs, etc.), means and degree adverbs, reason adverbials and so on. At a more abstract level, the classification task is intended to provide generalizations which might be relevant for a satisfactory formal characterization of adverbs, on syntactic and/or semantic grounds. Adopting a semantic or a syntactic perspective may lead indeed to quite different results. Here, we will consider the two perspectives separately, comparing them only at a later stage.

Semantically, adverbs have been traditionally partitioned into predicate operators and sentence operators (roughly corresponding to the familiar distinction into VP-adverbs and S-adverbs). S-adverbs are assumed to take scope over the whole sentence, as is clearly the case with modal adverbs such as *probably, certainly, presumably, etc.*, whose semantic structure roughly coincides with a copula clause containing 'Adj' (that is, the adjectival counterpart of the modal adverb) and taking as its unique argument the sentence resulting from removing the adverb (*Frank is certainly avoiding us* → *It is certain that Frank is avoiding us*) (Jackendoff 1972:69). However, the interpretation of S-adverbs as uniformly belonging to the syntactic category *t/t* (categories combining with sentences to yield sentences) is clearly deemed to fail, since many other sorts of S-adverbs, such as evaluative adverbs (*fortunately, happily, etc.*), domain adverbs (*politically, botanically, etc.*) and pragmatic adverbs (*frankly, honestly, etc.*) seem to resist this straightforward semantic treatment.⁶ Jackendoff's Type I adverbs ('speaker-oriented adverbs') are actually interpreted as involving (at least in some cases) a two-place adjectival predicate, whose first argument is the sentence resulting from removing the adverb and whose second argument is an NP referring to the speaker: ADJ (SPEAKER, f(NP1, ..., NPn)), where ADJ is the adjectival counterpart of the adverb and f(NP1, ..., NPn) expresses the relation between the verb and its strictly subcategorized arguments. As a consequence, the appropriate paraphrase for a sentence such as *Happily, Frank is avoiding us* (containing an evaluative adverb) will involve a two-place adjective, as in *I am happy that Frank is avoiding us*. Matters are even more complex in the case of speech-act modifying or pragmatic adverbials, which seem to modify

an implicit speech-act predicate: the appropriate paraphrase for *Botanically, a tomato is a fruit* will presumably be something equivalent to *In making the following assertion, I speak botanically: A tomato is a fruit*. What seems to be at stake here is that "we do not use the proposition expressed by the modified sentence as input to our adverb: rather, the adverb helps determine what proposition that sentence expresses. And this then makes it impossible to treat sentence adverbs of this kind as semantic functions whose arguments are propositions expressed by the modified sentences" (McConnell-Ginet 1982:176). In other words, it seems reasonable to conclude that Jackendoff's class of 'speaker-oriented adverbs' is sufficient to show that the interpretation of S-adverbs in terms of sentence-operators is severely inadequate. As for the nature of the mapping between sentences containing adverbs and the adjectival structures purported to express their interpretation, it is important to emphasize that Jackendoff interprets it in terms of 'projection rules' belonging to the interpretive component (against the view of generative semanticists, contending that adverbial sentences and their adjectival counterparts are transformationally related). The role of syntax consists in constraining the application of these rules, since each of them applies to a well-defined set of structural descriptions: for instance, the projection rule mapping speaker-oriented adverbs into two-place adjectives will not apply to syntactic configurations where the adverb is generated too low in the structure, as in **George will be happily finishing his carrots*. Of course, interesting issues arise concerning the compositional nature of the interpretation procedure, issues to which we will return below.

Let us consider now the case of VP-adverbs (that is, adverbs allegedly interpreted as predicate-operators). The traditional view in formal semantics (established in the work of Montague and defended in largely influential successive work, cf. especially Thomason & Stalnaker 1973) is that VP-adverbs, typically instantiated by manner adverbials such as *slowly*, correspond to predicate functors, that is, categories of type $\langle\langle e, t \rangle, \langle e, t \rangle\rangle$, which apply to predicates to yield predicates. A well-known shortcoming of this approach is that it fails to derive arguably valid logical entailments such as *John walks slowly* \rightarrow *John walks* as a matter of logical form, requiring the introduction of specific meaning postulates (that is, the validity of this kind of logical entailments has to be independently established, in principle, for each single predicate). It is worth noticing that the set-theoretic treatment of VP-adverbs as predicate functors appears to constitute a suitable formalization of Jackendoff's semantic structure

for manner, degree and time adverbs (Type III adverbs, Jackendoff 1972:70-71). The semantic structure associated to manner adverbs by projection rules is roughly represented as [F+ADV] (NP1, ..., NP n), expressing the fact that the adverb can be interpreted as adding a lexically determined set of 'semantic markers' interacting with the set of semantic markers corresponding to the lexical meaning of the verb, without altering its 'functional structure', that is, its selection properties.⁷ Both approaches (Montague's and Jackendoff's) fail to characterize adverbial modification as essentially involving that the extension of the modified predicate is (properly) included in the extension of the original one - "that the set of those who talk quickly is a (probably proper) subset of the talkers" (McConnell-Ginet 1982:162). That 'Davidsonian' inferences of this sort actually hold has been repeatedly challenged in the literature: *He filled the tank halfway* \rightarrow *he filled the tank* can be hardly viewed as a logically valid entailment, even though *halfway* qualifies as a VP-adverb according to the diagnostics proposed in Thomason & Stalnaker (1973), contrary to adverbials such as *allegedly* and *in a dream*, which have also been used in order to reject the Davidsonian inference pattern (Parsons 1970, Montague 1974). However, it is widely acknowledged that inference patterns such as *John walks slowly, therefore he walks* fit quite well our pre-theoretical intuitions about adverbial modification. That the analysis of VP-adverbs as predicate functors can hardly be assumed to adequately formalize our pre-theoretical intuitions about 'modification' is more clearly confirmed by the fact that this analysis cannot be satisfactorily developed in purely extensional terms. In a model where those who talk accidentally coincide with those who walk, we do not want to conclude that those who talk quickly necessarily coincide with those who walk quickly (McConnell-Ginet 1982:162). The solution traditionally consists in assuming that the adverb takes the 'intension' rather than the 'extension' of the predicate as its argument (this way, alternative situations are considered where the extension of the properties of walking and talking are differently defined, making it possible to differentiate the result of the application of the function 'quickly' to these properties). However, the intensional machinery does not really reflect the way we think about *why* quick talkers and quick walkers may well correspond to two distinct sets in situations where talkers and walkers coincide. Intuitively, what we would like to have is a semantics according to which "...a single situation can distinguish those walking quickly from those talking quickly, even if walkers are all talkers and vice versa" (McConnell-Ginet 1982:163). There is a clear sense in which

'intensions' are beyond the point here, but intensions is all we have to achieve the correct empirical result if VP-adverbs are to be treated as predicate functors.

As is well-known, the davidsonian approach (Davidson 1967) is often understood as a research program intended to circumvent these counterintuitive intensional complications, by means of a non-standard formalization of first-order logic. Events are entities and predicates contain an additional argument position for events. Sentences such as *Sebastian strolled through the streets of Bologna at 2 a.m.* and *Sebastian strolled through the streets of Bologna* are assigned the logical forms in (3) and (4), respectively, easily reducing logical entailment between the first and the second sentence to a matter of form (Davidson 1980:166):

- (3) $\exists e(\text{Strolled}(\text{Sebastian}, e) \ \& \ \text{Through}(e, \text{the streets of Bologna}) \ \& \ \text{at}(e, 2 \text{ a.m.}))$
- (4) $\exists e(\text{Strolled}(\text{Sebastian}, e) \ \& \ \text{Through}(e, \text{the streets of Bologna}))$

The real issue, however, is that interpreting VP-adverbs as predicate functors (as in Montague grammar) or as predicates of events (as in Davidson's proposal) does not provide any viable approach for the analysis of slightly more sophisticated uses of VP-adverbs, as with the 'subject-oriented' reading of manner adverbs like *rudely*, *carefully*, etc. According to this reading, the adverb does not express the manner in which the action occurred, but rather expresses some judgement about the import of its occurrence (the latter reading is also qualified as 'stative', cf. Higginbotham 1989). Jackendoff (1972) assigns this reading the following semantic structure: $\text{ADJ}(\text{NP}^i, f(\text{NP}^j, \dots, \text{NP}^n))$, corresponding to a two-place adjective which takes as its first argument the sentence obtained by removing the adverb and as its second argument one of the elements selected by the verbal predicate. The canonical example *Louisa rudely departed* will therefore be assigned, in its subject-oriented reading, a paraphrase roughly corresponding to *It was rude of Louisa to depart* (McConnell-Ginet 1982, Higginbotham 1989).⁸ Notice that a delicate compositionality issue arises here, since Jackendoff's paraphrase contains two instances of the subject NP (as a semantic constituent in its own right and as a sub-constituent of the sentential argument), whereas sentences such as *Louisa rudely departed* cannot be assumed to contain multiple occurrences of the subject NP (abstracting away, of course, from analyses which identify the deep structure of the senten-

ces under scrutiny with their logical form, as in Lakoff 1965). McConnell-Ginet proposes a solution according to which Jackendoff's paraphrase should be modified by replacing the sub-constituent of the sentential argument which also occurs as first argument of ADJ with a variable. This can be made semantically straightforward by assuming that in the subject-oriented reading of *Louisa rudely departed*, the adverb is a daughter of the sentential node and applies to VP (interpreted as a predicate, that is, λxPx). Since predicates and open sentences of the form Px are both interpretable as propositional functions, the semantics of *Louisa rudely departed* can be partially made parallel to that of its adjectival paraphrase *It was rude of Louisa to depart* (where the semantic variable is presumably provided by the subject PRO of the infinitival clause), without any need of unorthodox stipulations concerning the syntactic structure of *Louisa rudely departed*.⁹ However, application of the predicate functor *rudely* to either V (yielding (6)) or to the whole VP (yielding (5)) will still be insufficient to differentiate the manner reading from the subject-oriented one, since the predicates to which the adverb applies in the two cases differ only structurally, but not semantically, and will therefore yield undistinguishable interpretations (McConnell-Ginet 1982:161):

- (5) (Louisa) (*rudely* ($\lambda x (x \text{ departed})$))
- (6) (Louisa) (*rudely* (departed))

Again, the predicate-operator approach is in need to resort to meaning postulates in order to arrive at the correct empirical result: in this case, it seems necessary to assume two distinct predicate operators '*rudely*₁' and '*rudely*₂', one designating manner and the other attitude.

This is the reason why a number of scholars have rejected the predicate-operator approach, essentially by adopting non-standard assumptions about the argument structure of (verbal) predicates. According to one of these hypotheses, manner adverbs (presumably on a par with other 'circumstantial' adverbs such as locatives, instrumentals, etc.) are to be interpreted as 'optional' arguments of the verb. The main piece of evidence is provided by the fact, discussed in section 2, that adverbs, on a par with other 'optional' arguments such as 'benefactives', are sometimes obligatorily selected by the verb, as in *Joan behaved *(badly)* and *Most of the people treated Jill *(rudely)*. Jackendoff's failure to satisfactorily connect the homonymous 'man-

ner' and 'sentence-complement' (i.e. subject-oriented) adverbs is allegedly repaired by assuming that adverbs that are semantically equivalent to predicates with a sentential complement are actually connected (by means of some lexical rule) with genuine 'higher' predicates, modified by the adverb and regularly taking sentential complements. In this way, the subject-oriented interpretation of *Louisa rudely departed* will be traced back to structures of the form *Louisa acted rudely to depart*. Notice that this kind of approaches is essentially based on assuming fairly complex lexical representations, with a high degree of lexical ambiguity: the manner reading depends on the possibility of adding an extra argument position in the theta-grid of *depart*, whilst the subject-oriented reading is based on the possibility that the adverb be interpreted as the modifier of an implicit higher predicate. Conceptually, they seem to be motivated by the desire to replace the mechanical meaning postulates which would anyway be necessary within the predicate-operator approach with explicit assumptions about the nature of the lexical operations involved, in the hope that these assumptions will eventually lose their stipulative flavor. In the same vein, but more in the spirit of Davidson's approach, Higginbotham (1989) proposes that the issue of adverbial modification reduces to how open positions in the lexical structure of lexical items are 'saturated' by means of the mechanism of 'thematic discharge' (involving the operations of theta-binding, theta-identification and anonymous theta-marking) developed in Higginbotham (1985), and originally applied to adjectival modification. The basic insight is that there are cases of adverbial modification, as in *Mary fatally slipped*, which exactly parallel canonical adjectival modifications in *a white ball*. Under the assumption that adverbs express relations about an event *e* and an individual *x*, and that the open positions in the lexical structure of the adverb can be 'discharged' by identifying them with those in the lexical structure of the verb, it is possible to arrive at the correct semantic paraphrase (*Mary slipped and it (the slip) was fatal to her*). Needless to say, the manner and subject-oriented readings of adverbs such as *rudely* require that the adverb under scrutiny be assigned more complex (and distinct!) lexical structures: as for the manner reading, *rudely* is interpreted as expressing a relation between situations and 'attributes' (the latter corresponding to the 'intensional' equivalents of predicates), in order to arrive at paraphrases like "e is a departure by Lisa and it is rude (for a departure by Lisa)"; as for the subject-oriented reading, the adverb is assigned the lexical structure of a three-place predicate (expressing a relation among situations, individuals and attributes),

in order to yield paraphrases such as "the departure of Lisa was rude of Lisa, as classified by the very attribute of being a departure by Lisa".¹⁰ It is worth noticing that Higginbotham's analysis of adverbial modification can be interpreted as an attempt to provide the semantics for adjunction structures: adverbs, within the large variety of their interpretations, are consistently analysed in terms of n-place relations crucially involving the event variable assigned to action predicates by Davidson.¹¹ This position has to be carefully kept apart from the view taken in McConnell-Ginet (1982) or Larson (1985), where 'circumstantial' adverbs are interpreted, as emphasized above, as (optional) arguments of the verb. In section 7, we will see that the latter view is apparently supported by important facts concerning (a subset of) temporal adverbs. For the time being, we will limit ourselves to point out some intriguing facts concerning adverb-incorporation in Modern Greek, which also seem to militate in favor of the relevance of the argument status of adverbials (Rivero 1992). Rivero discusses the fact that manner and directional adverbs apparently incorporate into the verb in Modern Greek. Incorporation is not limited to strictly selected adverbials (as in *Mary behaves badly towards her sister*) but significantly extends to normal cases of adverbial modification like *Mary turned it upside down*. The class of incorporators arguably includes 'aktionsart' adverbials such as *again* (intuitively referring to the internal properties of the event, much in the spirit of Verkuyl's (1993) 'theory of aspectuality' and as such qualifying as VP-internal), but crucially excludes 'aspect' adverbials like *still* (apparently sensitive to the perfective/imperfective distinction) and 'tense' adverbials like *yesterday* and *often* (which are assumed to be adjoined to different functional layers such as AspP and TP). Under the assumption that these phenomena fall under the range of Baker's (1988) analysis of incorporation in terms of head-movement into a higher selecting head, Rivero uses them as a diagnostic for a distinction between adverbials which qualify as arguments of the verbal predicate (manner, directional and aktionsart adverbs) and those that are adjuncts related to different functional projections (primarily aspect and tense adverbs). The results produced by the application of this diagnostic are sometimes highly intriguing. The classification cuts across the class of circumstantial adverbs: manner and locative adverbials are kept apart from temporal adverbials, suggesting that the latter are never interpreted as arguments, a result difficult to justify both on empirical and theoretical grounds (see section 7).

As emphasized at the onset, identifying different adverb classes

is strictly dependent on the nature of the criteria which are applied. On essentially distributional grounds, the number of relevant classes can be easily shown to exceed the semantically motivated partition into VP and S-adverbs, and the related quadripartition proposed in Jackendoff (1972). There is a large amount of literature, concerning a relatively large typological domain, about the rigid relative ordering of different sorts of adverbs.¹² Cinque (forthcoming) proposes a universal hierarchy of adverbs (hopefully correlating with a fixed universes among (at least) an ordered sequence of 'higher' sentence adverbs, an ordered sequence of 'lower' VP-adverbs and an unordered sequence of VP-internal 'circumstantial' adverbs:

- (7) higher sentence AdvPs > lower AdvPs > (DPsubj) (V) complements
> place, time, manner, etc. adverbials

The theoretical relevance of the partition obtained by applying distributional criteria is assumed to depend on the feasibility of the correlation between (classes of) adverbs and independently motivated functional projections, and on the existence of a one-to-one correlation between syntactic positions and semantic structures. At the same time, it is worth emphasizing that these results are unlikely to improve our understanding of the compositionality issue. The relation between the syntactic position occupied by an adverb and the semantic role fulfilled by the latter remains essentially non-compositional (as was the case in Jackendoff's analysis).¹³ We might say, by adopting Jackendoff's terminology, that the arbitrariness of the projection rules involved is hopefully compensated by the presence of a distinct structural description for each projection rule. The role of syntax seems to consist in producing an unambiguous input for the application of non-compositional interpretive strategies. Restated in terms of the discussion above, this would entail that the relation between the manner and the subject-oriented readings of adverbs such as *carefully* or *rudely* does not go far beyond accidental homonymy.

Summarizing, we have seen that the familiar distinction between VP-adverbs and S-adverbs is hardly supported by a semantic partition between adverbs that are predicate-operators and adverbs that are sentence-operators. Rather, a large variety of interpretations has emerged (for instance, Jackendoff's speaker-oriented and subject-oriented readings of S-adverbs and VP-adverbs, respectively). Two major streams of research have been discussed. The one

tries to cope with the challenge that adverbial syntax poses to compositionality. The other accepts the arbitrariness of the projection rules and tries to provide the most adequate characterization of the set of structural descriptions involved (representing the input for the interpretive component). We turn now to the consequences of the proposed analyses for the issue of adverb placement.

4. Issues of adverb placement

As remarked at the end of the previous section, investigations on the syntactic position occupied by adverbs are likely to play an essential role if syntax is assumed to provide an unambiguous input for the application of the interpretive procedure ('projection rules') which associates adequate semantic structures to sentences containing adverbs. In the ideal situation, configurations where an adverb is assigned more than one interpretation should be ambiguous between two distinct configurations in which the adverb fills a different position, and, conversely, there should be no case of an adverb receiving the same interpretation in more than one syntactic position (abstracting away, for the time being, from the 'reconstruction' properties of certain kinds of adverb movement, which will be discussed in the sections 5.1 and 5.2). Jackendoff (1972) tried to reduce the notion 'ambiguity of syntactic position' to the notion 'ambiguity of syntactic attachment'. The canonical cases of ambiguity taken into consideration concern relative ordering of adverbs and auxiliaries, as in the following examples:

- (8) a. John cleverly has read the book
b. John has cleverly read the book
c. John has read the book cleverly

As is well-known, (8a) is only possible with the subject-oriented reading of the adverb, and (8c) with the manner reading of the adverb. As for (8b), it is assumed to be ambiguous between the subject-oriented and the manner reading. These facts easily follow if the adverb is attached to S in (8a) and to VP in (8c), whereas it is ambiguous between VP-attachment and S-attachment in (8b), under the assumption that the projection rule providing the subject-oriented and the manner reading only applies to adverbs attached to S and to VP, respectively. The ambiguity of attachment holding for (8b) is derived from the hypothesis that the auxiliary system is split into

