

Word order and quantification over times

(paper presented at the conference on Facts and Events, held in Trento in August 1995)

0. Introduction *

In this contribution, we would like to propose a principled explanation for the fact that the syntactic position of temporal adverbs can affect both well-formedness and truth-conditions. The general hypothesis that will be put forward is that aspect provides explicit forms of quantification on the temporal variable associated with verbal predicates, on close analogy with the role performed by the determiner position within the nominal system (the argument variable of nominal predicates is assumed to be closed at the D-level, cf. Higginbotham 85 and Longobardi 94 for articulated proposals). Once aspect is properly understood as involving different modes of quantification on the temporal variable associated with verbal predicates, the semantics of temporal adverbs can receive a straightforward account: adverbs may be interpreted as referential temporal arguments (perfective sentences), as predicates of time (imperfective/habitual sentences) or even as generalized quantifiers expressing relations among sets of times, as is the case with frequency adverbs. By investigating the role of aspect, we intend to argue in favour of the idea that adjuncts are not to be understood as optional modifiers but rather as a fundamental part of clausal architecture. The clear parallelism between nominal arguments (DPs) and temporal arguments (adverbs) strongly suggests that adverbs might be involved in movement operations triggered by morphological feature-checking as nominal arguments are, under current syntactic assumptions (cf. Chomsky 95). In this perspective, it seems possible to confirm and extend Cinque's fundamental insight that the position of adverbs systematically correlates with the presence and nature of a fixed set of functional projections realizing specific sets of features. However, it is our specific contention that there is much more at stake than a simple one-to-one correlation between adverbs and functional positions: adverbs undergo checking operations within the computational system (i.e. syntax) as a consequence of the specific sets of features they instantiate (and which clearly correlate with their referential, predicative or quantificational status). In fact, we will argue that not only temporal adverbs but even other syntactic constituents such as VPs obligatorily undergo movement under certain conditions, as a consequence of the fact that they can properly match the quantificational features encoded in aspectual projections (VPs are interpretable as predicates of times as a consequence of the fact that verbal predicates are generally endowed with a temporal argument). It is therefore not surprising that temporal adverbs can surface in different positions, and are given quite different interpretations in different syntactic positions, as we will try to illustrate, a finding that is readily amenable to the position that adverbs undergo the same kind of 'dynamic' syntactic processes to which nominal arguments are subject.

We will defend the hypothesis that movement is uniform within the computational system, in that the movement operations involving adverbs are exclusively triggered by checking requirements and never directly triggered by interpretative requirements (a claim which has to be accurately distinguished from the statement that the 'checked' features may be 'interpretable'). On the other hand, we intend to show that the unavailability of certain interpretations admits a fairly syntactic explanation, being based on the syntactic ill-formedness of the required representation at the LF-interface. The exclusion of certain logically admissible readings on purely syntactic grounds will in fact represent one of the main pieces of evidence in favour of the kind of syntax of aspect and adverbial modification we are going to propose. As a consequence, the focus of this article is on the syntax/semantics interface. Since our main issue

* This paper was jointly developed by the two authors. For academic purposes, however, PMB bears responsibility for section 2, and DD for the remaining sections.

is a better understanding of how the position of certain temporal adverbs affects well-formedness and/or interpretation, we will be more interested in the general nature of the contribution that the syntax of tense and aspect may provide to the solution of this problem than in the systematic derivation of the full array of correlations between word-order and interpretation that the syntax of adverbs confronts us with, and which would clearly exceed the limits of this article (see Delfitto & Bertinetto, in progress).

In more general philosophical terms, we want to argue that the notions of tense and aspect clearly have a morphosyntactic dimension and that the development of a syntax of tense/aspect crucially hinges on the extension of Davidson's fundamental insight that verbal predicates are associated with an event argument, of which manner adverbials are typically predicated. Our approach is crucially based on the idea that predicates are endowed with both an event and a time argument and that adverbs are always related, in ways that have to be carefully studied, with the realization of these two arguments. The conclusion is that the development, on empirical grounds, of a syntax of tense and aspect, can greatly contribute not only to a better understanding of the issues of referentiality and quantification in natural language (in forms which are clearly related to the development of the DP-hypothesis within the nominal domain), but also to a proper appreciation of the many issues posed by the syntax of 'adverbial modification'.

The paper is organized as follows. After having discussed, in section 1, the important symmetries which can be detected between the nominal and the temporal domain, and which provide crucial empirical motivation for the analogy between the quantificational role of the determiner position and the quantificational role of aspect, we will develop, in section 2, a 'Radical Symmetry Hypothesis' (RSH), according to which the different syntactic positions of temporal adverbs are triggered by morphological checking of the quantificational features encoded in the aspectual projection, on full parallelism with the approach to checking of quantificational features of nominal arguments developed in Stowell & Beghelli 94 and Szabolcsi 95. In section 3, we will extend this approach from habitual to progressive aspect, by proposing that the distributional constraints applying to temporal adverbs in progressive sentences receive a principled explanation once the usual assumption that the progressive aspect involves quantification over 'familiar' times (see especially Kearns 91) is given an explicit syntactic implementation, along the lines of the syntax of tense developed in Stowell 94. Finally, in section 4 we will discuss the far-reaching consequences of the approach developed in the preceding sections for the proper assessment of the so-called 'clause-splitting-algorithm' (cf. particularly Diesing 92) in structures such as those containing frequency adverbs, which involve a bipartition into a (nuclear) scope and a restrictive clause. We will show that the mechanism of 'association with focus' proposed in Rooth 85 may be assumed to correspond to a more 'compositional' mapping between syntactic representations (at the LF-interface) and interpretations under a 'copy-theory' of movement, thereby emphasizing that the approach consisting in limiting the complexity of the interpretative procedures by extending the range of syntactic computations to 'adverbial modification' may be pursued with a significant degree of success. Trying to assess the empirical motivations for our approach, we will also compare it with other versions of the clause-splitting algorithm, such as that found in Chierchia 95.

Needless to say, we presuppose some degree of familiarity with formal syntax, in both the 'principles and parameters' and the 'minimalist' version.

1. Parallelism between the nominal and the temporal domain

Adopting and extending the Davidsonian insight, we would like to propose that verbs are generally associated with both an event argument and a time argument. In line with the standard approach, we assume that the variable corresponding to the event argument is existentially bound within the VP (cf. Kearns 91 for a discussion of this point). The question we are interested in here concerns the syntactic realization of the time argument. In order to provide a principled answer to this question, we propose the following 'Radical Symmetry Hypothesis' (RSH):

- (1) RSH: There is a non-trivial correlation between the syntactic position in which nominal arguments are generated and the syntactic position in which temporal adverbs are generated. This correlation consists in the fact that point-of-time adverbials (*four o'clock*, etc.) and other temporal phrases (*Friday*, etc.) corresponding to predicates of times are licensed as arguments of V and represent the most deeply embedded arguments within VP. (see Larson 88)

A first consequence of RSH is that temporal adverbs are predicted to behave as referential expressions in the appropriate contexts, paralleling the option instantiated by referential DPs such as proper nouns. We will not explore this issue here, limiting ourselves to emphasize that this view has recently been advocated in Giorgi & Pianesi 95, on the grounds of the sensitivity of temporal phrases to Longobardi's tests for argumenthood and of their argumental behaviour in extraction contexts. The issue of referentiality is clearly reminiscent of Kleins' 92 distinction between p(osition)-definite and non-p(osition)-definite temporal phrases (depending on the possibility that the latter unambiguously fixes the position of a time span on the temporal axis (cf. Hitzeman 95)). A second consequence is that strings such as *often at 8 o'clock* (that is, the combination of a frequency adverb with a point-of-time adverbial) instantiated in sentences like (2) below, start the syntactic derivation as a quantified argument of V, on strict analogy with quantified DPs such as *many boys*:

- (2) Gianni beveva spesso il tè alle 8
'Gianni drank-IMP often the tea at 8'

The basic insight is that temporal phrases expressing predicates of times (*at 8 o'clock*, *Friday*, *in ten weeks*, etc.) refer to the (temporal) range over which the frequency adverb (*often*, *always*, *rarely*, etc.) quantifies, on strict analogy, again, with the role performed by the element filling the determiner position, which is generally assumed to quantify over the range of objects referred to by its NP-complement (see Longobardi 94 for a discussion of the relation between quantification and the concept of referentiality/rigid designation). This approach entails that the linear order effects (in particular, that the frequency adverb and the point-of-time adverb often surface as discontinuous constituents) are essentially a by-product of the overt checking operations performed within the syntactic component. As already mentioned above, we will not attempt a derivation of the complex word order effects arising with different classes of temporal adverbs (see Delfitto & Bertinetto, in progress, for a detailed discussion of some of the relevant cases). Instead, we will be concerned with a limited class of core cases, which will hopefully be sufficient to illustrate the nature of the mapping between syntax and semantics that we have in mind and the conceptual and empirical advantages that might arise from the elimination of adjunction in dealing with the case of 'temporal modification'.

The treatment of predicate-of-time expressions as base-generated (that is, inserted) in argument position clearly raises the issue of the parallelism between determiner-like elements quantifying over non-temporal objects in the nominal domain and the frequency adverbs quantifying over temporal entities (points or intervals) in the temporal domain. Our basic proposal consists in the claim that temporal 'modifiers' are in fact temporal 'arguments' entering checking relations with the quantificational features encoded in the aspectual projection(s). In this way, the semantic analogy between determiners and frequency adverbs is given a quite radical syntactic implementation. In the remainder of this section, we want to briefly illustrate how deep this correlation is on the semantic ground.

First of all, it is well-known that the treatment of determiners as generalized quantifiers can easily be extended to frequency adverbs (see de Swarts 91 for a detailed discussion of this topic). On strict analogy with determiners, which express relations among sets of individuals, frequency adverbs can be assumed to express relations among sets of times. For instance, the interpretation of the frequency adverb *always* in (3) (drawn from de Swarts 91) as a generalized quantifier is expressed in (4) and is made explicit in (5) as corresponding to a relation between two sets of times:

- (3) John always writes with a red pencil
(4) ALWAYS (($\exists y$ (John writes with y)), (John writes with a red pencil)) iff
 $\lambda e [\exists y$ (John writes with y) (e)] \subseteq λe [(John writes with a red pencil) (e)]

- (5) $\lambda t [\exists e (\exists y (\text{John writes with } y) (e)) (t)] \subseteq \lambda t [\exists e ((\text{John writes with a red pencil}) (e)) (t)]$.

The analogy can be pursued up to the extension of the semantic properties of determiners (such as conservativity and monotonicity) to Q-adverbs. As discussed by de Swarts, Q-adverbs like *sometimes*, *mostly*, *always* are easily shown to be monotone increasing, whereas Q-adverbs like *never* and *not always* turn out to be monotone decreasing.

An even more striking analogy, equally well-known since Lewis' seminal work, concerns the possibility that Q-adverbs act as unselective binders, on a par with determiners. The examples in (6) and (7) clearly show that the indefinite *a donkey* appears to behave as a free variable in the scope of the universal quantifiers, which corresponds to the determiner *every* in (6) and to the Q-adverb *always* in (7):

- (6) Every man who owns a donkey beats it
 (6') $\forall x \forall y [[\text{man}(x) \ \& \ \text{donkey}(y) \ \& \ \text{own}(x,y)] \rightarrow \text{beat}(x,y)]$
 (7.) If a man owns a donkey he always beats it
 (7') $\text{Always } \langle x,y \rangle [[\text{man}(x) \ \& \ \text{donkey}(y) \ \& \ \text{own}(x,y)] \rightarrow \text{beat}(x,y)]$.

On the other hand, there is a strong tendency, in the literature (especially in the framework of the Dynamic Montague Grammar, cf. Chierchia 95), to give up the unselective binding approach developed within the Discourse Representation Theory in favour of the more classical approach where indefinites are dealt with as existential quantifiers. Even if we adopt this approach, the symmetry between determiners and Q-adverbs manifests itself in striking forms. The existential disclosure effects arising in (9) (as compared with (8), where the indefinite is correctly interpretable as involving existential quantification), whose truth-conditions apparently involve the claim that the mothers send *every* four-year old child they have to school easily extends to the case where the presence of a Q-adverb appears to be sufficient to erase the existential quantifier induced by the perfective aspect, exemplified in (11). Notice that the natural paraphrase of the perfective sentence in (10) is something like "there is a time *t* at which the event of going out by Gianni took place, and *t* is five minutes ago". On the contrary, the perfective sentence in (11) (containing the Q-adverb *always*) seems to involve universal quantification over the time variable, giving rise to a clear existential disclosure effect: "for every time *t* such that Maria called at *t*, Gianni answered at *t*":

- (8) Every man who has a quarter in his pocket will put it in the parking-meter
 (9) Every mother who has a four-year old child sends it to school
 (10) Cinque minuti fa, Gianni è uscito (Italian)
 'Five minutes ago, Gianni went out'
 (11) Quando Maria ha telefonato, Gianni ha sempre risposto
 'When Maria called, Gianni always answered'.

The interpretative symmetry between determiners and frequency adverbs is thus straightforwardly confirmed by the possibility of extending to the latter the 'existential disclosure effects' commonly detected with the former, under standard assumptions concerning the interpretation of the perfective aspect.

A further piece of evidence in favour of the proposed parallelism concerns the possibility of interpreting both 'weak' determiners and the corresponding Q-adverbs 'adjectivally'. As is well-known (cf. for instance Higginbotham 87), weak determiners easily admit of a non-relational reading, according to which they express the cardinality of pluralities of objects, as in (12), to be related to the ungrammaticality of (13), which involves a 'strong' determiner:

- (12) Questi studenti sono molti
 'These students are many'
 (13) *Questi studenti sono tutti/ogni
 'These students are all/every'.

Quite significantly, the weak/strong contrast clearly extends to the corresponding classes of Q-adverbs. Adjectival Q-adverbs such as *often* (which may be assumed to express a 'symmetric'

relation between classes of events/times, on strict analogy with the definition of adjectival determiners proposed in Higginbotham 87: 48) may naturally occur in sentence-final position and be assigned a 'pure frequency' reading according to which they represent a cardinal predicate of the plurality of events expressed by the verbal predicate:

- (14) L'anno scorso, Gianni ha fatto visita a Maria (assai) spesso
'Last year, John visited Mary (quite) often'.

This option is clearly excluded with the adverbial counterparts of strong determiners, such as *always* (expressing a non-symmetric relation between two classes of events/times in their quantificational reading), which give rise to strong marginality when occurring in sentence-final position and cannot be assigned a 'cardinality' reading:

- (15) *L'anno scorso, Gianni ha fatto visita a Maria sempre
'Last year, John visited Mary always'.

In the case just reviewed, the semantic analogy between determiners and Q-adverbs has been shown to be represented syntactically, in terms of the impossibility of strong determiners/Q-adverbs to occur postverbally in predicative position.

In this paper, we would like to propose that the syntactic effects of the proposed parallelism between the nominal and the temporal domain can be detected also elsewhere, providing a non-trivial account for the distribution of temporal adverbs in habitual and especially in progressive sentences. A case in point is related to the issue of 'familiarity'. Familiar constituents have often been assumed to involve features which undergo syntactic encoding, varying from the presence of familiarity indexes on pronouns in Discourse Representation Theory to displacement phenomena triggered by the presence of familiarity features in certain functional positions. In the by now abundant syntactic literature on specificity, a broad class of word-order and morphosyntactic effects (cliticization, clitic-doubling, object-scrambling, object-agreement, etc.) has been related, in different ways, to the syntactic encoding of familiarity (cf. Obenauer 92, Dobrovie-Sorin 93, Delfitto & Corver 95 among others). On the other hand, it is well-known that discourse-linked constituents produce peculiar syntactic effects, such as the absence of weak crossover violations and island effects in contexts where the latter are expected to show up (cf. for instance Cinque 90). Assuming the view that temporal adverbs correspond to arguments of the verbal predicate, the issue can be raised whether temporal adverbials referring to familiar times are subject to distributional constraints which might be compared with those applying to 'familiar' nominal arguments, such as pronominal clitics. It is our claim that this might well be the case. In the literature on the progressive aspect it has been frequently claimed that progressivity crucially involves reference to familiar times (see Kearns 91 for a detailed discussion of this issue). To put it in informal terms, we might say that the time at which the event referred to by the progressive predicate is assumed to take place can never be existentially quantified, but crucially corresponds to an implicit, 'presupposed' specific point of time or temporal interval. This fact represents an instance of the more general phenomenon according to which 'tenses' that express the progressive interpretation, such as the Romance 'imperfect', are necessarily assigned an anaphoric reading, admitting for instance a non-simultaneous reading with respect to the main clause time only in cases where an independently established temporal location is provided by the context or by an overt adverbial phrase in the embedded clause (see Giorgi & Pianesi 95a, Delfitto & Bertinetto 95 for a discussion of these and related matters). Quite significantly, the 'specific' interpretation of the event time in progressive sentences appears to correlate with the distributional constraint according to which the temporal adverb expressing the familiar time is generally excluded from the VP-internal position (cf. 18), and normally surfaces in a dislocated position, as shown in (16)-(17) (drawn from Bianchi et al. 95), at least in contexts where the relevant sentences are uttered in an 'out-of-the-blue' fashion:

- (16) Alle 5, Gianni stava partendo
'At 5 o'clock, Gianni was leaving'
(17) Gianni stava partendo, alle 5
'Gianni was leaving, at 5 o'clock'

(18) *Gianni stava partendo alle 5.

The hypothesis that we would like to put forward is that the exclusion of point-of-time adverbials from the VP-internal position does not stem from pure logico-semantic considerations, but depends on the application of independent syntactic conditions constraining movement, and therefore excluding, on purely syntactic grounds, the interpretable syntactic representation that might be associated, at the LF-interface, with sentences such as (18). The application of these syntactic constraints depends in turn on the hypothesis that the familiar interpretation of event time denoting temporal adverbials is encoded in syntax, on full analogy with the syntactic approach to the familiar interpretation of nominal arguments which has been pursued within the stream of research referred to above.

On the empirical side, it should be emphasized that the ungrammaticality effects produced by the occurrence of punctual adverbs in the VP-internal position (which we assume to coincide with their original argument position) appears to be limited to the structures where the temporal phrase can be argued to refer to informationally prominent times (the 'perspective points' of Bianchi et al.), being also found in contexts involving the Pluperfect and the Future Perfect (essentially in their non-aoristic interpretation) (see Bianchi et al. for a detailed presentation of the relevant data). In the contexts where the times involved are arguably not subject to any presuppositional/familiar interpretation, the occurrence of punctual adverbials in their base-position does not yield ungrammaticality, even though it may affect truth-conditions, depending on aspectual considerations. In 'habitual' sentences such as (19) and (20) the position of the adverb (either VP-internal or dislocated) clearly affects interpretation, as shown by the logical paraphrases in (19') and (20'), depending on the possibility that the adverb be projected into either the restrictive clause (19') or the (nuclear) scope (20'):

(19) Alle 8 Gianni beveva un caffè
'At 8 o'clock John drank-IMP a coffee'

(19') Gn t [8 (t)] [∃e: D(e) & at(e,t)].

(20) Gianni beveva un caffè alle 8
'John drank-IMP a coffee at 8 o'clock'

(20') Gn t [∃e: D(e) & at(e,t)] [8(t)].

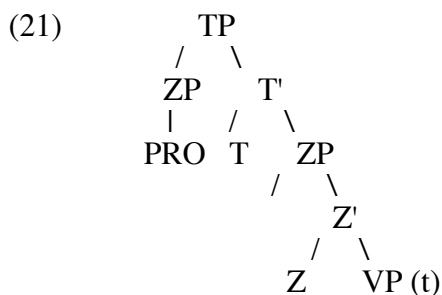
These data are relevant in two basic respects. First of all, they seem to indicate that the VP-internal position of temporal arguments affects well-formedness only in structures where the latter may be argued to correspond to 'familiar' variables and that this is not the case in structures where they arguably correspond to quantified variables (involving a 'generic' operator, as we have assumed for (19)-(20) following standard assumptions, or quantifiers of the usual type, corresponding to overtly realized frequency adverbs). Second, these data appear to support the hypothesis that the splitting-algorithm which has been advocated for the interpretation of quantificational structures involving nominal arguments (see especially Heim 82 and Diesing 92) is also relevant for the interpretation of quantificational structures involving aspect (cf. 19-20), and appears to correspond, within the aspectual/temporal domain, to a condition on overt syntactic representations, being sensitive, as shown by (19)-(20), to the surface position of temporal phrases (see Diesing 92 for the hypothesis that the splitting-algorithm may apply to overt syntactic representations in Germanic, and Chierchia 95, Hitzeman 95 for possible extensions to adverbs). One of the main issues we will try to deal with in the next sections concerns the correct definition of the splitting-algorithm applying in the temporal domain. The goal will be achieved by developing an explicit syntax of aspect (on the model of Stowell's syntax of tense), in the attempt to clarify how the quantificational features usually associated with aspect are actually encoded in syntax and how they affect syntactic derivations. We will try to show that the answer to these questions may provide us with a mapping between syntax and semantics (i.e. with a formulation of the splitting-algorithm) which appears to satisfy the compositionality requirements.

To sum up, we have seen in this section that the interpretation of temporal adverbs as arguments of the verbal predicate receives important confirmation from the extensive interpretative parallelism between determiners and frequency adverbs (regarded as quantifiers on nominal and temporal arguments, respectively), and by the word-order effects allegedly

produced in both the nominal and the temporal domain by the syntactic encoding of familiarity. After having shown, in the next section, how an explicit syntax of aspect might lead to a (potentially) adequate derivation of the observed correlations between word-order and interpretation, we will discuss, in section 3, the proposed correlation between familiarity and the distributional constraints applying to temporal phrases in progressive sentences.

2. On the interaction between aspect and temporal adverbials

Our proposal for a syntax of aspect is based on the syntax of tense developed in Stowell 93-95 (for somehow related approaches, see Zagana 95 and the literature cited therein). According to Stowell, 'tense' is a dyadic operator expressing a temporal ordering relation between the event time (E) and the speech time (S) or the E of a superordinate clause, both syntactically represented as time-denoting Z(eit)P(hrase)-arguments, the first of which is realized as the specifier of the T(ense)-projection, and the second of which corresponds to the complement of T:

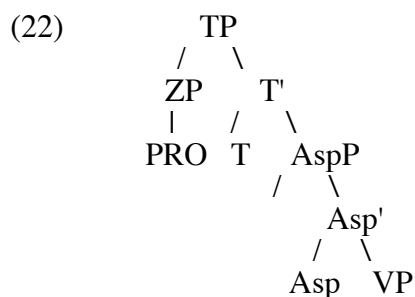


The interpretation of the 'temporal' structures exemplified in (21) is crucially based on the activation of the PRO-module within the temporal domain. The external ZP-argument is realized as an instance of PRO, which is interpreted as referentially dependent on the E of a superordinate clause when (21) corresponds to an embedded structure (potentially accounting for the 'sequence-of-tense' effects), and as coinciding with S when (21) corresponds to an independent clause. The assumption of the structure in (21) raises a series of complex technical issues. We will simply put them aside here, emphasizing that the proposed relevance of the PRO-module for an adequate treatment of the anaphoric relations among temporal arguments constitutes, if correct, an important corroboration of the general approach advocated in this paper, based on the essential analogy between nominal arguments and temporal phrases.

On the other hand, we would like to propose some essential modifications to Stowell's approach. First of all, Stowell assumes that the ZP complement of T in (21) is interpreted as a quantified argument, on full analogy with quantified DPs. More exactly, either Z itself or an empty operator in spec-ZP is assumed to saturate the VP by binding a null temporal variable in a VP-internal argument position, theta-marked by the verb. We want to depart from this assumption by proposing that the temporal argument is realized as an overt temporal phrase (the alleged temporal modifier), which may be interpreted, exactly paralleling the behaviour of argument DPs, as either a quantified or a rigidly denoting argument. For concreteness, we may assume that temporal phrases of different sorts (*in ten weeks, Friday, at 5 o'clock*, etc.) are generated in a 'predicative' position in which they refer to 'kinds' of temporal objects, by essentially extending to temporal arguments the approach to nominal arguments developed in Longobardi 94. Obviously, this move arguably coincides with the null hypothesis and might lead, if empirically feasible, to a considerable degree of theoretical simplification. The basic insight is that temporal phrases, say punctual adverbials such as *at 5 o'clock*, are generated in a 'predicative' position essentially corresponding to the N-position for nominal arguments, where they get interpreted, through the application of strictly compositional procedures, as 'predicates of times', exactly as common nouns get interpreted as 'predicates of objects' (the 'kind-referring' reading of Longobardi 94). As a predicate of time, a punctual adverbial contains an open position, which must be saturated in order for the adverbial to be interpreted as an argument. In this way, temporal arguments are 'saturated' temporal phrases, exactly as

nominal arguments are 'saturated' NPs (cf. Higginbotham 87). The null hypothesis is that the mechanisms through which saturation takes place coincide exactly with those that have been shown to be operative in the case of nominal arguments. A mechanical extension of Longobardi's basic insight leads us to the hypothesis that the argumenthood of temporal phrases crucially depends on the presence of a functional position, say F, selecting the temporal phrase and encoding referentiality, on strict analogy with the role performed by the D-position in the case of nominal arguments. According to Longobardi, referentiality can be achieved either by moving the NP-level constituent to the D-position (as is arguably the case with proper nouns and with common nouns interpreted generically) or by filling the D-position with an element that quantifies into the range denoted by the NP (as is the case with quantified DPs). Analogously, we want to propose that a temporal phrase such as *at 5 o'clock* is interpreted either referentially (via abstract movement to the FP-level) or quantificationally (via insertion of a frequency adverb in the F-position). As already mentioned in section 1, this approach entails that the sequences 'frequency adverb + punctual adverb' correspond to argument constituents filling the temporal argument position (by hypothesis, following Larson 88, the most embedded position within VP), and representing the temporal counterparts of quantified DPs. Notice that this approach, besides being conceptually straightforward, allows us to dispense with the idea of base-generated null variables (the actual temporal arguments in Stowell's original proposal, according to which temporal adverbs are adjunct modifiers, either of the null temporal variable in argument position or of the full ZP dominating VP).

The proposed modification to Stowell's approach entails that the ZP-phrase dominating VP is not to be conceived of as the relevant syntactic level for quantification over temporal variables, since such a level is now assumed to coincide with the functional projection dominating the temporal phrase inside the VP (possibly filled by frequency adverbs). On these grounds, it seems quite natural to interpret Stowell's ZP complement of T(ense) as a functional category encoding some of the features realized on the temporal phrase, on strict analogy with the functional projections which instantiate some of the (quantificational) features realized on nominal arguments (see Stowell & Beghelli 94 for a full discussion of the different kinds of quantificational features involved). Within this approach, temporal phrases are thus characterized as sets of features entering checking relations in syntax, on a par with nominal arguments (see in particular Chomsky 95). The alleged ZP complement of T can therefore be identified with the 'aspectual' projection at which some of the relevant quantificational features of temporal phrases are encoded. According to the present proposal, aspect is thus the syntactic level at which a particular set of 'interpretative' features of temporal phrases is checked. As a conclusion, the syntactic representation in (21) should be replaced by (22):

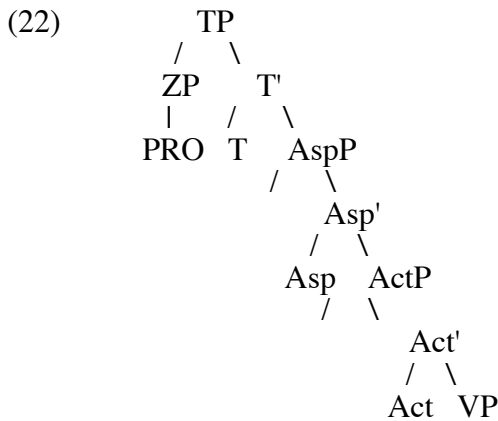


At this point, the relevant question concerns the features which are realized in the aspectual head. Notice that a punctual adverbial such as *at 5 o'clock* can be interpreted either referentially (when it unambiguously designates a certain point on the time axis, for instance *the 5 o'clock of the day containing the Speech Time*) or predicatively (when it refers to the set of times satisfying the predicate 'at 5 o'clock', over which quantification, encoded in F, takes place). If the interpretation is quantificational, as in the 'habitual' sentences exemplified in (19) and (20), the temporal argument will be interpreted, at the LF-interface, as a quantified restricted variable, as is the case with quantified DPs such as *every boy*. The hypothesis that we would like to put forward is that the habitual aspect represents the realization of the quantificational feature [+sortal] in the aspectual head, and that this feature encodes the logical information that the interpretation of the temporal argument involves the presence of a RESTRICTED variable. In more informal terms, we might assume that the habitual morphology

in the aspectual head encodes the information that the punctual adverbial crucially involves quantification over 'kinds', as is the case with common nouns in Longobardi's framework. In other words, we might assume that the habitual aspect expresses the information that the temporal phrase is not interpreted referentially (in Klein's 92 terms, it does not represent a p-definite constituent, unambiguously fixing the position of a time span on the time axis). 'Aspect' might be seen as the morphosyntactic device used for the encoding of the distinction between the quantificational and non-quantificational reading of temporal phrases. Conceptually, this approach appears to be supported by the observation that such a distinction does not undergo 'lexical' encoding, contrary to what happens in the nominal domain, via the existence of a class of rigid designators (proper nouns).

Let us consider now some of the empirical consequences of the analysis developed above. As for the habitual reading exemplified in (19)-(20), we want an explanation for the fact that the different syntactic position of the punctual adverbial apparently correlates with a different interpretation, involving the projection of the punctual adverbial into either the restrictive clause (19) or the nuclear scope (20). Suppose that the [+sortal] feature present in the Asp-head is non-interpretable IN THAT POSITION, arguably the null hypothesis. According to the 'minimalist' system developed in Chomsky 95, this entails that the Q-feature in Asp must be erased through 'checking' with a constituent which is lexically endowed with the same feature (i.e. a 'predicate of times'). One of the candidates is obviously the punctual adverb. We may assume that the derivation of (19), where the punctual adverb surfaces in the left-dislocated position, involves in fact intermediate movement of the adverbial phrase to the spec-of-Asp position, producing the checking configuration required for the erasure of the non-interpretable Q-feature in Asp. In order to derive the correct mapping to (19'), we have only to assume that the 'restrictive clause' corresponds to the specifier of the aspectual projection (see Ladusaw 92 and Acquaviva 95 for the claim that the restrictive clause generally corresponds to specifiers of functional projections). Under the instruction that the copy of the temporal phrase in dislocated position provides the content of the restrictive clause, the required mapping from (19) to (19') easily follows.

Consider now (20), where the punctual adverbial is projected into the nuclear scope, as shown by the logical paraphrase in (20'). This result can be straightforwardly derived under the natural assumption that the sentence-final position of the punctual adverb in (20) simply corresponds with its base position (i.e. the most embedded argument position within the VP). This entails that (20) corresponds to a syntactic derivation in which the temporal phrase does not overtly move to spec-of-AspP and cannot therefore give rise to the restrictive clause, given the splitting-algorithm proposed above. However, the grammaticality of (20) forces us to assume that 'checking' of the Q-feature in Asp must have taken place, correctly ensuring the erasure of this uninterpretable feature. The hypothesis that temporal phrases constitute VP-internal arguments provides us with another obvious candidate for checking. If we could replace the temporal argument with a variable, the whole VP (under the standard hypothesis that all the arguments of V are generated VP-internally, see especially Koopman & Sportiche 91) would be interpretable as a 'predicate of times', informally referring to the set of times at which the event denoted by the verb takes place (more formally: " $\lambda t (\exists e: P(e) \ \& \ at(e,t))$ "). As a consequence, (20) might be assumed to correspond to a syntactic derivation in which the whole VP has been moved to spec-of-AspP. Under the proposed splitting-algorithm, according to which the restrictive clause is provided by the lexical material in spec-of-AspP, this syntactic derivation would be directly mapped into the required logical representation in (20'). What we need for the correct mapping from (20) to (20') is therefore a principled mechanism which enables us to replace the temporal argument with an open position. Consider the following possibility. Under our interpretation of Aspect as the morphosyntactic encoding of the quantificational features realized on temporal phrases, the possibility arises that even the actionality features of these phrases are syntactically encoded in a specific functional position. If we assume that this position corresponds to the projection selecting the VP, the representation in (22) should be more accurately rewritten as (23):



The obvious assumption is that the temporal phrase *at 5 o'clock* moves to spec-of-ActP in order to check the features realized on the Act-head (notice that temporal phrases are the only constituents which are lexically endowed with this kind of features). The independent motivation for this sort of checking is provided by the possibility of ruling out, through its application, the co-occurrence of certain temporal adverbs with predicates of the wrong type, for example the co-occurrence of 'in-x-time' adverbials with 'activity' predicates (see Bertinetto 86, Verkuyl 89 for an in-depth discussion of the actionality features). After the temporal phrase has moved to spec-of-ActP, we may assume, under the copy theory of movement (see Chomsky 95), that a phonetically unrealized 'copy' of the displaced constituent remains in the VP-internal argument position. However, notice that the 'copy' of the temporal phrase is no longer c-commanded by the head of the chain in spec-of-ActP after the whole VP has moved to spec-of-AspP. In other words, VP-movement destroys the chain configuration. Under these conditions, the natural move is to assume that the content of the phonetically empty category contained in the VP is no longer 'recoverable', as far as the VP in spec-of-AspP is concerned, as the 'copy' of the displaced temporal phrase and is therefore interpreted, at the LF-interface, as an open position subject to quantification. In this way, we are able to derive the required semantic result (the VP must correspond to a 'predicate of times' which checks, in the appropriate spec-head configuration, the [+sortal] feature encoded in Asp) from completely independent syntactic considerations (essentially, the hypotheses that checking extends to the actionality features and a quite straightforward implementation of the copy-theory of movement). If this approach is on the right track, the mapping from (20) to (20') would essentially depend on the possibility that the aspectual features be checked by the whole VP and that the latter be therefore interpreted as the element providing the restrictive clause, as a consequence of the fact that it fills the spec-of-AspP position).

To sum up, it seems the hypothesis that the habitual Aspect represents the syntactic encoding of the information that the temporal argument is interpreted quantificationally can successfully account for the fundamental kind of interaction between interpretation and word-order exemplified in (19)-(20), and leads to an interesting version of the splitting-algorithm. Obviously, many interesting questions arise. We will not try to answer them here, being content with having indicated the main direction of analysis. In the remainder of this section, we will limit ourselves to illustrate the possible consequences of our approach for the analysis of the (different varieties of the) perfective aspect.

Under the label 'perfective aspect' we intend here both 'perfect' forms (such as the English Present Perfect) and 'aoristic' forms (such as the English Simple Past), which we interpret as both belonging to the aspectual subdomain of 'perfectivity', as contrasted to the aspectual subdomain of 'imperfectivity' (see Bertinetto 86, Delfitto & Bertinetto 95 for the discussion of matters relevant to the proposed categorization). Perfective 'tenses' are known to differ along a number of parameters, the main one of which concerns the possibility that they give rise to a 'specific' (that is, p-definite) interpretation of the E. This parameter has a clear crosslinguistic significance, since the Present Perfect turns out to be incompatible with the specific reading of E in English and mainland Scandinavian, but fully admissible with such an interpretation in Romance, Dutch, German and Icelandic (see Giorgi & Pianesi 95).

For our present purposes, it is important to emphasize that the cases which give rise to the specific interpretation of E do not seem to involve any significant correlation between the

surface position of temporal phrases and the change of the truth-condition of the sentenceP in which they are contained. As a consequence, there is a clear contrast between these cases and the habitual sentences discussed above, whose interpretation has been shown to be sensitive to the overt syntactic position of punctual adverbials. Our claim is illustrated by the fact that both (23) and (24) are assigned the reading in (25) in languages, such as Italian, where the Compound Past (morphologically equivalent to the English Present Perfect) can be interpreted specifically:

- (23) Alle 8 Gianni ha bevuto un caffè
 'At 8 o'clock John drank-PERF a coffee'
 (24) Gianni ha bevuto un caffè alle 8
 (25) $\exists e: 8(t) \ \& \ D(e) \ \& \ at(e, 8 \text{ o'clock}).$

The relevant generalization seems to be that the way in which the syntactic position of temporal phrases affects interpretation crucially depends on whether the perfective or the imperfective aspect is involved. How can we derive this important generalization? According to the framework proposed above, temporal phrases which receive a specific (that is, p-definite) interpretation are temporal arguments interpreted referentially (presumably by means of abstract movement to the F-position selecting the temporal constituent within VP). Under these conditions, aspect might be assumed to encode the non-quantificational reading of the temporal phrase. For sake of concreteness, we can assume that the specific interpretation of E in (23) and (24) crucially correlates with the interpretation of the aspectual morpheme involved as an expletive-like element, essentially used to express the negative information that no quantificational feature is encoded and the reading of the temporal argument is consequently non-quantificational. There is an important conceptual symmetry with the occurrence of expletive determiners with proper nouns and common nouns interpreted generically, which are essentially used, according to Longobardi 94, in order to block the 'default' existential reading generally assigned to empty determiner positions. We would like to propose that the symmetry could be further extended. In particular, the possibility arises that perfective morphemes, on close analogy with determiners of a well-defined class, be ambiguous between an expletive and a non-expletive interpretation. We have already seen that the expletive interpretation appears to correlate with the non-quantificational reading of the temporal phrase. Suppose now that the non-expletive lexical variant of the perfective morpheme encodes the Q-feature [-sortal]. The presence of this feature can be assumed to correspond to the logical information that the interpretation of the temporal phrase involves quantification over a non-restricted variable (that is, on the whole set of 'times'). Clearly, this option covers the cases of 'default' existential quantification in Discourse Representation Theory, which involve 'unrestricted' variables and give rise to bipartite structures lacking a restrictive clause. In other words, we want to assume that the existential interpretation which arises in perfective sentences where E is not interpreted specifically (that is, receives a non-p-definite reading) corresponds to syntactic structures where the perfective morpheme encodes the Q-feature [-sortal]. According to the framework developed above, the non-interpretable [-sortal] feature in Asp must be erased via checking. The only syntactic derivation which permits achieving this result entails that the F-position selecting the temporal phrase within VP be left empty (so that it can be assigned, by default, the same 'non-presuppositional' interpretation proper to 'existential' bare plurals) and be successively moved, as a maximal projection, to the spec-of-AspP position, where it can felicitously match the [-sortal] feature in Asp, eliminating it from the interface-representation, as required for convergence. The fact that the position of the temporal phrase does not affect interpretation in (23) and (24) straightforwardly follows from the absence of any correlation, in these cases, between the movement of the temporal phrase to spec-of-AspP and the process of restrictive clause formation. As a result of the proposed procedure, (23) and (24) are easily mapped into the logical representation in (26), corresponding to the existential reading:

- (26) $\exists t \exists e: 8(t) \ \& \ D(e) \ \& \ at(e,t).$

The view of the perfective aspect advocated here significantly involves a considerable degree of parallelism between nominal and temporal phrases, in strict accordance with the general thesis defended in this contribution. The perfective aspect has been shown to correlate

with either a referential or an existential interpretation of the E referred to by the temporal phrase. We have proposed that the selection of one of these two readings crucially depends on the application of processes which are highly reminiscent of those which have been shown to be relevant for the referential or existential interpretation of DPs in Longobardi 94 (for instance, the emptiness of D/F and the (non) expletive status of aspectual morphemes/determiners. The systematic ambiguity of perfective sentences between a referential and an existential (non-presuppositional) interpretation is clearly illustrated by examples such as (27) (drawn from Hitzeman 95):

(27) Mary has lived in Amsterdam for three years.

Hitzeman emphasizes that (27) "has a reading in which there is some three-year interval during which Mary lived in Amsterdam, and a reading in which Mary lives in Amsterdam at speech time and has done so for the three years preceding speech time" (Hitzeman 95: 2).

Finally, we would like to point out that the availability of the existential (that is, non-p-definite) interpretation of the temporal adverb in sentences such as (27) (where the adverb occurs sentence-finally), contrasting with the impossibility that the adverb in (20) be mapped into the restrictive clause, appears to require a difference in 'strength' between the feature [+sortal] (correlating with restricted quantification and restrictive clause formation) and the feature [-sortal] (correlating with unrestricted quantification and bipartite clause formation). If this is the case, we have found important confirmation for the hypothesis that the operations performed in overt syntax are related to the presence of quantificational/interpretable features. Since this evidence is notoriously lacking as far as quantified nominal phrases are concerned (for instance, the proposed operation of quantifier raising is generally not overtly instantiated), attempts have been made in order to interpret the 'minimalist' system of Chomsky 95 as entailing a ban on quantificational features of the usual sort, with important consequences for the notion of A-bar movement (see Hornstein 95). If our proposals concerning quantification in the temporal domain are on the right track, there might be reasons to think that the skepticism has been excessive and that 'interpretable' quantificational features should be given quite a pervasive role.

3. Familiarity and progressive aspect

As already discussed in section 1, the interaction between progressive aspect and temporal adverbials appears to give rise to ungrammaticality effects. In particular, we have seen that the presence of VP-internal adverbs is incompatible with the progressive aspect, as shown by the ill-formedness of (18) (cf. Bianchi et al.), repeated for convenience below:

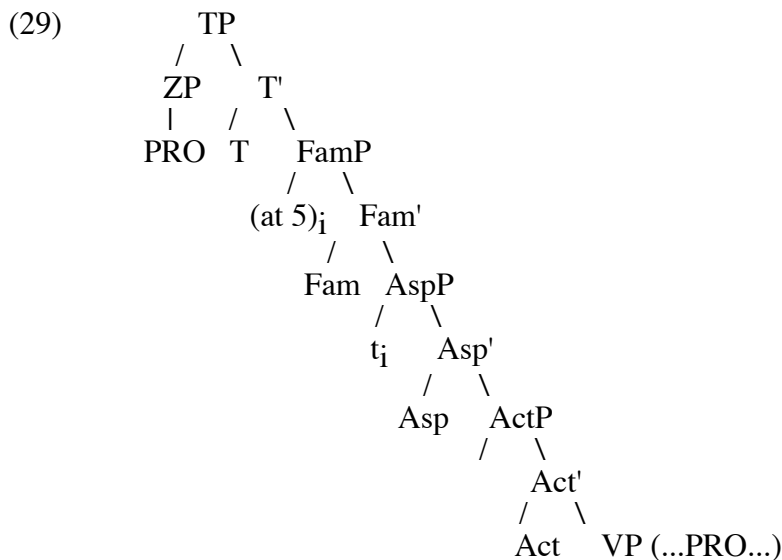
(18) *Gianni stava partendo alle 5
'Gianni was leaving at 5 o'clock'.

We have also noticed that this fact seems to correlate with the 'familiar' interpretation of the E associated with the progressive. Descriptively, the E of a sentence such as (28) can never be interpreted existentially ('there is a time t at which an event of leaving (by Gianni) was taking place'):

(28) Gianni stava partendo.

The only admissible interpretation of (28) entails that the event of leaving was taking place at a specific time (roughly, at a contextually salient or previously introduced time). As a result, (28) is necessarily understood as involving an implicit temporal adverb, expressing the 'familiar' time at which the event referred to by the predicate is assumed to have been taking place. If the content of the implicit temporal adverb cannot be recovered by means of contextual information, (28) results unacceptable, unless used in embedded contexts (in which case the E is interpreted as referentially dependent on the previously established time associated with the superordinate predicate). In other words, the relevant generalization seems to be that the E of progressive predicates is always anaphoric with respect to some previously established time,

which may be expressed by an (implicit) temporal phrase or by the E associated with a superordinate clause. In accordance with the 'syntactic' approach to meaning argued for in this contribution, we would like to propose that the anaphoric interpretation assigned to the E of progressive predicates receives a straightforward syntactic implementation. In section 1, we have seen that Stowell's syntax of tense is based on the assumption that the first temporal argument of 'tense' is syntactically realized as PRO, and receives either the 'arbitrary' interpretation where it is identified with S, or the 'anaphoric' interpretation where it is identified with a syntactically 'higher' E acting as a 'controller'. We want to claim that the basic property of the progressive consists in the fact that its temporal argument is realized as an instance of PRO. This hypothesis entails that in sentences such as (28) the temporal predicate realized in the T-position (PAST) expresses a relation of temporal ordering between the S and a distinct 'familiar' time, which is identified with the temporal argument of the progressive through syntactic 'control'. For sake of concreteness, we may assume that the temporal argument of T corresponding to the 'familiar' time is generated in spec-of-AspP, and successively moves to the specifier of the functional position which encodes 'familiarity'. These syntactic assumptions are reasonably compatible with the requirement that the familiar time correspond to a 'restricted' free variable, which is interpreted as referring to some contextually salient time. The temporal argument of the progressive is realized as PRO within VP, and is interpreted via 'control' by the variable under common assumptions. The syntactic structure that we propose to associate with (28) is shown in (29) below:



Notice that the 'familiar' temporal argument of T may be syntactically realized as an overt temporal phrase, generated in spec-of-AspP (where it checks the [+sortal] feature encoded in Asp, in accordance with the well-supported hypothesis that progressivity represents, together with habituality, one of the main subdomains of imperfectivity), and successively moved to spec-of FamP (where the familiarity feature is checked), which is responsible at LF-interface for the interpretation of the restricted variable as a contextually interpreted 'free' variable.

Putting aside a number of important details, the basic insight that the E of the progressive is inherently anaphoric has been syntactically implemented by proposing that E is realized as an instance of PRO and represents a distinct argument with respect to the temporal argument corresponding to the complement of the 'tense'-predicate, and directly theta-marked by the latter. Essentially, the difference with respect to habitual sentences is that the movement relation established there between the (quantified) temporal argument of V and the spec-of-AspP position has been replaced, in (29), by a 'control' relation between the two relevant syntactic positions (in the latter case, no 'chain' is established, and two distinct arguments must be assumed to be at stake).

Given the syntax of the progressive aspect proposed above, explaining why temporal adverbs cannot occur VP-internally becomes a relatively easy matter. According to the

discussion in section 2, the word-order in which the temporal phrase follows the complement(s) of V, occurring in (non-dislocated) sentence-final position, simply corresponds to the option in which temporal arguments surface in their VP-internal argument position. Since we have assumed that in progressive sentences this position is filled by the silent argument PRO, the temporal phrase is correctly predicted not to surface there. By contrast, the presence of the temporal phrase in dislocated position, as in (16)-(17), is fully compatible with the requirement that the temporal phrase be generated outside the VP, in a position from which it can 'control' the empty temporal argument of the progressive and from which it is overtly moved (for reasons that do not concern us here) to the 'dislocated' position.

Obviously, in order to fully exclude structures such as (18), in which the temporal phrase occurs sentence-finally, we have to show that this word-order does not correspond to *any* legitimate syntactic representation. Another potential candidate is the syntactic structure in which the temporal adverb is generated in predicative position (say, as adjoined to ActP), and the whole VP moves to spec-of-AspP in order to check the non-interpretable [+sortal] feature realized on the aspectual head. Note that this adjunction structure cannot be easily discarded on semantic grounds. The fact that temporal phrases may correspond to arguments does not prevent them from being employed in structures where they count as predicates, on full analogy with nominal phrases, which can notoriously be used as both arguments and predicates (see Higginbotham 87 for a full discussion). This 'predicative' structure would arguably produce, for a sentence such as (18), the following legitimate interpretation: "The Speech Time t is after the familiar time t' such that an event L of leaving (by John) was taking place at t' and t' is 5 o'clock". In other words, this interpretation corresponds to the option where the time variable realizing the familiar argument of T is 'restricted' by the predicate of times corresponding to the whole VP, on a par with the procedure described above for habitual sentences, and 'controls' the empty temporal argument of the progressive predicate. In this structure, the temporal phrase would correspond to an adjunct modifier of the ActP dominating VP and undergoes the predicative interpretation spelled out above. However, there are principled reasons to think that the syntactic structure under examination is not suitable to provide an adequate input for the required interpretation at the LF-interface. Remember that for habitual sentences it was possible to assume that the position corresponding to the temporal argument (filled by the overtly realized temporal phrase) could be vacated before the VP is moved to spec-of-AspP. Movement of the temporal phrase to a VP-external position was independently motivated by the requirement that the 'actionality' features of the temporal argument be checked in the appropriate functional position (spec-of-ActP). At the same time, this sort of movement has the positive consequence that the displaced VP is correctly interpreted as a 'predicate of times', containing an open position for the temporal argument. This kind of derivation is arguably inadmissible in the case of progressive sentences. If the temporal argument is realized as the empty category PRO, there is no reason why the latter should vacate the VP prior to movement of this constituent to the Asp-level. Being anaphoric, PRO is not endowed with any 'actionality' feature which has to undergo syntactic checking and thus moves along with the non-temporal arguments of the verbal predicate. As a result, the copy of the VP found in spec-of-AspP corresponds to a 'saturated' expression (there is no open position, even though one of the realized arguments is inherently 'anaphoric'), and is therefore unable to erase, through checking, the non-interpretable [+sortal] feature in Asp.

The conclusion that we would like to draw from these considerations is that the syntax we associate to the progressive aspect appears to provide us with a principled way to rule out the a priori legitimate interpretation corresponding to the syntactic structure where the temporal adverb is an adjunct modifier and the restriction of the familiar time variable is provided via VP-movement (which would result in the word-order shown in (18)).

This approach has another quite appealing empirical consequence. According to the argumentation above, the reason why VP-movement does not lead to a felicitous interpretation in progressive sentences consists in the fact that the temporal argument is realized as PRO. Under reasonable assumptions, this entails that the reading under examination might well be available in contexts where the predicative 'restriction' corresponding to an unsaturated VP (i.e. a VP containing an open position for the temporal argument) is 'contextually' specified. Suppose this is the case when the sentence-final temporal adverbial is assigned narrow focus, for instance by uttering (18) as an answer to the question in (30):

- (30) Quando pensi che Gianni stesse partendo?
'When do you think that Gianni was leaving?'

We may assume that (30) introduces 'the time t at which an event L was taking place' as familiar. In other words, uttering (18) as an answer to (30) might actually involve a syntactic representation in which the predicative restriction of the familiar variable spelled out above is not achieved by means of VP-movement, but by means of an elliptical structure involving a base-generated variable in spec-of-AspP, whose value is necessarily specified by the context (and turns out to correspond, in the felicitous case, to the content of the 'unsaturated' VP) (for the contextual 'specification' of the restrictive clause of 'presuppositional' operators, see among others Chierchia 95). Significantly, the sentence-final position of temporal adverbials is fully admissible in these contexts.

To sum up, in this section we have proposed that the prohibition on VP-internal temporal adverbials might follow in a principled way from the syntactic structure we have tentatively associated with progressive sentences. We have also seen that the 'compositional' interpretative strategy argued for in the case of habitual sentences, according to which the restriction of Q-adverbs coincides with the specifier of the aspectual projection, can be successfully extended to progressive sentences with a significant degree of empirical success.

4. *Deriving the clause-splitting algorithm*

In this section, we would like to examine some of the consequences of our analysis of the interaction between Aspect and temporal adverbials. In the first part, we will try to show that the arguments of Q-adverbs are always syntactically represented. In particular, the mechanism of 'association with focus' proposed in Rooth 85 for the analysis of the so-called 'sentence-internal relations', where the first argument of the Q-adverb does not correspond to an overtly realized (phrasal or clausal) temporal adverbial, need not be conceived of as the application of an essentially interpretative procedure, devoid of any reflex in syntax. On the contrary, we will argue that the mechanism of VP-movement independently motivated above easily allows a reformulation of Rooth's proposal in pure syntactic terms. This approach entails that the first argument of Q-adverbs (that is, the argument corresponding to the 'restrictive clause') always corresponds to the material contained in the specifier of the aspectual projection. As a consequence, an essential relation is assumed to hold between the syntactic mechanism which involves checking of the [+sortal] feature in Asp and the semantic procedure adopted at the LF-interface, whereby some syntactic material is mapped into the restrictive clause (see especially Diesing 92 for a detailed discussion of the issues concerning the 'splitting-algorithm'). In the second part of this section, we will try to find some additional empirical evidence for the form of the 'clause-splitting algorithm' defended in this contribution, by considering the empirical predictions made by competing analyses with respect to 'object-scrambling' phenomena in Germanic.

The first issue we want to deal with concerns the interpretation of sentences such as (31), for which it is widely assumed in the literature that the first argument of the frequency adverb must be 'built up' by applying a 'focus-based' interpretative procedure:

- (31) [_FMary] always takes John to the movies.

Under the interpretation of Q-adverbs as generalized quantifiers expressing relations between two distinct classes of eventualities (cf. de Swarts 91), the issue boils down to wondering how the class of events corresponding to the first argument of *always* can be defined, given the absence of any overtly realized temporal phrase. The answer to this question consists in assuming that the set of eventualities corresponding to the first argument of the Q-adverb coincides with the p(resupposition)-set associated with the proposition expressed by (31). Informally, the p-set associated with a proposition A consists in the eventualities expressed by A , where the focused constituent has been replaced by an existentially quantified variable. Under the standard assumption that focus corresponds to a syntactic feature assigned to a given constituent on the grounds of well-defined procedures (cf. Cinque 95 for a recent discussion of

the issues involved), focus-assignment can be related to p-sets in the following way (cf. de Swarts 91: 163):

- (32) The p-set of a proposition is the set of contextually relevant eventualities in the model, which differs from the set of eventualities corresponding to the normal interpretation of the proposition only in that there is an existentially closed variable matching a in semantic type if a is in focus, i.e. bears the feature F.

Application of (32) to sentences of the form of (31) leads to the definition of the following two classes of eventualities as the arguments of the relation expressed by the Q-adverb *always*:

- (33) Second argument: λe (Mary takes John to the movies (e))
 First argument: $\lambda e \exists x$ (x takes John to the movies (e)).

Under the standard assumption that the VP is a 'propositional' constituent, involving the realization of all arguments of V, the 'first argument' can be understood as the p-set of the VP, defined as the set of eventualities which differs from the set of eventualities corresponding to the normal interpretation of the VP only in that there is an existentially closed variable replacing the constituent a if a bears the syntactic feature F(ocus). The application of the 'association with Focus' mechanism roughly described in (33) produces the 'relational' interpretation of the Q-adverb *always* expressed in (34):

- (34) $\lambda t \exists e \exists x$ (x takes John to the movies (e) & at (e,t)) \subseteq $\lambda t \exists e$ (Mary takes John to the movies (e) & at (e,t)).

Informally, (34) expresses the 'sentence-internal' reading of (31) according to which the set of eventualities in which someone takes John to the movies is an (improper) subset of the set of eventualities in which Mary takes John to the movies, intuitively the correct result under the interpretation of Q-adverbials as generalized quantifiers. As emphasized above, there seems to be a large consensus, in the literature, that the interpretative procedure needed for the expression of the sentence-internal reading, based on the 'association with focus' mechanism, contrasts with the case where the first argument of the Q-adverb undergoes overt syntactic realization, in the form of a phrasal or clausal temporal adverbial. In other words, the inescapable conclusion seems to be that the arguments of temporal quantifiers need not be syntactically represented (cf. de Swarts 91 for the explicit formulation of this position). It is worth emphasizing that this issue is of central conceptual relevance, hinging on the role of syntactic representations for the interpretation of quantificational structures and on the correct understanding of the parallelism between nominal and temporal structures widely argued for in this contribution (as is well-known, the two arguments of determiners *are* syntactically realized, as the NP-complement of D and as the VP, respectively).

The framework developed in the preceding sections, and in particular the analysis of the cases where the temporal phrase is projected into the nuclear scope as involving overt VP-displacement to the Asp-level, strongly suggest that de Swarts' conclusions might well be wrong, in that the first argument of the Q-adverb in (31) IS indeed syntactically represented at the interface with the interpretative system. Given the set of assumptions defined in sections 2 and 3, the first argument can be assumed to coincide with the VP-copy which has moved to spec-of-AspP in order to check the non-interpretable [+sortal] feature realized on the aspectual head, and which is arguably understood as providing the restrictive clause at the LF-interface. Under a plausible version of the copy-theory of movement proposed in Chomsky 95, the second argument of the Q-adverb can be assumed to coincide with the VP-copy left in the original position (the trace of movement according to a perhaps more familiar syntactic terminology). The crucial point in our argumentation consists in the assumption that the presence of the existentially quantified variable replacing the focused constituent in the displaced VP-copy is also the product of an independently well-motivated syntactic operation, essentially triggered by the LF-requirement that focused constituents be scoped out of the VP to the appropriate operator-position (giving rise to the required operator-variable structure) (cf. Chomsky 76 for the analysis of the focus-constituent as a quantificational phrase and

Zubizarreta 94 for a recent survey of the literature on the topic). Putting aside a number of related issues, let us simply assume that the operator-variable structure created by displacing the focused constituent is interpreted existentially at the LF-interface, a (non-uncontroversial) position which has been frequently held in the literature (see Zubizarreta 94 and the references quoted therein). According to this line of argumentation, it is quite plausible that the interpretative procedure adopted for the definition of the p-set corresponds in fact with the 'compositional' interpretation, at the interface, of an independently well-motivated syntactic representation, involving a VP-copy in spec-of-AspP and an (existentially quantified) variable in the position originally filled by the focused constituent. Under the hypothesis that the restrictive clause is provided by the material in spec-of-AspP, the syntactic structure created by successive application of VP-movement and focus-movement of one of V's arguments is likely to be interpreted as expressing the relation between two classes of times exemplified in (35), corresponding to (31):

- (35) $\lambda t \exists e \exists x (x \text{ takes John to the movies } (e) \ \& \ \text{at } (e,t)) \subseteq \lambda t \exists e (\text{Mary takes John to the movies } (e) \ \& \ \text{at } (e,t)).$

The conclusion that we would like to draw from these considerations is that under a plausible extension of the VP-movement analysis proposed in section 2 for habitual sentences, the 'association with focus' procedure used to build up sentence-internal relations among classes of events seems to admit a straightforward 'syntactic' interpretation, essentially based on the familiar idea that focused constituents give rise to operator-variable structures in (covert) syntax. This kind of representation (and the corresponding reading) is clearly blocked in sentences involving overt temporal phrases or clauses: the adverbial is either focused (hence projected into the nuclear scope) or moved to the Asp-level (hence projected into the restrictive clause), thereby preventing one of V's arguments from undergoing focus-movement exactly in the cases where the VP provides the restriction for the temporal variable. According to this proposal, arguments of temporal quantifiers are *always* syntactically represented, confirming the parallelism between the nominal and the temporal domain and the potential interest of research programs which adopt the hypothesis of a strictly compositional mapping between syntax and semantics.

Let us turn now to the second issue we would like to address in this section, concerning the empirical evaluation of the 'clause-splitting algorithm' argued for above with respect to alternative versions which have been proposed in the literature. In the cases where the frequency adverb expresses a sentence-internal relation, we have assumed that the nuclear scope coincides with the VP-copy in the original position, whereas the restriction is provided by the VP-copy that has been moved to the specifier of the aspectual phrase. For a sentence such as (36) (drawn from Chierchia 95), the application of the proposed splitting-algorithm produces the logical representation in (37), expressing the interpretation of the Q-adverb in terms of a relation between two classes of times:

- (36) Computers always route modern planes
 (37) $\forall t (\exists e \exists x (x \text{ routes a modern plane } \& \ \text{at } (e,t))) (\exists e (\text{a computer routes a modern plane } \& \ \text{at } (e,t))).$

Clearly, the possibility that syntactic representations involving VP-movement to the aspectual level give rise to logical forms of the kind of (37) crucially depends on the presence of an open position for the temporal argument within the displaced VP, that is, on the interpretation of the displaced VP as a predicate of times. This open position is quantified in by the frequency adverb, which corresponds in (36) to a universal quantifier (whose surface position probably depends on the satisfaction of the relevant quantificational features at a well-defined syntactic level, on analogy with the checking mechanism proposed in Stowell & Beghelli 94 for different classes of determiners). An important corollary of our position is that there is no requirement that in the syntactic representation which constitutes the input for (37) the lexical material which is projected into the restriction be realized outside the c-command domain of the Q-adverb. The mapping we propose relies on the insight that the material realized in spec-of-AspP at the interface is uniformly projected into the restrictive clause, as an effect of the logical information encoded in Asp, and quite independently of the position of the quantifying element.

Chierchia 95 deals with the cases exemplified in (36) in a different way. He assumes that Q-adverbs may freely be adjoined to 'propositional' constituents, essentially IP and VP, and that the nuclear scope coincides with their c-command domain (roughly, all the lexical material which is c-commanded by the adjunction site of the adverb must be mapped into the scope of the frequency adverb). As a logical consequence of this strictly configurational approach, the restrictive clause is assumed to coincide with the part of the m-command domain of the adverb which is not also c-commanded (roughly, the material in the same local environment as the adverb, which is not included in its scope/c-command domain). This splitting-algorithm provides us, in the case of (36), with the logical representation in (38), where the Q-adverb is represented as an 'unselective' operator expressing a relation between two classes of 'objects'. The syntactic input for (38) at the LF-interface arguably corresponds to the representation in (39) (Chierchia 95: 115):

(38) $\forall x (\text{plane } (x)) (\exists y (\text{computer } (y) \ \& \ y \text{ route } x))$

(39)

```

      IP
     /  \
    NP   IP
 [modern planes]j /  \
                 alwaysj IP
                   [a computer routes tj]

```

In Chierchia's approach, structures such as (39) are an instantiation of the possibility that the correct input for interpretation be created by means of familiar movement operations, in particular those involving adjunction to maximal projections. Adjunction structures are rather unconstrained, as shown by the possibility that frequency adverbs be generated adjoined to any 'propositional' maximal projection. In fact, Chierchia assumes that "this process of partitioning the clause (which, like Quantifier Raising, is just an instance of move a) is basically free, subject to standard conditions on movement and issues of pragmatic plausibility" (Chierchia 95b: 117).

At the syntactic level, Chierchia's proposal clearly represents a variant of Diesing's Mapping Hypothesis, the main difference having to do with the fact that the syntactic domain which is assumed to correspond to the nuclear scope is not rigidly identified with the VP, but with any propositional constituent to which the Q-adverb is adjoined. This is clearly shown by the fact that Chierchia adopts Diesing's view that sentence-partitioning applies overtly in some languages (for instance German and Dutch), that is, prior to 'spell-out'. A mechanical extension of this proposal to the structures involving quantificational adverbs "would mean that the movement that may extract elements out of the intended scope of a quantificational adverb, making them part of the restriction, takes place before the operation that maps syntactic representations into phonetic ones, i.e. before 'spell-out'" (Chierchia 95: 121).

This approach entails a quite important empirical consequence. It predicts that object-scrambling in German and Dutch, which gives rise to structures where an internal argument of V occurs to the left of the adverbial, is quite plausibly triggered by the requirement that the internal argument be mapped into the restrictive clause. In other words, the expectation arises that scrambling of the object to the left of the Q-adverb takes place exactly in the cases in which the object must be mapped into the restrictive clause.

The version of the clause-splitting algorithm advocated in this paper makes quite different predictions. According to our proposal, the adequate syntactic input for the process of restrictive clause formation is provided by the displacement of a 'predicative' constituent (necessarily the VP in absence of a 'predicative' temporal phrase) to the specifier of the aspectual phrase. As emphasized above, this syntactic operation is independently motivated by the checking requirement on non-interpretable features (such as the [+sortal] feature encoded in Asp). Since the lexical material found in spec-of-AspP at the LF-interface is systematically mapped into the restrictive clause, there is no need to move internal arguments of V outside of the c-command domain of the Q-adverb, hence no need to interpret object-scrambling as triggered by the requirement that the object be projected into the restriction. In fact, the version of the splitting-algorithm argued for here turns out to be immediately compatible with the

hypothesis that at least certain instances of scrambling correspond to focus-driven operations, a view recently advocated in Reinhart 95. According to this proposal, scrambling of the object to the left of an adverbial depends on the application of the unmarked focus assignment procedure (see Cinque 95 and Reinhart 95 for a detailed discussion of the relation between the 'focus-rule' and the 'nuclear stress rule'). Putting irrelevant details aside, scrambling might be conceived of as representing a 'defocusing' effect.

As is well-known (and as widely discussed in Reinhart 95), there is an important class of scrambling facts that seem to strongly support the view that scrambling corresponds to a 'defocusing' operation. As originally pointed out in de Hoop 92, the contrast exemplified in (40)-(41) (scrambling of the 'generic' object is illegitimate in (40) and perfectly acceptable in (41)) seems to correspond to the descriptive generalization according to which in Dutch, scrambling of the object yields the same semantic effect as the contrastive predicates obtained by stressing the verb in English (de Hoop 92: 165). The English equivalents of (40)-(41) are given in (42) and (43), respectively:

- (40) *...omdat ik een kat altijd heb
'because I cat always have'
(41) ...omdat ik een kat altijd liefheb
'because I a cat always love'
(42) ??...because I always HAVE a cat
(43) ...because I always LOVE a cat.

Accounting for the long-standing issue raised by (40)-(41) becomes a relatively easy matter under the view that scrambling may correspond to a 'defocusing' operation. Consider first of all the (relevant part of the) algorithm for unmarked stress assignment in Dutch (cf. Gussenhoven 84):

- (44) Adv - O - V → (stress on O)
(45) O - Adv - V → (stress on V).

Essentially, this means that the unmarked stress is assigned to the object in the contexts where this immediately precedes the verb, and is assigned to the verb in the contexts where the latter is immediately preceded by an adverbial.

As a second step, consider now the following proposal for the way in which focus and unmarked stress are generally related (Reinhart 95: 62):

- (46) The focus rule
The focus of IP is a(ny) constituent containing the main stress of IP, as determined by the stress rule.

In addition to the principled association of focus with unmarked stress, it is generally possible to assign focus to a given constituent by means of marked prosodic procedures, essentially consisting in deaccenting the lexical material to the right of the focused constituent (cf. Zubizarreta 94 for a detailed discussion of this point).

The contrast between (40) and (41) should now naturally follow. According to the approach briefly sketched above, scrambling of the object in (40)-(41) is assumed to take place in order to derive the structure (45) from the structure (44). The only legitimate motivation for such an operation is the requirement that the verb be assigned focus in accordance with the unmarked strategy described in (46): the verb is permitted to receive the main stress (hence focus, according to (46)) only in configurations where it is NOT immediately preceded by the object. Scrambling ensures that the appropriate syntactic output be created in order for the application of (46) to create the required result. As emphasized in Reinhart 95, we do not expect-scrambling to be possible when it is unlikely that the verb is interpreted as the focused constituent. This is arguably the case in (40), since *have* clearly constitutes a 'light' verb which can be focused only under very special circumstances. In other words, there is no trigger for scrambling in (40) under the view that scrambling is defocusing, which is why the output of scrambling is of dubious grammaticality in (40). On the contrary, scrambling is expected to yield an acceptable result if it applies to create the appropriate syntactic configuration in order

for the verb *love* to receive main stress (hence focus, in accordance with (46)). The perfect status of (41) confirms that the prediction is indeed borne out.

We think that there is compelling empirical evidence that object-scrambling (at least as far as 'generic' indefinites are concerned, as in (40)-(41)) is actually NOT triggered by the requirement that the object vacate the c-command domain of the adverbial in order to be interpreted in the restrictive clause. As explicitly acknowledged by Chierchia (Chierchia 95: 112), the reading of (36) according to which the object is mapped into the restrictive clause, roughly corresponding to the logical paraphrase in (38), is favoured by putting focal stress on the subject *computers*, which receives in this way an existential interpretation:

(36') COMPUTERS always route modern planes.

If the subject is not assigned stress, it tends to receive a quasi-universal interpretation, according to which (36) roughly expresses the meaning "it is a property of computers in general that of routing some modern planes". Essentially the same procedure can be adopted in Dutch, producing the two variants exemplified in (47) and (48), depending on whether object-scrambling applies:

(47) (Ik denk dat vliegen veilig is) omdat COMPUTERS altijd moderne vliegtuigen besturen
'(I think that flying safe is) because COMPUTERS always modern planes route'

(48) ??(Ik denk dat vliegen veilig is) omdat COMPUTERS moderne vliegtuigen altijd besturen
'(I think that flying safe is) because COMPUTERS modern planes always route'.

If object-scrambling corresponds to a defocusing operation (as we want to claim), the prediction is that it should not apply in contexts such as (36'). The reason is that assignment of focal stress to the subject *computers* involves the adoption of a marked 'prosodic' strategy, essentially involving deaccenting of the lexical material following *computers*: according to the unmarked stress assignment procedure, either the verb or the direct object should receive the main stress. In other words, the application of object-scrambling, as in (48), can only be motivated by the requirement that the object be displaced in order for the verb to be assigned main stress and focus: however, main stress/focus is independently assigned to the subject (via a marked procedure), with the result that there is in fact no trigger for scrambling. In this way, we can easily explain why (48), involving scrambling, is marked with respect to (47), where scrambling has not taken place.

Chierchia's theory makes entirely different predictions. If object-scrambling is triggered by the requirement that the object vacate the c-command domain of the frequency adverb every time the object must be mapped into the restrictive clause, the object is expected to scramble in contexts such as (36') under the interpretation roughly expressed in (38), quite independently of the distribution of focus. The expectation is clearly not fulfilled, given the better status of (47) with respect to (48). Obviously, one might propose some weaker version of Chierchia's splitting algorithm, by assuming that adjunction may apply covertly also in Dutch. However, this would yield a considerable empirical loss, for the fact that splitting applies overtly in certain languages has generally been viewed as the main piece of empirical evidence in favour of Chierchia's (and Diesing's) version of the clause-splitting algorithm. More importantly, 'weakening' the algorithm would not allow us to capture the important correlation which seems to exist between the application of object-scrambling and the distribution of focus. It is worth noting that the version of the clause-splitting algorithm proposed in this contribution makes crucial use of the application of focus-movement in syntax, as the discussion of Rooth's 'association with focus' in the first part of this section has hopefully made clear. It is therefore not surprising, within the perspective adopted here, that scrambling turns out to be only indirectly relevant for the application of the splitting-algorithm, in the sense that it represents a focus-driven operation and focus IS relevant for the correct application of the splitting-algorithm.

To sum up, we have claimed that the approach to clause-splitting developed here makes more accurate predictions than competing proposals with respect to a well-defined class of object-scrambling phenomena. On the other hand, our analysis supports the view of scrambling of 'generic' objects as a 'defocusing' operation independently advocated in Reinhart 95.

5. *Conclusions*

In this contribution we examined some issues concerning the interaction between Aspect and temporal adverbials, trying to 'derive' the surface position of temporal adverbs and to show how this position affects interpretation. The picture which emerges appears to confirm the validity of a research program according to which the operations performed within the syntactic component have an essentially morphological trigger, that is, checking of features realized in well-defined syntactic positions and possibly encoding specific logical instructions used for the mapping to logical representations at the interface with the so-called Conceptual-Intentional system (cf. Chomsky 95). The representations produced within the syntactic component turn out to be easily amenable to a 'compositional' semantics, but are never DIRECTLY triggered by interpretative requirements. Increasing the role of the 'interpretable' features allowed us to develop some hypotheses about the nature of Aspect and the way the process of restrictive clause formation takes place in the cases which involve overt quantification over times, with frequency adverbs interpreted as generalized quantifiers. The clause-splitting algorithm argued for here differs significantly from some of the variants found in the recent literature on the topic, and is crucially based on the role of the 'quantificational' feature encoded in the aspectual projection. The davidsonian insight about the pervasiveness of quantification over events in natural languages was adopted and extended to quantification over times. Surprising and deep analogies between the nominal and the temporal domain have emerged, strongly suggesting that the extension of the domain of quantification to events and times does not simply reflect an arbitrary interpretative choice, but has deep roots in the form of the syntactic component and in the nature of the feature system encoded in syntax. By taking Aspect and quantification over times into account it becomes possible to reduce the role of adjunction within the syntax of 'adverbial modification' and to look at the traditional dichotomy between argument and adjuncts from an entirely new perspective.

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