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Aspect, Adverbs and Events: Habituality vs. Perfectivity

(To appear in the Proceedings of the Conference on Facts and Events, Trento, August 28-30 1995)

1. **Introduction**[*]

Adverbial quantification is a widely debated topic in model-theoretic semantics. Its relevance does not only depend on the fact that it deals with an important class of lexical items, but also on its being part of the broader field which Partee (1995) refers to as *A-quantification*, where 'A' is a mnemonic for Adverbs, Auxiliaries, Affixes and Argument-structure Adjusters. This label intends to subsume a (possibly) non-homogeneous set of phenomena, that share the relevant feature of introducing the quantificational structure of sentences in a more 'constructional' way than determiners do. On the other side, aspect is a fundamental linguistic category that covers the different modalities in which the development of events can be represented. The basic opposition between perfective and imperfective aspect finds a precise morphological realization in many languages and, notwithstanding the difficulty of eliminating much of the vagueness still present in their use, these categories correspond to really different semantic values.

Aspect and quantification are clearly related and interacting phenomena: since it is possible to give a quantificational interpretation of aspectual values, we can look at aspect as one of the ways in which the quantificational force of sentences is established. Thus, it seems straightforward to include aspect in the class of A-quantification. But then an interesting question arises, namely how morphologically realized aspectual features are related to other types of constructional quantification, like the adverbial one. This is our main concern in the present paper, and we will face it by debating two facets of the general problem, i.e. (i) by investigating the way in which explicit quantificational adverbs interact with aspectual values; (ii) by examining whether one of these two features could (or should) be reduced to the other.

In the next section we will mainly deal with point (i). However, a survey of the data will also bring evidence supporting a negative answer to the question concerning point (ii). Sections 3 and 4 are devoted to outline a formal analysis of aspectual oppositions, that will hopefully be able to explain the distribution of data that we are going to illustrate.

2. **Quantificational adverbs and aspect**

In De Swart (1993), quantificational adverbs like *spesso* 'often', *sempre* 'always, *due volte al giorno* 'twice a day', etc., are called *frequency adverbs*, as opposed to *due volte* 'twice', *molte volte* 'many times', *poche volte* 'few times', which are referred to as *iterative adverbs*.[1] According to De Swart, iterative adverbs "count events as individual entities and specify the absolute cardinality of a set of situations" (De Swart 1993: 316). On the contrary, frequency adverbs never express absolute quantities of situations, but rather relative ones. De Swart also distinguishes two further readings of frequency adverbs, a *relational reading* and a *pure frequency reading*, which can be illustrated in (1):

(1) Gianni va spesso al mare con Anna.
John often goes to the beach with Ann

In the relational reading, the quantificational adverb simply establishes a proportion between two sets of events or situations, which are identified either by means of the material inside the

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[*] This paper was jointly developed by the two authors. For academic purposes, Alessandro Lenci bears responsability for sections 3-5 and Pier Marco Bertinetto for sections 1-2.

[1] Actually, De Swart's original analysis is on French: however her classification is easily adaptable to the Italian case.

sentence, or with the help of external material. For instance, in (1) we have a set *A* of events of going to the beach by John, and a set *B* of events of going to the beach by John with Ann: the relational reading simply compares the extension of the intersection of *A* and *B* with the cardinality of *A* itself, and the quantifier specifies the ratio of this comparison that makes the sentence true. This means that (1) is roughly equivalent to saying that most of the situations in which John goes to the beach are situations in which he goes there with Ann. On the contrary, the pure frequency reading of (1) does not establish any proportion between sets of situations, and consequently there is no partition of the material inside the sentence: the quantifier simply refers to the totality of events of going to the beach by John with Mary and specifies that they have happened with a high frequency. The notion of frequency is then characterized as the expression of the number of occurrences of an event per time unit.

De Swart also claims that frequency adverbs can be distinguished depending on whether they allow for just one interpretation or both. For instance, *sempre* 'always', *il più delle volte* 'most of the times' have only a relational reading: this is the reason why De Swart calls them *strong frequency adverbs*, since they resemble strong nominal quantifiers like *ogni* 'every' which are intrinsically relational. On the other hand, *spesso* 'often' and *raramente* 'rarely' are completely ambiguous between a relational reading and a pure frequency one: these quantifiers are referred to as *weak frequency adverbs*.

To sum up, De Swart distinguishes three notional features that define different classes of adverbs: iteration, frequency and relationality. As regards frequency, she claims that it is expressed both by weak frequency adverbs, when they are interpreted non-relationally, and by adverbs like *due volte al giorno* 'twice a day', *settimanalmente* 'weekly', the only difference being that the latter type explicitly specifies the time unit which is necessary to compute the frequency of an event.

2.1. *Iteratives*. Many scholars have noticed that habitual imperfective sentences are incompatible with iterative adverbs:

(2) a. * Gianni andava al mare con Maria due volte.
John went-IMP to the beach with Mary twice
b. * Gianni vedeva *Blade Runner* molte volte.
John watched-IMP *Blade Runner* many times

On the contrary, perfective tenses can occur freely with iterative adverbs:

(3) a. Gianni è andato al mare con Maria due volte.
John has gone to the beach with Mary twice
b. Gianni ha visto *Blade Runner* molte volte.
John has watched *Blade Runner* many times

Many hypotheses have been suggested in order to explain these data: Hoepelman & Rohrer (1980) claim that the incompatibility of iterative adverbs with habitual IMP is to be connected with the unbounded, 'mass-like' nature of imperfective aspect, in opposition to the bounded, 'count-like' nature of perfective one. As mass nouns cannot occur with cardinal determiners (unless with a shift in their meaning), similarly habitual imperfective sentences cannot contain iterative adverbs, whose function is to express a bounded quantity of events (cf. Kleiber 1987). Bertinetto (1986) connects this restriction with the inherent 'indeterminateness' that characterizes the imperfective aspect: in other words, habitual sentences would represent the number of iterations of an event as 'tendentially indeterminate'.[2]

De Swart (1993) proposes a formal implementation of Hoepelman's and Rohrer's hypothesis. First of all, she gives a procedural interpretation of quantificational adverbs in terms of semantic automata, extending the analysis of nominal quantifiers given in Van Benthem (1987). Specifically, De Swart interprets iterative adverbs as finite state automata and explains the ungrammaticality of (2) by stating that finite state automata have to reach a definite evaluation point, which is incompatible with the imperfective aspect, that refers to "an open, potentially growing domain" (De Swart 1993: 328).

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[2] Notice that it is important to keep distinct this notion of 'indeterminateness' or unboundedness typical of the imperfective aspect, with the intrinsic vagueness of certain iterative adverbs like *molte volte* 'many times', that are also incompatible with this aspectual value.

This line of analysis is grounded on the idea that there is a total incompatibility between the notional categories of unboundedness, expressed by the imperfective aspect, and cardinality, expressed by iterative adverbs. However, this assumption runs against some problems; first of all, notwithstanding the data in (2), the sentences in (4) and (5) are perfectly acceptable:

(4) Il mio postino suona due volte.
My postman rings twice

(5) a. Un film interessante, Gianni lo vedeva due volte.
An interesting movie, John watched-IMP it twice.
b. Un uomo intelligente non commette lo stesso errore più volte.
An intelligent man does not commit the same error several times.

Both these sentences are generic or habitual, and contain a (present or past) imperfective tense. If there were an absolute incompatibility between imperfectivity and iteratives, these data could not be explained.

Secondly, iterative adverbs are acceptable in imperfective sentences with a temporal adverb or clause:

(6) a. In quel periodo, la domenica, Gianni mi telefonava tre volte.
In that period, on Sundays, John called-IMP me three times
b. In quel periodo, quando veniva in città, Gianni mi telefonava tre volte.
In that period, when he came-IMP downtown, John called-IMP me three times

The sentences in (6) show that there might be some precise structural restrictions governing the compatibility of iterative adverbs with imperfective sentences. We will return on these problems in §. 4.

2.2. *Relational adverbs*. The precise semantic analysis of habitual sentences remains an open problem in the contemporary linguistic research. All the different formal approaches to genericity and habituality share the idea that explaining these phenomena requires assuming the existence of a particular 'generic' operator. However, while in the first proposals (cf. Carlson 1977) this operator was interpreted as a monadic sort-shifting function over predicates, it is nowadays widely accepted that habituality is rather a quantificational phenomenon and that the generic operator is actually a particular kind of adverbial quantifier (Schubert & Pelletier 1989; Krifka 1988; Krifka *et al.* 1995). According to this idea, characterizing sentences[3] always contain a quantificational adverb, either overtly or covertly. In the latter case, the logical representation of the sentence is equipped with a so-called generic quantifier 'Gn', whose meaning is stated as being roughly equivalent to *typically*, *in general*, and so forth. Thus, characterizing sentences are given the following general logical structure:

(7) $Q[x_1,\ldots,x_i; y_1,\ldots,y_j]$ (*Restrictor* $[x_1,\ldots,x_i]$; *Matrix* $[x_1,\ldots,x_i, y_1,\ldots,y_j]$)

This structure involves a segmentation of the lexical material of the sentence, which must partly be assigned to the restrictive clause and partly to the matrix one.

In this section, we want to discuss the relationship between habituality and overt quantificational expressions. Adverbs like *generally* or *typically* (conventionally, we shall call them 'generic' adverbs) are the best candidates to make explicit the notion of habituality; thus, it is reasonable to regard them as the spell-out of the generic operator. This move seems to be supported by data from English, which lacks a tense like the Imperfetto that is intrinsically able to express habits in the past:

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[3] In this field, the terminology can be rather confusing especially for the notion of habitual sentences. In fact, in formal semantics 'generic' and 'habitual' sentences are usually considered to be disjoint classes, which differ for the type of their subject: the subject of generics is interpreted in a class-like way, while the subject of habituals is an individual object. However, habituality is also an aspectual category, that encompasses both types of sentences. Since the present work mainly deals with aspectual problems, we will always use the term habituality in this latter sense. Similarly, following Krifka *et al.* (1995), we will employ the term *characterizing* (or *gnomic*) *sentences* to globally qualify the class of sentences that do not have an episodic, factual interpretation. By contrast, we will reserve the term *generic* to refer exclusively to those habituals that assign a class-like interpretation to the subject DP.

(8) John walked to school.

As Krifka *et al*. (1995) claim, this sentence is ambiguous between a habitual interpretation and a semelfactive-existential one. The former reading can be singled out by adding a suitable quantificational adverb like *generally*:

(9) John generally walked to school.

These data suggest the following picture: (8) is structurally ambiguous between a reading containing the generic operator and one with an existential quantifier and this ambiguity is part of the semantic potential of the Simple Past. Moreover, the presence of an explicit operator, as in (9), helps to select the proper interpretation, i.e. the one structurally similar to (7).

However, in Italian (and more generally in Romance) the question is somewhat different. In fact, compare the following sentences:

(10) a. In quel periodo, Gianni generalmente / di solito vedeva Maria la sera.
In that period, John generally / usually saw-IMP Mary at night
b. ?? In quel periodo, Gianni generalmente / di solito vide Maria la sera.
In that period, John generally / usually saw Mary at night

The first sentence contains the Imperfetto and has a habitual interpretation, which in this case is also made explicit by the adverbs: if we leave out the quantificational adverbs, the sentence has only a habitual interpretation. On the contrary, the second sentence contains a perfective tense like the Simple Past and it is somehow anomalous with a 'generic' adverb. If we drop the quantifier, the sentence is correct, but only in a semelfactive reading. These data reveal two facts that distinguish Italian from English. First, the Imperfetto univocally expresses habituality (in the appropriate contexts), and this feature opposes it to the Simple Past. Second, the role of explicit 'generic' adverbs must be stated more carefully.

As far as the second point is concerned, consistently with the idea that expressions like *generally* contain some sort of modality,[4] we could take them as modal operators similar to items like *possibly* or *necessarily*. Compositionally, this would imply assuming that *generally* takes as input a semelfactive sentence and turns it into a habitual one, similarly to the case of standard modal operators, that apply to non modal sentences and modalize them. But then the prediction would be that applying such adverbs to a perfective sentence would produce a habitual reading. The problem is that this prediction is not borne out, because, as (10b) reveals, such move results in an ungrammatical sentence.

A plausible conclusion seems to be that in a language like Italian, which has a specialized aspectual device to express habituality as part of the domain of imperfectivity, the aspectual dimension cannot be overruled by overt adverbial expressions. In other words, the intrinsic nature of perfective tenses cannot be turned into habituality by quantificational adverbs, even by those like *generally* that seem more suitable to perform this operation. Rather, to express habituality a different aspectual value must be chosen, i.e. the imperfective one. This also suggests a particular relationship between habituality and overt 'generic' adverbs, at least for Italian. If a sentence is habitual, its meaning can be made more explicit by means of these adverbs, but if a sentence does not aspectually express habituality, such a reading cannot be produced by the mere use of the given adverbs. Therefore, we can take 'generic' adverbs as being able to make explicit the semantics of habitual sentences, but habituality cannot be obtained by simply juxtaposing these adverbs to any sentence.

Another related problem concerns the common assumption that the operator 'Gn' in the logical form of habitual sentence is a *default* quantifier, in the sense that it appears in the representation of a sentence unless other explicit quantificational adverbs are present. Compare then the following examples:

(11) a. Gianni usciva con Maria
John went-IMP out with Mary
b. Gianni usciva raramente con Maria.
John rarely went-IMP out with Mary

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4 See below and Krifka *et al*. (1995).

c. Gianni è uscito raramente con Maria.
John has rarely went out with Mary

Although both (11a,b) are imperfective and express habits, nevertheless they are not equivalent.[5] If *Gn* is simply a default type of quantificational adverb, which appears in the logical form unless an overt adverb is specified, (11a) and (11b) come to have exactly the same logical structure, the only difference being that in the case of (11b) *rarely* replaces 'Gn'. The interesting fact is that (11c) also contains an explicit quantifier (the same as in the former sentence), which gives rise to a tripartite structure. Therefore, (11b) and (11c) would also end up having the same logical form and, unless we want to say that *rarely* is actually homophonous between two different operators, the same truth conditions too. The question is that these two sentences are not equivalent: although they both express a relation between sets of events, it is clear that the imperfective sentence is a real characterizing statement, while the perfective one simply expresses a factual, accidental statement.

Moreover, the alleged identification between (11b) and (11c) shows a conflict between some reasonable assumptions about the aspectual system that are considered to be uncontroversial. First of all, typological studies usually describe habituality as a subtype of imperfectivity, (cf. Comrie 1976; Bertinetto 1986) and there are good reasons to state this fact as a kind of semantic universal. Second, adverbial quantification is an essential ingredient for habituality, not only because habitual sentences often contain overt quantificational structures, but also because the truth conditions of these sentences seem to require the recovering of such a structure, even when there is not an overt one. Third, quantificational adverbs often occur in perfective sentences too. Given these facts, if the semantic contribution of habitual imperfective sentences simply consisted in an adverbial-like quantification over events, since the sentence in (11c) also contain the same kind of quantifier as (11b), then it might be straightforward to include the perfective sentence in the domain of habituality. However, the consequence of this solution is that we would lose the correlation between habituality and imperfectivity. In fact, if sentences like (11c), which contain a perfective tense, were described as habituals, this would mean that habituality could be expressed either with an imperfective tense or with a perfective one. Consequently, habituality could no longer be univocally associated with imperfectivity. This seems to suggest that the hypothesis of characterizing the semantic contribution of habitual imperfective aspect as simply consisting in the introduction of an adverbial tripartite structure, plus a default value for the operator, is too weak. In fact, this hypothesis is not able to capture a really specific feature of habituality, so as to distinguish it from other related, yet different, types of event quantification, like the one that can be expressed by perfective sentences too.

Another context that shows the different behavior of imperfective and perfective sentences with quantificational adverbs is the one involving arbitrary null objects in Italian. Since Rizzi (1986), it is well known that null objects in Italian receive an arbitrary (generic) interpretation, which is responsible for the fact that they can only occur in habitual sentences, as the contrast between the following examples reveals:

(12) a. In passato, la musica rendeva pro_{arb} felici.
In times past, music made-IMP (people) happy
b. * In passato, la musica ha reso pro_{arb} felici.
In times past, music has made (people) happy

If we adopt Rizzi's proposal to represent the null object as an empty pronominal, i.e. *pro*, with an arbitrary interpretation, it is clear that the perfective sentence is not able to license it for some reason. Moreover, the same contrasts remains if we add an explicit quantificational adverb:

(13) a. In passato, la musica rendeva spesso / generalmente / sempre pro_{arb} felici
In times past, music often / generally / always made-IMP (people) happy
b. * In passato, la musica ha reso spesso / generalmente / sempre pro_{arb} felici.
In times past, music has often / generally / always made (people) happy

However, if the object is overt, the perfective sentence is correct:

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[5]For some issues concerning habituals without explicit quantificational adverbs see Lenci (1995).

(14) In passato, la musica ci ha resi (spesso) felici.
In times past, music has (often) made us happy.

The plausible conclusion to be drawn is the following. Whatever licensing factor is responsible for the arbitrary null object pronominal in Italian, it cannot be identified with any quantificational adverb, but rather with the habitual imperfective morphology of the verb. Moreover, the semantics of habituality cannot reduce to a default quantifier which can be freely substituted by an overt one, since overt quantifiers alone in perfective sentences are not able to license the object pro_{arb}.

Finally, temporal adverbs indicating a time frame or background for the main sentence have a different function in perfective and imperfective sentences:

(15) a. Nel 1994, Gianni è andato spesso al cinema con Maria.
In 1994, John has often gone to the cinema with Mary
b. Nel 1994, Gianni andava spesso al cinema con Maria.
In 1994, John often went-IMP to the cinema with Mary

In the perfective sentence, the temporal frame adjunct actually restricts the domain of the quantificational adverb to the events of going to the cinema occurred in 1994, so that in most of the cases John was with Mary. In the imperfective habitual sentence, the role of the background expression is different: it says that in 1994 the generalization that most of the events of John's going to the cinema were with Mary was true, without entailing that the quantification is restricted to the occurrences contained within the limits of 1994. The possibility is completely open that the same habit was already true in the years before and is possibly still true (the use of the past comes with an implicature that the generalization does not hold anymore, but it is easy to verify that this is just a pragmatic, defeasible inference). This fact is also proved by the insertion of an adverb like *già* 'already', which implies that the series of events went on beyond the right boundary of the interval specified by the background clause:

(16) a. * Nel 1994, Gianni è già andato spesso al cinema con Maria.
In 1994, John has already-often gone to the cinema with Mary.
b. Nel 1994, Gianni andava già spesso al cinema con Maria.
In 1994, John already-often went-IMP to the cinema with Mary

All these facts imply that the characterizing nature of a sentence does not depend on the presence of a relational quantificational adverb, but rather on its being imperfective. We can then state the following tentative generalization: in a language like Italian, overt adverbs are neither a necessary nor a sufficient condition for habituality. They are not necessary, because the Imperfetto can be interpreted habitually even without any overt quantificational device; but they are also not sufficient, because the presence of a quantificational adverb in a perfective, semelfactive sentence does not turn it into a characterizing one. Moreover, there is also a certain variation among the adverbs: those like the 'generic' ones that are semantically close to the interpretation of 'Gn' are anomalous in perfective sentences (10), while strong frequency adverbs are acceptable, but they simply express a quantificational statement over a bounded set of events, rather than a truly gnomic proposition (11).

3. **A model for aspect**

The domain of imperfectivity is usually assumed to be further distinguishable in the two subclasses of habitual and progressive aspects.[6] In Italian, the Present and the Imperfetto are potentially ambiguous between these two interpretations, while in English the habitual aspect is typically realized with the Simple Present and with some defective past periphrases like *used to* and *would*; moreover, in both languages the progressive periphrasis is a specialized device to express progressivity. The semantic opposition between imperfectivity and perfectivity is normally characterized in terms of bounded vs. unbounded representations of events, as we have already reported in §. 2.1. Notwithstanding the intuitive appeal of this solution, there are

6 Actually, Bertinetto (1986) also distinguishes a third subtype of imperfectivity, the *continuous aspect*. For simplicity, we shall not discuss it here.

several problems with it. First of all, it is extremely difficult to detail the content of these features and to clearly state their semantics; secondly, the same notions of boundedness vs. unboundedness are often used for event classification, especially to capture the distinction between telic and atelic predicates. Thus, it might not be appropriate to use the same features to describe two related but nevertheless distinguished phenomena, like Aktionsart and aspect.

In modeltheoretic semantics, semelfactive perfective sentences like (17a) and habitual imperfective sentences like (17b) are distinguished in terms of the type of quantification over events:

(17) a. Gianni è andato al mare con Maria.
John has gone to the beach with Mary
b. Gianni andava al mare con Maria.
John went-IMP to the beach with Mary

Starting from Davidson (1967), the idea that predicates carry an extra argument (usually called the *e-argument*) ranging over occasions or events has become widely accepted . Another standard assumption is that the e-argument is existentially closed by default at some point during the derivation of the logical form. This closure is usually operated by a functional projection (tense, or mood) dominating the VP.[7] In his discussion of the interaction between aspect and the interpretation of *when*-clauses, Bonomi (1995) related the existential closure of the e-argument with a specific aspectual value, namely the perfective one. The result is the semelfactive reading of sentences like (17) which is assigned the following logical form:

(18) $\exists e$ [**go-to**(e) $\wedge$ **theme**(John,e) $\wedge$ **to**(beach,e) $\wedge$ **with**(Mary,e)]

By contrast, imperfective habitual sentences would contain a sort of quasi-universal quantification over events. Apart from the formal details, the core idea of Bonomi's proposal is that "aspect plays a systematic role in the determination of the relevant quantificational structures." (Bonomi 1995: 99). Similarly, Delfitto & Bertinetto (1995) suggest that the essential feature of an imperfective tense like the Italian Imperfetto is to introduce a strong quantifier over times.

In the following section, we will extend and detail the hypothesis that aspect is connected with particular types of quantification over events, and we will try to suggest a general framework that will allow us to deal with the problems concerning the interaction of aspect and overt quantificational adverbs that we discussed in §. 2.

3.1. *Aspectual operators*. The proposal we want to outline here is that distinguishing imperfective and perfective sentences only in terms of the default quantificational force assigned to the e-argument is actually not enough. The reason why this solution is inadequate comes from data discussed in the former section. In fact, such a hypothesis predicts that when the default value of the event-quantifier is replaced by other quantificational adverbs, the difference between imperfective and perfective sentences should disappear. The facts show that this prediction is not borne out, and suggest that aspectual values differ in at least another respect besides the type of quantification over the e-argument. Our amendment to the current view amounts to stating that imperfective and perfective aspect also differ because the former is typically intensional, while the latter is typically extensional.

Intensionality covers different phenomena. But there is a sense in which this term can be useful to describe the habitual imperfective aspect. The most salient features of characterizing sentences is that they do not represent factual statements, but rather normative ones. In other words, they express law-like generalizations, which cannot be reduced to quantifications over specific and limited sets of objects, and show a sort of intensional behavior.[8] This intensional nature can be represented by interpreting the generic operator as a modal quantifier, along the lines of Kratzer (1981): this analysis of genericity dates back to Heim (1982) and, more recently, has been adopted by Krifka *et al*. (1995). Modal operators, such as *must* and *can*, are defined within a possible-world semantics along three parameters. First, these operators are distinguished according to the *modal relation* they express (e.g. necessity or possibility), which is represented in terms of different quantifications (e.g. universal or existential) over possible

[7] See Higginbotham (1985), Kratzer (1994) and many others.
[8] See also Carlson (1989), who stresses the widespread role of intensionality inside gnomic sentences.

worlds. Second, there is a *modal base* (or *conversational background*) which is often contextually recovered and specifies the set of possible worlds quantified over by the modal operator. The modal base represents the set of presuppositions that constitute the necessary background for the interpretation of the modal operator.[9] Kratzer defines different classes of interpretations for such expressions, depending on the assumptions contained inside the modal base. Following Stalnaker (1978), each proposition can be represented as a set of possible worlds and the conversational background as the set of possible worlds compatible with the presuppositions assumed to be relevant for a certain modal interpretation. Third, there is an *ordering source* that gives us a ordering among possible worlds: this relation restricts the evaluation of modal sentences to worlds that are maximally normal, i.e. that are most similar to the real world. Therefore, given two worlds w_i and w_j, $w_i \leq_w w_j$ is true iff w_i is at least as normal as w_j w.r.t. the actual world w. According to this definition of modality, the truth conditions of a characterizing sentence like (19) can informally be stated as follows: the sentence is true in the actual world iff everything that is a man in the worlds of the modal base B_w is such that, in every world that is most normal according to the ordering source, it has two legs.

(19) A man has two legs.

Since we restrict ourselves to most normal worlds, we exclude exceptional cases (e.g. the ones in which a man has lost his leg in war). Similarly, this definition does not presuppose the existence of men, because the actual world might not be included in B_w. Moreover, we quantify over *all* the most normal worlds, and thereby the operator has a necessity-like modal force.

At the outset of this section we claimed that the imperfective aspect is intrinsically intensional. We have now outlined an intensional analysis of characterizing sentences that seems highly suitable to capture their salient features. Is this enough to conceive of the realm of imperfectivity as altogether intensional? Of course not, because habituality is just a subtype of the imperfective aspect, but turning to the other possible uses of this aspect we can see that, if an intensional analysis is not the only possible solution, nevertheless it is surely apt to highlight some common features of imperfectivity in general. What about the progressive, for instance? Actually, the debate about its nature and semantics is still open, but some data seem to suggest that this aspectual value shows a behavior which can also be described as intensional: Landman (1992) brings interesting evidence to support this view. Obviously, extensional models of progressivity, as well as of habituality, have been proposed and opposed to the intensional approach. However, other uses of the imperfective aspect, which do not fall within the major classes of progressive and habituality, seem to confirm the 'modal' nature of this aspect,[10] and some scholars have also claimed that imperfectivity is the realm of 'irrealis'. Therefore, even though we commit ourselves to the weaker claim concerning the intensional nature of habituality, we believe that there is good evidence for a stronger version of the statement, suggesting that imperfectivity can be analyzed as an intrinsically intensional phenomenon.[11]

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[9] Alternatively, the modal base can be seen as a function that maps the actual world onto a set of possible worlds, which roughly corresponds to the relation of accessibility for possible worlds in modal logic.

[10] For a discussion about the modal uses of the Imperfetto see Bertinetto (1986). An interesting example is the following:

(i) Se Gianni studiava di più, passava l'esame senza problemi.
If John studied-IMP more, he passed-IMP the exam without any problem

The Imperfetto here has a clear counterfactual interpretation, roughly equivalent to 'If John had studied more, he would have passed the exam without any problem'. Moreover, notice that this reading is impossible with a perfective tense, which makes the sentence odd too:

(ii) ?? Se Gianni ha studiato di più, ha passato l'esame senza problemi.
If John has studied more, he has passed the exam without any problem

Finally, this contrast also proves that conditional clauses do not perform any aspectual neutralization between imperfective and perfective aspect, as instead it is often claimed.

[11] This also means a shift from the standard description of the opposition between imperfectivity and perfectivity in terms of boundedness vs. unboundedness. However, the intuition behind this classical approach can be captured in the intensional analysis, too. For instance, Carlson (1989) adopts the features 'bounded' and 'unbounded' for the description of the domain of quantifiers, and interpret them as being equivalent to extensional

In order to give a formal representation to the contribution of aspect to the semantics of a sentence, we adopt some version of IL as a representation language, and we assume models defined in the following way (see Chierchia 1995b):

DEF. 1

A model for IL is a tuple M such that

$M = \langle\langle D, \leq, \oplus\rangle, W, \leq_w, F\rangle$ where

(i) D is a multi-sorted domain of individuals, containing objects, events and times; D_o, D_e, D_t are the proper subsets of D associated to the respective sorts; the extension of each of these sets is an algebra with the structure of a join semi-lattice, where $\leq$ is a partial order ('is a part of') over D_k X D_k with $k \in \{o, e, t\}$, and $\oplus$ is a two place operation, D_k X $D_k \rightarrow D_k$, the join operation;

(ii) W is a set of possible worlds;

(iii) $\leq_w$ is an ordering source over the possible worlds, i.e. a partial order to be interpreted as "be at least as normal as".

(iv) F is an interpretation function.

This kind of model allows us to refer to plural entities and group of events as individuals, according to the classical analysis of Link (1983). Moreover, we assume the following definition of an assignment to variables:

DEF. 2.

An assignment is a function g from IL's variables into values of the appropriate type or sort, such that for any v_a, $g(v_a) \in D_a$, where a is a certain type or sort.

In order to define the temporal extension of an event we borrow from Krifka (1992) the notion of temporal trace τ: τ is a function from D_e to D_t, that maps an event to its 'run time'. Formally, it is a homomorphism relative to the join operation:

DEF. 3.

$$\forall e, e' [\tau(e) \oplus \tau(e') = \tau(e \oplus e')]$$

Again, following Krifka, we assume that D_t contains a proper set of atomic times T_a, or instants (variables $t_1,\ldots t_n,\ldots$ will range over instants); moreover we adopt a relation of precedence between instants '$\leq_t$', which is a linear order for time points. Finally, we define the set of convex times or intervals in the standard way:

DEF. 4.

$$\forall t \ [CONV(t) \leftrightarrow \forall t', t'', t''' \ [t' \leq t \wedge t'' \leq t \wedge t' \leq_t t''' \leq_t t'' \rightarrow t''' \leq t]]$$

We also adopt the convention that interval variables $i_1,\ldots,i_n\ldots$ will range onto elements of D_t satisfying DEF. 4,[12] and we augment IL with a special relation '$\subseteq$' between events and intervals, which is interpreted in the following way:[13]

(20) $[\![e \subseteq i]\!]_{w,g} = 1$ iff $\tau(g(e)) \leq g(i)$.

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vs. intensional. Similarly, we can interpret the intensionality of the imperfective aspect as a realization of its intrinsic unboundedness.

[12] We also define the relation of strict precedence of an interval to an instant:

(i) $\forall i, t' [i <_t t' \leftrightarrow \forall t'' [t'' \leq i \rightarrow (t'' \leq_t t' \wedge t'' \neq t')]$

[13] The representation language will also contain the predicate '$\subseteq^*$' between intervals, interpreted in the following way: $[\![i \subseteq^* i']\!]_{w,g} = 1$ iff $g(i) \leq g(i')$.

Chierchia (1992a) develops a version of dynamic semantics in which sentences denote context change potentials.[14] This means that the semantic contribution of a sentence is not only to present a certain content, i.e. to express a proposition, but also to change the context of information which is assumed by the participants at the conversation. Chierchia defines the system of Dynamic Type Theory (DTT), which is like Montague's IL, except that assignments to variables take the place of worlds. Therefore, given a sentence φ, the proposition expressed by that sentence, ^φ of type <s, t>, is the set of assignments with respect to which the sentence is true. However, the crucial notion in DTT is the *context change potentials* (henceforth ccp) expressed by a sentence. Informally, the ccp of a sentence is the set of propositions that are compatible with the truth of that sentence. Given a formula φ, the corresponding ccp, ↑φ, is as follows:

(21) $\uparrow\varphi = \lambda p\,[\varphi \wedge \check{}p]$

The ccp of a sentence determines the set of possible alternatives that remain open after the sentence has been uttered. The propositional variable p stands for possible continuations of the sentence. Conversely, given a ccp A, ↓A is the truth-functional component of A.

The core part of Chierchia's proposal consists in refusing DRT's claim that indefinites are free variables and, therefore, type-theoretically different from strong quantifiers. To this purpose, Chierchia assumes that indefinites are actually existentially quantified terms, as in the classical Montagovian analysis. However, in dynamic existential quantifiers the propositional variable that forms its ccp is contained within the scope of the quantifier itself, in the following way:

(22) $\underline{\exists}x\,[\uparrow P(x) \mathbin{\underline{\wedge}} Q(x)] = \lambda p\,\exists x\,[P(x) \wedge Q(x) \wedge \check{}p]$

where $\underline{\exists}$ and $\underline{\wedge}$ are the dynamic existential quantifier and the dynamic conjunction, defined in the following way:

(23) a. $A \mathbin{\underline{\wedge}} B = \lambda p\,[A(\hat{}B(p))]$
b. $\underline{\exists}x\,A = \lambda p\,\exists x\,[A(p)]$

In dynamic semantics, the meaning of a discourse sequence "S1S2" is computed by replacing the propositional variable of S1 with the dynamic truth-conditional representation of S2. In the specific case of existentially quantified sentences, adding other information will result in inserting this information always within the scope of the quantifier, given the placement of the propositional variable in (22): this intends to capture the possibility for indefinites to extend their scope domain beyond the clause boundaries. In other words, given a sentence containing an indefinite, we can further specify its content by simply adding other information concerning the variable introduced by the existential quantifier.

Chierchia also assumes that adverbs of quantification turn indefinites into free variables, by means of a rule of *existential disclosure* (Dekker 1993). Quantificational adverbs are interpreted as polyadic generalized quantifiers. They form tripartite structures and select (via indexation) one or more indefinite DPs that appear in the restrictive clause as what is actually quantified over. The existential disclosure is a type-shifting mechanism that applies to these selected items. It first 'opens' the variable of an existential quantifier, and then λ-abstract over it to form a predicate, which represents the restrictor of the adverbial quantifier (see Chierchia 1992a for details). The existential disclosure is then the operation by which quantificational adverbs determine what they quantify over. To sum up, the relevant assumptions in DTT concerning quantification are the following:

(24) a. Indefinites are existentially quantified.
b. Adverbs of quantification 'disclose' the indefinites they are coindexed with and λ-abstract over them.

Consistently with the model we have assumed, we adopt an intensional version of DTT. Accordingly, propositions are not simply sets of assignments verifying a sentence, but sets of

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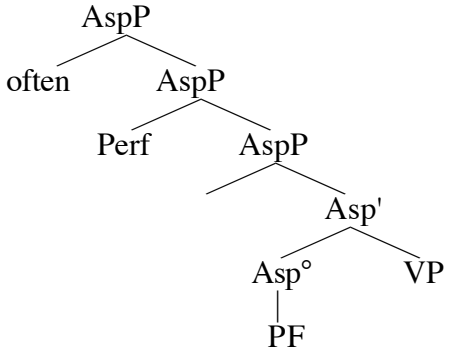
[14] This is a short exposition of the parts of theory that are relevant for the present discussion. For the complete details of the system see Chierchia (1992a) and Chierchia (1995b).

world-assignment pairs:

(25) $[\![\hat{}\varphi]\!] = \{<w, g> : [\![\varphi]\!]_{w,g} = 1\}$

In order to realize a correct mapping between syntactic structures and logical representations that incorporates the process of aspectual interpretation of sentences, we adopt a Principles & Parameters approach to syntactic analysis. Similarly to Chierchia (1992b), we assume that VP is dominated by an aspectual projection AspP, that heads aspectual morphemes. These will contain agreement features which require a suitable operator in their checking domain. Thus, we introduce the morphological features PF and HAB respectively for perfective sentences and for habitual ones, which will be projected under Asp°. Moreover, we introduce the two *aspectual operators* 'Perf' and 'Gn' which are adjoined to AspP and check PF and HAB, respectively. Consequently, we also augment the language of DTT with the dynamic operators 'Perf' and 'Gn^{+}' and their static counterparts. If other explicit relational quantificational adverbs occur, they will be further adjoined to AspP, according to the following configuration:

(26)



The aspectual operators are not default. Rather, they are always projected given a certain aspectual value, and they cooccur with overt quantificational adverbs, instead of being replaced by them.

Moreover, we assume that verbs are basically translated as properties of (or relations between) individuals, i.e. the property of being (or the relation between) the participants of an event:

(27) $\text{walk} \Rightarrow \lambda x\, \exists e\, [\uparrow \mathbf{walk}(e) \mathbin{\underline{\wedge}} \uparrow \mathbf{theme}(x,e)]$

The e-argument in (27) is existentially closed, forming a sort of indefinite description of an event. Its status as an indefinite makes it available for the existential disclosure. Thus, like with standard indefinite DPs, the existentially quantified event variable can be disclosed in order to be bound by other quantificational devices.

As far as the perfective operator is concerned, we first define its static counterpart as an existential-like operator binding a time variable, whose structure is:

(28) $\text{Perf}\ [i]\ (C(i) \wedge \varphi(i))$

The formula '$\varphi(i)$' contains some quantification over events, and the interval *i* restricts the quantification to those events that happened in that interval: the first conjunct states some (contextual) condition about the size of the interval. The semantics of 'Perf' can be defined as follows:

DEF. 5.

$[\![\text{Perf}\ [i]\ (C(i) \wedge \varphi(i))]\!]_{w,g} = 1$ iff for some assignment h s.t. $h = g[i'/i]$, $[\![C(i) \wedge \varphi(i)]\!]_{w,h} = 1$

Thus, the whole representation in (28) captures the idea that perfective sentences refer to bounded events or series of events. Moreover, 'Perf' is an extensional operator, in the sense that the interpretation of its component clause is in the current world (the actual one, by default). Given the existential nature of 'Perf', it is also possible to define its dynamic version in the following way, where A is a ccp:

(29) Perf [i] (A) = λp Perf [i] (A(p))

Compositionally, we assume that AspP receives the existential quantified formula over events created at the VP-level and dynamically conjoins it with the formula '↑e⊆i', which can be imagined as associated with the perfective feature of the aspectual head. The result is that AspP translates into the following formula of IL, which contains a free variable over intervals:

(30) ∃e [↑P(e)] ∧ ↑e⊆i

where P is some event description. The higher tense phrase TP will expand this formula by adding information concerning the reference time with respect to which the interval is located: in section 3.3 we will outline an analysis of the interaction between aspect and tense. The relevant mapping to IL for a perfective sentence is as follows:

(31) a. Gianni fumò.
John smoked
b. Perf [i] (↑C(i) ∧ ∃e [↑**smoke**(e) ∧ ↑**agent**(John,e) ∧ ↑e⊆i]) = λp Perf [i] (C(i) ∧ ∃e [**smoke**(e) ∧ **agent**(John,e) ∧ e⊆i] ∧ ˇp)

Limiting ourselves only to the truth-functional component of (31b), we can say that (31a) is true iff there is an interval *i* (of a certain contextually specified size) such that there is at least an event of smoking by John that happened in it (tense information will be added in §. 3.3). In other words, the perfective aspect selects a temporal interval and makes a predication on it concerning the occurrence of an event.

As for habitual sentences, we assume that the generic operator that is triggered by the feature HAB is translated into an intensional operator, composed of a restrictor and a matrix that correspond to open formulas:

(32) Gn (φ(d_1,…,d_n)) (ψ(d_1,…,d_n))

'Gn' is interpreted as a modal operator, which is also able to bind the variables that occur free in its restrictor. The truth conditions for 'Gn' are stated as follows (where d_i is a variable of type e of a certain sort):

DEF. 6.

⟦Gn (φ(d_1,…,d_n) (ψ(d_1,…,d_n))⟧$_{w,g}$ = 1 iff given a modal base B_w, for every assignment h, s.t. h = g[d_1',…,d_n'/d_1,…,d_n], and every w'∈B_w s.t. ⟦φ(d_1,…,d_n)⟧$_{w',h}$ = 1, there is a world w''∈B_w s.t. w''≤$_w$w', and for every world w'''≤$_w$w'' ⟦ψ(d_1,…,d_n)⟧$_{w''',h}$ = 1

This definition is a slight variation of that in Krifka *et al.* (1995) and characterizes the truth conditions of generic sentences as similar to those of conditional statements. The usual restriction against vacuous quantification applies: as Krifka *et al.* (1995: 32) say, "characterizing sentences must have at least one variable to generalize over. That is, there must be at least one variable which is not explicitly tied to some particular object.". We can also define the dynamic counterpart for 'Gn', where A and B are ccp:

(33) Gn$^+$ (A) (B) = ↑Gn (↓A) (↓[A ∧ B])

Therefore, while 'Perf' is existential in nature, on the contrary 'Gn$^+$' is an operator which resembles strong quantifiers (for the strong character of the generic operator see Diesing 1992).[15]

It is nowadays an accepted fact that the content of the restrictor depends on the presuppositions of the sentence. More specifically, Schubert & Pelletier (1989) claim that habituals are always interpreted on the background of certain situations or cases that can be determined on the basis of the presuppositions of the sentence. For instance, the truth conditions of (34) depend on the cases in which John goes to school:

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15 The definition in (33) characterizes the generic operator as a conservative quantifier too.

(34) John walks to school.

Therefore this sentence is felt to be roughly equivalent to:

(35) When John goes to school, he walks.

The presuppositional basis that fills in the restrictor of the habitual clause can be explicitly stated with *when-* or *if*-clauses (like in (35)); otherwise it must be recovered contextually. For instance, the presence of a question to which the habitual is an answer, can be decisive to determine the presupposition set and therefore the structure of the restrictor:

(36) a. 1. Where does John smoke?
2. John smokes in the garden.
b. If John smokes, he smokes in the garden.

The question in (36a) determines the cases in which John smokes as the presuppositions for the habitual, whose truth conditions are roughly equivalent to (36b). Establishing a precise algorithm to determine the semantic presuppositions of a sentence is beyond the limits of the present paper. Therefore, we will limit to assume that the relevant presuppositions for the interpretation of habitual sentences are accommodated into the restrictor of 'Gn+'. Moreover we assume that existentially quantified variables expressed by the linguistic material in the sentence and that must occur in the restrictor of the operator are turned into free variables. To implement this procedure, we assume that certain elements in the sentence are marked with a feature T (topic):[16] in some languages this marking is realized by specialized linguistic devices, e.g. the topic particle *wa* in Japanese. Alternatively, we can imagine that at LF the topic elements are moved to a projection c-commanding the generic operator, and we can adopt the 'Splitting Algorithm' proposed in Chierchia (1992b) and (1995b) to determine the partition of the sentence material in the restriction and the scope of quantificational adverbs. According to this proposal, quantificational adverbs are free to choose their scope via LF adjunction, and the DPs which c-command the adverb at LF will fill its restriction. Similarly, the aspectual operators too will be able to adjoin to some higher projection, after they have checked the relevant feature in Asp°. Finally, we define the following mapping rule from LF to logical representations (for the sake of simplicity, we just mark the topic elements in their positions at Spell-Out):

(37) $[_{AgrSP}\ XP_1{}^T, \ldots, XP_j{}^T\ [_{AspP}\ Gn \ldots, XP_n{}^T, YP] \ldots] \Rightarrow Gn^+\ (\uparrow C(i)\ \underline{\wedge} \ldots \underline{\wedge}\ !_{di}XPi\ \underline{\wedge} \ldots)$ (B), for every i, $1 \leq i \leq n$, where $!_{di}XPi = \lambda P\ P(\lambda d_i\ [\uparrow d_i = d_i'])$, if *P* is an existential quantifier, else undefined.[17]

The generic operator discloses (and accommodates into its restrictor) every existentially quantified variable which is contained in the expression corresponding to the translation of a topic-marked constituent. Therefore, the rule is sensitive to two factors: (i) the 'indefinite' character of a constituent, i.e. its containing an existential quantifier binding any sort of variable, eventive or objectual; (ii) the topic status of the constituent. This idea is consistent with the assumption that presuppositions are accommodated into the restrictor: in fact, it is a standard assumption in model-theoretic semantics that sentential topic elements determine the restrictor of operators and quantifiers (cf. Partee 1995). (37) also states that 'Gn+' will bind an interval variable whose size is (contextually) restricted by a condition C: this amounts to saying that habitual sentences always contain a quasi-universal quantification over the intervals where events occur.

As far as the compositional process is concerned, we assume that the aspectual head marked with HAB dynamically expands the representation created at VP-level with the formula '$\uparrow e \subseteq i$'. As an example, let us take:

(38) [Gianni andava al mare]$_T$ con Maria.
John went-IMP to the beach with Mary

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16 This solution is adopted in Chierchia (1992a).

17 This definition adopts the implementation of the existential disclosure proposed in Chierchia (1992b), which has the form of a type-shifting operation $!_yXP$ defined on existential quantifiers.

and let us assume that we have selected the bracketed section of the sentence as the part to be accommodated into the restrictor, since it provides the background set of cases for the interpretation of the whole habitual. The relevant logical form will be as follows:

(39) a. Gn^{+} (↑C(i) ▵ ↑**go**(e) ▵ ↑**theme**(John,e) ▵ ↑**to**(beach,e) ▵ ↑e⊆i) (↑**with**(Mary,e)) = ↑Gn (↓[↑C(i) ▵ ↑**go**(e) ▵ ↑**theme**(John,e) ▵ ↑**to**(beach,e) ▵ ↑e⊆i]) (↓[↑C(i) ▵ ↑**go**(e) ▵ ↑**theme**(John,e) ▵ ↑**to**(beach,e) ▵ ↑e⊆i ▵ ↑**with**(Mary,e)])

b. ↑Gn (C(i) ∧ **go**(e) ∧ **theme**(John,e) ∧ **to**(beach,e) ∧ e⊆i) (C(i) ∧ **go**(e) ∧ **theme**(John,e) ∧ **to**(beach,e) ∧ e⊆i ∧ **with**(Mary,e))

In this specific case, the part of the sentence which has been selected by the topic-marking algorithm to fill the restrictor of 'Gn^{+}' contains only the existentially quantified event argument, which is disclosed and bound by 'Gn^{+}' according to the rule of translation in (37). (39b) is obtained by applying the definition of the dynamic generic operator in (33) and the standard ↓↑-theorems (see Chierchia 1992a for details). The sentence (38) is true iff, in any world of the modal base, every interval of a certain size and every event of John's going to the beach occurring in this interval are such that, in every world which is most normal according to the ordering source, the events of John's going to the beach that happened in these intervals took place in the company of Mary. This representation seems suitable to capture the normative character of habituality.

3.2. *Adding a relational quantificational adverb*. Since the aspectual operators are not default, they cooccur and interact with explicit quantificational adverbs, when these are present. Let us assume that in (40) both 'Perf' and the quantificational adverb are free to move at LF and to select their scope. Thus, different resulting configurations are possible. A first possibility is that 'Perf' has scope over *spesso*, maybe as a consequence of its adjunction to AgrSP:

(40) a. Gianni lesse spesso romanzi di spionaggio.
John often read spy stories.

b. $[_{AgrSP}\ Perf_i\ [_{AgrSP}\ Gianni_j\ lesse_k\ [_{AspP}\ spesso\ [_{AspP}\ t_i\ [_{VP}\ t_j\ t_k$ romanzi di spionaggio]]]]

The restriction and the nuclear scope for the relational adverbs can be built out of the following expressions:

(41) a. ∃e [↑**read**(e) ▵ ↑**agent**(John,e) ▵ ↑e⊆i]
b. λe ∃x [↑**spy-stories**(x) ▵ ↑**theme**(x,e)]

This partition corresponds to the reading in which the quantificational adverb establishes a relation between the set of events of reading and the set of the events of reading spy stories. Obviously, other partitions are possible according to contextual and linguistic factors (for details, see De Swart 1993).

Since the quantificational adverb must bind the e-argument, the existential disclosure applies to (41a) to turn the quantifier over events into a free variable which is then λ-abstracted:

(42) λe [↑**read**(e) ▵ ↑**agent**(John,e) ▵ ↑e⊆i]

This property defines the sets of events which represents the restriction of the quantificational adverb, i.e. what the quantifier is about. Furthermore the free variable *i* is bound by the aspectual operator 'Perf' which will have scope over the adverb. The logical form we get is the following (where '$Most^{+}$' is the dynamic counterpart of 'Most'):

(43) Perf [i] (↑C(i) ▵ $Most^{+}$ [λe [↑**read**(e) ▵ ↑**agent**(John,e) ▵ ↑e⊆i]] [λe ∃x [↑**spy-stories**(x) ▵ ↑**theme**(x,e)]])

Applying the truth conditions for the perfective operator, we get that the sentence in (40) is true iff most of the events of reading something by John, *which occurred within the boundary of a certain interval*, were events of reading spy stories. This formalization accounts for the data concerning perfective sentences containing relational adverbs that we have discussed in §. 2.2.

That is to say, although they contain a quantificational adverb, nevertheless these sentences do not express normative generalizations. The quantifier merely establishes a relation between bounded sets of events, because it is restricted to events that happened in a certain interval.

Another possibility is that the quantificational adverb c-commands at LF the aspectual operator. In this case, 'Perf' will appear inside the nuclear scope of the relational adverb. Thus the following logical form could also be generated:

(44) Most^{+} [λe [↑**read**(e) ∧ ↑**agent**(John,e) ∧ ↑e⊆i]] [λe Perf [i] (↑C(i) ∧ ∃x [↑**spy-stories**(x) ∧ ↑**theme**(x,e)])]

However, this representation is not well formed, because the interval variable in the restrictor clause of the quantificational adverb remains unbound, and accordingly the whole formula cannot be properly interpreted. Therefore, although the scope configuration that generates (44) is syntactically well-formed, the logical form is ruled out at the interpretative level, and this is consistent with the fact that (40a) is not ambiguous and its only reading is the one represented in (43).[18]

If the relational quantificational adverb is contained in a habitual sentence (like in (45)), the relevant representation at LF, in which the aspectual operator has scope over the adverb, will be as follows:

(45) a. Gianni leggeva spesso romanzi di spionaggio.
John often read-IMP spy stories

b. [$_{AgrSP}$ Gn$_i$ [$_{AgrSP}$ Gianni$_j$ leggeva$_k$ [$_{AspP}$ spesso [$_{AspP}$ t$_i$ [$_{VP}$ t$_j$ t$_k$ romanzi di spionaggio]]]]]

The mapping algorithm will proceed similarly to the perfective case in (40). The output is the following logical representation:[19]

(46) Gn^{+} (↑C(i)) (Most^{+} [λe [↑**read**(e) ∧ ↑**agent**(John,e) ∧ ↑e⊆i]] [λe ∃x [↑**spy-stories**(x) ∧ ↑**theme**(x,e)]])

This proposition is true iff for every possible interval of a certain contextually fixed size, in the worlds that are most normal, most of the events of John's reading that occurred in this interval were events of John's reading spy stories. Notice that the restrictor of 'Gn^{+}' is not filled with material from the sentence, but simply contains a contextual condition about the interval within which the events have occurred.[20]

Moreover, it is interesting to compare the logical forms in (43) and (46) corresponding respectively to a perfective and an imperfective sentence containing a relational adverb. In both cases, the adverb establishes a proportion between two sets of events. However, in the perfective sentence the members of these sets are events that happened in the actual world and within the boundaries of a time interval that is existentially closed; by contrast, in the imperfective case, the events quantified over are from different possible worlds and the adverb establishes a proportion between sets of events that happened in every possible interval of a certain implicit size. This way, although the quantificational adverb is the same in both sentences, only the habitual corresponds to an intensional generalization, stating that the proportion expressed by the quantifier is not just an episodic fact, but rather a normative one. Therefore, this solution accounts for the data concerning the semantic differences of imperfective and perfective sentences containing relational adverbs, as discussed in §. 2.2.

The idea that the generic operator is not a default one, but rather cooccurs with quantificational adverbs allows us to explain the ambiguity of (47):

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[18] The only ambiguities being those due to different ways in which the clauses of the quantificational adverb can be filled.

[19] Differently from the habitual case analyzed in the former section, the variable disclosure is now operated by the quantificational adverb itself, like in perfective sentences. This is due to the fact that *Gn* opens only those indefinites that are to be inserted into its restrictor, but in the current case, the clauses in (441) are part of the structure of the quantificational adverb *spesso*, which instead forms the nuclear scope of *Gn*.

[20] Again, the configuration in which *Gn* has narrow scope w.r.t. the quantificational adverb is ruled out at the interpretative level, because in that case the interval variable would remain unbound.

(47) In passato, un marito raramente usciva insieme alla moglie.
In times past, a husband rarely went-IMP out together with his wife

In one reading, this sentence means that few husbands used to go out with their wives; on the second reading, it means that it was a characteristic of any husband that few of his events of going out occurred in the company of his wife. This ambiguity can be captured in terms of the possible scope configurations between the aspectual operator and the quantificational adverb. The logical representation of the two readings is given in (48):

(48) a. Few^{+} [λx [↑**husband**(x)]] [λx Gn^{+} (↑C(i) ∧ ↑**go-out**(e) ∧ ↑**theme**(x,e) ∧ ↑e⊆i) (↑**with**(wife,e))]

b. Gn^{+} (↑C(i) ∧ ↑**husband**(x)) (Few^{+} [λe [↑**go-out**(e) ∧ ↑**theme**(x,e) ∧ ↑e⊆i]] [λe [↑**with**(wife,e)]])

Thus, (48a) is true iff few husbands had the habit of going out with their wife. On the contrary, (48b) is true if it was typical of any husband that in the most normal worlds few of his events of going out, were events of going out with his wife. The perfective sentence corresponding to (47) shows a pair of readings too:

(49) In passato, un marito è uscito raramente con sua moglie.
In times past, a husband has rarely gone out with his wife

In one case, (49) means that for few husbands there was an interval in which an event of going out with his wife occurred; in the second reading, the sentence means that there was a husband and there was an interval in which few of his events of going out that occurred within that interval took place with his wife. These two readings correspond to the following representations, due to different scope configurations of the operator and the adverb:

(50) a. Few^{+} [λx [↑**husband**(x)]] [λx Perf [i] (↑C(i) ∧ ∃e [↑**go_out**(e) ∧ ↑**theme**(x,e) ∧ ↑**with**(wife,e) ∧ ↑e⊆i])]

b. Perf [i] (↑C(i) ∧ ∃x [↑**husband**(x) ∧ Few^{+} [λe [↑**go_out**(e) ∧ ↑**theme**(x,e) ∧ ↑e⊆i]] [λe [↑**with**(wife,e) ∧ ↑e⊆i]]])

The difference between perfective and imperfective cases is predicted by the representation we gave to the aspectual values: in fact, 'Perf' does not perform any variable disclosure, and therefore, an indefinite DP that appears outside the quantificational adverb is forced to keep its existential force.

3.3. *Aspect and tense*. In this section we want to debate the question of the relationship between aspect and tense, since aspectual features are carried by inflectional morphemes that also anchor sentences to time. Our goal is to discuss the following three points: (i) what information is brought into the derivation of the logical form of sentences by tense features; (ii) whether and how aspect and tense interact; (iii) the role of certain temporal adverbs that are used to set the temporal background of the events. As to the representation of tense, we will adopt the Reinchenbachian proposal that tenses can be defined depending on the respective relationships between three salient times, the *utterance time* (t_u), the *event time* and the *reference time* (t_r). However, while Reichenbach (1947) claims that every tense has to be defined in terms of all three salient times, we will instead follow Bertinetto (1986) and other scholars in using the reference time only for the representation of tenses expressing the notion of perfect.[21]

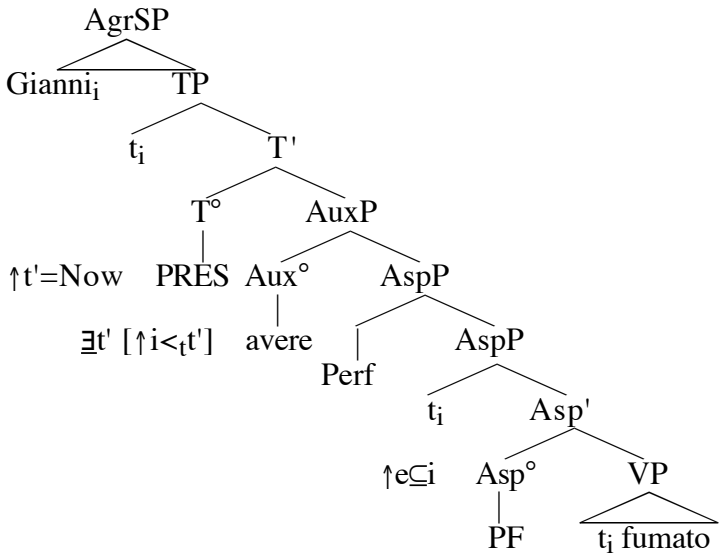
In Italian, the imperfective aspect is typically represented by two tenses, the Simple Present, for present imperfective, and the Imperfetto for past imperfective values. By contrast, perfective aspect is represented by a whole range of tenses: the Simple Past, the Compound Past, the Pluperfect, the Simple Future and the Future Perfect. Moreover, the very notion of perfectivity needs to be further specified in two aspectual subtypes, which we will refer to as *perfect aspect* and *aoristic aspect*, adopting the terminology in Comrie (1976) and Bertinetto (1986). In both cases, the event is represented as a completed and bounded entity. However, the two subtypes of perfectivity differ with respect to the way the event is connected with time. In the case of the perfect value, perfective tenses express the fact that the result of an event lasts up to the

[21] See Bertinetto (1986) for the evidence in favor of such an analysis.

reference time. By contrast, the aoristic perfective value simply represents the event as totally anterior or posterior to the utterance time, so that no part of the event or its effects are connected with the utterance time or to a contextually relevant reference time. The interesting fact of this distinction within the perfective domain is that it allows us to group the different perfective tenses depending on the particular value they may carry. Specifically, the perfect aspect is only expressed by the compound tenses: in turn, these differ depending on the location of the reference time, which coincides with the utterance time, a time in the past and a time in the future respectively for the Compound Past (in its perfect reading), the Pluperfect and the Future Perfect. By contrast, the aoristic aspect is typically expressed by the Simple Past and the Simple Future (besides the Compound Past in its aoristic meaning).

In order to implement this picture in the analysis of aspect we have proposed, it is necessary to keep in mind the following points: (i) there is a common feature that all perfective aspectual values share; (ii) the subtypes of perfectivity are (normally) associated with different tenses and depend of the way the bounded event is related with different salient times (the reference time for the perfect tenses and the utterance time for the aoristic tenses). These considerations suggest a natural distribution of the semantic information associated with the perfective aspect between different functional heads in the following way. First of all, the common part of perfectivity is given by the content of AspP, which in every case will head the feature PF and will contain the operator 'Perf' in an adjoined position. Furthermore, there are two different possibilities depending on whether the tense is compound or simple. In the former case (leaving aside the aoristic reading of the Compound Past), we adopt the representation proposed by Belletti (1990), according to which the auxiliary is generated under the head of a functional projection AuxP that is located under TP (in our analysis, AuxP will also dominate AspP):

(51)



The semantic contribution of the relevant nodes to the logical representation of the sentence is shown on the left of the tree. The basic idea is that the Aux° *introduces* the reference time by means of an existential quantifier over instants, and set the interval which includes the event time as anterior to the reference time. The tense phrase (to which the auxiliary will move to check the relevant morphological features) *specifies* the reference time: in the case of the Compound Past the reference time is deictically identified with the utterance time (here indicated with the constant 'Now'), while with the Pluperfect and the Future Perfect the reference time is some (familiar) time respectively anterior or posterior to the utterance time. This corresponds to the classical Reichenbachian analysis for compound tenses.[22] The result is the following representation:

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[22] We can assume that at LF, after having checked the aspectual features in Asp°, 'Perf' scopes out and adjoins first to TP (to whose head the auxiliary has simultaneously adjoined) and then to AgrSP: this way, it is possible to capture the natural connection between aspectual and tense information. The semantic reflex of the chain formed by the movement of the operator would be the restriction of the interval variable quantified over by 'Perf' with the formulas associated to Aux° and T°. At the same time, the verb moves to Asp°, to get the aspectual information.

(52) [Il portacenere è pieno]
[The ashtray is full]

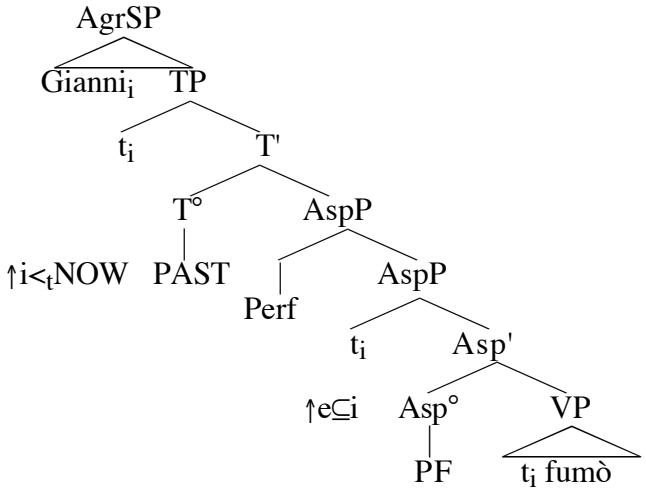
a. Gianni ha fumato.
John has smoked

b. Perf [i] (↑C(i) ∧ ∃t' [↑i<$_t$t' ∧ ↑t'=Now ∧ ∃e [↑**smoke**(e) ∧ ↑**agent**(John,e) ∧ ↑e⊆i]])

The case of the Simple Past is similar, but differs because AuxP is not projected. Since the reference time is associated with Aux°, this implies that the logical form of a sentence with the Simple Past will not contain the reference time, and the event will be simply represented as being anterior to the utterance time. Therefore, we can associate to (31a), now (53a), the following structure and logical representation:

(53) a. Gianni fumò.
John smoked

b.



(54) Perf [i] (↑C(i) ∧ ↑i<$_t$NOW ∧ ∃e [↑**smoke**(e) ∧ ↑**agent**(John,e) ∧ ↑e⊆i])

Since there is no reference time and the event is represented as being strictly anterior to the utterance time, the logical form in (54) seems to be a suitable formalization of the semantic of the aoristic perfective aspect.

Thus we have not only given a representation of the interplay of tense and aspectual information, but we have also formalized the different facets of the perfective aspect, i.e. the perfect and the aoristic values. The core of our proposal amounts to a precise 'division of labour' between the different functional heads that make up the description and location of the reported event. The common feature is the aspectual operator 'Perf', which is shared by every perfective sentence, while the distinguishing element is the presence or absence of the reference time, which is only carried by the auxiliary of compound tenses, that typically express the perfect value of perfectivity.

The issue of the relationship of habituals and tense is not an easy one. A possible answer to this question is that, since habituals express normative generalizations, they are intrinsically atemporal. The flaw in this solution (which has been adopted by many scholars) is that it runs against linguistic and commonsensical evidence. Starting from the latter, habits (like smoking) begins at some time, last for a certain period and then finish, notwithstanding their tendentially stable character. Apart from metaphysical and mathematical laws, most of generic sentences express general statements that may be true now, but that may have been false some time ago. On the linguistic side, the obvious evidence is that habits can be expressed both in the present and in the past as well as in the future (although with certain pragmatic restrictions). If tense connects language with time, then the fact that habituals occur with all the three tense values means that general statements are well situated in time.

A related question concerns the role that background clauses have in perfective and imperfective sentences:

(55) a. Nel 1994, Gianni è andato al cinema con Maria.
In 1994, John has gone to the cinema with Mary

b. Nel 1994, Gianni andava al cinema con Maria.
In 1994, John went-IMP to the cinema with Mary

According to what we noted in section §. 2.2 (see the discussion of the examples (15) and (16)), the temporal adverb that occurs with the habitual in (55b) does not fix the boundaries of the habit, which may still hold in 1995. By contrast, in the perfective case we refer to events that occurred within the boundaries of the interval denoted by the temporal adverb. It is thus necessary to explain the apparent paradox of imperfective habituals, i.e. their possibility of cooccuring with expressions that introduce a finite interval as a background for the habit, while still maintaining the character of unboundedness typical of imperfectivity.

In order to accommodate these facts, we propose that the generic operator is to be translated into IL in a more complex way than we have assumed in the former sections. Following and adapting some insights in Chierchia (1992b), we assume the following representation of the generic operator, which therefore substitutes the one in (32):

(56) $\exists i\,[\uparrow C(i) \mathbin{\triangle} Gn^{+}\,(\uparrow \mathbf{overlap}(i,i') \mathbin{\triangle} \uparrow\varphi(d_1,\ldots,d_n))\,(\uparrow\psi(d_1,\ldots,d_n))]$

We will refer to the existentially quantified interval *i* as the *external interval*, which is assumed to be anchored to time. This interval is contextually restricted, and the value of C can be overtly specified by temporal adverbs. Thus, the condition 'C(i)' corresponds to the background clause in (55b). We call the second interval *i'* the *internal interval*, which is bound by the generic operator. The core of this proposal concerns the relation between the external and the internal interval, which must overlap (i.e. have at least one common subpart). Therefore, the logical translation of (55b) is as follows:

(57) $\exists i\,[\uparrow i = 1994 \mathbin{\triangle} \uparrow i <_t \mathrm{Now} \mathbin{\triangle} Gn^{+}\,(\uparrow \mathbf{overlap}(i,i') \mathbin{\triangle} \uparrow \mathbf{go}(e) \mathbin{\triangle} \uparrow \mathbf{theme}(\mathrm{John},e) \mathbin{\triangle} \uparrow \mathbf{to}(\mathrm{cinema},e) \mathbin{\triangle} \uparrow e \subseteq i')\,(\uparrow \mathbf{with}(\mathrm{Mary},e))]$

Notice that the background adverb and the relevant tense information restrict the external interval.[23] The sentence in (55b) is true iff there is a past interval coinciding with 1994 such that, in any world of the modal base, every interval overlapping with the external one and every event of John's going to the cinema that occurred in this interval are such that, in every world which is most normal according to the ordering source, the events of John's going to the cinema that happened in these intervals took place in the company of Mary. The relation of overlapping between the external and internal intervals allows us to capture the interplay between the boundedness of the background interval, and the intrinsic unboundedness of habituality. In fact, although the external background interval is a finite one, yet 'Gn^{+}' quantifies over all possible intervaly which simply overlap with the external one. Therefore, the habit holds even for periods of time that extend beyond the boundaries of the background clause. In other words, we can say that in habitual sentences, background adverbs and tense information locate the habit in a certain time period, but at the same time they do not restrict the habit only within the boundaries of this period. As it is easy to verify, the treatment of habituality we gave in the previous section naturally extends to this new version of the generic operator.

4. **Iterative adverbs**

Languages differ concerning the way multiple events are represented. Various morphemes can be used to express the distribution of events among multiple agents, or the repetition of events in time, or the scattering of events in space, and so forth. Lasersohn (1995) refers to all these devices as *pluractional markers*, to stress the parallelism with the plural morphemes that occur with nominal elements. The interesting fact is that plurality in the event domain is a much more composite phenomenon than its counterpart in the objectual domain, because of the multidimensional nature of events. In fact, events can be plural with respect to time, or space, or one of their arguments, or with respect to more than one of these variables at the same time.

Iterative adverbs like *twice* can surely be described as plurality expressions, because they

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[23] Like in the perfective case, we assume that the syntactic operator 'Gn' first adjoins to TP, picking up the tense information, and then moves up to AgrSP.

specify the multiple occurrence of an event. However, the question of the dimension of plurality they express is less obvious, as the following example reveals:

(58) Yesterday, the gun shot twice.

This sentence is ambiguous: it can mean that there was a single occasion yesterday in which the gun fired two shots, or that there were two different times in which the gun fired an undefined number of shots.[24] However, the same ambiguity does not arise in (59):

(59) Yesterday, John called me twice.

which simply means that there were two moments of the day in which John called me. As Lasersohn says, the ambiguity of (58) is shared by sentences containing verbs like *knock*, *ring*, *nibble*, *wink*, etc. The characteristic of these verbs is that, for instance, an event of knocking at the door is normally (although not necessarily) composed of repeated knockings, as well as nibbling usually consists of repeated small bitings. We will take from Lasersohn the distinction between *repetitive* and *repeated* actions, corresponding respectively to the case of firing many shots on the same occasion, and to the case of many different occasions of firing.

The main goal of this section is to give an explanation of the tendential incompatibility of iterative adverbs with the habitual imperfective aspect. In particular, we will try to derive it from our quantificational analysis of habituals. The model we are going to propose will also be suitable to predict the cases in which iterative adverbs *can* occur in habitual sentences. First of all, remember that we have represented verbs as containing indefinite descriptions over events:

(60) run $\Rightarrow \lambda x \, \underline{\exists} e \, [\uparrow \mathbf{run}(e) \, \underline{\wedge} \, \uparrow \mathbf{theme}(x,e)]$

Thus, we can say that verbs like *run* resemble singular indefinite nominal predicates like *a man* or *a house*. On the other hand, we suggest that some verbs, the ones denoting repetitive events, should be represented as being intrinsically collective, similarly to collective nominal predicates like *flock* or *cattle*. Furthermore, we assume that so-called iterative adverbs are actually ambiguous between a *repeated* and a *repetitive* interpretation: in the former case they count the number of occurrences of events in the sense of bounded units temporally separated one from another. In the latter case, iterative adverbs count the elements that compose a single occurrence of a repetitive event. The existence of such an ambiguity is supported by data from languages that have lexically distinct adverbs to express the repeated and the repetitive interpretation (Hengeveld 1992).

As Lasersohn suggests, the difference between repeated and repetitive readings of iterative adverbs lies in the level of granularity of the entities we count with these expressions. Let us take:

(61) John knocked twice.

We can assume that the denotation of the predicate corresponds to a *sum* of events of type P, where P is some contextually relevant predicate, that can also be similar to the original predicate.[25] The events of type P will be called the *atoms* of knocking. For instance, an occurrence of knocking can actually be composed of multiple atomic knockings, and an occurrence of shooting can be composed of the firing of multiple shots, each corresponding to an atom of shooting. This way, *knock* or *shoot* are similar to collective predicates: e.g.*committee* denotes an object which is actually the sum of individuals that represent its atoms. Using Link's notation, we can represent repetitive predicates as indefinite descriptions of an event that is the 'material fusion' of atomic-events of a given type P:

(62) knock $\Rightarrow \lambda x \, \underline{\exists} e \, [\uparrow \mathbf{knock}(e) \, \underline{\wedge} \, \uparrow \mathbf{agent}(x,e) \, \underline{\wedge} \, \uparrow e \gg \sigma e' \uparrow \mathbf{P}(e')]$,

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[24] Cf. Bertinetto (1986) and Hengeveld (1992).

[25] A *sum* can be defined as a relation between an object of D and a subset of D in the following way:

(i) $x \; \mathrm{Sum} \; \alpha \leftrightarrow \forall y \, [y \in a \rightarrow y \leq x]$

Each sum is atomistic, in the sense that it has atoms or minimal elements.

where '»' stands for 'constitutes' and 'σe'P(x,e')' denotes the sum of atomic events of type P (see Link 1983 for details): we will call each *e'* that constitutes *e* a *phase* of *e*.

However, atoms can also be defined in a different way: Lasersohn suggests that events are cut or packaged in bounded units, with respect to different parameters, i.e. time, space, and participants. He also shows that languages provide different devices to refer to multiple bounded units of events along one of these three dimensions. It seems plausible to state that repeated adverbs really count temporally packaged events, which now constitute sorts of atoms. Notice also that the compatibility of iterative quantifiers with event predicates depend on the possibility of carrying out this sort of packaging:

(63) a. Yesterday, John called twice.
b. Yesterday, John ran twice.
c. ?? Last night, John slept twice.

While *call* in (63a) has a clear partition in temporal bounded units, each corresponding to a single call, (63b) is correct only if we are able to distinguish two runs by John. By contrast, in normal conditions the packaging operation is more difficult to carry out with sleeping. Following Lasersohn, we will refer to each temporally packaged event as an *event unit*.. Thus, each event predicate P will denote a set of event units (someway determined with different criteria depending on the event type), while for some predicates Q, each event unit of type Q is further equivalent to a sum of phases of a certain type.

Given a sentence like (63a), let us assume that the VP is translated in the following way:[26]

(64) $[_{VP}\ t_i\ \text{call}] \Rightarrow \underline{\exists}e\ [\uparrow\mathbf{call}(e) \mathbin{\underline{\wedge}} \uparrow\mathbf{agent}(x,e)]$

In the former section we have adopted the idea that quantificational adverbs perform an operation of variable disclosure and abstraction, turning an existentially quantified formula into a first-order property. We now define iterative adverbs in the repeated interpretation as generalized quantifiers of type <<e, t>, t>. Consistently with this characterization, they perform an operation of disclosure and abstraction over the e-argument. Since syntactically iterative adverbs are VP-internal, these operations apply at the level of VP. What we get is the following property over events:

(65) $\lambda e\ [\uparrow\mathbf{call}(e) \mathbin{\underline{\wedge}} \uparrow\mathbf{agent}(x,e)]$

We can thus define the repeated reading of *due volte* 'twice' in the following way:[27]

(66) $\lambda P\ \underline{\exists}e\ [\uparrow e = \sigma e'^{\smile} P(e') \mathbin{\underline{\wedge}} \uparrow\mathbf{two}(\sigma e'^{\smile} P(e'))]$ (repeated interpretation)

The adverb will then apply to the event property, producing a description of a sum of event, whose cardinality is two:

(67) $\underline{\exists}e\ [\uparrow e=\sigma e'[\uparrow\mathbf{call}(e') \mathbin{\underline{\wedge}} \uparrow\mathbf{agent}(x,e')] \mathbin{\underline{\wedge}} \uparrow\mathbf{two}(\sigma e'[\uparrow\mathbf{call}(e') \mathbin{\underline{\wedge}} \uparrow\mathbf{agent}(x,e')])]$

The other iterative adverbs can be defined in a similar way; the essential part of the definition is that these adverbs are now considered as sorts of pluralizing operators, that turns indefinite descriptions over events into descriptions of sum of events, specifying their cardinality.

We noted that iterative adverbs in languages like Italian or English also have a repetitive interpretation. We suggest that in this reading, adverbs like *due volte* actually behave like normal first order predicate, with a selection restriction concerning their argument, i.e. that it must be a sum (the restriction states that the values of *e* must not be single atoms):

(68) $\lambda e\ [\uparrow\mathbf{two}(e)]$ s.t. $\forall g,w,\ [\![\lambda e\ [\uparrow\mathbf{two}(e)]]\!]_{w,g} \not\subseteq \text{ATOM}$ (repetitive interpretation)

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[26] We have adopted some version of the Internal Subject Hypothesis and we interpret the trace left by the subject as a variable of type e. Thus, (64) represents the output of applying the translation of V to this variable. The same variable will be λ-abstracted at some higher projection, and then applied to the subject DP.

[27] We assume the analysis of cardinal adjectives in Ojeda (1993) and in Moltman (1995), according to which they count the atoms of a sum.

This restriction allows us to derive the observed fact that only a set of verbs give rise to a repetitive interpretation, namely the collective ones, i.e. those verbs that denote events corresponding to sums of phases of a certain predicate P. Therefore, at the VP level the repeated and repetitive readings of (61) are represented in the following way:

(69) a. $\underline{\exists}e\ [\uparrow e = \sigma e'[\uparrow \mathbf{knock}(e')\ \underline{\wedge}\ \uparrow \mathbf{agent}(x,e')]\ \underline{\wedge}\ \uparrow \mathbf{two}(\sigma e'[\uparrow \mathbf{knock}(e')\ \underline{\wedge}\ \uparrow \mathbf{agent}(x,e')])]$

b. $\underline{\exists}e\ [\uparrow \mathbf{knock}(e)\ \underline{\wedge}\ \uparrow \mathbf{agent}(x,e)\ \underline{\wedge}\ \uparrow e \gg \sigma e' \uparrow \mathbf{P}(e')\ \underline{\wedge}\ \uparrow \mathbf{two}(\sigma e' \uparrow \mathbf{P}(e')]$

In the repetitive case, there is a group of event units of knocking, whose cardinality is equal to two; in the repeated case there is a single event of knocking, which consists of a group of phases of type P and whose cardinality is equal to two. The crucial difference is that the existentially bound variable in (69a) is a group one, i.e. is not an atomic event unit; on the contrary in (69b) the existentially closed variable is an atomic one, which however corresponds, at a finer level of description, to the sum of different parts. For comparison, this is reminiscent of the difference between *platoon*, which denotes a group of soldiers, and *John* that denotes a single individual constituted by the sum of other entities (for instance, its body-parts).

Given this analysis of iterative adverbs, it is possible to derive the anomaly of sentences like (2) (now (70):

(70) a. * Gianni andava al mare con Maria due volte.
John went-IMP to the beach with Mary twice

b. * Gianni vedeva *Blade Runner* molte volte.
John watched-IMP *Blade Runner* many times

First of all, remember that we have analyzed habitual sentences as containing a generic operator which binds the event variable in the proper cases, producing a generalization over events of a certain type. The same operator is responsible for the generic interpretation of indefinite singular DPs, and in general of so-called 'I-generics', following the terminology of Gerstner & Krifka (1993). Notice now that singular indefinite generic DPs are incompatible with collective predicates:

(71) * A lion gathers near water-holes.

This restriction can be explained on the grounds that the truth conditions of the generic operator that is contained in characterizing sentences have the form of a conditional statement:

(72) If x is a lion, then x gathers near water-holes.

Given the singular indefinite predicate *a lion* in the restrictor of the conditional, *x* can only be an atomic individual, but surely not a plural sum. Therefore, there is a clash between the atomic nature of *x* in the restictor, and the fact that the collective predicate in the matrix clause requires *x* to range over plural individuals, i.e. over sums and not atoms. Hence the anomaly of (71).

A similar argument can be formed for the sentences in (70). First of all, notice that if the former example were correct, then its truth conditions should be roughly equivalent to the following conditional statement:

(73) If John went-IMP to the beach with Mary, John went-IMP to the beach with Mary twice.

or equivalently:

(74) Everything that was an event of John's going to the beach with Mary, was an event of going to the beach with Mary twice.

Besides their self-evident oddness, these restatements show that the restrictor of 'Gn$^+$' contains an indefinite singular description of an atomic event, which is disclosed and bound by 'Gn$^+$'. Thus, the sentence is actually 'about' a singular, atomic event. However, the matrix clause does not ascribe any property to this event. The logical representation corresponding to

(73) would then be something like this (for simplicity we henceforth omit tense information in the representation of the aspectual operators):

(75) Gn+ (↑C(i) ∧ ↑**went**(e) ∧ ↑**theme**(John,e) ∧ ↑**to**(beach,e) ∧ ↑**with**(Mary,e) ∧ ↑e⊆i) (∃e' [↑e'=σe''[↑**went**(e'') ∧ ↑**theme**(John,e'') ∧ ↑**to**(beach,e'') ∧ ↑**with**(Mary,e'')] ∧ ↑**two**(σe''[↑**went**(e'') ∧ ↑**theme**(John,e'') ∧ ↑**to**(beach,e'') ∧ ↑**with**(Mary,e'')])])

The logical form in (75) is ill-formed because, although the generic quantifier ranges over an atomic event, the matrix clause does not predicate anything of it, but rather introduces a sum of events that are completely unrelated to the one in the restrictor. Thus, the oddness of the paraphrases in (73) and (74) also corresponds to the anomaly of the logical form in (75). To sum up, the anomaly of the sentences in (70) is similar to the impossibility of singular indefinite DPs to be generically interpreted in sentences with collective predicates. The reason of this similarity is that the event description that appears in the restrictor of 'Gn+' in habitual sentences is a singular predicate over event units, while iterative adverbs in the matrix clause behave like collective predicates, i.e. range over sums of events.

How come then that (4) (now (76)) is correct depite its habitual aspect?

(76) Il mio postino suona due volte.
My postman rings twice

Notice that *ring* belongs to the class of repetitive verbs, such as *knock* or *shoot*. They are intrinsically collective, i.e. each event of ringing is constituted by a sum of phases. The repetitive reading of (76) can then be paraphrased as in (77a) and formalized as in (77b):

(77) a. If my postman rings (at my door), he rings twice.
b. Gn+ (↑C(i) ∧ ↑**ring**(e) ∧ ↑**agent**(postman,e) ∧ ↑e»σe'↑**P**(e') ∧ ↑e⊆i) (↑**two**(σe'↑**P**(e')))

The e-argument bound by 'Gn+'ranges over event units, since we are dealing with a singular description of an event atom. The point is that, as a repetitive verb, each atom is also formed by other subparts of a certain type. It is the cardinality of this sum which is expressed by the cardinal adjective in (77). This analysis predicts that with verbs like *ring* iterative adverbs in sentences like (76) can only have the repetitive interpretation. This prediction is actually borne out, as is shown by the comparison of (76) with the corresponding perfective sentence:

(78) a. Il mio postino suona due volte.
My postman rings twice
b. Oggi, il mio postino ha suonato due volte.
Today, my postman has rung twice.

The former sentence is not ambiguous and it can only mean that every time my postman rings at the door, he generally makes two rings. On the contrary, the latter sentence can either mean that there have been two occasions during the present day in which my postman has rung at the door (repeated interpretation), or that there has just been one event composed of two rings (repetitive interpretation).

We pass now to analyze other cases of imperfective habituals containing iterative adverbs, i.e. sentences like (6a), here reported as (79):

(79) In quel periodo, la domenica, Gianni telefonava tre volte.
In that period, on Sundays, John called-IMP three times

We can plausibly assume that the adverb *la domenica* 'on Sundays' denotes a kind, whose atoms are intervals, and that the generic operator binds instances of this kind.[28] The habitual sentence in (79) roughly states that for every contextually fixed interval *i* of size C, every Sunday in *i* was such that, in most normal cases, John called me three times. Formally, we get

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[28] Like in Chierchia (1992b), the disclosure type-shifting operation $!_y$XP can easily be extended to kind-denoting DPs too.

something like this:

(80) Gn+ (↑C(i') ∧ ↑i≤Sunday ∧ ↑i⊆*i') (∃e [↑e=σe'[↑**call**(e') ∧ ↑**agent**(John,e')] ∧ ↑**three**(σe'[↑**call**(e') ∧ ↑**agent**(John,e')]) ∧ ↑e⊆i])

The generic operator binds here the interval variable and the event predication is wholly contained in the matrix. Therefore, differently from the case of (76), the logical form is structurally correct. Moreover, notice that in this case the iterative adverb has a repeated interpretation, although the sentence is habitual.[29]

Similarly, we can explain the fact that both the perfective and the imperfective sentences in (81) are correct:

(81) a. Ogni domenica, Gianni mi veniva a trovare tre volte.
Every Sunday, John came-IMP and visited me three times

b. Ogni domenica, Gianni mi è venuto a trovare tre volte.
Every Sunday, John has come and visited me three times

These sentences will get the following logical representations:

(82) a. Gn+ (↑C(i)) (Every+ [λi' [↑**Sunday**(i') ∧ ↑i'⊆*i]] [λi' ∃e [↑e=σe'[↑**visit**(e') ∧ ↑**agent**(John,e') ∧ ↑**theme**(me,e')] ∧ ↑**three**(σe'[↑**visit**(e') ∧ ↑**agent**(John,e') ∧ ↑**theme**(me,e')]) ∧ ↑e⊆i']])

b. Perf [i] (↑C(i) ∧ Every+ [λi' [↑**Sunday**(i') ∧ ↑i'⊆*i]] [λi' ∃e [↑e=σe'[↑**visit**(e') ∧ ↑**agent**(John,e') ∧ ↑**theme**(me,e')] ∧ ↑**three**(σe'[↑**visit**(e') ∧ ↑**agent**(John,e') ∧ ↑**theme**(me,e')]) ∧ ↑e⊆i']])

In either case, the quantifier *ogni* 'every' is the same, the difference lying in the presence of 'Perf' or of 'Gn+'. In the perfective one, the sentence is true iff there has been a time interval of a certain size such that every Sunday occurring within its boundaries John called me three times. Therefore, if on one Sunday John actually called me just twice, the sentence turns out to be false. On the other hand, (82a) is true iff for every possible interval *i* of a given size, in most normal cases, every Sunday in *i* John called me three times. Thus, if it has happened that John actually called me twice on one Sunday, this fact does not make the sentence false, because the actual world may not belong to the most normal ones. Therefore, the representation we have given to those sentences explain the normal intuition that, although both sentences contain the same universal quantifier, the imperfective but not the perfective one allows for exceptions.

A similar case is represented by (5a) (now (83):

(83) Un film interessante, Gianni lo vedeva due volte.
An interesting movie, John watched-IMP it twice

In this case, the restriction of the generic operator is filled by the left-dislocated DP, which is topic-marked. Therefore the event and the iterative adverb both appear in the nuclear scope of the 'Gn+', like in (80) and (82a).

Finally, it is possible to explain why imperfective habitual sentences are always compatible with frequency adverbs expressing cyclic iteration, as shown by the following sentences:

(84) a. Gianni mi telefonava tre volte alla settimana.
John called-IMP me three times a week

b. Gianni andava al cinema due volte al mese.
John went-IMP to the cinema twice a month

We can assume that the cyclic interpretation depends on the fact that these adverbs contain a universal quantification over time intervals of the specified type. Therefore their semantic representation resembles that of (81a), i.e. (82a), and the grammaticality of (84) is due to the

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[29] If a temporal adverbial is adjoined to (76), this sentence may also get a repeated interpretation:

(i) La domenica, il mio postino suona due volte.
On Sundays, my postman rings twice

same reasons. However, sentences containing frequency adverbs like (84) differ in an important respect from sentences with a universal quantifier over time intervals overtly adjoined at AgrSP:

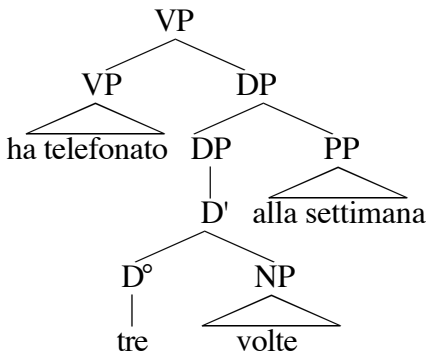
(85) a. Uno studente ha telefonato tre volte alla settimana.
A student has called three times a week
b. Ogni settimana, uno studente ha telefonato.
Every week, a student has called

The difference concerns the scope domain of the quantifier over time intervals: in fact, while (85b) can mean that each week a different student called me, according to our intuitions, this reading is impossible with (85a), which can only mean that the same student has called me three times a week. In other words, the universal quantifier which is contained in the frequency adverb cannot have scope over of the subject DP. Therefore, (85a) will only have the following representation:

(86) Perf [i] (↑C(i) ∧ ∃x [↑**student**(x) ∧ Every+ [λi' [↑**week**(i') ∧ ↑i'⊆*i]] [λi' ∃e [↑e=σe'[↑**call**(e') ∧ ↑**agent**(x,e')] ∧ ↑**three**(σe'[↑**call**(e') ∧ ↑**agent**(x,e')]) ∧ ↑e⊆i']]])

A possible explanation of this scope restriction can be derived if we assume the following relevant representation before Spell-Out:

(87)



Given the adjoined position of the PP *alla settimana*, the fact that it can not have wide scope over the subject can be traced back to the well-known impossibility in Romance of extracting out of a DP a PP that is not its 'subject'. Consequently, QR will adjoin the PP at most at the DP. Thus, given the definition of scope in May (1985), the quantifier will have wide scope over the VP, but not over the subject DP.

5. **Conclusions**

As a general conclusion, we can say that language represents series of events in two different modes: as normative habits or simply as accidental pluralities of occurrences. In both cases, quantificational adverbs can specify some properties of these series of events, like for instance their frequency or the proportion between sets of events. However, quantificational adverbs never turn an episodic sentence into a characterizing one. Rather, habituality is a typically aspectual phenomenon, even if it can be represented at a certain level in terms of some sort of intensional quantification. In other words, there are two independent, yet interacting, levels: the level of quantificational adverbs; and the aspectual one, with its two basic values of perfectivity and imperfectivity, the latter including habituality too. Perfective sentences can represent series of events or the frequency of events, but always remaining the vehicles of episodic propositions. Therefore, it is necessary to distinguish the mere expression of quantification over events, which is mainly realized by specific lexical items, from the expression of truly normative and intensional generalizations, this function being carried out only by the habitual imperfective aspect.

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