

Punctual Verbs and the Linguistic Ontology of Events

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1 Introduction

The motivation for this research¹ stems from the need of bringing to surface an unrecognized (yet occasionally alluded to in the literature) distinction within the class of non-durative verbs. Although some authors have, more or less incidentally, referred to a finer classification within this category, nobody to our knowledge has directly addressed the issue.

In the present paper we analyse data from Italian, compellingly suggesting that some non-durative verbs show systematic divergences w.r.t. the typical behavior of achievements. These differences may be accounted for by assuming that a subclass of non-durative verbs, that we call punctuals, are non-telic, in the sense that they do not involve a resulting state as part of their semantic endowment. In addition, punctual verbs do not involve a preparatory phase, pragmatically attached to the actual completion of the event. Thus, with the progressive, the event can be viewed only in its actual occurring, rather than (as a possible alternative available to achievements) in the prelude leading up to the event, whose completion brings about the resulting state. Interestingly, we shall also show that the class of punctual verbs may be further articulated. Namely, we shall partition it into two main types, here called event-punctuals (= e-punctuals) and state-punctuals (= s-punctuals). As these terms indicate, e-punctuals share features with eventive predicates, while s-punctuals share features with stative predicates.

The reason why punctuals have not received so far the attention they deserve is obviously due to the relatively small number of verbs belonging to this class. Nevertheless, the discussion will prove that several interesting properties can be detected, whose inclusion into the analytic framework brings about a more comprehensive picture, both from a descriptive and from a theoretical point of view (i.e. within a full-fledged ontology of events). It will turn out, in fact, that the two types of punctual verbs represent the missing rings in the general theory of actionality, filling a notable gap in the system. Thus, their recognition is not only descriptively relevant, but also theoretically desirable.

Although the discussion focuses on Italian, our conclusions may easily be extended to other languages as well. Indeed, the hints towards a finer classification of non-durative verbs that are dispersed in the literature concern several other languages, such as English, German and Mandarin (at the very least). We believe that, minor details aside, the picture delineated here should basically apply to most, perhaps all, natural languages.

The structure of this paper is as follows. In 2 we analyse the available evidence, suggesting that punctuals differ from achievements in a number of salient properties. In 3 we present our formal approach to the ontology of events. In 4 we apply our model to account for all relevant contexts, such as the use of the progressive (4.1), or the compatibility with specific temporal adverbials (4.2).

2 The Data

In this section we present evidence that the class of non-durative verbs should be split into two main categories: achievements and punctuals. In addition, we will show that the latter category further divides in two subcategories: e-punctuals and s-punctuals. For the sake of simplicity, in the whole of this section we focus on a comparison between achievements on the one side and the two types of punctuals on the other side, disregarding the remaining classes of predicates. A comprehensive picture of the main categories, based

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on a cross-classification by semantic features, is shown by the following prospect for ease of the reader:

	durative	telic	stative
states	+	-	+
processes	+	-	-
accomplishments	+	+	-
achievements	-	+	-
punctuals	-	-	-

As may be seen, the feature [+/- telic] opposes punctuals not only to achievements, but also to accomplishments. However, achievements and punctuals together are contraposed to the remaining categories by the feature [+/- durative]. Thus, it will be enough for our immediate purposes to show that punctuals and achievements differ on some relevant properties. Nevertheless, in section 3, when presenting our formal proposal for the treatment of actional categories, we shall provide the basic semantics for all the main classes listed above.

The proposal that we are putting forth here is not new in itself. It has been creeping in the literature for quite a while, although it never gained general attention, let alone consensus. Obviously, this is a minor distinction, within the general problem of actionality, for it concerns a relatively small number of predicates. It is thus no wonder that even the authors who allow for it, do not always mention it in all of their writings. Despite this, we would like to claim that the full acknowledgement of this particular class has far-reaching theoretical consequences. As a first step, we shall review a selection of works containing explicit indication of the existence of punctual verbs (whatever is the name they are called with in each case). This may be regarded as the background of our analysis, for it proves that the problem we are dealing with here has been (at least implicitly) faced by a number of scholars in this field.

Vlach (1981) observes that:

There is a class of achievement sentences that do not report the completion of any accomplishment and such that there is no process that characteristically leads to their truth. Presumably for this reason, progressives of sentences in this class are unusual. *I am astonishing Max* is distinctly odd, although *I am doing something that will astonish Max* is acceptable. Some other mental verbs, like *realize*, belong with *astonish*, as do some verbs that designate instantaneous physical events, like *explode* and perhaps *hit*.
(p. 290)

Edgren (1985, 68-69) notes that while typical achievements with the progressive often express an imminent meaning, a related class of non-durative verbs, that she calls “strictly punctual verbs”, denote the actual occurrence of the event or its iteration. As examples of this, she proposes *reach*, *stab*, *hit*, *yell*. Essentially the same position is expressed by Smith (1991, 65-67), who proposes examples such as *cough* or *flap* (*one’s wings*). In her terminology, punctuals are called “semelfactives”. This view (and terminology) is also adopted by Yeh (1991, 263-264), who explicitly quotes the previous work. This author claims that semelfactives, such as *knock*, differ from achievements inasmuch as they “have no associated process and result state”. Just as in English, in Mandarin these verbs may take a purely iterative (as opposed to imminent) meaning, when the progressive marker *zhe* is employed.

Very much in the same vein, Kearns (1991, 22) writes:

I add here a fifth [scil., w.r.t. the four Vendlerian categories] class of predicates describing events which may be momentary and apparently bounded, but are not classed as telic by the usual tests; these are the activity predicates such as *touch*, *cough*, *sneeze*, *kick*, *punch*, *hit*, *slap*, etc. on their semelfactive reading.

Later on (p. 276-277), this author repeats the argument that punctual verbs, as opposed to achievements, have no *prelude*, so that when the progressive is applied to them, they cannot develop an imminent meaning, and it is hard to use the progressive in general.

Vater (1989) presents a classification of actional categories in which punctual verbs, or “Semelfaktive” in his terms, occupy a specific place. As examples he indicates *husten* (‘cough’) and *aufschrecken* (‘jerk’). These are contraposed to “Vorkommnisse” (i.e. achievements) by the feature [-RES], “resultativ” (that we may interpret as *telic*). Similarly, Jackendoff (1991, 40) isolates the class of “point-events”, which includes *flash* and *click*,

characterized by their boundedness and by their lack of dimensionality (which translates as lack of duration in the time domain).

On the computational side, the presence of punctual verbs has been explicitly recognized by Moens and Steedmann (1988):

The point may perhaps best be made by noting that there is another class of punctual expressions that is *not* normally associated with a consequent state.

For example,

6. John hiccupped

is not usually viewed as leading to any relevant change. It typifies what we call a point expression. A point is an event (not necessarily an instantaneous one) that is viewed as an indivisible whole and whose consequences are not at issue in the discourse - which of course does not mean that *de facto* consequences do not exist.

(p. 16)

As we will see in 3.3, we share with Moens and Steedmann this view of punctuals, even though the formal machinery we assume differs radically from theirs.

Finally, Bertinetto (1986) opposes punctuals (“puntuali”) to achievements (“trasformativi”), on the ground of a number of parameters, such as their behaviour with specific tenses (namely, the Compound Future and the Pluperfect II), or with a selected series of temporal adverbials (*in*-adverbials, *for*-adverbials, etc.). We shall examine this kind of evidence in 4.2, explicitly elaborating on the issues that are only left implicit in the work cited, and correcting minor details in the analysis.

As a general remark on the brief survey reported here, we would like to observe that the hints to the existence of punctuals, that we may find dispersed in the literature, have so far been fairly incidental in nature. No one, to our knowledge, has taken up the task of working out a full-fledged analysis of this actional category. We believe this to be a disconcerting fact, given the implicit (even though marginal) recognition that punctuals have received in a number of cases. Thus, the enterprise attempted here is not only worthwhile (as we hope to show) in the light of the general theory of events, but first of all highly desirable as a test of a theoretical hypothesis that has often been advanced without proper demonstration.

Before turning to the core of our topic, it is useful to clarify our position with respect to the issue of aspect and its relation to actionality (or Aktionsart). Although some authors do not make a sharp distinction between these two domains, we believe there are strong reasons to keep them separate (Bertinetto and Delfitto, in press). By aspect we refer to notions such as perfect vs. imperfective and their subspecifications (progressive, perfective, and the like). By actionality we refer instead to classes of predicates in the Vendlerian style. This paper is chiefly devoted to actionality, but the discussion of our examples necessarily involves aspectual phenomena. For instance, we shall discuss the interaction of the various actional categories with the progressive (cf sections 2.1 and 4.1); and we shall also see that the actional categories, when combined with the perfect, interact in a significant way with a specific class of temporal adverbs (*da*-adverbs, cf. 2.3). As will soon become clear, the different actional categories react differently to the various aspectual values, and this is in itself good evidence that aspect and actionality are both independently relevant, and must be kept apart from one another. However, whenever aspect is not a relevant factor in the analysis, we shall shape our examples in the most neutral form, using the perfective past, which may be regarded as the least compromising value in the aspectual domain.

2.1 Progressive

In the literature concerning the *progressive* aspect the inability of English non-durative verbs to appear with the progressive has sometimes been stressed. For instance Piñon (1995) claims that a sentence such as

(1) ? Basia was noticing Piotr when I noticed her

is acceptable only under an iterative interpretation, thus, basically unacceptable as a genuine progressive.

Other authors, for instance Parsons (1990, 34-37) dispute the validity of the progressive test in order to distinguish accomplishments from achievements, providing as evidence a

sentence such as (2), which is just as acceptable as a standard accomplishment with the progressive:

- (2) Grandpa is dying

In these cases the explanation which is most commonly assumed is that the *progressive* is able to shift the meaning of the verb in such a way that it denotes an extended event with a *preparatory* phase, the one for which the progressive holds (*extended progressive reading*). Hence the imminential meaning usually attached to these sentences.

By contrast, authors such as Kearns (1991) accept the progressive with non-durative verbs without any meaning shift, explaining the resistance of many speakers to accept it as a function of the difficulty to fix the precise time of occurrence of a momentaneous event. For instance a sentence such as

- (3) He's touching the desk

could be accepted only in a very particular *scenario*, such as the slow motion playing of a videotape thriller, where the action is temporally expanded so as to allow the determination of the *exact* instant of touching the desk (*momentaneous progressive reading*).

In our view, these differences of judgement and interpretation can be traced back to the failure to recognize a finer grained distinction within momentaneous events. On this respect, the behaviour of Italian verbs is likely to shed some light on English. First, every Italian verb which is a genuine achievement can appear in the progressive:

- (4) a. Gianni sta uscendo.
Gianni is going out
'Gianni is going out.'
- b. Il mio cane sta morendo.
The my dog is dying
'My dog is dying.'

Second, given an appropriate context, these verbs are always ambiguous between an *extended progressive reading* and a *momentaneous progressive reading*. Thus, for instance, (4a) could be uttered either while Gianni is tying his shoe laces just before going out, or right when he is passing through the exit door.

The behaviour of a related class of verbs, that we shall call punctual verbs, is, however, more restricted. First, a subclass of punctuals, namely 'e-punctuals' (= eventive punctuals), are possible only under a *momentaneous progressive reading*. Thus a sentence such as

- (5) Leo sta facendo un salto.
Leo is doing a jump
'Leo is performing a jump.'

can be uttered only when Leo is actually jumping², not while he is preparing for the jump. In this sense, we agree with Kearns' intuition that the context has to be such, that the time of occurrence of the event can be determined *exactly*, otherwise the use of the progressive sounds weird. For instance the oddness of a sentence such as

- (6) ?? Il proiettile lo sta colpendo.
The bullet him-Clitic is hitting
'The bullet is hitting him'

²When used to describe sport event (such as high jump or long jump) *saltare* can be characterized as a telic verb, as there is a clear preparation phase, as well as a resulting state (the athlete being detached from the ground). Here we are interested in this verb in its standard meaning.

could be explained by virtue of the fact that very few natural contexts can be found, where the moment when the bullet reaches the targetted body can be determined. Indeed there are severe pragmatic restrictions on the use of the progressive with this class of verbs.

Second, many e-punctuals have, as we will see, a second reading as processes. If this is the case, whenever the progressive is used, the latter reading is favoured, for obvious reasons. For instance, since the verb *bussare* ('knock') is ambiguous between *knocking at the door once* and *knocking at the door repeatedly*, a sentence such as (7) is more readily interpreted under a repetitive reading, which is ultimately to be understood as a process:

- (7) Leo sta bussando.
 Leo is knocking
 'Leo is knocking'

This explains Pinõn's observation, among others, that achievements are interpreted as iterations in progressive contexts. In fact, this is true of a subclass of punctuals, rather than of achievements in general.

Third, another subclass of punctuals, that we propose to call 's-punctuals' (=stative punctuals), are never grammatical with the progressive, irrespective of the context. Thus sentences such as

- (8) a. * Quando Leo entró, Lia si stava stupendo.
 When Leo entered, Lia SI-Clit was amazing
 'When Leo came in, Lia was getting amazed.'
 b. * Quando Leo entró, Lia si stava spaventando.
 When Leo entered, Lia SI-Clit was scaring
 'When Leo came in, Lia was getting scared'

are rejected by any Italian speaker. The use of this kind of verbs (such as *noticing* in (1)) as prototypical achievements might thus have been at the origin of the traditional claim that achievements are not compatible with the progressive. In fact, only this particular subclass of momentaneous events (s-punctuals) is radically incompatible with the progressive.

2.2 *in/for* Adverbials

Traditionally, *in-* and *for-*adverbials are considered a basic test to distinguish between telic and atelic events. Their behaviour w.r.t. the traditional Vendlerian classes could be summarized as follows:

- *In-*adverbials are compatible with:
 - Accomplishments: the adverbials measure the length of the process preparing the final state:

(9) Ha mangiato la torta in dieci minuti.
 Has eaten the cake in ten minutes
 'He has eaten the cake in ten minutes'
 - Achievements: the adverbials measure the length of some contextually determined process whose completion brings about the resulting state:

(10) Il colonnello lasciò la caserma in due ore.
 The coronel left the barracks in two hours
 'The coronel left the barracks in two hours.'
- *For-*adverbials are compatible with:
 - States:

(11) Leo ha abitato a Pisa per tre anni
 Leo has lived in Pisa for three years
 'Leo lived in Pisa for three years.'

- Process:
 - (12) Leo ha camminato per dieci minuti
Leo has walked for ten minutes
'Leo walked for ten minutes.'
- Accomplishments: the adverbials measure the length of an unfinished event, giving rise to an instance of the *Perfective Paradox* (Singh, 1992):
 - (13) Leo ha mangiato la torta per dieci minuti
Leo has eaten the cake for ten minutes
'Leo ate the cake for ten minutes.'
- Achievement and accomplishments: under certain conditions, the adverbials measure the length of the resulting state:
 - (14) a. Leo è uscito per dieci minuti.
Leo is gone out for ten minutes
'Leo went out for ten minutes.'
 - b. Leo è corso a casa per dieci minuti.
Leo is run at home for ten minutes
'Leo ran home for ten minutes.'

The reference of *for*- and *in*-adverbials to concepts such as *resulting state* and *preparatory phase* makes them good candidates to distinguish among different classes of momentaneous events (namely, achievements vs. punctuals). In particular, we should expect *for*-adverbials to be usable to appear with punctuals, which have no resulting state to be measured. Analogously, *in*-adverbials should also be ungrammatical, since the notion of *preparatory process* is always interpreted as *preparatory process leading up to the completion of the actual event, thus to the resulting state*. Indeed, the incompatibility of *in*- and *per*-adverbials with punctuals is confirmed by the Italian data³:

- (15) a. * Leo ha battuto un colpo sul tavolo in/per cinque secondi. /≠e-punct/
Leo has tapped on the table in/for five seconds
'Leo tapped on the table in/for five second.'
- b. * Leo si è stupito in/per venti secondi. /≠s-punct/
Leo SI-Clit is amazed in/for twenty seconds
'Leo became amazed in/for twenty seconds.'

³It goes without saying that whenever punctual verbs have an homophone with a process reading, as in (i), the sentence is grammatical with *for*-adverbials (cf. 4.3):

- (i) Leo ha bussato per dieci minuti.
Leo has knocked for ten minutes
'Leo knocked for ten minutes.'

Moreover *for*-adverbials can be used with punctuals whenever an iterative reading can be forced. For instance a sentence such as (15b) could be accepted by certain speakers with the meaning *kept on becoming amazed* or *became more and more amazed*. These readings are obviously not excluded by our treatment. What our treatment would exclude is a reading of (15b) where something made Leo amazed and Leo remained amazed for ten minutes, without any source of amazement active during this ten minutes.

As for *in*-adverbials, it must be said that the judgments are made fuzzier by the fact that, in Italian, *in*-adverbials are sometimes used with the meaning of pure time location adverbials. Thus, a sentence such as (ii) is grammatical if it is interpreted with the meaning of *after five minutes (from now) you will notice it* (cf. 4.2.1):

- (ii) In cinque minuti te ne accorgerai
In five minutes you-Clit of-it-Clit will realize
'In five minutes you will realize it.'

However, this is not the reading that emerges with telic predicates (accomplishments and achievements).

2.3 *Da*-adverbials

In Italian, *da*-adverbials, when combined with perfect tenses, are sometimes considered telicity indicators, in the sense that they can naturally be used to measure the temporal distance separating a *bounded* event from the reference point:

- (16) a. Leo ha preso un'aspirina da mezz'ora /=*achiev*/
Leo has taken an aspirine since half an hour
'Leo took an aspirine half an hour ago.'
- b. * Leo ha camminato da mezz'ora. /=*process*/
Leo has walked since half an hour
'Leo walked since half an hour.'

However, this is not the whole story. Surprisingly, the grammaticality of (16a) decreases once a bigger distance interval is taken into account:

- (17) ?? Leo ha preso un'aspirina da una settimana.
Leo has taken an aspirine since one week
'Leo took an aspirine two week ago.'

In fact, their meaning is more specific than that: they are used to measure the length of a state which persists at the reference time. For instance, a sentence such as (18) can roughly be paraphrased as: Leo went out and his state of absence, which still holds now, has been lasting for ten minutes:

- (18) Leo è uscito da dieci minuti.
Leo is gone out since ten minutes
'Leo went out ten minutes ago.'

Now, if we were to assume a semantics of *da*-adverbials based on the fact that they can only measure the length of the resulting state, we should expect them to be ungrammatical with punctual verbs, for which no resulting state is lexically specified. In general, this is the case, as sentences such as

- (19) ?? Leo ha starnutito da dieci minuti
Leo has sneezed since ten minutes
'Leo sneezed ten minutes ago.'

are hardly acceptable in Italian. However, there are exceptions, as attested by examples such as (20), which are perfectly acceptable:

- (20) La prima bomba atomica è esplosa da soli cinquant'anni

As we will see (cf section 4.2.2), our explanation relies on the assumption that *da*-adverbials measure a *consequent state* (in a sense to be defined) triggered by certain events. Since the resulting state of achievements and accomplishments incorporates, as a weaker notion, the property of being a consequent state, we correctly predict that achievements and accomplishments are easily compatible with *da*-adverbials, provided the relevant pragmatic conditions are fulfilled (see 16b). By contrast, the consequent state of punctual events is only made available by the context. If the context is not 'strong' enough to make such a consequent state available, the resulting sentence will be ill-formed, as shown by contrast of (19) and (20). As to the contrast *resulting* vs. *consequent state*, cf footnote 12.

3 The Formal Approach

In this paper we assume a kind of event semantics in which events can be arbitrarily composed in order to form complex events. The approach is thus mereological in nature (Hinrichs, 1985, Bach, 1986, Link, 1987, Krifka, 1989, among others). Actional distinctions are encoded as *the way in which atomic events are composed*. We will see that by imposing some minimal constraints on this operation of composition we will obtain necessary and sufficient conditions to identify both the traditional Vendlerian classes and the two classes of punctual events that we have described in the preceding sections.

3.1 Kinds of Events in the World

In this section we will try to determine which is the minimal ontology we need in order to build a semantics for events which is fine-grained enough to capture all the relevant actional distinctions. We will see that all we need is a sortal distinction between *atomic changes* and *atomic states*.

Atomic changes are those situations⁴ at which a certain predicate is true, without being true at smaller situations. Take for instance a situation of hammering. It is possible to isolate sequences which can be defined as *hammerings*. However, a situation of hammering will also contain situations which cannot be defined as *hammering*. For instance the action s' of raising the hammer, while being part of a situation of hammering, cannot be properly defined a *hammering*. We consider an *atomic change* a situation such that there is at least a predicate which is true of that situation, without being true of its parts. Let's call D (from dynamisms) the set of all atomic changes in a given model⁵.

On the other hand, there are predicates which denote situations which can be infinitely divided. These predicates are the so called *stative* predicates. Take for instance the situation of me sitting on a chair: this situation is holds at a certain interval: you can pick up any subinterval i' of this interval and you can be sure that there is a situation s' which holds at i' such that s' is again a situation of me sitting on a chair. Thus the only division in parts which can be achieved with states is one which strictly depends on the temporal structure: the structure of states is completely parasitic on the structure of time. Or, to put it in a different perspective, whereas atomic changes hold at intervals (non singleton, non empty sets of points of time), atomic states are hold at instants (singleton sets of points of time). We call Q (from *qualities*) the set of situations which hold at instants.

To see the difference between D and Q , consider that processes will be defined as sums of atomic changes and states as sums of atomic states. Now consider the difference between a process of *hammering* holding at an interval i and a state of *me sitting on a chair* holding at the same interval. Let's evaluate what is happening at the point of time t_1 , where both my hammering and my sitting on a chair have already begun. Looking at the process you can *count*, in a certain sense, the single hammering sequences (for instance the atomic changes which correspond to the sequence of raising the hammer and letting it fall down) which already happened at t_1 , and say, for instance, 'I have already hammered 30 times'. In other words you can describe what is happening in the world without appealing to the notion of time, just looking at *the changes that occurred in the world*, and counting them. On the other hand, when considering a state, you have no means of referring to what is happening in t_1 (with respect to the initial instant t_0), without referring to time: you can say 'I have been sitting here for a couple of hours' but not 'I already sat 150 times'. Identifying atoms of states without the notion of time is an impossible enterprise, while it is possible to identify atomic changes without resorting to the temporal structure.

Atomic changes and atomic states (let's call them *atomic situations*) are organized in such a way as to form complex situations: we can join two or more atomic situations and obtain a new situation. For instance, joining a set of atomic changes which are changes of *running*, we are likely to obtain a bigger (non atomic) situation which is again a *running*. Furthermore, joining this non atomic situation with the state denoted by *being at home*, we are likely to obtain a situation which is in the denotation of the predicate *running*

⁴In the following we will indifferently use the terms *event* or *situation* to refer to individuals which can appear in the denotation of verbal predicates, irrespective of their actional class. Also the variables e and s will be used interchangeably, even though we tendentially employ e for complex events and s for their parts

⁵There could be some problem of philosophical nature, here, namely the fact that events which are in a part-of relation could be included in this set. Take the process of hammering. Since we want to construct such a process as the sum of *hammering* events, these events have to be included in D . If however there were a verb denoting a process composed only of sequences of atomic events of raising the hammer, we should have in D both the atomic hammering and what intuitively counts as a part of a hammering, i.e. the event of raising the hammer. Apparently, a case like that could exist: consider for instance the process of walking, whose atomic parts are, say, events of *stepping*. Now, every step could be considered as a sequence of atomic events which are of type *moving*, in turn generating, under summation, a process which is in the denotation of the verb *move*. If this is so, we cannot capture the fact that small movements are parts of a stepping event, in the same way in which steps are parts of a walking event. This could be a problem if we were to provide a realistic description of the world and what is intuitively understood as "part-of relation". However, in our intention, the present ontology is part of a *metaphysics of language* (in the sense of Bach (1987), cf. also), rather than a realistic description of the world. In this sense, the fact that there is a part-of relation between an event of stepping and an event of moving, is completely irrelevant from the point of view of language.

*home*⁶. Thus all the situations in a world are, in one way or another, built up from the composition of subsets of $D \cup Q$. Let's call this "composition" *join* (\vee)⁷. We want to guarantee that there is a situation corresponding to the join of any subset of $E = D \cup Q$, irrespective of the fact that such a situation can be naturally referred to by an expression of English (or Italian)⁸. This can be done by assuming that any admissible domain for event semantics contains members of the free *i*-join-semilattice $\langle E', \vee, \sqsubseteq_s \rangle$ minimally generated by $D \cup Q$ ⁹. Thus we can assume the following constraint (where τ is a function associating to every event its *run time* interval; it will be referred to as *temporal trace*):

(21) **Domain of events for any admissible model:**

- E the set of atomic situations.
- D , the set of atomic changes, defined in the following way¹⁰:
 $\forall s[s \in D \leftrightarrow \neg inst(\tau(s)) \wedge s \in E]$
- Q , the set of atomic of states, defined in the following way:
 $\forall s[s \in Q \leftrightarrow inst(\tau(s)) \wedge s \in E]$
- $\langle E', \vee, \sqsubseteq_s \rangle$, the free *i*-join-semilattice minimally generated by E .

where E' is the minimal set containing E and closed under \vee , and \sqsubseteq_s is a relation between situations ('being a part of') which can be defined on the basis of \vee , the operation of join.

To put it in more colloquial terms: we can describe the world in terms of atomic situations, without any need to list the individual complex situations. Complex situations just *exist* by virtue of the fact that for any arbitrary set of atomic situations there is a situation which is the join of those situations. Take for instance our situation of running and assume a model containing a set D composed of three atomic changes ($\{d_1, d_2, d_3\}$), each of which is of type *running* (i.e. it is in the denotation of the predicate *run*), and a set Q composed of one atomic state ($\{q_1\}$), which is of type *being at home* (i.e. is in the denotation of the predicate *being at home*). In such a model, E will be the set $\{d_1, d_2, d_3, q_1\}$, whereas E' will be formed by all the bulleted elements of the diagram in fig. 1. In such a structured domain we pick up the denotation for verbal predicates: for instance the complex events labelled s_1 , s_2 and s_3 are in the denotation of *John ran*, whereas the event s_4 is in the denotation of *John ran home*.

We have still to clarify which is the relation between $\langle E', \vee, \sqsubseteq_s \rangle$, the lattice of events, and the lattice $\langle I, \sqcup, \sqsubseteq_t \rangle$, which we assume to be our temporal structure (cf. van Benthem, 1983, Landman 1991, Kamp, 1979). The point is that we introduced an operation of join between situations as well as a function τ mapping every situation onto an interval, but we did not explicitly state the relationship between the temporal trace of

⁶This obviously happens only when considering perfective forms. When operators which suspend the telicity of the verbal form are introduced (such as the progressive, cf. 4.1) also the join operation is suspended.

⁷Even though it is tempting to consider this join operation as the semantic reflex of syntactic coordination, we will remain skeptical here on the question whether the conjunction *and* appearing in coordinate structures has to be translated as an operator of join.

⁸Piñon (1995, 75-78) has an interesting digression concerning the existence of arbitrary sums (for instance the sum of *my cooking of an egg* and *Brutus' stabbing of Caesar*). Even though we do not completely agree on his conclusions, we purchase here the assertion according to which the existence of arbitrary sums is harmless and incurs no ontological expense.

⁹There is no space here to properly introduce lattices and the way they are generated from unstructured sets. Basically, a lattice is a partially ordered set which is closed under join and meet. Free *i*-join-semilattices are more constrained structures where

- only the join of members of the lattice is defined (there is no bottom element)
- for any subset of elements of the lattice there is an element in the lattice which is the sum of that subset and only of that subset (*Distinctness*)

The atoms of a free *i*-join-semilattice are called *minimal generators*. See Landman (1991) for a clear and concise exposition of the theory of lattices, with special applications to the semantics of natural languages.

¹⁰Since we assume a period structure based on a partial order of points of time, the definition of the predicat *inst* will be:

$$\forall i[inst(i) \leftrightarrow |i| = 1]$$

See Landman (1991) for a full fledged definition.

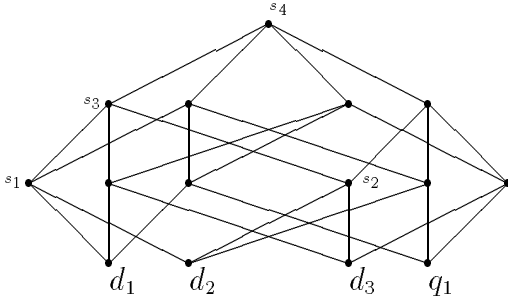


Figure 1:

a whole situation and the temporal traces of its parts. As a consequence, in our system it would be perfectly possible to have, for instance, a situation lasting five seconds whose parts last more than five seconds each. To remedy this undesirable consequence we have to impose a stricter relationship between events and intervals. In particular:

(22) τ is a homomorphism from E' into I .

Given the properties of homomorphisms, the following fact is true (s and s' are variable over situations, i.e. $s, s' \in E'$):

(23) $\forall s \forall s' [\tau(\vee\{s, s'\}) = \sqcup\{\tau(s), \tau(s')\}]$

Under this condition, the temporal trace of a non atomic situation is equivalent to the temporal sum of the traces of the situations which are parts of it (for instance, its atoms), which is exactly the kind of relationship which corresponds to our intuitions about events and intervals.

3.2 Mereologies of Events and the Traditional Vendlerian Classes

3.2.1 States

We define a state as the join of a non singleton contiguous set of atomic states, i.e. of situations which are hold at instants (we omit the definition of temporal contiguity of sets of situations (*CONV-S*), which can be trivially derived from the contiguity of sets of intervals):

def 1 $\forall e [state(e) \leftrightarrow \exists X [e = \vee X \wedge X \subseteq Q \wedge CONV-S(X) \wedge |X| > 1]$

Note that the restriction that the set of atomic states be non singleton is crucial to make the difference between states and s-punctuals (see below).

We may wonder whether this definition of states is enough to account for the set of properties usually ascribed to this actional class (cf. Dowty (1979, 55-56) for an exhaustive list), most notably for their incompatibility with agentivity. Our position is that such properties should not be considered as belonging to states *qua* an actional class, i.e. descending from def. 1, but a property of certain situations *qua* belonging to the set Q of situations. In other words non agentivity, from which most of the alleged 'stative behaviors' stem, could be considered as a general property of atoms of states, irrespective of the way they are actionally composed.

3.2.2 Processes

Processes are defined as the join of a non singleton set of atomic changes:

def 2 $\forall e [proc(e) \leftrightarrow \exists X [e = \vee X \wedge X \subseteq D \wedge |X| > 1]$

where, again, the restriction that the set of atomic changes be singleton is crucial to make the difference between processes and e-punctuals.

Concerning this definition, it is worth spending some words about the so called *subinterval* property of processes. It has been observed (Rescher and Urquhart, 1971, Dowty, 1977) that processes, contrary to states, admit temporal gaps. For instance, if I walked

for two hours there may be an interval within this period when I stopped and spent some minutes talking with a friend of mine. More abstractly, a process can be said to hold at an interval even if it does not hold at *every* subinterval of this interval. States, on the contrary, have been claimed to be always homogeneous: if I have been sick from 4 to 6, there is no subinterval included in the interval 4-6 such that it is not true that I was sick in this interval. As Dowty has it:

If ϕ in an (atomic) activity sentence, then if ϕ is true at interval I , then there is some non-empty initial subinterval of I at which ϕ is true and some non-empty final subinterval of I at which ϕ is true.
(Dowty 1977, p.60)

In order to capture this difference between states and processes, we have dropped the condition of contiguity for processes in def 2. Since in the temporal structure that we are assuming the join of non contiguous intervals always returns a convex interval (an interval with no gap, Landman (1991, 172)), and since by (22) there is a homomorphism from E' into I , we can be sure that if a process p is holds at an interval i (i.e. $\tau(p) = i$) there are at least a change at the beginning of the interval and a change at the end of the interval (cf. also Dowty 1979).

3.2.3 Achievements

Achievements are characterized by the presence of an *atomic* change followed by an atomic resulting state (cf. also Pustejovsky, 1988):

def 3 $\forall e[ach(e) \leftrightarrow \exists s \exists s'[e = \vee\{s, s'\} \wedge s \in D \wedge s' \in Q \wedge s \Rightarrow s']$

where \Rightarrow is a relation between situations, whose meaning can be paraphrased as: s' is the state resulting from s . In this paper, we will not discuss such a relation, which we assume to be a primitive. Note that the possible outcomes of a single change can be many, but only one is specified in the lexical semantics of telic verbs, thus determining both their syntactic properties (cf. Dini and Di Tomaso, 1995) and their semantic behaviour (see section 4). For instance the result of a *walking* event is either *being in a different place* or *being a bit more tired*, but only the former enters into the lexical meaning of the predicate *walk*. Moreover not every event of change lexically specifies the nature of such a resulting state, as we will prove shortly.

3.2.4 Accomplishments

Accomplishments are defined in analogy with achievements, with a process instead of an atomic change as the initial event. Thus:

def 4 $\forall e[acc(e) \leftrightarrow \exists s \exists s'[e = \vee\{s, s'\} \wedge proc(s) \wedge s' \in Q \wedge s \Rightarrow s']$

The presence of a resulting state in the representation of accomplishments is justified by the fact that they are sometimes compatible with *for*-adverbials quantifying precisely over the resulting state (the reasons why not all accomplishments can, are explored in 4.2.1). See for instance

- (24) Leo è corso a casa per dieci minuti.
Leo is run at home for ten minutes
'Leo ran home for ten minutes,'

which is most standardly interpreted as 'he ran home, remained there for ten minutes and then he came back'.

Further evidence for having a resulting state for accomplishment is provided by verbs which can be interpreted either as processes or accomplishments, depending on their selectional properties. Take for instance the situation of John eating a chicken this morning. This event lasted exactly 15 minutes. I can refer to it by uttering either (25a) or (25b)

- (25) a. This morning John ate for 15 minutes
b. This morning John ate a chicken in 15 minutes

In (25a) a verb denoting a process has been used, while in (25b) the addition of a direct object shifts the actionality towards an accomplishment. If both verbs were to denote the sum of exactly the same situations, there would not be any reason for this difference: (25b) should contain only the additional information that the patient of John’s eating was a chicken. Our claim is that the difference between the two sentences is to be found in the fact that the accomplishment in (25b) denotes the sum of situations denoted by the process in (25a), *plus* the situation for which the resulting state (in this case the state of a chicken being completely consumed) holds.

3.3 On the Need for Punctuals

Up to now, we have seen how the traditional Vendlerian classes can be “reconstructed” within our system without resorting to *ad hoc* predicates. Assuming that such a classification exhaustively covers all verbal predicates in a language such as Italian, we might formulate the following constraint on verbal denotation:

$$(26) \text{ All verbal predicates range over the set } E'' \text{ such that } E'' = \{e : e \in E' \wedge \forall s'[s' \in Q \wedge s' \sqsubseteq_s e \wedge \exists s''[s'' \in D \wedge s'' \sqsubseteq_s e] \rightarrow \text{final}_i(s', e)] \}$$

In prose (26) states that any event appearing as the denotation of a verb is either homogeneous or composed in such a way that the state is always the final¹¹ part of the event. This is a pretty obvious generalization, as it would be extremely surprising if changes could follow the state in which they result. It is easy to verify that the definitions of the Vendlerian classes provided in the preceding sections satisfy the second conjunct of the restrictions over members of the set E'' . Indeed:

- Homogeneous events, i.e. processes and states, satisfy vacuously the second conjunct, as the antecedent of the universal quantification ($s' \in Q \wedge s' \sqsubseteq_s e \wedge \exists s''[s'' \in D \wedge s'' \sqsubseteq_s e]$) can never be true. Indeed, they are exhaustively composed of either members of Q or members of D .
- Achievements and accomplishments satisfy both the antecedent and the consequent of the second conjunct, as the final state is always the final part of the overall event.

The point now is: is (26) restrictive enough? Actually, two “unpredicted” classes of events result from it: (1) events which are simply members of D ; (2) events which are simply members of Q . These are exactly the denotation of e-punctual and s-punctual verbs, as we will show in the remainder of this section.

Consider verbs such as *colpire* (‘hit’) or *starnutire* (‘sneeze’). If they were considered achievements, we would find ourselves in the condition of identifying a state resulting from single changes of *hitting* or *sneezing*, which contradicts our basic intuitions about events of this kind. As a matter of fact, an event of *sneezing* is just a change with very poor consequences. If someone in a room goes out, we are immediately able to understand that a change of state occurred in the room: the world is significantly changed. If, however, someone in a room sneezes, there is no difference (at least not necessarily) between the world before and after such an action: no new state has been introduced, just something happened. In our approach this difference is represented almost literally: achievements, such as *partire* (‘go out’), are the join of a change and a state, while e-punctuals, such as *starnutire* (‘sneeze’) are just atomic changes. We do not want, however, to stress too much the *realistic* nature of this analysis. The difference between achievements and e-punctuals is *tendentially* a difference in the nature of the described event, but in fact it is only language and language use which decides which verbs are classified how¹². To see this, consider that there are pairs of almost synonymous verbal expressions which are conceptualized in different ways. A good example is represented by the difference between *saltare giù* and *scendere* in sentences such as:

¹¹ $\text{final}_i(s, e)$ is trivially defined as

$$(i) \text{ final}(s, e) \text{ iff } \neg \exists s'[s' \sqsubseteq_s e \rightarrow \tau(s) < \tau(s')]$$

where $<$ is a standard relation of complete precedence.

¹²This is particularly evident if one considers that every event has at least an obvious consequence (which we label *trivial consequence*): the fact of having happened, or better, the state of being part of the history of the world. However, as far as we know, these consequences have no linguistic influence at all, thus they will never be referred to when we speak of *resulting* or *consequent* states.

- (27) a. Giovanni è sceso per dieci minuti, poi è risalito.
 Giovanni is gone down for ten minutes, then is gone up again
 ‘Giovanni went down for ten minutes, then he climbed up again.’
- b. * Giovanni è saltato giù per dieci minuti, poi è risalito.
 Giovanni is jumped down for ten minutes, then is gone up again
 ‘Giovanni jumped down for ten minutes, then he climbed up again.’

The descriptions in (27) can surely denote the same event in the real world with the same consequences (think of a situation where we are considering Tarzan leaving his house on the tree for a short while); yet, the event is linguistically seen from two different points of view, one considering also the result (27a), the other focussing merely on the change (27b). Hence, the ungrammaticality of a *for*-adverbial measuring the resulting state in (27b)¹³. To see another example consider the difference between (28a) and (28b)

- (28) a. Giovanni è uscito dalla stanza.
 Giovanni is gone out from the room
 ‘Giovanni went out from the room.’
- b. Giovanni è uscito dalla finestra.
 Giovanni is gone out from the window
 ‘Giovanni went out through the window.’

It goes without saying that the sentences in (28) may be able to describe the same event, and we can also say that the same consequent state can be inferred, namely the state of Giovanni being absent. However, they are linguistically different, for (28a) can focus both on the change and the resulting state, whereas (28b) only says that an event of a certain type occurred. Thus (28b) is impossible with *for*- and *in*-adverbials and can occur with the progressive only under a *momentaneous progressive reading*:

- (29) a. * Giovanni è uscito dalla finestra per dieci minuti.
 Giovanni is gone out from the window for ten minutes
 ‘Giovanni went out through the window for ten minutes.’
- b. ?? Giovanni è uscito dalla finestra in dieci minuti.
 Giovanni is gone out from the window in ten minutes
 ‘Giovanni went out through the window in ten minutes.’
- c. Giovanni sta uscendo dalla finestra. /one reading only/
 Giovanni is going out from the window
 ‘Giovanni is going out through the window.’

The typical representation of an e-punctual verb such as *saltare* is:

$$(30) \lambda x \lambda e^- .jumping(x, e^-)$$

where e^- is a sorted variable referring to individuals belonging to D .

Similarly, consider s-punctuals such as *meravigliarsi*, *stupirsi* (‘become amazed’), *spaventarsi* (‘become scared’). They intuitively denote a change of state and nothing more. By contrast, the verbs which are traditionally considered achievements, such as *uscire* (‘go out’), have more in their semantics than a simple change of state. In fact, when we simply

¹³It could be objected that we miss the inference according to which every *jumping down* is followed by a state of being down. This is certainly true (cf. footnote 12), but our opinion is that one should avoid to unnecessarily complicate linguistic representations with the only purpose of capturing inferences. In cases such as the ones we are examining, meaning postulates can do the job.

pass from a state of *being in* to a state of *being out*, what we get is not enough to necessarily instantiate change that is in the denotation of *uscire*. For instance, a situation such as the one described in (31) is a situation where a piece of furniture undergoes a change from *being in* to a *being out*, but it would be improper to describe such a situation as *il mobile uscì* ('the piece of furniture went out'):

- (31) Il mobile fu trasportato fuori dalla stanza
 The piece of furniture was moved out from the room
 'The piece of furniture was moved out of the room'

However, whenever we pass from a state of non-amazement to a state of amazement, it is appropriate to say that an event of *meravigliarsi* has occurred. As a consequence it is intuitively correct to claim that verbs belonging to this class denote *the first atomic state when a certain state comes to be true* (i.e. the first atomic state of a (possibly) continuing state). Thus, from an actional point of view they simply denote an atomic state, this state being preceded by a state where the relevant predicate does not hold. For instance a verb such as *meravigliarsi* will have the following denotation (where \prec stands for *immediately precedes*):

$$(32) \lambda x \lambda s [astonished(x, s) \wedge \neg \exists s' [s' \prec s \wedge astonished(x, s')]]$$

4 An Explanation of the Data

In the following sections we will try to sketch a semantic treatment of the progressive aspect (4.1), *in-* and *for-*adverbials (4.2.1) and *da-*adverbials (4.2.2), showing how the distinction between achievements and punctuals (and their further subclassification) allows us to shed light on these problems. Finally, in section 4.3 a principled explanation is given of the fact that a large set of punctual verbs have a homophonous form denoting a process.

4.1 Progressive

The semantics of the progressive aspect has received a great deal of attention during the last three decades by researchers working in the framework of either interval semantics or event semantics. The main issues of this discussion can be summarized as follows:

- Determination of the aspectual import of the progressive (i.e. its relation to the reference time).
- Solution of the so called "Imperfective Paradox", i.e. the well known fact that the truth of *I was building a house* does not entail the truth of *I built a house*, whereas the truth of *I was walking* entails the truth of *I walked*.
- Determination of the actional class to which verbs in the progressive form should be ascribed.

The last two problems have always been considered as intrinsically connected. In particular, we can roughly distinguish among: (i) approaches which retain the actional nature of the basic predicate and consider the imperfective paradox as a kind of modalizing operator (most notably Dowty (1979)); (ii) approaches which demote the imperfective paradox to the realm of pragmatics and consider the progressive as an 'actionality sensitive operator' able to shift the actionality of a predicate from telicity to atelicity (most notably Partee (1989) and Parsons (1990)). Here we will sketch an analysis which tries to combine both approaches. In particular, we will try to remedy an oversimplification which is intrinsically connected with the 'progressive as an actionality sensitive operator'. Consider for instance the point of view of Parsons (1990):

Semantically, changing an event verb to the progressive form requires that it be treated as a state verb; the sentence in question thus requires for its truth that the event in question *hold*, not that it *culminate*.

This intuition is implemented through the use of the two predicates *cul* and *hold*, which range over the event variable at the perfective and progressive form, respectively. Two main objections can be raised against this treatment. First, as Bertinetto (1994) shows, the idea that the progressive changes every event into a state is untenable in many respects. Second, in such an approach the relation between *cul* and *hold* is left completely underspecified. Since these predicates have no precise model theoretic interpretation, we could associate to them every kind of implausible meaning. In other words, what Parsons' approach misses is the possibility of drawing an inference such as:

- (33) *Sto correndo a casa* → *ho corso*
I am running home → I ran

In our treatment, as we will see, we solve this problem in a principled way by substituting the primitive predicates *cul* and *hold* with independently motivated type-shifting operators. Moreover, rather than rejecting the modal approaches to the semantics of the progressive, as Parsons does, we will limit their scope to the resulting state of telic events, thus avoiding any resort to pragmatics in order to explain the well known 'goal oriented' semantics of the progressive¹⁴. Let us start from the simple case, i.e. the semantics of the progressive with homogeneous events.

Assuming the interval i_r as the reference time in a Reichenbachian sense, we propose the following semantic representation for the progressive operator (from here on variables with a superscript '−' are restricted to range over members of the set $D \cup Q$ (atomic events), whereas variables with a superscript '+' are restricted to range over members of the set $E' - (D \cup Q)$ (non atomic events); moreover we assume that in Italian i_r (the reference interval involved in the progressive) is always an instant, as shown in Bertinetton press (1986, in press)):

- (34) $prog(e, i_r) \text{ iff } \forall i [i \sqsubseteq_t i_r \wedge inst(i) \rightarrow \exists s^- [i \sqsubset_t \tau(s^-) \wedge s^- \sqsubseteq_s e \wedge hom(e)]]$

In prose, (34) states that a progressive event is true at an interval i (which is usually instantiated by the reference interval) if and only if the event is homogeneous and for every instantaneous subinterval i' of i there is an atomic part s^- of that event such that $\tau(s^-)$ (i.e. the temporal trace of s^-) is bigger than i' ¹⁵. The predicate imposing homogeneity is defined as follows¹⁶:

- (35) $hom(e) \text{ iff } \neg \exists \exists s' [s \sqsubseteq_s e \wedge s' \sqsubseteq_s e \wedge s \in Q \wedge s' \in D]$

¹⁴Kearns (1991), which embraces, with some modification, Parson's approach, claims:

The counterfactual analysis can now be seen, not as a truth condition for the progressive, but as a highly productive predicate formation rule generally used for purposeful human activity or processes where custom and experience support the classification of a process as of a typically goal directed kind.
(p. 299)

¹⁵The reason why we maintain the possibility of having *prog* ranging over an interval, rather than an instant, is that we want our semantics for the progressive to handle also cases such as the following (from Kearns (1991)):

- (i) John was playing the piano from ten to eleven

Since examples such as (i) are at least substandard in Italian, we conclude that in this language the progressive can only range over instants. Thus, in Italian, (34) reduces to (ii)

- (ii) $prog(e, i_r) \text{ iff } \exists s^- [i_r \sqsubset_t \tau(s^-) \wedge s^- \sqsubseteq_s e \wedge hom(e)]$

¹⁶Homogeneity here is intended as actional homogeneity, not homogeneity over the event type. Such a requirement would be too strong, as the progressive operator can predicate over non homogeneous events. For instance in a sentence such as

- (i) Quando Lia arrivó, Leo stava pulendo e riordinando.
When Lia arrived, Leo was cleaning and reordering
'When Lia arrived, Leo was cleaning and reordering.'

all we can assert is that the moment of Lia's arrival is included in a process which is the sum of *cleaning* events and *reordering* events. In this case, homogeneity intended as homogeneity of event type would trivially fail.

Note that the crucial difference w.r.t. Parsons' approach is that the semantics of the progressive *requires* the event to be of a certain type (homogeneous), but it does not *change* it into either a state or a process. As we will see, in our approach such is performed by a type-shifting operator.

At this point we are in a situation such that:

1. Processes are admitted as they are homogeneous and have atomic parts bigger than instants (by definition, cf. 3.2.2):

(36) Lia sta camminando.
 Lia is walking
 'Lia is walking.'

2. States are excluded as they are homogeneous but have no atomic part bigger than an instant (by definition, cf. 3.2.1):

(37) * Il cadavere sta giacendo a terra
 the corpse is laying on ground
 'The corpse is laying on the ground.'

3. e-punctual verbs are admitted, as they satisfy homogeneity and have an atomic part (in fact they *are* an atomic part, cf. 3.3) bigger than an instant. Note that the difficulty found by some speakers to use certain punctual verbs with the progressive aspect can be explained by the difficulty of including the reference time within a temporal trace barely bigger than an instant. In fact, the partial acceptability of (38a) vs. the full acceptability of (38b), can be explained by the fact that the temporal trace of the bullet hitting the target is barely more than an instant, whereas the explosion of a bomb can last several seconds (note that in our system punctuality does not mean lack of temporal extension):

(38) a. ? Quando entrai nel poligono, il proiettile stava colpendo
 When entered in the firing ground, the bullet was hitting
 il bersaglio.
 the target

'When I entered into the firing ground the bullet was hitting the target.'

b. Quando guardai a Nord, la casa stava esplodendo.
 When looked to North, the house was exploding

'When I looked North, the house was exploding.'

4. S-punctual events are excluded as they are homogeneous but have no atomic part bigger than an instant (by definition):

(39) * Quando entrai, Lia si stava stupendo.
 When entered, Lia SI-Clit was amazing
 'When I entered, Lia was getting amazed.'

5. Accomplishments and achievements are excluded, as they are not homogeneous

Obviously, the last consequence is wrong, as we have seen that both classes can be used with the progressive aspect. In order to fix this problem, we should address some questions concerning the meaning of the progressive with accomplishments and achievements. When one says *John is running home*, what can be understood is more or less the following: *John is running and maybe John will be at home*. In other words the meaning of a telic progressive form can be divided into two parts: (i) an *extensional* part, stating what the actors are actually doing; (ii) a *defeasible* part stating what is the most likely conclusion of the extensional part. There have been several proposals in order to capture the notion of 'possible outcome of an event': *Inertia Worlds* (Dowty, 1979), *default reasoning* (Asher, 1992), *Continuation branches based on the concept of event stage* (Landman, 1992), and so on. Since we are not concerned with this question, we are simply going to assume here

that the second part of a progressive sentence is embedded within the scope of a modal *possibility* operator, without caring about the cases where such an operator is unable to do the proper job. All we want is that the following fact be true in our semantics:

(40) I was building a house \nrightarrow I built a house

A more crucial problem is whether the modalization of the second part of the progressive semantics is due to the progressive operator or to an independent operator which is active in certain syntactic/semantic contexts. On this respect we agree with Kearns (1991) in that we consider the *imperfective paradox* not to be a peculiar feature of the progressive semantics. At least the following cases can be identified where an ‘unfinished event’ (i.e. an event with an “uncertain” resulting state) has to be assumed:

- Aspectual (or phasal) verbs such as *start*, *begin* and *continue* take an atelic event (i.e. a process or an unfinished accomplishment) as their complement, as the following pattern (from Kearns (1991)) exemplifies:

(41) a. John started to move \rightarrow John moved
 b. John began to move \rightarrow John moved
 c. John continued to laugh loudly \rightarrow John laughed loudly
 d. John started to build a house \nrightarrow John built a house
 e. John began to build a house \nrightarrow John built a house
 f. John continued to build the house \nrightarrow John built a house

- Accomplishments within the scope of *for*-adverbials are interpreted as unfinished. For instance in a sentence such as (42) no inference can be drawn whether the house was finished or not:

(42) Leo ha costruito una casa per due anni.
 Leo has built a house for two years
 ‘Leo has built a house for two years.’

- The same effect is obtained using a temporal specification introduced by the preposition *fino a* (‘until’). For instance, from (43) we cannot infer that Lia finished reading Leo’s thesis:

(43) Lia ha letto la tesi di Leo fino a mezzanotte.
 Lia has read the thesis of Leo until to midnight
 ‘Lia read Leo’s Thesis until midnight.’

As a consequence, it seems that a kind of operator producing ‘unfinished events’ has to be present anyway in the semantics of a language. Whenever a certain predicate requires an event of a homogeneous type (like processes or states), such an operator would be resorted to in order to make the derivation possible, as in standard cases of type coercion (Moens and Steedmann, 1988, Pustejovsky, 1991). Let’s call this operator ‘UNFINISHED’

To see how ‘UNFINISHED’ can be naturally introduced in our system, we should consider again the operation of event composition. Are complex events already complex in the lexicon (*static event composition*), or are they formed as the join of objects which are present in syntax (*dynamic event composition*)¹⁷? There are, it seems, reasons which urge towards the second option. Consider for instance a verb such as *run*. When used alone, it behaves like a process, whereas with a goal phrase it behaves as an accomplishment, as the following pattern exemplifies:

¹⁷This question has obviously to be parametrized w.r.t. the kind of syntax one assumes. In a framework such as GB (and Minimalism) one can avail her/himself of the whole inventory of empty categories and functional projections in order to reproduce a syntactic structure which mirrors the way in which events are actionally composed. On the contrary, in more restrictive frameworks, such as HPSG, which make no customary use of empty categories and functional projections, the mechanism of *dynamic event composition* (as opposed to *static event composition*) has to be implemented through a system of type inferences over underspecified lexical entries. At the current state of our research we do not see any reason to prefer the transformational view over the declarative one, but, for reasons of space, here we consider only the former. However, see Dini and Di Tomaso (1995) for an implementation of the latter.

- (44) a. John ran for/# in three hours
 b. John ran to the office # for/ in three hours

Moreover, in a language like Italian (and in the other languages which fit the PATH incorporation type of Talmy (1985)) the preposition introducing the goal place is always non distinct from the corresponding static locative preposition. For instance, the preposition *a* used in (45a) is the same which is used in the static locative relation in (45b):

- (45) a. Leo è corso a casa.
 Leo is run at home
 ‘Leo ran home.’
 b. Lia è a casa.
 Lia is at home
 ‘Lia is at home.’

Crucially, this fact led Dini and Di Tomaso (1995) to assume that, in Italian, the denotation of the alleged goal-PP *is* a state which acts as the resulting state of a process. If this is the case, we must assume (as is done by several authors) that actionality is not lexically specified, but is determined at a phrasal level by the application of certain aspectual operators introducing a join operation between changes and states (in Krifka (1989) and Verkuyl (1993) this “bridging” function is taken over by θ -roles). The same is true for all transitive accomplishments, such as *read*, whose actionality depends on the presence or the absence of the complement (a different case arises with bare plurals and mass nouns, which are not dealt with in this paper). The only difference is that the resulting state is not overtly realized by, say, a preposition as in (45a), but its presence is detected by virtue of the ability of the verb to select a direct object¹⁸.

If process/changes are to be joined with states in syntax, we need an operator to perform such a task. Let’s call such an operator ‘TELIC’. TELIC and UNFINISHED are operators which range over the same arguments, the former originating a *finished event*, the latter an *unfinished event*. They are defined in the following way:

- (46) TELIC: $\lambda P.\lambda S.\lambda x\lambda e.\exists d\exists q^-[P(x, d) \wedge S(q^-) \wedge e = \bigvee\{d, q^-\} \wedge d \Rightarrow q^-]$
 (47) UNFINISHED: $\lambda P.\lambda S.\lambda x\lambda d.[P(x, d) \wedge \diamond\exists e\exists q^-\exists d'[S(q^-) \wedge d \sqsubseteq_s d' \wedge e = \bigvee\{d', q^-\} \wedge d' \Rightarrow q^-]]$

The operator TELIC is in some sense the default operator for composing a (possibly plural) change with a state. In fig. 2 a part of the derivation of *correre a casa* (‘to run home’) is provided, where this operator applies to join the state of *being at home* with the process of *running* (we ignore how the identification of the variable x_1 is achieved).

The operator UNFINISHED, conversely, is advocated only when something crashes in the derivation, in the same fashion as a type shifting operator. This is exactly the case of the progressive: since both accomplishments and achievements are non homogeneous, their standard event composition through the operator TELIC cannot be maintained and the operator UNFINISHED is activated. For instance, the crucial part of the derivation of *Leo sta correndo a casa* would proceed as in fig. 3.

Let’s now consider again the case of achievements and e-punctuals. In principle, they are both compatible with the semantic of the progressive, the former through the application of UNFINISHED, the latter by virtue of the fact that they are homogeneous by definition. In both cases, the progressive says that the atomic change is in progress and, crucially, that it exists. The following are the logical forms associated to the the sentences *Leo sta uscendo* and *la bomba sta esplodendo*:

¹⁸In some sense we go in a direction similar to the one of Larson (1988) in admitting that certain VPs are in fact ‘layered’, i.e. they contain a further nested VP. Our proposal differs, however, from Larson’s one in three respects: (i) only telic events have a layered structure; (ii) all telic events have a layered structure, irrespective on the presence of a direct object; (iii) we do not assume any light verb: all verbs in our layered structure bear a semantic contribution. Our position also differs from the one assumed in Hale and Keyser (1993) in that our projections are true syntactic projections, not to be understood as *Lexical Relational Structures* in Hale and Keyser’s sense. On this respect we feel closer to McClure (1994)’s aspectual projections, even though the system described therein differs from the present one in a number of aspects, both on the semantic and the syntactic side.

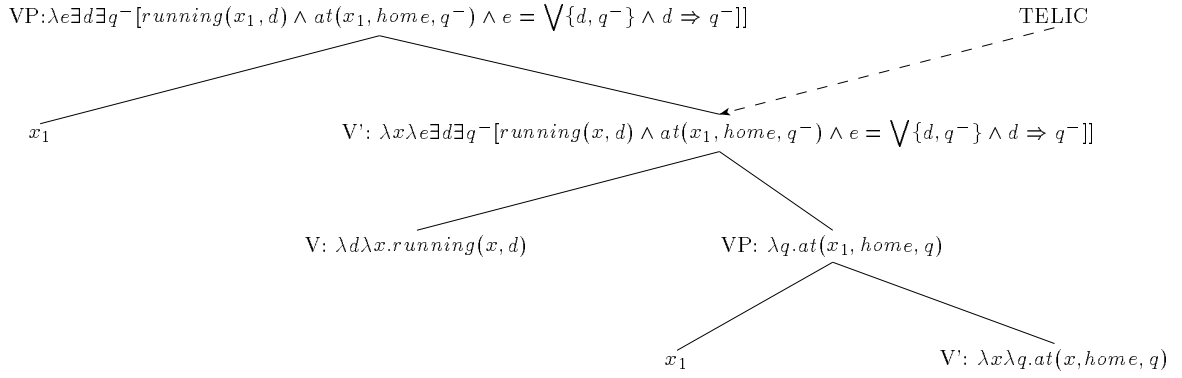


Figure 2: Relevant part of the derivation of *correre a casa* through the TELIC operator.

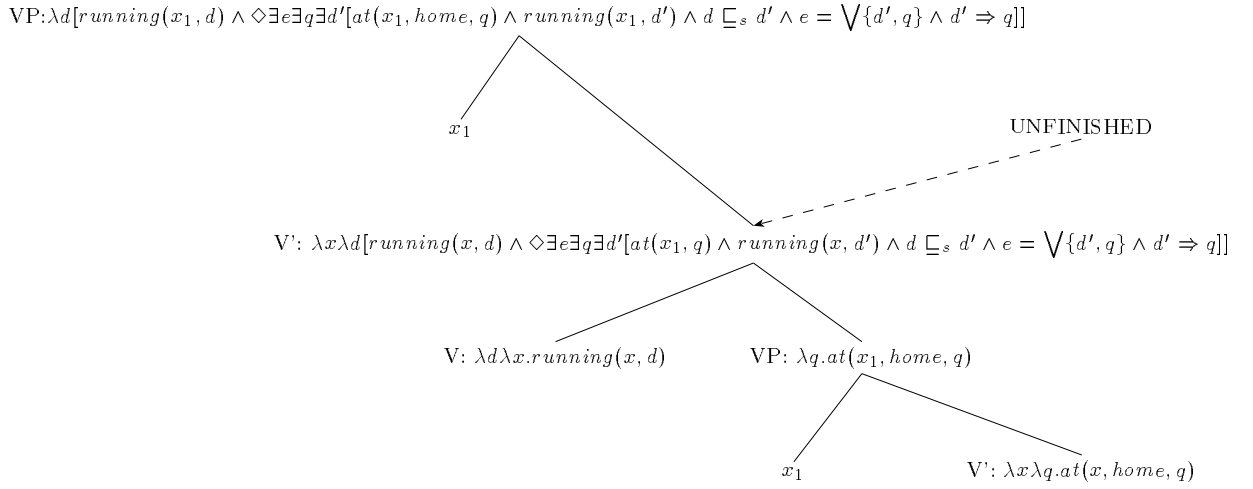


Figure 3:

- (48) a. $\exists d[\text{going_out}(\text{Leo}, d) \wedge \text{prog}(d, i_r) \wedge \diamond \exists e \exists q[\text{absent}(\text{Leo}, q) \wedge e = \sqrt{\{d, q\}}]]$
 b. $\exists d[\text{exploding}(\text{the_bomb}, d) \wedge \text{prog}(d, i_r)]$

With achievement verbs, the attainment of the resulting state is in the scope of a modal operator: nothing in principle suggests that it will be realized, but since its causing event *has* to be realized, its consequence is also likely to occur, unless something prevents it to ¹⁹. This is even clearer when punctuals are considered: since they have no resulting state and since, in spite of the application of the progressive operator, their unique atomic change is existentially predicated, we get the following inference, whose validity is confirmed by Italian speakers:

- (50) La casa stava esplodendo → la casa è esplosa
 The house was exploding → the house exploded

As for the imminential use of the progressive, trying to capture its exact semantics and context of use is outside the scope of the present paper. Suffice it to say that the kind of semantics we would like to propose makes crucial reference to the notion of *preparatory*

¹⁹Actually, some speakers accept the use of achievements with the progressive even in contexts where the attainment of the resulting state is not certain. In this cases, however, it is the imminential use of the progressive which is realized. This fact is clearer when considering the behavior of *bare imperfect*. As Delfitto and Bertinetto (1995) claim, from a sentence such as (49), where the use of the *imperfect* excludes the imminential reading, we can draw the inference that Lia eventually went out:

- (49) Quando Leo è entrato, Lia usciva.
 When Leo is entered, Lia was going out
 ‘When Leo went in, Lia was going out.’

phase of a resulting state. This is not a unique case in the semantics of Italian: in the next section we will see that also *in*-adverbials embody such a notion in their semantic interpretation (through the function *res* in (59)). If this is the case, we expect imminent uses of achievements, for which the notion of *preparatory phase of a resulting state* makes sense. This explains why a sentence such as (51) can be interpreted as *I am in the process preparing my leaving*:

- (51) Sto partendo
Am leaving
'I am leaving.'

The notion of resulting state for punctuals is, however, undefined and so is, *a fortiori*, the notion of *preparatory phase of a resulting state*. This explains why punctuals with the progressive form are always interpreted according to the *momentaneous progressive reading*, rather than the *extended progressive reading*, as we claimed in (2.1).

4.2 Temporal Adverbials

4.2.1 *in/for* Adverbials

in-adverbials Let's have a look at two semantic representations of the time-span adverbial *in an hour* provided in the framework of lattice-based event semantics, namely those of Hinrichs (1985) (in turn derived from Dowty (1979)) and Krifka (1989):

- (52) in an hour: $\lambda S \lambda e_1^s \lambda x^i . \exists l [hour'(l) \wedge e_1^s \preceq l \wedge S(e_1^s)(x^i) \wedge \forall e_2^s [e_2^s \preceq e_1^s \wedge S(e_2^s)(x^1) \rightarrow e_1^s = e_2^s]]$

- (53) in an hour: $\lambda P \lambda e . [P(e) \wedge \exists t [CONV(t) \wedge h'(t) = 1 \wedge \tau(e) \subseteq_T t]]$

A common point of the above translations is an *inclusion* relation between the duration of the interval picked up by *in* and the event time ($e_1^s \preceq l$ in (52) and $\tau(e) \subseteq_T t$ in (53)). The rationale for using such a constraint, rather than the more intuitive constraint of equality, is twofold. In Krifka's system it is justified by the fact that time-span adverbials are upward-entailing operators; i.e. if I performed an action *in x time*, it has to be true that I also performed it *in x+n time*. Thus the following assertion will not necessarily be contradictory:

- (54) Ann drank a bottle of wine in one hour; in fact she did it in 53 minutes.

Hinrichs, on the other hand, borrowing arguments from Dowty (1979), justifies the use of an inclusion relation on the basis of the fact that *in*-adverbials can be used also with momentaneous events, for which, in his system, no interval specification should be possible:

- (55) John closed the door in an hour

Gricean reasons are then advocated in order to capture the fact that the interval has to be as short as possible, that the event has reasonably to take place during the final subinterval denoted by the *in*-adverbials, and so on.

We think that Dowty/Hinrichs's rationale for using an inclusion relation is on the wrong track, the reason being that when I utter a sentence containing a momentaneous verb like

- (56) The soldier left in two hours

it is not true that I am giving an "inaccurate" characterization of the interval when the *leaving* takes place. On the contrary, I am trying to measure, by some contextual parameter, the process which prepared the soldier's leaving, in such a way that if he left in two hours, it can simply be false that he left in three hours or he left in one hour. Trying to capture the fact that *in*-adverbials are compatible with achievements by using the temporal inclusion relation, hides the fundamental aspect of the meaning of *in*-adverbials, i.e. the fact that they always measure a process (whether lexicalized or not) which prepares a state.

Coming to Krifka’s rationale for having an inclusion relation, we admit that sentence (54) can be uttered without contradiction, but we also think that *vagueness* should be resorted to, rather than *pragmatics*, to account for its non contradictory meaning. In other words, we think that temporal characterizations such as *in an hour*, when appearing in unmarked contexts, have to be interpreted vaguely, i.e. as making reference to a human perception of time, where there is no such a big difference between one hour and 59.59 or 53 minutes. In any case, since we will account for achievements when appearing with *in*-adverbials in a way radically differing from Dowty-Hinrichs’ treatment, if the reader were not satisfied by our hypothesis that the alleged upward entailing property of *in*-adverbials is in fact a matter of vagueness, s/he can substitute ‘=’ with ‘ \sqsubseteq ’ in formula (60), without incurring in the “informational weakening” of Dowty-Hinrichs’ treatment.

The second point concerning (52) and (53), is the way in which they rule out processes with *in*-adverbials. Both treatments rely on the fact that the event modified by these adverbials has to be atomic (through pragmatics rules in Krifka, directly in the semantics of the *in*-adverbial in Hinrichs). However, they do not explicitly state that processes are, in their systems, non-atomic, which implies that *in*-adverbials should be considered compatible with processes, provided they denote an interval small enough to contain only a single ‘bit of a process’. For instance (57) (which is an example from Krifka (1989), the asterisk is ours) should be acceptable, and this seems to us rather dubious, at least under a non-inchoative reading:

(57) * Ann drank wine in 0.43 seconds

In our system, *in*-adverbials measure the length of the process which prepares the final state. For instance we interpret the sentence:

(58) Leo ran home in ten minutes

as: the duration of the process which prepared the final state of Leo’s being at home (i.e. Leo’s running) is ten minutes. In order to implement such an idea we must first introduce a partial function returning the resulting state of a telic event, undefined otherwise. Such a function (*res*) could be defined as :

(59) $res(e) = \iota q^- [q^- \sqsubset_s e]$

That is $res(e)$ will return the unique atomic state which is part of the input event e , if e has a unique proper part which is an atomic state, undefined otherwise. Such a function will be undefined with processes and e-punctuals (as they have no state at all) with states (as the uniqueness requirement is not satisfied) and with s-punctuals (as they have no proper subparts). Equipped with the *res* function, the semantics of *in*-adverbials is rather simple (remember: s^+ is a variable over non atomic situations):

(60) $in(e, i) \text{ iff } \exists s^+ [s^+ \Rightarrow res(e) \wedge \tau(s^+) = i]$

If e is a state or a process, *in*-modification will always turn out false, as $res(e)$ is undefined. This explains the ill-formedness of (61a) and (61b) under a non inchoative reading (and obviously, it explains also the ungrammaticality of (57), as *drink wine* is always a process, with no resulting state):

(61) a. * Lia walked in ten minutes

b. * Lia was sick in three minutes

If s is an accomplishment, since the function $res(s)$ will return the resulting state of such an accomplishment and since accomplishments lexically specify the process which causes their resulting state, *in*-adverbials will measure the length of the preparatory process. Thus the following inference is captured²⁰:

²⁰Actually, such an inference is defeasible, as the speaker can have in mind a bigger process than the one literally ending into the described resulting state. For instance someone could say:

- (i) Leo ha mangiato la mela in 60 minuti.
 Leo has eaten the apple in 60 minutes
 ‘Leo ate the apple in 60 minutes.’

including the time of peeling the apple, not just the eating time. Such a possibility is admitted in the kind of semantics we are proposing, even though the lexical availability of the preparatory process strongly discourages such uses in unmarked contexts.

(62) Leo has eaten a cake in ten minutes → Leo has eaten for ten minutes

Note that (60) also explain the behaviour we identified with achievements when modified by *in*-adverbials. We noted in section 2.2 that the preparatory process measured by *in*-adverbials in those examples heavily depends on our world knowledge. Take for instance a sentence such as

(63) They left in twenty minutes

If the subject of (63) is understood as a group of travellers, we would identify the preparatory phase which lasted twenty minutes with the process of doing the luggage, loading it on the car and so on. However, if the subject of (63) is understood as a platoon of soldiers, things are different: the twenty minutes long preparatory process would involve other actions, such as awakening the soldiers, distributing the rifles, load the military stuff on the trucks and so on. In both cases there is a complete dependence of the preparatory phase on contextual factors, a dependence which forces us to avoid any reference to the preparatory process in the semantics of achievements (*contra* Pustejovsky (1988)). Moreover, even in the same contexts different speakers tend to identify the preparatory process with different sequences of actions. For instance, both sentences in (64) can be true at the same time, depending on whether the speaker has in mind a sequence of quarreling events involving Leo and Lia or Lia's final talk to Leo:

(64) a. Lia ha lasciato Leo in una settimana.

Lia has left Leo in one week

'Lia left Leo in one week.'

b. Lia ha lasciato Leo in venti minuti.

Lia has left Leo in twenty minutes

'Lia left Leo in twenty minutes.'

This indeterminacy is fully predicted by our system. Sentences in (64) are true only if the duration of the process preparing Leo's remaining alone lasted either a week or twenty minutes. Obviously such a process is not lexically specified, for the initial change of an achievement such as *lasciare* is not a process, but a mere atomic change. Thus the *in*-adverbials in (64) measure some *contextually* determined preparatory process of the state of *remaining alone*. Since such a process needs not to be unique (there is a great indeterminacy among speakers in identifying what counts as a preparatory process) the fact that (64a) and (64b) can be simultaneously true is easily accounted for.

Obviously, since no resulting state is admitted with punctuals, they will always be ungrammatical with *in*-adverbials. Thus the following data are explained:

(65) a. # Leo sbaglió in dieci minuti. / =e-punctual/

Leo failed in ten minutes

'Leo failed in ten minutes.'

b. # Leo si stupí in quattro minuti. / =s-punctual

Leo SI-Clit amazed in four minutes

'Leo became amazed in four minutes.'

The reason why the diacritic '#' has been used, rather than '*' is that, in Italian, there is a homophonous preposition *in* designating a prospective use. Informally, this other use of *in* may be stated as: *in(e, i) is true if and only if e takes place i time after the reference time*. In this case, no notion of preparatory phase is involved and punctuals behave as any other actional class under this particular reading of *in*-adverbials. Thus, crucially, (65a) is interpreted, by the speakers which accept it, as *Leo failed after ten seconds*, rather than *the process which caused Leo's failure lasted ten minutes*.

For-adverbials Intuitively, if John ate for three hours, it is true that for every interval included in three hours there is an event of an eating type, in which such an interval is included. Thus, we impose the following condition on the interpretation of *for* (note the reminiscence of those proposed in Dowty (1979), Hinrichs (1985), Moltmann (1991)):

$$(66) \text{ (prov.) } for(s, i) \text{ iff } \forall i'[i' \sqsubset_t i \rightarrow \exists s'[s' \sqsubset_s s \wedge i' \sqsubseteq_t \tau(s')]]$$

The truth conditions in (66) state that if a situation s occurs *for* an interval i , then for every subinterval i' of i there is a part of s such that its temporal trace is equal or bigger than i' . Under such a definition, *for*-adverbials are downward monotone, i.e. they allow the following inference

$$(67) \text{ I hammered for ten minutes } \rightarrow \text{ I hammered for five minutes.}$$

More interestingly, in spite of being downward monotone, they do not run into the problem of minimal parts. The problem can be formulated as follows: if my walking is composed of a set of atomic events which are again walkings, but which have no walking as a part, it should be impossible to draw the inference that, for instance, if I walked for ten minutes I also walked for 0.5 seconds. Indeed, if there is no walking defined at that interval, it makes no sense to speak about the duration of a walking event. Thus we would end up with the following exception to (67):

$$(68) \text{ I walked for ten minutes } \not\rightarrow \text{ I walked for 0.5 seconds}$$

Our opinion, however, is that language does not behave in this way and the semantics of *for*-adverbials should ignore whether there is a situation corresponding *exactly* to the interval under consideration. This is basically the reason why in (66) we imposed the subpart relation (\sqsubseteq_t) rather than equality between i' and $\tau(s')$. An inference like (68) would then be justified, since there is a part of the event of walking for ten minutes whose temporal trace *includes* an interval of 0.5 seconds.

With this interpretation of *for*-adverbials we are able to justify why they are compatible with states and processes. However, we fail to predict their incompatibility with achievements and their 'unfinished' reading with accomplishments. In order to remedy this, we impose, as in the case of the progressive, the homogeneity condition over the modified event:

$$(69) \text{ } for(s, i) \text{ iff } \forall i'[i' \sqsubset_t i \rightarrow \exists s'[s' \sqsubset_s s \wedge i' \sqsubseteq_t \tau(s') \wedge hom(s)]]$$

Now, only states and processes are allowed, while the derivation for achievements and accomplishments crashes, due to the failure of the *hom* predicate. As with the progressive, the derivation can be rescued by the application of the UNFINISHED operator, which makes only the eventive part available, by embedding the resulting state within an intensional context. Thus, in the case of an accomplishment modified by a *for*-adverbial, such as the one in (70a), we obtain the logical form in (70b):

- (70) a. Leo ha mangiato la torta per dieci minuti.
 Leo has eaten the cake for ten minutes
 'Leo ate the cake for ten minutes.'
- b. $\exists d[eating(leo, d) \wedge for(ten_minutes, d) \wedge \diamond \exists e \exists q[consumed(the_cake, q) \wedge e = \bigvee \{d, q\} \wedge d \Rightarrow q]]$

In this way we justify the already mentioned fact that:

$$(71) \text{ Leo ha mangiato la torta per dieci minuti } \not\rightarrow \text{ Leo ha mangiato la torta.}$$

$$\text{ Leo ha mangiato la torta per dieci minuti } \rightarrow \text{ Leo ha mangiato per dieci minuti.}$$

Concerning the relationship of the remaining actional classes (punctuals and achievements) with the UNFINISHED operator, there are two possibilities. Either this operator cannot apply at all, as in the case of punctual verbs (which lack a state to be joined to the atomic change), or it can apply, as in the case of achievements. However, in both cases the conditions on the interpretation of *for* adverbials are not satisfied. Punctuals have no parts by definition; achievements, after coercion, can make only one atomic change available to *for*-modification, so that our formula, again, fails to apply. This explains the ungrammaticality of the sentences in (72), at least under a standard durational reading:

(72) a. # Leo è uscito per dieci minuti. /=*achievement*/
 Leo is gone out for ten minutes
 ‘Leo went out for ten minutes.’

b. * Ha commesso uno sbaglio per dieci minuti /=*punctual*/
 Has made a mistake for ten minutes
 ‘He made a mistake for ten minutes.’

This parallelism between achievements and punctuals is broken when the *for*-adverbial is used to measure the resulting state, as in (72a), which is acceptable under the reading *Leo went out and was absent for ten minutes*. Given the treatment we gave of telic verbs, two options are conceptually possible: (a) there is an operator (analogous to TELIC and UNFINISHED) which is able to shift the actionality of telic verbs, transforming them into states; (b) there is a second entry for *per/for* which is able to modify only the resulting state without changing the actionality of the event. Hypothesis (a) cannot work, as achievements with a *for*-adverbial over the resulting state still behave as achievements, not as states. For instance, they are compatible with the progressive:

(73) Sto uscendo per una decina di minuti.
 Am going out for a ten minutes.
 ‘I am going out for ten minutes.’

As to hypothesis (b), the following arguments can be provided to support it:

Cross-linguistic evidence. As noted by Moens and Steedmann (1988), while languages such as Italian and English have a unique preposition to express the meaning associated to both standard *for*-adverbials (let’s call them *for*₁-adverbials) and *for*-adverbials over resulting states (*for*₂-adverbials), other languages, such as Spanish, French and German specialize these two uses by means of different prepositions:

(74) a. Il est sorti pour trois minutes
 b. Il á marché pendant deux heures

(75) a. Salió para dos minutos
 b. Caminó durante dos horas

(76) a. Johann verliess für einige Minuten das Zimmer
 b. Johan ging zwei Stunden lang.

Syntactic evidence. In Italian *for*₂-adverbials behave in a different manner w.r.t. *for*₁-adverbials. For instance, while *for*₁-adverbials can naturally appear in a preverbal position, *for*₂-adverbials are usually ungrammatical in the same position:

(77) a. Per due ore ha corso, poi è andato a riposarsi.
 For two hours has run, then is gone to rest
 ‘He ran for two hours, then he rested.’
 b. * Per due anni è partito, poi è tornato e si è messo a
 For two years is left, then is come back and SI-Clit is started to
 lavorare.
 work
 ‘For two years he left, then came back and started to work.’

Moreover *for*₂-adverbials show a clear tendency to appear after the constituent instantiating the resulting state, if present. For instance (78a) is more readily interpreted as a case of *for*₁ modification, while (78b) is acceptable under both readings:

- (78) a. E' corso per 10 minuti a casa.
 Is run for 10 minutes at home
 'He ran for ten minutes home.'
- b. E' corso a casa per 10 minuti.
 Is run at home for ten minutes
 'He ran home for ten minutes.'

Providing an explanation for these facts is obviously beyond the scope of this work. Suffices it to say that there are syntactic tests by which *for*₁ and *for*₂ can be distinguished.

Semantic evidence. There is a well-known semantic difference between *for*₁ and *for*₂ modification in terms of the constraints they impose on the type of event they modify. While *for*₂ can only modify reversible final states, this is not the case with *for*₁ (even though quantifying over a never ending state always produces pragmatically strange results), as the following contrast shows:

- (79) a. * L'universo ha avuto origine per almeno due miliardi di anni.
 The universe has had origin for at least two billions of years
 'The universe came into existence for two billions of years.'
- b. L'universo è esistito per almeno due miliardi di anni.
 The universe is existed for at least two milliards of years
 'The universe existed for at least two milliards of years.'

Here, we assume that the resulting state of the predicate *avere origine* in (79a) is a state of *existence*, the same state which is in the denotation of the verb *esistere* in (79b). Thus, since the *for*-adverbials in (79) necessarily range over a state of the same type, the different degree of acceptability of (79a) and (79b) cannot be explained without resorting to the hypothesis that two different kinds of *for* are in fact involved.

We consider these pieces of evidence to be a sufficient prove that a lexical ambiguity analysis is superior to a type coercion analysis. We will avoid, however, to introduce another predicate with an autonomous interpretation, such as *for* in (69), but will rely on different semantic traslations of the words *per/for*:

- (80) a. *for*₁ translates as $\lambda I \lambda P \lambda s. [P(s) \wedge for(s, i) \wedge I(i)]$
- b. *for*₂ translates as $\lambda I \lambda P \lambda s. [P(s) \wedge REV(P) \wedge \exists s' [s \sqsubset_s s' \wedge P(s') \wedge for(s', i) \wedge I(i)]]$

In prose, (80b) states that a *for*₂-adverbial takes a reversible predicate and measures the length of a situation which includes it and for which the same predicate holds. Since the definition of *for*₂ is based on the semantic definition of *for*, the predicate has to be homogeneous. Moreover, as we will see shortly, the predicate *REV* is defined only for predicates of state, thus both *s* and *s'* have to be states. The reason why, in (80b), *for* predicates of a situation *including* the λ -abstracted situation is straightforward: if we were to impose a duration to the latter, the operator TELIC, which restricts it to be atomic, would always fail to apply.

Obviously, together with the above semantic translation of *for*₂, we are making some syntactic assumptions, namely the one according to which *for*₂-adverbials can only be adjoined to an inner VP projection. This seems to be justified by the impossibility for them to appear in a non topicalized sentence initial position (77b) and by their preferential attachment to the right of the constituent denoting the state, if any, (cf. the contrast in (78)). A possible representation of a VP such as *uscire per dieci minuti* ('go out for ten minutes') is provided in fig. (4)

Let us now consider the predicate *REV* which plays a crucial role in ruling out sentences such as (79a). We propose the following definition (where *q* is a variable over states):

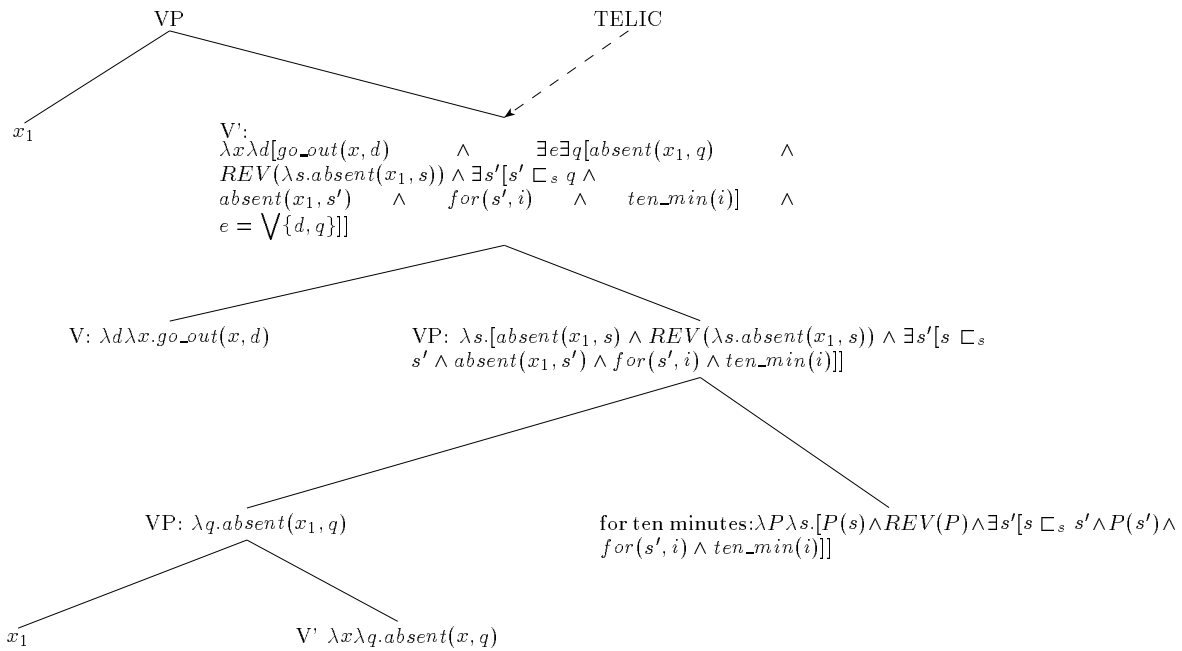


Figure 4:

$$(81) \text{ REV}(S) \text{ iff } \forall q [S(q) \rightarrow \diamond \exists i [\tau(q) \prec i \wedge \neg \exists q' [S(q') \wedge \tau(q') = i]]]$$

In prose: a predicate S is reversible if and only if it is true of a certain state and there could be an interval in its future such that the same predicate would not be true for any of the states holding in that interval. For instance the predicate $\lambda s. dead(john, s)$ does not satisfy this condition by virtue of the fact that one part of the definitory conditions of the predicate *dead* is the clause according to which once you are dead you are dead forever. Thus all we need to account for the ungrammaticality of (82a) is a meaning postulate like the one in (82b):

- (82) a. * Leo é morto per due anni
 Leo is died for two years
 ‘Leo died for two years.’

$$b. \forall x \forall s [dead(x, s) \square \rightarrow \forall i [\tau(s) \prec i \rightarrow \exists s' [dead(x, s') \wedge \tau(s') = i]]]$$

As the reader can easily prove, $REV(\lambda s. dead(john, s))$ and the meaning postulate in (82b) generate a contradiction, hence the ungrammaticality of (82a)²¹. Concerning the

²¹Pustejovsky (1988) seems to be inclined to assume that such a reversibility condition is in fact due to pragmatic matters, as the following example should prove:

- (i) My SPARC died for two days

The same thesis is assumed in Egg (1995) (1995), where the failure of *for*-adverbials over non reversible resulting states is explained in term of informativeness. It is not informative to specify a part of the duration of a never ending state. Such hypothesis has however to face the problem that no pragmatic condition can rescue a sentences such as (ii), as we should expect if the problem with (ii) were only a pragmatic one:

- (ii) * Mary won the race for three months

Moreover, the same uninformaticiveness is present in sentences containing stative verbs such as

- (iii) Once you are dead you are dead at least for three months

with the difference that when I utter (iii), I assert something fairly stupid, whereas when I utter (ii) I utter something wrong. Under Eggs’ account, there is no room to understand such a difference, for (ii) and (iii) should be ruled out by virtue of the same pragmatic principle.

Our explanation of the grammaticality of (21) thus relies on lexical ambiguity: the state resulting from a machine “dying” and from a man dying is simply of a different type (say $dead_1$ and $dead_2$), with different meaning postulates associated.

The same fact can be observed with the verb *win*:

use of the modal operator of possibility in (81), its introduction stresses the fact that for a predicate to be reversible it is enough to have a *possible* world were it stops being true. An actual state can be true forever in the actual world, and still the associated predicate be reversible. This modal characterization of reversibility is required to capture the perfect grammaticality of sentences such as:

- (83) Leo è partito per sempre.
 Leo is left for ever
 ‘Leo left forever.’

Without the possibility operator in (81), (83) should count as a contradiction: (81) would say that the state of being absent must have a conclusion, but the *for*₂-adverbial in (83) would state the contrary. In our formulation this is not the case. What the reversibility condition states is that there could be a world where Leo comes back, even if such a world does not coincide with the actual one. Conversely the impossibility of:

- (84) * Leo ha mangiato la mela per sempre
 Leo has eaten the apple for ever
 ‘Leo ate the apple forever.’

is accounted for by assuming that the fact that “once something is consumed, it is consumed for ever” is a necessary condition for the predicate *being_consumed* to be applied. There is simply no world where something which is consumed stops being consumed. Thus a contradiction is generated every time a *for*₂-adverbial applies.

4.2.2 *Da* Adverbials

We have seen in section 2.3 that *da*-adverbials when used with telic events have a double semantic import:

- they testify that the resulting state still holds true at the reference time;
- they measure the duration of the resulting state.

The same features hold with respect to *da*-adverbials when used with homogeneous events, i.e. state and processes, the only difference being that in this case an imperfective inflection is used, rather than a perfect tense. Thus, the following inference can be drawn, where we assume that *being ill* is the state resulting from an event of *getting ill*:

- (85) Mi sono ammalato (COMP-PAST:pf.) da due anni
 MI-Clit am become ill since two years
 → sono ammalato (SIMP-PRES:ipf.) da due anni
 → I am ill since two years

‘I became ill two years ago → I have been ill for two years’

It would be surprising if the preposition *da*, used with homogeneous events, turned out to be different from the preposition *da* used with telic events. In fact, the only data arguing against such a unification comes from the consideration that, even when they refer to the same situation, as in (85), telic events and homogeneous events have different verbal inflections, i.e. perfective and imperfective respectively. Could we turn this difference into a proof of the need for a unitary treatment of *da*-adverbials, rather than being an objection against it? Assume the following semantics for *da* :

-
- ((iv)) a. * Mary won the race for two month
 b. Mary won a car for two month

Here, again, pragmatics seems to play no role: the event described in (iv.a) can have, as a pragmatic resulting state (or *aftermath* in Eggs’ terminology), the possession of a car, as in (iv.b). However, the contrast between the two sentences still persists. This proves that it is not pragmatics that is at stake here, but lexical semantics: whereas the resulting state of the verb *win* used with an eventive direct object is irreversible (*being the winner of a certain competition*, i.e. a state which persists all life long), the resulting state of the same verb, when it subcategorizes for an object or an amount, is reversible (*possession*, i.e. a state which can be alienated).

$$(86) \text{ da}(s, i) \text{ iff. } \exists s'[\text{for}(s', i) \wedge (s = s' \vee \text{cons_state}(s, s')) \wedge \text{final}_i(i_r, i)]$$

Here i_r is the reference time and final_i is a relation which holds between an interval and its final subintervals ($\text{final}_i(i_r, i)$ means i_r is a final subinterval of i); cons_state is a predicate denoting a set of pairs of situations such that $\langle s, s' \rangle \in \text{cons_state}$ if and only if s' is a state caused by (being a consequence of) the event s . In prose, (86) states that a *da* relation between a situation s and an interval i holds if and only if the reference time is a final segment of i and there is a situation s' which holds *for*²² i and it is either equal to s or a consequent state of s . The first disjunct is aimed at covering the use with imperfective tenses, whereas the second one deals with the cases where a *da*-adverbial is used in conjunction with perfective tenses. Let us see how.

The first fact which follows from the definition in (86) is that *da* adverbials can be used with homogeneous events. For instance in a sentence such as

- (87) Leo è depresso da due anni.
 Leo is depressed since two years
 ‘Leo has felt depressed for two years.’

we will obtain

$$(88) \exists s[\text{being_depressed}(\text{leo}, s) \wedge \text{da}(s, \text{3_years})]$$

which is true iff:

$$(89) \exists s[\text{being_depressed}(\text{leo}, s) \wedge \text{final}_i(i_r, \text{3_years}) \wedge \text{for}(s, \text{3_years})]$$

Where i_r stands for *now*. In this case, since the reference time is included in the whole event (from $\text{final}(i_r, i)$ we infer $i_r \sqsubseteq_t i$ and from the semantics of *for* we infer $i \sqsubseteq_t \tau(s)$), the use of the imperfective aspect (which we standardly assume to be semantically represented as $i_r \sqsubseteq_t \tau(s)$) is fully justified. Could it be otherwise? Or, in other terms: do we have a justification for the oddness of (90)?

- (90) ?? Leo è stato depresso da due anni.
 Leo is been depressed since two years
 ‘Leo felt depressed for two years.’

²²The use of the predicate *for* guarantees the downward monotonicity of *da*-adverbials. It may be disputed, however, if we really want *da*-adverbials to be downward monotonic. On this respect the judgements of the speakers are controversial. While they do not have any problem in accepting a dialog such as (i-a), the inference in (86b) is rejected by many of them, even by those who accept (86c):

- ((i)) a. -A: Sei in casa da due ore?
 -A: Are you at home since two hours?
 ‘Have you been at home fr two hours?’ -B: Sì, sono in casa da tre ore.
 -B: Yes, I am at home since three hours.
 ‘Yes, I have been at home for three hours.’
 b. Leo è in casa da quattro ore, dunque è in casa da tre ore.
 Leo is at home since four hours, thus he is at home since three hours.
 ‘Leo has been at home for four hours, thus he has been at home for three hours’
 c. Leo è stato a casa per quattro ore, dunque è stato a casa per tre ore.
 Leo has been at home for four hours, thus he has been at home for three hours.
 ‘Leo was at home for four hours, thus he was at home for three hours’

The fact is that certain speakers, the one who do not accept (i-b), tend to interpret *da*-adverbial as measuring the *exact* amount of time that elapsed since the relevant state became true. Two explanations are then available. On the one hand, we may claim that *da*-adverbials are downward monotonic, thus explaining the oddness of (i-b) as a violation of the gricean maxim of quantity; on the other hand, we may claim that they are *not* monotonic, and we admit that in contexts such as (i-a) the *da*-adverbial is not interpreted *literally*. Under the latter hypothesis we have to replace (86) with the following:

$$(ii) \text{ da}(s, i) \text{ iff. } \exists s'[\tau(s') = i \wedge \text{hom}(s') \wedge (s = s' \vee \text{cons_state}(s, s')) \wedge \text{final}_i(i_r, i)]$$

Since this issue is beyond the scope of this paper, we will not take issue on whether (86) or (ii) should be adopted.

Since here a perfective aspect is used, we have to add the constraint $\tau(s) \prec i_r$ (the interval when the state of depression occurred precedes *now*), which immediately causes the failure of the first disjunct of the clause ‘ $s = s' \vee \text{cons_state}(s, s')$ ’ in (86) (indeed, we would impose that i_r be at the same time part of $\tau(s)$, by virtue of the predicate *final_i*, and anterior to it). The second disjunct is still available, in which case we should interpret (90) as: *the state caused by Leo’s depression is still active at the reference time and lasted at least two years*. The reason why such an interpretation is hardly available lies in the fact that :

- It is hard to conceive a non trivial state (cf. footnote 12) resulting from a state of depression.
- Even if such a non trivial state is found, it has to be “conversationally relevant” at the reference time, otherwise the use of a simpler temporal location adverbial would be preferred²³:

(91) Leo è stato depresso due anni fa.
 Leo is been depressed two years ago
 ‘Leo felt depressed two years ago.’

If this pragmatically based explanation is on the right track, we should find contexts where the grammaticality of sentences containing a homogeneous verb in the perfect aspect with a *da*-adverbial increases. This is indeed the case: for instance, even if a sentence such as (92a) seems odd if pronounced out of the blue, it improves when it is cast in a context such as the one in (92b), where the pragmatically relevant consequent state is the knowledge of German.

- (92) a. * E’ stato in Germania da due anni.
 Is been in Germany since two years
 ‘He was in Germany two years ago.’
- b. ? Incredibile: è stato in Germania da solo due anni ed ha già
 Incredible: is been in Germani since only two years and has already
 dimenticato il tedesco.
 forgotten the German
 ‘Incredible: he was in Germany only two years ago, and he already forgot German.’

The same holds with respect to the following pair, where a notion crucially involving world knowledge is responsible for the different acceptability (the fact that after a cold you reach no kind of immunity, whereas once you have got the measles you are immune for ever):

- (93) a. ?? Ha avuto il raffreddore da due anni.
 Has had the cold since two years
 ‘He had the cold two years ago.’
- b. Ha avuto il morbillo da due anni.
 Has had the measles since two years
 ‘He had the measles three years ago.’

The possibility of having *da*-adverbials applying on the same verbal stem with perfective and imperfective aspect, with obvious differences in meaning, becomes clear when considering the class of accomplishments. Consider first the imperfective case:

²³Krifka (1989) rephrases Grice’s maxim ‘Be brief’ in the following way:

Pragmatic Rule II: If two expressions are equally informative, and one is more complex than the other, then choose the one which is less complex.

- (94) Giovanni corre a casa da due ore.
Giovanni runs at home since two hours

‘Giovanni has been running home for two hours.’

The second member of the disjunction ($s = s' \vee \text{cons_state}(s, s')$) in (86) is excluded: from the semantics of *for* (which is part of the definition of *da*), we infer that $i \sqsubseteq_t \tau(s')$ and from the semantics of *final_i* we infer that $i_r \sqsubseteq_t i$; thus, by transitivity, $i_r \sqsubseteq_t \tau(s')$. However s' is the consequent state of the main event s , thus $s \prec s'$. From $i_r \sqsubseteq_t \tau(s')$ and $\tau(s) \prec \tau(s')$ we infer that $\tau(s) \prec i_r$, which contradicts the semantics of imperfective ($i_r \sqsubseteq_t \tau(s)$). Thus, only the first member of the disjunction is active, namely the one applying the semantics of the *da*-adverbial directly to the event, not to its consequent state. The modified event, however, has to be homogeneous, as required by the semantics of *for*, a constraint which is not satisfied by an accomplishment under the default application of the operator TELIC. Thus, as in the case of progressive, another operator can apply, namely UNFINISHED. The logical form of (94) would therefore be (expanding the definition of *da*):

- (95) $\lambda x \lambda d \exists i [\text{running}(x, d) \wedge \text{final}(i_r, \text{two_hours}) \wedge \text{for}(\text{two_hours}, d) \wedge \diamond \exists e \exists q [\text{at}(x, \text{home}, q) \wedge e = \vee \{d, q\}]]$

Now, since the resulting state occurs within the modal operator \diamond , the typical effects of the *imperfective paradox* should arise. This is indeed the case, as the following pattern exemplifies:

- (96) a. Giovanni corre a casa da due ore \nrightarrow Giovanni è corso a casa
Giovanni runs at home since two hours \nrightarrow Giovanni is run at home
‘Giovanni has been running home for two hours \nrightarrow Giovanni ran home’
- b. Giovanni corre a casa da due ore \rightarrow Giovanni ha corso.
Giovanni runs at home since two hours \rightarrow Giovanni has run
‘Giovanni has been running home for two hours \rightarrow Giovanni ran.’

If we are on the right track we should expect this derivation to be impossible with achievements. Indeed, the operator UNFINISHED would only make an atomic change available for *da* modification, but an atomic change cannot be modified by a durative adverbial. This is confirmed by the data:

- (97) * Lia lascia Leo da tre minuti.
Lia leaves Leo since three minutes

If a *da*-adverbial is used with a telic verb in combination with the perfect aspect, as in

- (98) Leo è partito da due anni.
Leo is left since two years
‘Leo left two years ago.’

it must be the second member of the disjunction that is true, as the first one in this case would generate a contradiction. From the semantics of *for*, we infer that $i \sqsubseteq_t \tau(s)$ and from the semantics of *final_i* we infer that $i_r \sqsubseteq_t i$; thus, by transitivity, $i_r \sqsubseteq_t \tau(s)$. However the perfect aspect imposes $\tau(s) \prec i_r$, and a contradiction is generated. Thus the only way in which (98) can be true is under the reading *the consequent state of Leo’s departure, namely Leo’s absence, lasted at least two years and still holds at the reference time*. The reason why telic events are always possible with *da*-adverbials is due to the fact that the *resulting state* specified in their lexical semantics is always a consequent state too, as the following postulate guarantees:

- (99) $\forall s \forall s' [s \Rightarrow s' \rightarrow \text{cons_state}(s, s')]$

Thus all events denoted by achievements and accomplishments have a consequent state *by definition*²⁴. Obviously, as we have seen, such a resulting state has to be “conversationally relevant”, otherwise a simple temporal location adverbial is preferred. Consider for instance the following contrast:

- (100) a. Ho comprato la macchina da due mesi.
 Have bought the car since two months
 ‘I bought my car two months ago.’
- b. ?? Ho comprato la macchina da dieci anni
 Have bought the care since ten years
 ‘I bought my car ten years ago.’

The contrast between (100a) and (100b) can be hardly explained on a purely semantic ground: both sentences force the consequent state (the car’s possession) to be still true at the reference time, the only difference being the duration of the resulting state (two months vs. ten years). The point is that while the state of having a new car is something worth speaking about two month after the purchase, it is not easy to see how it can maintain a pragmatic relevance after ten years. However, since pragmatics is at stake here, it is possible to find contexts where (100b) becomes perfectly acceptable:

- (101) Ho comprato la macchina da dieci anni, ed ancora non mi hanno
 Have bought the care since ten years, and yet not to me have
 inviato il libretto di circolazione
 sent the document of circulation
 ‘I bought my car ten years ago, and I haven’t yet received its identification card.’

We have seen so far that *da*-adverbials are always possible with achievements and accomplishments with perfective aspect, since the presence of a lexically specified resulting state guarantees the presence of a consequent state. Pragmatics only intervenes in guaranteeing that such a state is still relevant at the reference time. With punctual events,

²⁴One could object that since consequent states are not unique (there could be more than one consequent state for a single event), nothing guarantees in our system the validity of the inference according to which, for instance,

- (i) Sono partito da due anni → sono assente da due anni
 Am left since two years → Am absent since two years
 I left two years ago → I have been absent for two years

Indeed, there could be a state *s'* which is a consequent state of the leaving event, but which is not in the denotation of the predicate *being absent*. Remember that we found an analogous problem in the treatment of *in*-adverbials, where the preparatory process for accomplishments was contextually determined, thus not necessarily the one specified by the lexical semantics of the verb. In that case, we found that the preparatory process was *preferentially* the one specified by the lexical semantics of the verb (for obvious reasons), but exceptions were possible. Here we are facing the same problem, and, if the solution we gave in section 4.2.1 is on the right track, we should be able to find examples which reveal the defeasibility of inferences such as (i). Consider for instance:

- (ii) La prima spia d'emergenza si è accesa ormai da venti minuti e nessuno è
 The first light of emergency SI-Clit is turned on already since twenty minutes and nobody is
 ancora venuto ad aiutarci.
 yet come to help us

‘The first emergency light turned on twenty minutes ago, and till now nobody came to help us.’

In this sentence there is nothing which forces us to believe that the first emergency light is still on: in this case pragmatic considerations force us to assume that the most relevant situation resulting from the turning on of the emergency light is not the state of the light being on, but the *emergency state*. Thus the semantics of *da* will measure the duration of such a state, which has to be true at the reference time. In this case contextual information forces the recovery of a consequent state which was not specified by the lexical semantics of the main predicate. Our semantics predicts such a possibility, even though the context has to be strong enough to make lexical semantics pragmatically irrelevant. Anyway, to account for the judgement of those speakers which do not accept (ii) and believe that inferences such as the one in (i) are indefeasible, we only need to assume that the relation *cons_state* is in fact a function (i.e. for every event *s* there is a unique state *s'* such that *cons_state(s, s')*).

on the contrary, we should find a situation very close to the one that is typical of homogeneous events. Since their lexical semantics does *not* guarantee the presence of a resulting state, the context alone should force the presence of a consequent state. Thus, it should be possible to find examples where *da*-adverbials are impossible, for the context is not strong enough to determine a consequent state. Moreover, such contexts should be rather frequent, for punctual events have been conceptually characterized in section 3.3 as kinds of events which have very poor consequences in the world. This prediction is confirmed by empirical data:

- (102) a. ?? Lia ha sbagliato da due ore.
 Lia has failed since two hours
 ‘Lia made a mistake two hours ago.’
- b. ?? Leo si è meravigliato da tre minuti
 Leo SI-Clit is amazed since three minutes
 ‘Leo got amazed three minutes ago.’
- c. ?? Il proiettile ha colpito il bersaglio da cinque minuti.
 The bullet has hit the target since five minutes
 ‘The bullet hit the target five minutes ago.’

Note that we are not just speaking of *actual* consequences, as almost any event has consequences of some kind (at least they have trivial consequences). The consequences which *da*-adverbials measure should also be understandable by the hearer by virtue of its world knowledge. Even though I know that my *hitting on the table* had great consequences on the mental stability of my neighbor, this is not a consequence which can easily be understood by my hearers. Thus I cannot utter a sentence such as

- (103) * Ho battuto sul tavolo da venti minuti.
 Have tapped on the table since twenty minutes
 ‘I tapped on the table twenty minutes ago.’

as nobody would be able to infer which kind of consequent state I intend to predicate. However, if I am speaking to my children and they know that, when I hit the table, this is a signal for them to bring me their homeworks, a sentence such as (103) becomes perfectly acceptable: we all share the knowledge that my hitting on the table triggers the consequent state of me waiting for their homeworks. Thus, the reason why certain sentences containing punctual verbs and *da*-adverbials are acceptable out of the blue is that there is a socially shared world knowledge which immediately helps to identify the kind of resulting state the speaker is referring to. For instance the full acceptability of:

- (104) La prima bomba atomica è esplosa da quarant’anni.
 The first bomb atomic is exploded since forty years
 ‘The first atomic bomb exploded forty years ago.’

is justified by the fact that our world knowledge tells us that the explosion of the first atomic bomb was the beginning of a new era for human history. Everyone is able to identify the kind of consequent state the *da*-adverbial is measuring in (104)²⁵.

²⁵An analogous case is represented by the behaviour of certain tenses in subordinate clauses. Bertinetto (1986, 474-475 and 502-503) claims that punctual verbs cannot be used with tenses such as the Compound Future (corresponding to the English Future Perfect) or the Pluperfect II (traditionally called “Trapassato Remoto” in Italian grammars and “Passé Antérieur” in French ones). As an example, he provides the following:

- ((i)) a. * Nonappena si fu spaventato, lanciò un urlo. /punct./
 As soon as SI-Clit was frightened, sent a shout
 ‘As soon as he became frightened, he shouted.’
- b. Nonappena si fu accorto della cosa, lanciò un urlo. /achiev./
 As soon as SI-Clit was realized about the thing, sent a shout

4.3 Reducing the Ambiguity to Underspecification

As the reader has surely noted, many of the punctual verbs we presented through the preceding sections display some actional ambiguity. For instance verbs such as *toccare*, *vedere*, *rispondere* are ambiguous between a punctual and a stative reading, depending on the syntactic-semantic context. For instance the verb *toccare* denote a punctual event in (105a) and a state in (105b)

- (105) a. Se tocchi il fuoco ti scotti.
 If touch the fire yourself burnt
 ‘If you touch the fire, you will burn yourself.’

‘As soon as he realized the matter, he shouted.’

- ((ii) a. ?? Nonappena fu caduto, sentí un tremendo dolore alla spalla. /punct./
 As soon as was fallen down, felt a terrible pain at the shoulder
 ‘As soon as he had fallen down, he felt a terrible pain on his shoulder.’
 b. Nonappena si rese conto di essere caduto, sentí un tremendo dolore alla spalla. /achiev./
 As soon as SI-Clit made aware of beeing fallen down, feeled a terrible pain at the shoulder
 ‘As soon as he realized that he fell down, he feeled a terrible pain on his shoulder.’

However, Alonge (1994, 170) correctly observes that one may enrich these contexts in such a way that the sentences become acceptable, as in:

- (iii) Solo quando ti sarai sorpreso *per qualcosa* penseró che non sei del tutto cinico
 Only when TI-Clit will be surprised for something will think that not are at all

cynic

‘Only when you will get struck by something I will think you are not completely cynic.’

- (iv) Dopo che mi fui spaventata *per la seconda volta* per quel rumore improvviso, andai a dirgli di smettere.
 After that MI-Clit was scared for the second time for that noise sudden, went to say him to stop

‘After having been frightened for the second time by that sudden noise, I said him to stop it.’

Alonge uses this argument to suggest that the class of punctual verbs has no theoretical status in the grammar of actionality. We propose here a different analysis of this datum. The fact that is worth noting here is that these enrichments of the context (see in particular the italicized portions) seem to indicate that the constraint affecting the usage of punctuals with the Compound Future and the Pluperfect II may be circumvented, whenever a pragmatically relevant consequent state may be recovered. Thus, a better generalization to be stated in this connection (at least w.r.t. the Compound Future, for the Pluperfect II has additional constraints, as we shall soon see) is that these tenses require the verb to incorporate a consequent state, rather than a genuine resulting state as claimed in Bertinetto (1986). In other words, it is not strictly necessary for the verb to be telic, in order for these tenses to be licenced. Indeed, even states may be used in the appropriate contexts:

- (v) Solo quando sarai stato in Germania riuscirai a parlare bene il tedesco.
 Only when will be been in Germany will be able to speak well the German
 ‘Only when you will have been in Germany you will be able to speak German well.’

- (vi) Dopo che ebbe avuto l’epatite A, si mostró sempre molto cauto nel suo comportamento alimentare.
 behaviour alimentary
 ‘After having got hepatitis A, he was always very careful about his alimentary behaviour.’

Moreover, contrary to what claimed in Bertinetto (1986), telicity as such is not a sufficient condition for the use of Pluperfect II, as shown by:

- (vii) ? Dopo che ebbe cotto la bistecca, la serví.
 After that had cooked the steak, it served
 ‘After having cooked the steak, he served it.’

- b. L'armadio tocca la scrivania
 The closet touches the desk
 'The closet touches the desk.'

Other verbs are even more idiosyncratic: for instance *ricevere* denotes an achievement when it is used in the standard sense of *getting in possession of*, while it denotes a punctual when its direct object denote an event. Thus, while *ricevere un premio* is an achievement VP, *ricevere un ceffone* passes all the tests for punctuality.

These cases are, in our opinion, genuine cases of lexical ambiguity. Indeed, at the best of our knowledge, there is no semantic criteria to sort out exactly the class of verbs which participate in such alternations. If, however, we were to find an alternation which involves punctual verbs in an almost systematic way, we should consider whether our semantics is adequate to handle it in a proper way. By *proper way* we mean a treatment which avoids the use of nonmonotonic devices such as rules of lexical redundancy: the mere stipulation that there is a device in the grammar converting a verb of type A into a verb of type B is just a surrender to the impossibility of finding an explanations for *why* there is such an alternation.

Actually, such a nearly systematic alternation does exist. Indeed, to most of e-punctual verbs there corresponds a homophonous form, denoting a process constituted by the repeated occurrence of the event designated by the e-punctual predicate. For instance: *saltare*, ('jump') *starnutire* ('sneeze'), *tossire* ('cough'), *sparare* ('shot'), *battere* ('beat'), *bussare* ('knock'), *singhiozzare* ('hiccup'), *urlare*, *gridare* ('shout'), *pugnalare* ('stab')... The double nature of these verbal predicates can be demonstrated by the fact that they can occur with adverbials presenting a contrasting meaning. For instance:

- (106) a. Improvvisamente sparó.
 Suddenly shot
 'Suddenly s/he shot.'
- b. Sparó per cinque minuti di fila.
 Shot for five minutes uninterruptedly
 'S/He shot for five minutes uninterruptedly.'

Before trying to sketch out our treatment for this alternations, we have first to get rid of the doubt that the process reading in (106b) is obtained by some coercion operator, possibly of the kind we introduced to handle telic events with the progressive form. This is

-
- (viii) ? Nonappena ebbe scritto la tesi, partí per le vacanze.
 As soon as had written the dissertation, left for the holidays
 'As soon as he had written his dissertation, he left on holiday.'

- (ix) * Allorché fu morto, i parenti iniziarono la ricerca del testamento.
 As soon as was died, the relatives started the quest of the testament
 'As soon as he died, the relatives started the quest for the testament.'

This proves that other factors are involved. It is important to realize, as a general precondition, that the Pluperfect II imposes a strict temporal adjacency of event time and reference time. Presumably, (vii) shows that the kind of consequent state that holds between dependent and main clause must be pragmatically salient, as we noted when discussing examples such as (100). Indeed, (vii) would become perfectly acceptable if the main clause were as follows: *si accorse di averla condita con strutto avariato anziché con burro* ('he realized that he had seasoned it with stunk fat rather than butter'). As to (viii), however, the way to improve it would consist in modifying the dependent clause as in: *nonappena ebbe finito di scrivere la tesi* ('as soon as he finished-Ppf-II writing the thesis'). This suggests that even with accomplishments it is often useful to introduce an explicit indication of the final limit of the event. Sentence (ix) is more intriguing, for none of the preceding explanations seem to work. Note that what is at stake here cannot be a purely morphological restriction, because the auxiliary *essere* with the Pluperfect II is perfectly acceptable with: *nonappena fu partito* ('as soon as he left-Ppf-II'). Possibly, we have to admit the existence of lexical idiosyncrasies. Indeed, there is no apparent reason why ? *nonappena fu arrivato* ('as soon as he arrived-Ppf-II') should be any less acceptable than *nonappena fu partito*; yet, this is exactly what we observe.

In conclusion, it is fair to state that Pluperfect II is not a decisive test for characterizing the class of punctual verbs, whereas the Compound Future works as a "consequent state indicator", in the same fashion as *da*-adverbials.

indeed a possibility, because *for*-adverbials may force an iterative reading of achievements and accomplishments through a mechanism of event quantification of the kind explored in Moltmann (1991), or through an iteration operator such as the one introduced by Krifka (1989). For instance, an achievement such as *partire* can be forced in (107) to denote a sequence of leaving events:

- (107) Per molti anni sono partito alle 7,30.
 For many years am left at the 7,30
 ‘For many years I used to leave at 7,30.’

However, we think that this is not the case in (106b): if the iterative reading were generated as a coercion induced by the *for*-adverbial, we should expect e-punctual predicates with the perfective form without *for*-adverbials to be unambiguously interpreted as single events. This, however, is contradicted by the data. A sentence such as (108) is ambiguous between a reading such that I performed a single shooting event and one such that I was involved in a sequence of shootings:

- (108) Oggi ho sparato.
 Today have shot
 ‘Today I shot.’

We conclude, therefore, that we are facing here a genuine case of ambiguity.

There is a particularly vital trend in the field of lexical semantics (Pustejovsky, 1995, Pustejovsky,) and lexicalist theories of the grammar (Kathol, 1992, Dini and Busa, 1994), which tends to reduce as far as possible lexical ambiguity to lexical underspecification. This reduction is welcome both from a computational and from a cognitive point of view, as proven by Pustejovsky (1996). Now, if our theory of events is on the right track, we should be able to derive the double nature of e-punctual verbs: (i) without postulating any lexical ambiguity; (ii) without resorting to lexical rules (Stanley, 1967, Jackendoff 1975, Bresnan, 1982), which constitute a spurious device in the organization of the grammar. This is achieved through underspecification. The reader will remember from section 3 that the only constraint distinguishing the definition of e-punctuals from that of processes is a condition on the cardinality of the set of events forming the main event:

- (109) a. $\forall e[\text{proc}(e) \leftrightarrow \exists X[e = \bigvee X \wedge X \subseteq D \wedge |X| > 1]]$
 b. $\forall e[\text{e-punct}(e) \leftrightarrow \exists X[e = \bigvee X \wedge X \subseteq D \wedge |X| = 1]]$

It is immediately clear that, by omitting such a specification, we obtain an actional class which is by definition ambiguous between process and e-punctuals:

- (110) $\lambda e \exists X[e = \bigvee X \wedge X \subseteq D]$

This is exactly the skeleton of the lexical entry of a verb such as *sparare*. When it appears in the scope of a *for*-adverbial, the cardinality of the set X is forced to be bigger than one (by the condition that events modified by *for*-adverbials have to be non atomic), thus it behaves as a standard process. When it appears in the scope of an adverbial marking punctuality, such as *all'improvviso* (‘suddenly’), the single-event reading is forced. Finally, if none of these factors intervenes, we maintain the underspecified reading which is lexically assigned to a verb like *shoot*: there is a set of atomic events of shooting whose cardinality is left unspecified.

5 Conclusions

Abstracting from formal details, we think that the major conclusion of our research is that *actionality* can be properly defined as *the way in which events are composed out of smaller events*. We have proven that in order for this definition to be effective only a small set of assumptions concerning the domain of event semantics has to be made. As a side effect of this assumption we derived the existence of two actional classes which have never received much attention in the relevant literature: eventive punctuals and stative punctuals.

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