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## ON WAYS OF REPEATING

### ABSTRACT

The paper presents an analysis of event repetition as a manifestation of additivity in the ordered domain of events. A collection of iterative and aspectual adverbs belonging to different languages, such as English 'again', French 'encore' or Mandarin 'zai', can so receive a unified semantic analysis and be characterised as additive particles whose presupposition displays properties which are sensitive to the structural properties of the predicate, and which, in many cases, are predictable from the different syntactic positions where the adverbs occur. The content of the presupposition is computed via a conditional higher order equation. This solution makes room for two types of variation, i) in the heuristics a language may use for selecting material from the asserted clause, and ii) in the consequences of satisfying vs. accommodating a presupposition.

### RÉSUMÉ

Cet article fait l'hypothèse que la répétition d'événement en langue naturelle est une manifestation de l'additivité dans le domaine ordonné des événements. La discussion d'un éventail d'adverbes appartenant à des langues différentes (parmi lesquels le français 'encore', l'anglais 'again' ou 'zai' du chinois mandarin), permet de montrer que, suivant cette hypothèse, il est possible de définir une classe sémantique d'adverbes de répétition qui recoupe en partie les distinctions traditionnelles d'adverbes itératifs et aspectuels. Les adverbes de répétition sont ainsi définis comme des opérateurs qui déclenchent une présupposition dont la caractérisation dépend d'un côté des propriétés structurelles du prédicat et, de l'autre, de la position de l'adverbe à l'interface syntaxique. Le contenu de la présupposition est calculé au moyen d'une équation conditionnelle d'ordre supérieur, une solution qui permet de rendre compte de la variation dans la sélection du matériel presupposé, ainsi que des différences qui dérivent du choix d'adopter une stratégie d'accommodation ou de vérification dans le contexte.

### 1. Introduction

By saying that an event is repeated, the speaker presents it as a member of an ordered collection based on some common feature(s). Information that there is a form of repetition may be provided using different linguistic devices. Obvious questions to ask are whether this collection of events has a linguistically relevant status and, if so, what this status is and if it is the same when different devices are in action.<sup>1</sup> In this paper, we analyse the

distribution and the semantic content of a group of adverbs – such as *zai* in Mandarin Chinese, *encore* in French and *ancora* in Italian – that illustrate the phenomenon of event repetition, and we argue for a unified notion of repetition.<sup>2</sup> These items have various English counterparts. Depending on the context in which they occur, they may translate as *again*, *n more* or *still*, but not all of them at once. The coherence of this set of readings is not so well established in the literature. On the contrary, the distinction between so-called ‘repetitive adverbs’ like English *again* and German *wieder*, and ‘aspectual adverbs’, like English *still* and German *noch*, is widely agreed upon. *Again* and *wieder* – as well as their counterparts in various languages – have often been analysed as additive particles in the domain of events, whose contribution to the hosting sentence is presuppositional in nature (see for instance Dowty 1979, Kamp and Roßdeutscher 1994, von Stechow 1996, Beck 2005). Aspectual adverbs, on the other hand, have been mostly analyzed as polysemic operators interacting with scalar domains (König 1977, Löbner 1989, Michaelis 1993). When they modify a verbal predicate, aspectual adverbs interact with the linear order of time and seem sensible to the structural properties of the predicate, on which their presuppositional content strongly depends (Borillo 1984, Tovena 1996), even when they receive an analysis as additive items.

Drawing from the results of much pre-existing literature, our paper presents some arguments in favour of a unified semantic analysis for the group of adverbs of repetition under consideration and takes into account both lines of analysis adopted in the preceding literature. In particular, we propose to characterize both ‘repetitive’ and ‘aspectual’ adverbs as additive particles, but we also argue that the type of their arguments is sensitive to the aspectual and structural properties of the modified event, since the adverbs always interact with the ordering of time. We then propose to exploit higher order unification to treat the phenomenon of partial match among members of the alternative set triggered by adverbs of repetition.

## **2 Repetition**

### **2.1 The notion of repetition**

We start with the questions of what is meant by repetition and whether the effect produced by an adverb of repetition can be analyzed as a case of pluractionality. In general terms, if we take event repetition to be a case of mere addition to a non-empty domain, it could fall under the broader definition of event pluralization or pluractionality, see (Cusic 1981, Laca 2007) and references therein. It could be seen as a subcase of pluractionality with specific properties or as a different but related phenomenon, depending on the weight given to its peculiarities.

According to the definition proposed by Cusic (1981: 64-70), event plurality can be obtained either by repeating occurrences of an event type (by pluralizing it ‘externally’) or by implying a plurality of phases inside one event (‘internal plurality’), cf. (Tovena and Kihm, this volume). Pluractional marking involves in most cases lexical suppletion or morpho-phonological variation on the verbal root, such as reduplication, affixation or vowel alternation. In this paper we focus our attention on collections of events obtained via the use of adverbs that express some idea of repetition, and this kind of repetition is in all cases only an instance of external pluralization.

We adopt (1) as a working definition for adverbs of repetition.

- (1) An adverb of repetition does not modify in a direct way the assertive content of the sentence in which it occurs, but adds to its presupposed content the piece of information that there exists (at least) another event that temporally precedes the asserted one and shares with it some relevant property.

In the next three sections, we discuss in more detail some implications that such a definition brings in for the analysis. Plural collections are usually defined by means of the theoretical notion of set. Definition (1), on the contrary, contains three components that do not correspond to necessary or even usual characteristics of a set. First, a set is defined as an unordered collection, whereas we are going to argue that the collection built *via* repetition is ordered. Second, a set is defined by enumeration or using a property to decide membership. In the case at hand, we observe that the property used to describe a certain member and relevant for its identification is not necessarily the one used to build the set. Third, members do not enjoy equal status, because the existence of one is asserted and that of the others is presupposed. The last two components are closely related.

### *2.1.1 The order of events*

Eventualities are located in time and in this sense they can be said to belong to a domain that is intrinsically ordered. A temporal order between each instantiation in a plurality of events may often be implied, especially if the events are caused by the same agent or undergone by the same patient. However, language may choose to disregard the order when building the set. Indeed, this point appears clearly from Cusic’s classification. Pluractional verbs may primarily convey high number of occurrences or high intensity in performing an action. On the contrary, one of the main characteristics of event repetition is the relevance of the ordering relation between two events, and this ordering is determined by the order of time.

One can wonder whether the order is really due to the adverb or is a mere reflection of the fact that we are dealing with events. As a matter of fact, this

point has already been settled by Kripke (cited in Kamp and Roßdeutscher 1994), who provides the minimal pair in (2).

- (2) a. We will have pizza on Mary's birthday. So we should not have pizza on John's birthday too.  
 b. We will have pizza on Mary's birthday. So we should not have pizza again on John's birthday.

In (2b), the presence of *again* alone can legitimate the inference that John's birthday will occur after Mary's birthday, which is absent in (2a), where additive *too* occurs. The same inference is supported by other adverbs in their repetitive reading, e.g. English *still* or French *à nouveau* and *encore*.

### 2.1.2 The characteristic property

Sets are defined either by listing their members or by giving a criterion for membership. In the first case, the set may be a totally inhomogeneous collection. In the second case, at least one meaningful property is shared by all the members, by definition, and it is taken to be the relevant one in the given situation over and above any other property of the members, be it shared or not. On the contrary, the property used for characterizing the asserted event is not necessarily the same used to build the set of alternatives. The following examples illustrate this partial mismatch, see more in section 4.3.1. In (3a), the relevant type of event is his/her eating a fruit and not his/her eating an apple, and only one apple is eaten in total. In (3b), it is people's painting the house not just his painting it, whereas in (3c) it is precisely his painting the house (examples (3b,c) are from Cusic 1981).

- (3) a Ha mangiato una pera, poi ancora una mela  
 s/he ate a pear, then also an apple  
 b He painted the house again  
 c He painted the house again and again
- Italian

As we will see, what is the relevant type of event may also vary depending on whether the presupposition is overtly verified in the context.

### 2.1.3 Assertion vs. presupposition

The third component to recall for our definition of repetitive adverb is the various statuses of the members of the collection of events. More precisely, there is a member whose existence is asserted and one or more members whose existence is presupposed. The use of partially different properties for identifying the members discussed above is a consequence of these different

statuses. Non-shared properties can be mentioned in the description of asserted entities and are dropped from the description of presupposed ones, the so-called antecedents. Analogously, satisfying the presupposition by verification makes it possible to recover non-shared properties in the antecedents, contrary to the case of accommodation (van der Sandt, 1992), where added information is tightly constrained.

As an example where accommodation and verification do not lead to the same result, we briefly talk about Mandarin Chinese adverb *zai*, to which we will come back later on. As example (4) shows, when the preceding context is not immediately recoverable, the presupposition conveyed by the adverb is accommodated and the only interpretation available is that of the repetition of a preceding event, which is understood as analogous to the asserted one.

- |     |  |                       |
|-----|--|-----------------------|
| (4) | Wo xiang zai qu Xianggan.              | Mandarin <sup>3</sup> |
|     | I think ZAI go Hong Kong               |                       |
|     | I'm planning to go to Hong Kong again. |                       |

The complement of the verb affects the choice of the relevant property for presupposition, making it possible for *zai* to express a range of interpretations covered by the English items *again* and *more*. In case of verification in context, however, the verb phrase does not contribute material for the presupposition in a rigid way. The extreme case is the one in which the verb phrase does not contribute material at all, as in (5).

- |     |  |          |
|-----|--|----------|
| (5) | Dao le Nanjing Dasha duimian,  | Mandarin |
|     | Arrive ASP Nanjing palace in-front   |          |
|     | (xian) you zhuan, zai zuo zhuan, zai jie Huanshan daolu.   |          |
|     | first right turn ZAI left turn ZAI take Huanshan bd.   |          |
|     | 'Once arrived in front of Nanjing Palace, turn right, then turn left, and then take Huanshan Boulevard.' |          |

The asserted event does not share any explicitly mentioned property with the event mentioned in the immediately preceding context. The sentence is felicitous only if it is possible to build a scenario in which asserted event and antecedents can be understood within a comprehensive sequence of events. The case of *zai* will be discussed in more length in section 3.4, since the adverb undergoes specific restrictions also on the temporal location of asserted and presupposed event in the discourse.

## 2.2 A minimal characterisation

The semantic properties that, in our view, characterize the adverbs of repetition as a specific class among event modifiers can be summarized in the following two parameters.

1. Relevance of temporal ordering. The relative (and sometimes absolute) ordering of the two events in time seems to be at the core of the functioning of repetitive adverbs. The general picture is that the asserted event is the repeated one and it must follow the presupposed event(s). On top of this ordering, specific items can impose constraints on the positioning of the two events with respect to the time frame set by discourse, e.g. Mandarin Chinese *zai*, cf. section 3.4.

2. Existence of a shared property that characterizes the asserted event as being the repetition of the presupposed one. As it will be argued, the informative content of the shared property subsumes that of the property characterising the asserted event (extensionally, the subset relation is reversed). Its identification depends on context, argument complementation of the predicate and peculiarities of the adverbs.

### 3. Manifestations of repetition

In this section, we discuss several aspects of the repetition of events<sup>4</sup>. The class of ‘adverbs of repetition’ we work on is built via the intuition that all its members provide information that eventualities of the same type have been instantiated at different times. ‘Adverbs of repetition’ is therefore a cover term for the class of items that have a repetitive reading according to the definition given in (1) and section 2.2. It allows us to generalize over readings that are usually termed in distinct ways in previous work.

#### 3.1 The readings

Before discussing the criteria for the proposed classification of repetitive adverbs, let us make a brief point of terminology. The repetition of an event can give rise to at least four prominent readings, exemplified by sentences (6) through (9).

- |     |                                    |              |
|-----|------------------------------------|--------------|
| (6) | Mary washed the shirt again.       | REPETITIVE   |
| (7) | Mary is still washing shirts.      | CONTINUATIVE |
| (8) | Mary washed one more shirt.        | INCREMENTAL  |
| (9) | Mary washed the shirt clean again. | RESTITUTIVE  |

Sentence (6) conveys the meaning that Mary washed the shirt for at least the second time. This is the reading that is often labelled ‘repetitive’ in the literature. Repetition of events, in this sense, intuitively implies the occurrence of two or more distinct events of the same kind.

The reading exemplified in (7) is called ‘continuative’. Sentence (7) says that Mary began to wash shirts at a prior time and that she has been doing so without interruption up to the relevant time. The intuition is that at the end of her current washing there will be only one relevant washing event by Mary.

Sentence (8) exemplifies a reading called ‘incremental’, that we keep distinct from both repetitive and the continuative readings. Sentence (8) is felicitous if Mary has been washing shirts before. But the main difference with respect to the continuative reading is that at the end one will generally count more than one washing event by Mary. The incremental reading, thus, is characterized as an activity that is incremented by adding subevents measured along one dimension.

Finally, (9) is ambiguous. Besides the more natural repetitive reading of *again*, close to (6), (9) can receive an interpretation called ‘restitutive’, that can be paraphrased by saying that Mary restituted the shirt to its original state of being clean by washing it. It can be true, for instance, if Sophie stained her brand-new shirt and then Mary washed it clean again. Under this interpretation, there are no prior events of washing the shirt by Mary. Repetition, if any, applies only to the state of being clean.

### 3.2 Repetition of states and the notion of event: *again* and *still*

Adverbs with repetitive and continuative readings, e.g. *again* and *still* in (6) and (7), have generally been organized into the two separate semantic classes of ‘repetitive’ and ‘aspectual’ adverbs, as we recalled. They differ in distribution and semantic properties. It is generally assumed that an ‘aspectual’ adverb like *still* can combine with a predicate having a homogeneous structure, such as a state (10a) or a progressive (10b), yielding a continuative interpretation. Given this structural constraint, the adverb cannot combine with a telic event (10c)<sup>5</sup>, i.e. non homogeneous (Krifka 1998). Under the same assumption, a ‘repetitive’ adverb like *again* does not undergo such structural constraints (11).

- (10) a. Mary is still angry.  
 b. Mary is still washing the shirt.  
 c. \*Mary still washed the shirt.
- (11) a. Mary washed the shirt again.  
 b. Mary is angry again.

Notice that the ability of *again* to repeat a stative eventuality is implied also by analyses that treat the difference of ‘restitutive’ and ‘repetitive’ *again* as a structural ambiguity. In von Stechow (1996)’s analysis, for instance, *again* is given the lexical content of an additive particle that takes an event as an argument in both readings. ‘Restitutive’ *again* takes as argument the resultant state of an accomplishment, which is considered as a maximal event. However, this definition of repetition raises some new questions about the principles of individuation of events in the case of *again*. Eventualities can be characterized as a whole as properties of time or one can make a divide between ‘events’ on the one hand (considered as abstract individuals from a logical point of view) and ‘states/processes’ (considered as properties of time) on the other. In the latter case, the ability to denote an individual of the type ‘event’ is to be understood as a property of the predicate. Only bounded predicates describe a situation which, for its structural properties, can constitute an event. Boundedness, on the other hand, can be encoded as a lexical feature of the predicate (as in Vendler’s (1967) taxonomy), but also be the output of grammatical operations. Lexically bounded predicates such as accomplishments, for instance, become imperfective in the scope of the progressive operator. If it weren’t the case, a progressive accomplishment like (12a) would entail its perfective counterpart (12b), i.e. the existence of the event of reading the book would be warranted in both cases. This is an example of the so-called ‘imperfective paradox’ (Dowty 1977, 1979).

- (12) a. Mary was reading *The brothers Karamazov*.  
 b. Mary read *The brothers Karamazov*.

When imperfective eventualities like the state in (11b) are in the scope of *again*, they have to be considered bounded events. What (11b) says is that the state of Mary being angry holds at some time *t* and that there has been a prior occasion in which the state of Mary being angry held. But what does it mean that the state of Mary being angry occurred at a prior ‘occasion’, and how can this intuition be related to the notion of event? To our mind, this means that it must be possible to identify two disjoint intervals and we will capture this through the notion of *hole interval* between two states of being angry, see section 4.1.1. This is indeed the difference in interpretation between *again* and *still* in (13).

- (13) a. When I last saw her, Mary was angry with you again.  
 b. When I last saw her, Mary was still angry with you.

The ‘lumping’ of the state into an individual bounded event, i.e. the loss of homogeneity which characterizes the atomicity of individuals, comes through the mapping of the eventuality in time. *Again* takes as its argument an



eventuality that can be represented as a thick point in time<sup>6</sup>, which can have internal structure but whose structure is irrelevant for the purposes of communication. This ‘aspectual’ component of *again* deserves full attention and will be one of the points that we exploit for drawing a generalization over ‘aspectual’ and ‘repetitive’ adverbs, discussed in section 4.

### 3.3 Repetition at the syntax-semantics interface: *encore* / *ancora*

In the literature, the divide between the two classes of ‘repetitive’ and ‘aspectual’ adverbs has been drawn mainly on data from Germanic languages, for which the distinction seems justified, at least synchronically, by the use of different lexical entries, e.g. the case of English. When looking outside the Germanic family, however, the distinction is questioned by the existence of languages in which a single lexical entry is able to trigger both aspectual and repetitive readings, depending on the type of the predicate and on the context. French *encore* and Italian *ancora* are two such items. When modifying a state (14) or a progressive (15), they most naturally produce a continuative reading that can be paired with the one expressed by *still*.

- |      |  |         |
|------|--|---------|
| (14) | a. Marie est encore fâchée.                            | French  |
|      | b. Maria è ancora arrabiata.<br>‘Mary is still angry.’ | Italian |

- |      |   |         |
|------|---|---------|
| (15) | a. Marie est encore en train de lire.                     | French  |
|      | b. Maria sta ancora leggendo.<br>‘Mary is still reading.’ | Italian |

When combining with telic predicates, these adverbs no longer trigger a continuative reading, but the sentences are nevertheless grammatical and, contrary to the case of *still* (cf. 10c), they produce either an incremental reading (16) or a sense of repetition of the whole event (17).

- |      |  |         |
|------|--|---------|
| (16) | a. Marie a lu encore un livre.                                   | French  |
|      | b. Maria ha letto ancora un libro.<br>‘Mary read one more book.’ | Italian |

- |      |  |         |
|------|--|---------|
| (17) | a. Marie a encore déclamé le poème.  | French  |
|      | b. Maria ha recitato ancora la poesia.<br>‘Mary declaimed the poem again.’ | Italian |

Our investigation into the general characteristics of event repetition is aimed to find a principled explanation to the different forms that event repetition can take. In this sense, adverbs like *ancora* and *encore*, where a

variety of interpretations seem to cluster in single lexical entries, provide particularly interesting cases. One way to approach the issue of the distribution of the readings would be to pair interpretations with different scope-taking possibilities. As a matter of fact, when considering the contrast between examples (14)-(15) and (16)-(17) one could say that the different interpretations of *encore / ancora* depend on syntactic and on semantic factors. There is more than one possible position for the adverb in the linear order of the clause, and these positions correlate with different semantic interpretations (Tovena 1996, Cinque 1999, among others). On the other hand, examples (14)-(17) are partitioned in the same two groups when considering the perfectivity of the verbal predicate they contain. The question of the relation between the semantics of *ancora / encore* and their structural position is particularly compelling in the light of theories of lexical decomposition of the predicate, since it may provide an argument for positing a structural ambiguity behind the different readings. In this paper we will not tackle the question directly, but we make some remarks in favour of the necessity of a semantic account. In the remainder of this section, we mainly discuss Italian data, but what said extends to French *encore*.

Attempts at establishing a correspondence between the semantic properties of adverbs and their syntactic distribution go back as early as Jackendoff (1972)'s basic taxonomy, in which semantic classes of adverbs are paired with different structural positions in the syntax. Recently, there has been a regain of interest in the topic due to comparative work by Cinque (1999), who analyses the distribution of adverbs in many languages and draws a generalization about the syntax of Universal Grammar. According to Cinque, adverbs are specifiers of dedicated functional projections associated with semantic content. In his hierarchy, Cinque posits two possible structural positions for repetitive adverbs, one after the lexical verb and the other after the whole predicate, in what is one of the lowest projections of the clause. As for *ancora*, this adverb can occupy the Continuative Aspect projection, as in (14) and (15), as well as one of the Repetitive Aspect projections, as in (16) and (17).

Data support Cinque's observations. In (18a), *ancora* is located between the auxiliary and the lexical verb in a progressive construction, and its reading is continuative. In (18b), the adverb occupies a lower position and an indefinite object has been added. From a theoretical point of view, the incremental interpretation could be considered either a case of repetition of events of reading one book or as a continuation of an activity of reading books by adding one more unit. In this second perspective, the meaning of *ancora* could be subsumed under the continuative reading. The activity of reading in the latter case need not be uninterrupted in time, though.

- (18) a. Maria sta *ancora* leggendo. Italian  
 ‘Maria is still reading’.  
 b. Maria sta leggendo *ancora* un libro. Italian  
 ‘Maria is reading one more book.’

This intuition that there may be interruptions becomes clearer in examples like (19), where no direct object surfaces. Two readings are available.

- (19) Maria sta leggendo *ancora*. Italian  
 a. ‘Maria is still reading’.  
 b. ‘Maria is reading again’.

In (19) *ancora* is intonationally marked, contrary to (18b). Sentence (19) can be uttered if Maria is in the middle of an event of reading, and in this sense the sentence is felicitous in nearly the same circumstances as (18a). However, (19) can also mean that Maria is once more in the middle of a process of reading, but this occasion is temporally distinct from the preceding ones. For instance, it can be uttered if Maria is supposed to abstain from reading because of her sour eyes, but we find her violating the ban once more. It would then be imprecise to speak of a continuative interpretation for both (18b) and (19). If (19) were to be subsumed under the continuative reading of (18a), we should admit at least that the granularity of the relevant intervals is different and finer in (18a) than in (19), since, in the latter, *ancora* can express the repetition of an activity in distinct occasions, a meaning that the same adverb does not convey in (18a). In fact, in (19) *ancora* conveys a meaning very similar to that of the repetitive adverb *di nuovo* (‘again’). The two adverbs, however, cannot occupy the same position, since *di nuovo*-but not *ancora*-can occur in an even lower position, which would correspond to Cinque’s second Repetitive Aspect Projection, cf. (20).

- (20) Maria sta leggendo un libro *di nuovo*/\**ancora*. Italian  
 ‘Maria is reading a book again’.

In short, the status of ‘Repetitive’ *ancora* is still unclear at the syntax-semantics interface. The position it occurs in is not the natural position of a repetitive adverb like *di nuovo* (20), and if the occurrence is interpreted as continuative, it seems to correlate with a different granularity from that of the preverbal position, as shown by the interpretations of (18a) vs. (19).

Finally, let us mention one more ambiguous reading of *ancora* in post-verbal position, see the two possible interpretations of (21).

- (21) Maria ha aperto ancora (un po’) la porta. Italian  
 a. ‘Maria opened the door (for a while) again’.



This leaves open the question of what allows *ancora* to take different tokens of event structure in its scope and lead to distinct interpretations.

At the end of this rapid survey, it appears that previous approaches haven't yet succeeded in settling the issue of the distribution of readings. We concede that the different interpretations might correlate with variations in scope as they seem to be mirrored in the linear order of the clause. Variation would correspond to the adverb taking as arguments times, events or even sub-events, depending on the material in its scope. Understanding to what extent the presupposition of *ancora* – and the type of repetition it conveys, in our general picture – depends on the internal structure of the predicate and on its complement, is a crucial issue. The topic is taken up in section 4.2.

### 3.4 'Future-oriented' adverbs: Mandarin *zai*

Structural ambiguity is questioned indirectly by repetitive adverbs that do not display the same mobility of *ancora*, e.g. the adverbs *zai* in Mandarin. As the examples in (23) show, Mandarin *zai* is confined to a preverbal position at surface structure<sup>7</sup>. Repetitive vs. incremental interpretations (see 23a vs. 4), depends on the characteristics of the verb phrase.

- (23) a. Wo xiang *zai* du yi ben shu. Mandarin  
       I think ZAI read one CL book  
       I would like to read one more book.  
       b. \*Wo xiang du *zai* yi ben shu.  
       I think read ZAI one CL book  
       c. \*Wo xiang du yi ben shu *zai*.  
       I think read one CL book ZAI

The issue of the selection of material to construct the presupposition will be taken up in more detail in section 4.3. Here we would like to emphasize that under a characterisation of *zai* as an additive adverb specialised for the event domain, that we support, this adverb provides evidence for an analysis that builds primarily on the semantics of the adverb and where overt scope relations are an additional device, but not a central one.

In our general picture, the distribution of Mandarin *zai* is interesting also insofar as it can be taken to represent a subclass of the class of repetitive adverbs including *ancora* / *encore*, which undergoes additional restrictions on the ordering of events. Along with some other examples in unrelated languages (e.g. Romanian *mai* (Donazzan & Mardale 2007)), it appears that *zai* must satisfy a constraint on the positioning of the asserted event in the time frame set by discourse relations, besides the general constraint according to which the presupposed event must temporally precede the asserted event. In Donazzan and Tovena (2007), we have proposed that *zai*

encodes in its lexical semantics the constraint that says that the asserted event must follow reference time (24a vs. 24b), but is unordered with respect to utterance time (25).

- (24) a. Wo mingtian hui zai qu. Mandarin  
 I tomorrow MOD ZAI go  
 ‘I will go again tomorrow.’  
 b. \*Wo zuotian zai qu (le). Mandarin  
 I yesterday ZAI go ASP  
 (I went again yesterday)
- (25) a. Na shihou, wo bu zhidao women Mandarin  
 That time I NEG know we  
 (zuotian) hui zai jianmian.  
 yesterday MOD ZAI meet  
 ‘At that time, I didn’t know that (yesterday)  
 we would meet again’.  
 b. Zhe zhong cai hen haochi, chi le yi ci,  
 This kind dish very tasty eat ASP one time  
 (kending) hui zai chi!  
 for-sure MOD ZAI eat  
 ‘This dish is very tasty, once you have tried it, you will eat it again!’

This constraint highlights, to our mind, two additional and specific effects. First, *zai* exhibits an incremental reading when combined with an activity predicate and an indication of measure, like *ancora*. But contrary to *ancora*, it is subject to the ban on homogeneous predicates (26). We would venture as a hypothesis that this may follow from the temporal constraint on the positioning of the asserted event, which requires the left boundary of the event to be clearly identifiable.

- (26) \*Wo zai xiang ni. Mandarin  
 I ZAI think you.  
 (I’m still missing you)

Second, the choice of the strategy for satisfying presupposition turns out to matter with respect to the order of the two events in the time frame. When antecedents can be found in the context, the existential presupposition is satisfied by verification and no specific temporal constraint apply for localizing the presupposed event, as in (27), where the presupposed event occurs after or before RT.

- (27) a. Jinchu women hui zai Beijing jianmian, Mandarin  
 This-spring we MOD in Beijing meet  
 jinqiu kending hui zai jianmian.  
 next-fall surely MOD *zai* meet  
 ‘We’ll meet next spring in Beijing and we will certainly meet  
 again next fall.’
- b. Women qunian zai Beijing jianmian, jinqiu hui zai jianmian.  
 We last-year in Beijing meet next-fall MOD *zai* meet  
 ‘We had met last year in Beijing and we will meet again next  
 fall.’

In the absence of overt antecedents, on the other hand, the existential presupposition is satisfied by accommodation and this is the case where temporal restrictions on the positioning of the presupposed event show up. The accommodated event is located before RT, cf. (25a). Furthermore, if UT precedes RT, the accommodated event must precede UT too, hence only configuration <presupposed event, UT, RT, asserted event > is available.

- (28) Zhangsan mingnian hui zai qu Xianggan. Mandarin  
 Zhangsan next-year MOD ZAI go Hong-Kong  
 ‘Zhangsan will go again to Hong Kong next year.’

Example (28) is understood only as saying that the previous visit by Zhangsan to Hong Kong has already taken place at speech time. This observation could be understood as pointing to a more general constraint on accommodation, in the sense that listeners tend to accommodate facts.

#### 4 Towards a semantic analysis.

##### 4.1 Two ways of repeating

As made precise in the preceding sections, the term ‘adverb of repetition’ applies to items that exhibit a different range of readings. We used the cover term ‘repetitive reading’ to refer to the interpretation whereby two separate events obtain at two distinct times and the presupposed event precedes the asserted one. In this section, we explore the idea that an equivalent characterization of this situation can be given by different devices and that this is what happens in the case of the repetitive reading produced via *again* or via *ancora*. The difference shows in full when these adverbs occur in sentences with homogeneous predicates. We present our proposal in rather intuitive terms and do not discuss issues related to adopting a specific theory of events. However, we make use of many notions defined by Krifka (1998).

#### 4.1.1 Again

Let us consider *again* first. The sentence that hosts it describes an eventuality that is positioned in time according to information independently provided in the sentence. This time is the interval the temporal trace of the event must overlap. We assume that *again* is associated with this eventuality - call it  $e1$  and say that it is its argument - which is taken as a thick point (see also section 3.2.1) whose internal structure can be disregarded. Time information is equally reduced, we call it  $t1$ . Then, *again* triggers the presupposition that there is another eventuality of the same type, ( $e2$ ), whose temporal trace  $\tau(e2)$  strictly precedes  $t1$ . Events  $e1$  and  $e2$  differ in their run time. The two temporal traces do not have to be adjacent. What matters is that  $e2$  is the first relevant occurrence of an event of the same type as  $e1$  that is found going backward in time starting from (the beginning of)  $\tau(e1)$ . Thus, one can conceive a time span  $t3$ , as a time whose beginning coincides with the beginning of the temporal trace of  $e2$ , whose end coincides with the end of the temporal trace of  $e1$ , and which is either equal to the sum of the two traces, or has an additional temporal part, the interval between the two traces.

The length of this interval is not predefined. It is certainly relevant for pragmatic considerations<sup>8</sup>, but what is crucial for the speaker is that the interval is defined in virtue of the fact that it does not overlap with any other trace of an event of the relevant type. In other words, either the traces of  $e1$  and  $e2$  are contiguous, or the interval in between them is what we call a 'hole', in the sense that it corresponds to the absence of instances of events of the relevant type. The hole is constrained within a span delimited by two instances that are the matter that gives existence to the hole.<sup>9</sup>

When the eventuality is a bounded event, no additional considerations are required. When it is unbounded, on the contrary, it ends up being lumped, i. e. information on its boundaries becomes available and the internal structure is neglected. A clear instance of lumping is provided by example (29), a slightly modified version of (11b), where states are treated like bounded events. (29) says that there is an eventuality which is an occurrence of a state of being angry experienced by Mary and that an analogous state for the same experiencer held at a previous time.

(29) Mary is currently angry again.

The requirement of strict precedence between the two eventualities, then, can be enforced by assuming that there is a hole interval that precedes  $\tau(e1)$  and is preceded by  $\tau(e2)$  and does not overlap with the temporal trace of a state of the relevant type. The presence of this hole interval between the traces of the two lumped states allows us to get some information about the initial boundary of  $e1$ . The hole is precisely what ensures that this boundary,



wherever it is, is strictly preceded by the final border of  $e_2$ , wherever it is. As a consequence, a continuative reading cannot be produced.

Language provides other ways of getting hold of the initial border of a state that can be exploited by *again*. One such way is by lexicalising process and resulting state in a single verb. This is indeed the type of verb that allows for the restitutive reading of *again*, cf. (30).

(30) Mary has opened the door again

The eventuality described by the accomplishment verb in (30) has a proper part that is a process, i.e. the action of opening a given door by Mary, and a part that is the resulting state of being open of the door. Now,  $e_1$  may be identified with such a resulting state. Thus, *again* once more triggers the presupposition of existence of another state that is of the same type as  $e_1$  and that is i) prior to it as well as ii) prior to the process that has brought it about. The preconditions of the process are such that this state of being open could not hold at the beginning of its running time, and as a result we infer that there is a hole interval abutting the trace of the process. The main difference between (29) and (30) is that in (30) the process gives us an indication of how the asserted state has come about, i.e. of how it has been restituted. Conversely, whenever  $e_1$  is identified with the process of bringing the door to a state of being open, also described by the verb in (30), it is the repetitive reading that obtains.

Finally, let us consider the case of (31). The sentence has two readings, one restitutive and one repetitive. For the restitutive reading, as noted by Fabricius-Hansen (2001), there is no need to record a temperature that is exactly equal to a previous measure, but it is rather supposed a previous opposite change of state.

(31) The temperature has fallen again.

In this case, the changes in temperature can be plotted as a directed path on the scale of temperature, where a measure function yields the measure of the asserted change of state and is enough to make the falling a telic transition event. The restitutive and repetitive readings require that the movement on the scale corresponds to two sub-paths, say  $a$  for  $e_1$  and  $b$  for  $e_2$ , that are tangential at an endpoint, namely the end of  $b$  is tangential with the beginning of  $a$ . When the paths are internally tangential, i.e.  $a$  and  $b$  have an overlap but opposite directions, it is the restitutive reading that is represented. When they are externally tangential, it is the repetitive one, whereby a further drop in the temperature is recorded.

#### 4.1.2 Ancora / encore

As for *ancora*, we elaborate on Tovena's (1996) proposal and assume that *ancora* takes two arguments. One argument is temporal and is instantiated by the temporal information used for positioning the asserted event. This argument can be considered as a current manifestation of the deictic origin of the adverb.<sup>10</sup> The other argument is a property of events and is instantiated by the asserted event. Repetition translates as the requirement for a time, prior to the time at which *e1* is asserted to hold, which is also a time of which the same event property can be predicated. Three main consequences follow from adopting this characterisation. First, when the eventuality is a bounded event, like in (32), the output of applying *ancora* is the same as when applying *again*.

- (32) a. Maria è andata ancora a trovare Luisa. Italian  
 b. Mary went again to see Louise.

In (32a), a property is predicated of a time and there is a previous time which also overlaps with an interval described by an instantiation of the same property. Since the property characterizes telic events - that are assumed not to have the subinterval property (Krifka 1998) - its instantiations at two different times are inferred to be different events. The second consequence is that we can account for the continuative reading that *ancora/encore* give rise to when modifying homogeneous structures. Since two repeated eventualities minimally differ with respect to their run time, but two different times are not necessarily in relation with different eventualities, by defining repetition on times, we make room for a continuative reading. Contrary to the case of events seen in (32), verifying the property at two different times does not trigger an inference of distinctiveness for atelic eventualities like states - that do have the subinterval property- and no lumping takes place either, because we deal with properties and not directly with events. Finally, the second argument of *ancora* being a property, it can be used in full for characterising an *e2* that shares all the relevant features of *e1* or by considering just a subset of it. This produces a partial match between *e1* and *e2*, see (33).

- (33) a. Elle a tracé un cercle sur le trottoir French  
 et puis encore deux cercles sur la chaussée.  
 b. Ha tracciato un cerchio sul marciapiede Italian  
 e poi ancora due cerchi sulla carreggiata.  
 'She drew one circle on the sidewalk and  
 then two more circles on the roadway.'

It also means that the incremental reading can be accounted for as a case of addition of a telic event to a non quantized previous activity of the same type.

## 4.2 Characterising the presupposition

The relevance of a property shared between events is a characteristic essential to the definition of the phenomenon of repetition of events obtained via a repetitive adverb. As noticed, adverbs differ somewhat with respect to the identification of this property, since a subset of the description of the asserted eventuality is often used to build the presupposition they trigger. In this section, we work out a heuristic to compute the characterisation of the presupposed event from the asserted one. We then exploit it for constraining unification on an equation of higher order which provides us the content of the presupposition. But before all that, we need to make precise what is presupposed.

In the preceding sections, we talked about the presupposition triggered by adverbs of repetition and mentioned presupposed events. This is a mild abuse of language that is common and harmless when it is understood that one is presupposing propositions. A presupposed proposition is added as true to the common ground. In order to include aspectual adverbs among adverbs of repetition, however, we need to presuppose a property, not a proposition, which is not an equally common step. Since properties are not true or false, and presupposing the existence of properties is too weak, the opposition true vs. false relevant for propositions, is replaced by used vs. not used in the context and salient. The property is presupposed to have been used and be salient in the context.

The presupposed property denotes a set of events and is a hypernym of the property characterising the asserted event and of those for the antecedents. Hence, alternatives, i.e. asserted event and antecedents, are characterised by co-hyponym properties. If the presupposition is satisfied by verification, a relevant co-hyponym was instantiated and is identified, and the superordinate property is implied. If it must be accommodated, only the existence of a time at which the superordinate property is instantiated is assumed.

## 4.3 Reconstructing the presupposed content via unification

### 4.3.1 *Heuristic for reconstructing the presupposed content*

This section mainly deals with data from French, Italian and Mandarin Chinese, but the observations are intended to extend to other languages. When observing the presuppositional properties of the adverbs discussed so far, one can single out the following two oppositions.

1. Partial vs. total use of the predicate.

The description of the asserted event always helps in building the presupposition, but not all the material in the clause necessarily enters it. It is

used in full by *again* when the presupposition is accommodated, and always by French *à nouveau*. In particular, arguments expressing quantities and measures are included, see (34a). Adverbs like *ancora* and *encore*, instead, do not include measures in the presupposed content, only the property expressed by the restriction. The result is an interpretation of increase (34b).

- (34) a. She drew two circles again. (two circles previously drawn)  
 b. Elle a tracé deux cercles à nouveau. French

## 2. Fixed vs. variable partial use of the predicate.

The adverb *zai* imposes the constraint of keeping information about the subject, the fixed part, and optionally allows keeping other parts. This constraint can be reformulated in semantic terms by saying that *zai* imposes identity of referent and thematic role for the subject among alternatives (35).

- (35) a. #Zhangsan/wo gangcai qu kan le yi xia, Mandarin  
 Zhangsan/I just go watch ASP a little  
 guo yi huir wo hui zai qu.  
 pass a moment MOD ZAI go  
 ‘#Zhangsan/ I just went to take a look, I will go again later.’

*Ancora* and *encore* do not single out a specific fixed part, but allow a choice between keeping the subject, the direct object and/or other parts. In (36a), the direct object need not have the same referent, and in (36b) the agentive subject of the two predicates is not the same.

- (36) a. Marie a mangé trois kiwis et puis encore autre chose. French  
 ‘Mary ate three kiwis and then some more stuff.’  
 b. Maria ha appena controllato che il bambino dormisse. Italian  
 Controllo ancora fra cinque minuti e poi andiamo.  
 ‘Mary just checked that the baby is asleep. I’ll check  
 again in five minutes and then we can go.’

When there is room for choice, then, we observe that peculiarities specific to different types of arguments constrain their use in building the presupposition, and have an impact on the reading of the adverb. As the data in this section show, nominal reference plays a crucial role in the computation of the content of the presupposition. Its relevance in a compositional analysis of sentential aspect is also well known. This is not pure coincidence. On the one hand, the presupposed content constrains the aspectual properties of the alternatives. On the other hand, aspectual concerns shape our characterization of repetition of events.

Referential NPs and rigid designators impose identity of arguments between asserted and presupposed events. As a consequence, a repetitive reading is ruled out by the combination of referential objects with destruction/construction predicates, whereas it obtains with referential objects whenever it is possible to repeat the event with the same participants (37).

- (37) Zhangsan hui zai xizao /#chi zhe ge pingguo. Mandarin  
 Zhangsan MOD ZAI wash/ eat this CL apple  
 ‘Zhangsan will rinse/ #eat this apple again.’

In languages such as French and Italian, which allow definite NPs to refer to kinds, definite NPs usually make their way into the presupposed material also with a type reading. The interpretation is that of repetition of the whole event type, as (38) shows.

- (38) a. Il a rencontré encore la copine de Marie. French  
 ‘He met again the friend of Mary’. (referential)  
 b. Ha mangiato ancora la polenta/la minestra. Italian  
 ‘He ate polenta/ soup again.’ (type reading)

Indefinite NPs often get a non-referential reading, and they always do in Mandarin Chinese. They only contribute a restriction on the type of the argument in the presupposition and, moreover, quantitative information coming from the determiner is not included. As a result, only the incremental reading is possible, cf. (39).

- (39) Zhangsan hui zai chang ji shou ge. Mandarin  
 Zhangsan MOD ZAI sing few CL song  
 ‘Zhagsan will sing a few songs more.’

As for spatial measure complements, observe that goal PPs can be interpreted as referring to a known path, cf. the repetitive reading glossed in (40a), or as providing a measure for the event, cf. the incremental reading glossed in (40b). Measure complements are not referential and (41) is analogous to (40b) in yielding an incremental reading.

- (40) Zhangsan yao zai pao-dao gongyuan. Mandarin  
 Zhangsan MOD ZAI run-arrive park  
 a) ‘Zhangsan has to run to the park again.’  
 b) ‘Zhangsan has to run also the additional distance to the park.’  
 (41) Zhangsan yao zai pao liang gongmi. Mandarin  
 Zhangsan MOD ZAI run two km  
 ‘Zhangsan will run two more km.’

Frequency adverbials, that may take the form of verbal classifiers in Mandarin, impose repetitive readings and require specific interpretation of the complement.

- (42) Zhangsan yao zai pao-dao gongyuan yi ci. Mandarin  
 Zhangsan MOD ZAI run-arrive park one-time  
 ‘Zhangsan has to run to the park one more time.’
- (43) \*Zhangsan yao zai pao liang gongmi yi ci. Mandarin  
 Zhangsan MOD ZAI run two km one-time  
 (‘Zhangsan will run once again two km.’)

Last case to consider is where the verb phrase does not contribute material for the presupposition. As pointed out in section 2.1.3 (see ex. 5), this possibility concerns only verified presuppositions, not accommodated ones.

#### 4.3.2 *Reconstructing presupposition via unification*

The preceding observations work as heuristics used while building the content of the presupposition. This content is the property that subsumes the characterisation of the asserted event and the antecedent. It does not subsume any other relevant property also subsuming asserted event and antecedent characterisations, and plays the role of the lowest upper bound in a partially ordered structure. This turns out to be a characterisation of the hypernym of the alternatives in terms of the most specific least general unifier.

We propose to reconstruct the relevant event property via higher order unification. The abstract problem of identifying the alternatives and finding a candidate for the property that characterises them all - and is not vacuously general - can be stated as a problem of recovering solutions to a conditional higher order equation inspired by the proposal of Pulman (1997) for focus and ellipsis resolution. In our case, the description of the asserted event plays the role of the source clause in ellipsis, and the presupposed material is the relation reconstructed between asserted event and other alternatives.

In order to present the equation, we must assume a neo-Davidsonian style of representation, where the verb contributes a predicate of events and the arguments are considered separately. They are added via a conjunction of theta role predicates that are relations between entities and events, i.e. we have a conjunction of literals providing information on the event participants. We must also assume an initial general step of normalisation of the representation. We suppose that we work with a representation that is a closed formula, i.e. a formula not containing free variables. Hence, we suppose a formula with existential quantification over an event for assertions. We consider its Prenex normal form, i.e. all the quantifiers occur on the left.

Once the semantic representation of the sentence describing  $e1 \rightarrow C$  in equation (44) is instantiated by a normalised representation of the sentence, our goal is to obtain a well formed formula P such that C implies it--like 'being a horse' implies 'being an animal' *mutatis mutandis* for events. Information is extracted from C via a conditional equation that assigns to P a property hypernym of the property characterising the antecedents, in the sense that the denotation of a potential  $e2$  is extensionally included in the denotation of P in all possible worlds. P is the presupposed property we want to recover. Strictly speaking, we get a property from P by undoing the existential closure on the event variable.

The unification step proceeds this way. Constraints coming from the heuristics and from peculiarities of single adverbs apply to the conjunction of literals in the scope of the quantifiers and guide the removal of some of them. Removal means producing an underspecified characterisation, in the sense that roles are not removed, but their value may be left unspecified. In the end, we may rewrite them as variables bound by lambdas.

$$(44) \text{presupp}(P,C) \iff \text{presupp}(P,P(c1, \dots cn))$$

if  
 excluded((c1, ... cn),C)  
 and  
 exist(A,antecedent(A,P(c1, ... cn))).

The equation in (44) decomposes the representation C in two parts, P and a sequence of elements to which it P is applied. Decomposition is obtained via higher order unification and is validated by the first condition. The primary goal of this step is to separate what is specific to the asserted event from what will constitute the event property that is shared with other alternatives. Deciding what counts as specific and should be removed involves using the heuristics discussed above. Only what is not shared among alternatives is mentioned in the sequence of elements. Material that makes up the presupposition goes in the unifier P. It is possible to remove partial information and leave a constraint that bears on sortal properties and logical type. The second condition requires a candidate for the role of antecedent A. It is the way presupposition is satisfied that decides what happens next. If presupposition is satisfied by verification, we can check a pairwise parallelism between elements of the description of the asserted event and of the description of candidate antecedents. In other words, A is decomposed into P and a sub-sequence (a1, ... an) which is not entirely disjoint from the sub-sequence (c1, ... cn), although not equal either. If presupposition is accommodated, only P is instantiated in the case of *ancora*, possibly P(c1, ... cn) in the case of *again*.

## 5. Summary and concluding remarks

In this paper, we have analysed a variety of adverbs with a common semantic core that makes it possible to subsume them all under the header of adverbs of repetition. The discussion has shown that adverbs may cover different portions of the picture drawn by a general notion of repetition, and we have proposed to capture the partition in terms of information on the basis of which repetition is computed.

We have assumed that a formal correspondence exists between the internal structure of events and the structure of time (Krifka 1998) and that adverbs can interact with different components of that predicate structure. In particular, we have argued that event structure and time intervals are visible to repetitive adverbs to different degrees. Adverbs like *encore* define repetition on the time side first, and then evaluate the consequences on the event side, whereas adverbs like *again* take maximal events.

The difference between the adverbs of the two groups thus shows up when considering the structural properties of the modified eventuality. If the eventuality has a homogeneous structure, as it is the case for a state, adverbs of the *again*-type lead to a plurality of events, whereas for adverbs of the *encore*-type only a reading of continuation of one and the same event is possible (13 vs. 12). In case of telic events, instead, the difference is predicted to disappear, since both adverbs take as argument a bounded eventuality (16,17). The aspectual component of these adverbs is taken into account precisely in the sense that aspectual adverbs are sensitive to the structure of the predicate, which is reflected by its lexical and grammatical aspect.

Finally, we have proposed to use a conditional higher order equation to compute the content of the presupposition triggered by these adverbs. This choice makes room for two types of variation, i) in the heuristics a language may use for selecting material from the asserted clause, and ii) in the consequences of satisfying vs. accommodating a presupposition.

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<sup>2</sup> For space reasons, we examine only positive sentences.

<sup>3</sup> ASP stands for aspect marker, CL for classifier, MOD for modal, NEG for negation.

<sup>4</sup> We often refer to ordered multiple occurrences of an event type as ‘repetition of event’. This is a shorthand expression and a way to leave aside the conceptual problem of event identification and related ontological commitment. Our use of the well established neo-Davidsonian representations is, therefore, a notational solution.

<sup>5</sup> Of course, (9c) becomes interpretable under the so-called counterfactual reading of *still*, which we won’t discuss (but see König 1986, Barker 1991, Michaelis 1993, among others).

i) *Despite the fact that Peter forbade her to do so, Mary still washed the shirt.*

<sup>6</sup> It is called *specious point* by the philosopher A.N.Whitehead (Schwer p.c.).

<sup>7</sup> We won’t discuss here the case of the adverbial *zai yi ci* (‘once more’), which enjoys a freer distribution than *zai*, but should be considered a different case altogether (see also Lin & Liu 2006)

<sup>8</sup> For instance, decades may be too long an interval for evaluating the repetition of eating events, so that a sentence such as *He ate cabbage once when he was five and he ate it again in his old age* may not sound as natural as *He ate cabbage once when he was five and he ate it a second time in his old age*.

<sup>9</sup> Another way of defining the hole interval could make use of Krifka’s (1989) notion of aximal Event. An analogous interval defined in terms of time is the hiatus proposed by van Geenhoven (2005).

<sup>10</sup> *Ancora / encore* both result from the fusion of a demonstrative and a noun from the accusative of duration *hanc horam* ‘this time’ in Latin (see e.g. Rohlfs 1969).