Aspect in Time

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Purpose

PPs may delimit aspect in VPs (Tenny1987, Ramchand 2008, a.o.); whereas their bounding properties in DPs are open to inquiry.

We present arguments that PPs have bounding properties in DPs referring to time, henceforth "time-counting expressions". The evidence comes from temporal and directional PPs, time span vs. durative adverbial modification and point of view in time counting expressions.

We draw consequences for the understanding of aspect in time counting expressions at the syntax-semantic interface.

Questions and hypothesis

What are the properties of time counting expressions?

one thirty, a quarter to one, one twenty five, …

What is the role of cardinal numbers?

thirty one, one hundred , one hundred twenty five, …

What is the role of the pronounced/silent time PP?

two o'clock, one thirty a.m., one twenty five p.m., …

Outline

1. Cardinal numbers and time counting expressions
2. PPs in time-counting expressions
3. Augmented functional projection and the spatial location of time
4. Consequences for the syntax/semantic interfaces and the CI/SM asymmetry and the domain specificity of language

1. Cardinal numerals and time counting expressions

We compare the syntactic and semantic properties of time-counting expressions to those of better studied counting systems, such as complex cardinal numerals (Kayne 2005, 2016; Ionin & Matushansky 2006; Stavrou & Terzi 2008; Di Sciullo 2012, 2015, a.o.). From a typological point of view, we will focus on Romance languages.

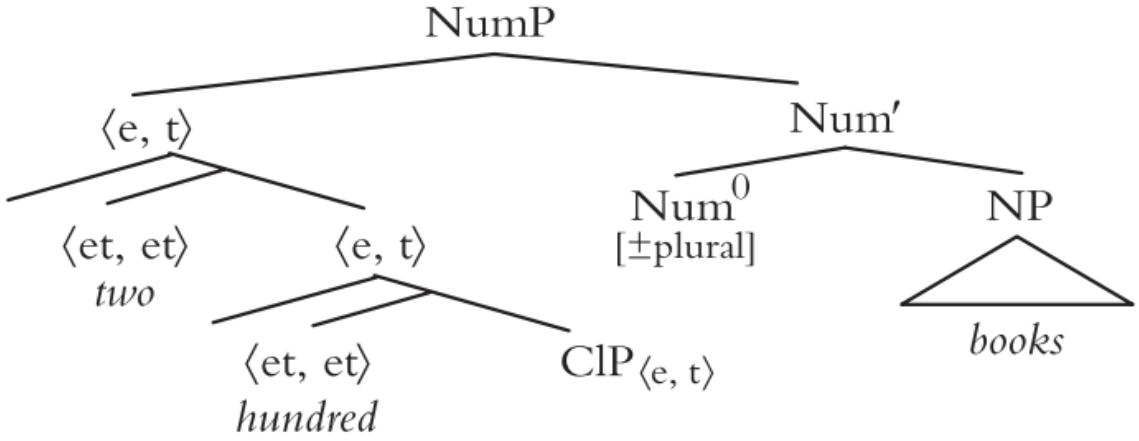
Ionin & Matushansky (2006, 2016)

Stavrou & Terzi (2008)

Di Sciullo (2014, 2015)

Ionin & Matushansky 2004, 2006

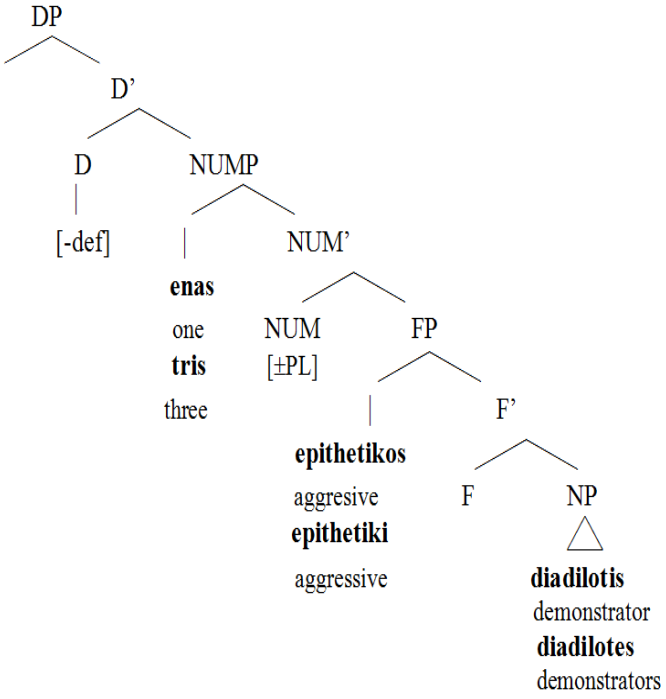
X-bar structure and type theoretical semantics

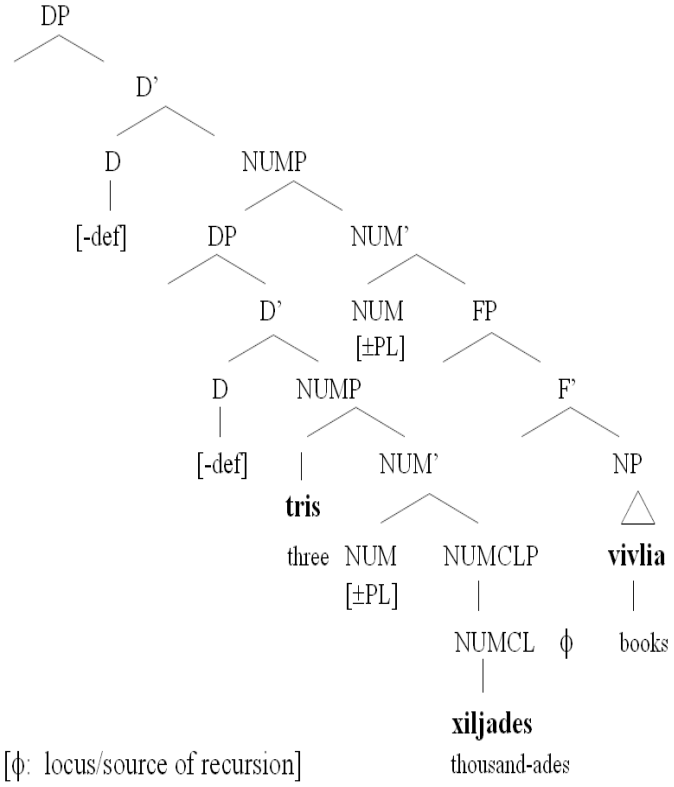


Complex cardinals involving multiplication (*two hundred*) are analyzed as complementation, whereas complex cardinals involving addition (*one hundred and two*) are two simplex cardinals combined into one via coordination.

Stavrou & Terzi 2008

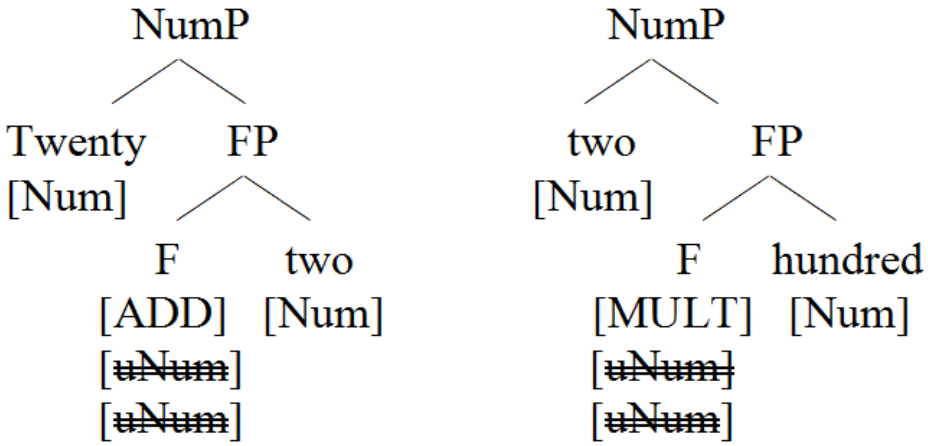
In Greek, simplex and complex cardinals are generated in the Specifier of NUMP.





Additive and multiplicative structures
Di Sciullo 2014, 2015

Numerals (NUM) merge with functional projections with interpretable features (ADD, MULT) and uninterpretable features (uNUM). Uninterpretable features are checked and eliminated; interpretable features are legible by the external systems.



Operators in cardinal numerals and time-counting expressions

Time-counting expressions usually involve the same operators found in complex numerical expressions, i.e. ADD(ition), MULT(iplication), as well as SUBSTR(action), and shown in the following examples:

(1) a. due cento cinque (It)
"two hundred five"
b. [two MULT hundred] ADD five]

c. vingt et un (Fr)
"twenty one"
d. [twenty ADD one]

(2) a. le due meno cinque (It)
the two minus five
"five to two"
b. [two MINUS five] …

c. dos quarts i cinc de nou (Ca)
two quarters and five of nine
"eight thirty-five"
d. [[two MULT quarter] ADD five] …

2. PPs in time-counting expressions

1. 1 In English, nouns, such as *years*, *hour* and *time*, can be silent, e.g. *it is six*: CLOCK TIME$_i$ F^o [six HOUR] t$_i$. (Kayne 2003, 2005). Agreement relations provide evidence that this is also the case in morphologically rich languages such as Italian, (3).

(3) a. È/*Sono l'una.
is/are the one
'It is one o'clock.'

b. *È/Sono le due. (It)
is/are the two
'It is two o'clock.'

Silent/pronounced adverbial PPs are also part of time-counting expression, whether or not they include additive or substractive morphology, (4).

(4) a. È l'una e ezza (di mattina).
is/are the one and a half of morning
'It is one in the morning.'

b. Sono le due meno un quarto (di pomeriggio). (It)
is/are the two minus a quarter of morning
'It is a quarter to two in the morning.'

Pronounced/silent adverbial PPs provide a region boundary to time counting expressions.

Time-counting expressions and intervals

2. Hours can be divided in parts, such as *quarters*, which are intervals that cannot be interpreted without a temporal endpoint brought about by PPs, (5a). Time span vs. durative PP modification, (5b), provide further support to the telicity of the DPs.

(5) a. È un quarto *(alle due). (It)
Is a quarter *(to two)
'It will be a quarter *(to two).'

b. Sarà un quarto alle due (tra pochi minuti/*per pochi minuti). (It)
will be a quarter at two (in a few minutes/*for a few minutes)
'It will be a quarter to two (in a few minutes/*for a few minutes).

Time-counting expressions and relative view

3. Differences in the linearization of the DPs, as in (6) from Romanian, indicate that natural languages articulate time in a prospective or retrospective point of view.

(6) a. Este doi și jumătate. (Ro)
is two and half
'It is two thirty.'

b. Este jumătate la trei. (Ro)
is half to three
'It is two thirty.'

Salient reference time

Time-counting expressions involve a "salient" reference time, henceforth SRT, as shown in the Italian and Spanish examples in (7)-(8):

(7) a. le tre e cinque (It)
the three and five
"five past three"

b. ? le quattro meno cinquanta cinque (It)
the four minus fifty and five
"five past three"

c. Las tres y cinco (Sp)
the three and five
"five past three"

d. ? las cuatro menos cincuenta y cinco (Sp)
the four minus fifty and five
"five past three"

(8) a. ? le tre e cinquanta cinque (It)
the three and fifty and five
"five to four"

b. le quattro meno cinque (It)
the four minus five
"five to four"

c. ? las tres y cincuenta y cinco (Sp)
the three and fifty and five
"five to four"

d. las cuatro menos cinco (Sp)
the four minus five
"five to four"

These examples show that time-points, i.e. 3:05 in (7a,c) or 3:55 in (8b,d), tend to be expressed making reference to an SRT in their vicinity; the preceding hour time in (7a,c) and the following hour time in (8b,d).

Time-point / time-interval

STR may denote either a time-point or a time-interval cross-linguistically.

The time-point interpretation of the SRT gives rise to telic construals in the cases in (9a)-(10a). The lack of SRT makes (9b)-(10b) not interpretable as time denoting expressions.

(9) a. un quarto alle cinque
a quarter to-the five
"a quarter to five"

b. #un quarto (It)
a quarter
"a quarter"

(10) a. vinte para as cinco
twenty for the five
"twenty to five"

b. #vinte (Port)
twenty
"twenty"

In (10a), for instance, *vinte* "twenty" gives the measure of the time-span between the time-point [4:40] and the SRT [5:00]. These telic construals usually involve locative or goal prepositions, cf. *a* "to" in Italian, *para* "for" in Portuguese or *to* in English.

Time-intervals and atelic STR

On the other hand, time-interval interpretations of SRT are typical of time-counting expressions involving pseudo-partitives in languages like Catalan or Russian, as in (11):

(11) un quart i cinc de nou (Ca)
a quarter and five of nine
"twenty past eight"

In (11), the constituent *un quart i cinc* "lit. a quarter and five" measures the time-span already past of the ninth hour.

We claim that pseudo-partitive time-counting expressions, as opposed to the cases in (9a)-(10a), involve an atelic salient reference-time, in the sense that the reference-time is not viewed as the endpoint of a telic interval.

Pseudo-partitive time-counting expressions and atelic cases

The atelic character of pseudo-partitive time-counting expressions is evidenced by the fact that they are marginal in denoting time-points close to the full hour, as shown in (12):

(12) a. ??un quart menys deu de nou (Ca)
a quarter minus ten of nine
“five past eight”

b. ?/?? tres quarts i deu de nou
three quarters and ten of nine
“five to nine”

Pseudo-partitive time-counting expressions and atelic cases

Telic cases in which the [*quarter + minutes*] constituents receive an interpretation similar to the one in pseudo-partitives. Consider for instance (13):

(13) tres quarts per les cinc (Valencian Catalan)
three quarters for the five
"a quarter to five"

(13) denotes the same time-point as the one denoted by (9). However, this time-point is denoted by measuring the time already past of the second hour and by incorporating this time into a telic construal (cf. preposition *per* « for » and definite unpronounced HOUR).

3. Augmented functional projection and the spatial location of time

We analyze time-counting expressions in terms of extended prepositional projections including Place and RelView categories, discussed in Cinque (2010) for the syntax-semantics of locative/directional prepositions, in order to formalize the spatial location of time.

[PPdir [PPstat AT [DPplace [DegP [ModeDirP [AbsViewP [RelViewP
source/goal/path stative AT measure diagonally north/south up/down
[RelViewP [DeicticP [AxPartP [PP P [NPplace [PLACE]]]]]]]]]]]]
in/our here/there under/over/behind Ground (Cinque 2010)

We argue for a unified prepositional account for (9a)-(10a) *un qualto alle cinque (*It) "a quarter to five" on the one hand, and (13) *tres quart per les cinc (Valencian Catalan)* "a quarter to five"on the other, as follows:

(14) a. a quarter [$_{\text{RELVIEW}}$ ~~a quarter~~ UP [$_{\text{RELVIEW}}$ ~~a quarter~~ to/for [$_{\text{PLACE/GOAL}}$ [the five HOURS] ~~a quarter~~]]]. → Italian, Portuguese

b. three quarters [$_{\text{RELVIEW}}$~~three quarters~~ DOWN [$_{\text{RELVIEW}}$ ~~three quarters~~ to/for [$_{\text{PLACE/GOAL}}$ [the five HOURS] ~~three quarters~~]]]. → Valecian Catalan

Variation between Romance languages

The contrast between the two telic construals resides in the two different heads under RelView. Italian and Portuguese feature a UP head under RelView, and *a quarter* in (14a) is interpreted as the time lacking towards the endpoint denoted by the definite *the five* HOURS.

On the other hand, in (14b), the Valencian Catalan hosts a DOWN head under RelView, and *three quarters* is interpreted as the time past with respect to the endpoint; the PATH selected by the DOWN head is a series of increasing number of quarters leading to the full-hour endpoint, whereas the PATH selected by the UP head is a series of decreasing number of quarters towards the endpoint, i.e. the STR.

4. Consequences

Our analysis has consequences for the understanding of Aspect in time at the syntax-semantic interface.

- Functional structure, including silent PPs, provides further support to the phonetic-semantic interfaces asymmetry (Chomsky 2008, Di Sciullo 2008) and the syntax-semantic transparency hypothesis (Chierchia 2013, Jacobson 2013).

Our analysis brings further support to the intervention of Third Factor Principles (Chomsky 2005 et seq.), including the Principles of *Minimize Externalization* and *Minimize Symmetry* (Di Sciullo 2015).

Interface Asymmetries : silent delimiting PPs are not legible at the SM interface, as a consequence of *Minimize Externalization*.

Syntax-semantic transparency : silent delimiting PPs are legible at the CI interface, as a consequence of *Minimize Symmetry*.

The arrow of time and time-counting expressions

According to the arrow of time (the asymmetry of time):

Time is one way directional. (Eddington 1927)

Temporal asymmetries are due to the asymmetric behavior of physical processes in our world.

Time counting expressions are asymmetrical with respect to a SRT.

The temporal asymmetries in time-counting expressions could be attributed to the domain specificity of human language, and in particular to the delimiting properties of PPs, and the role of Relative view in the syntax-semantics of time-counting expressions.

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