Temporal modifiers and the Romance imperfective[*]

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Summary

- I discuss the constraints on temporal modifiers of the event time (ET, as opposed to 'reference time', RT) with the imperfective, in Romance
- I argue that the data favor an 'ongoingness'-based analysis of the Romance imperfective (a semantics similar to the English progressive, as proposed by Ferreira 2005, 2016, Bary 2009, Deo 2010) over an inclusion-based analysis (where the imperfective just indicates RT $\subseteq$ ET or RT$\subset$ET; see Klein 1994, Kratzer 1998, Demirdache & Uribe-Etxebarria 2004, 2014, Arosio 2019, a.o.)
- Imperfectives allow LB-oriented modifiers[1], but disallow ET-localizers, ET-extent modifiers, and modifiers that refer to RB, unless the imperfective is habitual/pluractional and these modifiers refer to the individual events in the scope of the pluractional operator, not to the whole series of events (section 1);
- I present a compositional account where the constraints follow from the semantic types of the various temporal modifiers and aspectual operators (section 2):
  - the imperfective Asp takes properties of events (<v,t>)
  - the modifiers excluded are those that create boundedness (extent, modifiers that refer to RB) or rely on a boundedness-creating operator (ET localizers)
    - modifiers that create boundedness are <v,t><i,t> (map properties of events onto properties of times, introducing the temporal trace of a completed event)
    - temporal localizers are <i,t><i,t> and can modify ET provided that an operator BOUNDED has applied to the vP, introducing the temporal trace of a (completed) event
  - the modifiers allowed:
    - LB-localizers can be assumed to be <v,t>
    - 2 possible analyses for modifiers measuring the LB-RT extent are offered
  - HAB and quantificational adverbs are <i,t><v,t> (take temporal traces of bounded events and map then onto properties of events) => they quantify over bounded events and can occur in the scope of Asp_{impf}
- I argue that the ongoigness semantics of the imperfective is preferable to the analysis of the Romance past forms as tenses specialized for +/- homogeneous complements (de Swart 1998, Crăiniceanu 2002, Arosio 2003, 2010, 2019) (section 3)

1. The data

1.1 Preliminary observations

- I will illustrate the generalizations with Romanian data, but similar facts have been noticed for other Romance languages: French and Italian (de Swart 1998, Giorgi & Pianesi 2004, Arosio 2003, 2010, 2019), Spanish (Arche 2014)[2]

[*] I am grateful to Ioana Stoicescu for detailed and valuable comments to previous versions of this paper.
[1] LB stands for 'left boundary', RB for 'right boundary'
[2] For Romanian, most of these data have already been pointed out by Crăiniceanu (1995), but the only formal account they have been given was within De Swart's homogeneity-based analysis (Crăiniceanu 2002). This paper provides an alternative account. For arguments against De Swart's analysis, see §3.

- In contemporary standard Romanian, the imperfect is a past imperfective and the compound perfect is ambiguous between past perfective and present perfect (see Crăiniceanu 1995); the 'simple perfect' (which is unambiguously a past perfective) is confined to the narrative style of the written language and to regional varieties (cf. French for a similar situation); compared to Italian and Spanish, the system is simpler as it lacks progressive constructions (cf. It. *sto facendo* 'stay.1SG doing' = 'I'm doing')

The imperfective and perfective aspects ("viewpoint aspects") are usually analyzed as involving relations between ET (Event/Eventuality Time) and RT (Reference Time)[3]:

(1) a. **La ora trei,** a vorbit cu Maria.
'At 3 o'clock, (s)he talked to Maria'
= the interval of the event 'he talked to Mary' is improperly included in a brief interval surrounding the time 'three o'clock' ET $\subseteq$ RT
b. **La ora trei,** vorbea cu Maria. (progressive reading)
'At 3 o'clock, (s)he was talking to Maria'
= the interval of the event 'he talked to Mary' properly includes the brief interval surrounding the time 'three o'clock' RT $\subseteq$ ET

1.2 Single-event contexts

When describing a single event, the imperfect rules out ET-temporal modifiers
(i) that localize the (whole) event (e.g. *in the morning, between 3 and 6 o'clock*),
(ii) that refer to its right boundary (RB) (e.g. *until my departure*) or to both boundaries (*from 3 to 6*)
(iii) that specify the extent of the whole event (e.g. *for 3 hours*):

(2) Când am văzut-o, Maria scria / stătea în fotoliu {*dimineaţa /
when have.1 seen-her Maria wrote.IMPF sat.IMPF in armchair morning-the
*de la 3 la 6 /*până la plecarea mea / *timp de trei ore }. (Ro.)
from 3 to 6 until departure-the my for three hours
'When I saw her, Maria was writing/ sitting in the armchair {*in the morning /
*until my departure / *from 3 to 6 / *for 3 hours}'.

But ET-modifiers are not ruled out completely: those accessing the left boundary (LB) of the event are allowed:
(iv) LB localizers (e.g. *from/since 6*)
(v) modifiers measuring the extent from LB to RT (=Engl. *for*+perf.):

(3) Când am intrat în cameră, Maria scria/ stătea în fotoliu de la ora 3 (localiz. of LB)
- ''- de trei ore. (extent from LB)
'When I entered the room, Maria had been {writing/ sitting since 3 o'clock
in the armchair} for 3 hours'

The modifiers of types (i)-(iv) are compatible with the perfective past:

[3] Other terms for RT are 'Topic Time' (Klein 1994) and 'Assertion Time' (Demirdache & Uribe-Extebarría 2004). The distinction between RT, ET and ST (Speech Time) goes back to Reichenbach (1947).

(4) Ieri, Maria a {scris/stat în fotoliu} timp de trei ore (extent of the whole ET)
de la 3 la 6 (localiz. of LB and RB)
până la plecarea mea (localiz. of RB)
de la 5 (localiz. of LB)
dimineaţa. (localiz. of the ET)
'Yesterday, Maria {wrote/sat in the armchair} for 3 hours
from 3 to 6
until my departure
from 5
in the morning'

N.B. One might claim that such adjuncts refer to RT[4], but note that
(i) for the adjuncts referring to boundaries, the event is claimed to occupy the whole interval, whereas RT in perfectives includes ET, which predicts that the event interval may be smaller
(ii) for temporal location adjuncts, see the last line in (4), one may analyze the co-occurrence of a preverbal, topical localizer (*ieri* 'yesterday') and a focal postverbal localizer (*dimineaţa* 'in the morning') as reflecting the co-occurrence of RT and ET modifiers.
Note indeed that postverbal temporal location modifiers are less felicitous under focal stress in single-event imperfectives, as opposed to perfectives, which indicates that they are RT modifiers with the imperfective, but can also be ET modifiers with the perfective:

(5) a. Maria a fost bolnavă în IULIE.
Maria has been sick in July
b. ?# Maria era bolnavă în IULIE. (with a single-event reading)
Mara was.IMPF sick in July
OK in a context when an occasion is evoked based on the knowledge shared between speaker and hearer, and on that occasion Maria was sick
=> in this reading, 'in July' modifies that particular occasion, rather than the event => it is a RT modifier
c. Maria era BOLNAVĂ în iulie.
Maria was.IMPF sick in July

This contrast can be explained as follows: lack of stress indicates that the adverb belongs to the topical material, and RT is typically topical – see Klein (1994), who even replaces RT with the term 'topic time'[5]. The special context in which focal stress is allowed on the adjunct, in (5)b, is an instance of choice between several possible topic times. This is why the existence of an occasion in the shared knowledge is required.

The incompatibility of types (i)-(iii) with the imperfective (see (2)) also holds for the present (with a genuine present ongoing meaning; the futurate present may be perfective, see von Stechow 2002b):

(6) a. Sunt la Braşov. *Stau aici de ieri până mâine.
am at Braşov stay.1SG here from yesterday until tomorrow
'I'm in Braşov. *I'm staying here from yesterday until tomorrow.'

[4] See Reichenbach (1947) and Arosio (2019), for temporal location adjuncts.
[5] If the RT is not provided by overt material, it must be provided by the context. This is why the imperfect, where an RT smaller than ET is necessary, has been seen as an 'anaphoric tense' (cf. Giorgi & Pianesi 1995, 2004 for French and Italian, Crăiniceanu 1995:218 for Romanian).

b. [uttered in August:]
*Construiesc la casă din primăvară până toamna (unless habitual)
build.1SG at house from spring until autumn-the
(modeled after Crăiniceanu 1995:255)

N.B. RB modifiers are possible, but they rely on the futurate use of the present (a future state is asserted, from the context we infer that this state continues a present state):

(7) (Mai) stau aici până la 5.
(more) stay.1SG here until 5
'I'll be staying here until 5.'

The existence of 2 events in a continuation relation is shown by the possibility of inserting *mai* in Romanian, which is an additive particle (see Donazzan & Mardale 2010, Giurgea 2017), presupposing the truth of a focal alternative; here, the presupposed focal alternative introduces an event (of the speaker being there at the speech time: 'I'm here') *continued* by the event asserted by the sentence.

Modifiers of type (v), which indicate the extent from LB to RT, are incompatible with the perfective:
(8) *Ieri, Maria a {scris / stat în fotoliu} de 3 ore
yesterday Maria has written sat in armchair of/from 3 hours

Summary:

	Single-event imperfective	Perfective
(i) Temporal localizers (*dimineaţa* 'in the morning')	*	✓
(ii) RB-localizers (*până la 3* 'until 3 o'clock'), LB+RB localizers (*de la 3 la 6* 'from 3 to 6')	*	✓
(iii) Total extent (*timp de 3 ore* 'for 3 hours')	*	✓
(iv) LB-localizers (*de la 3* 'from/since 3 o'clock')	✓	✓
(v) LB-RT extent (*de 3 ore* 'for 3 hours + perfect')	✓	*

1.3. Habituals and other pluractional environments

In contrast to single-event imperfectives as in (2), habitual imperfectives allow co-occurring RT modifiers and ET modifiers of types (i)-(iii):[6]

(9) **Anul trecut** stăteam în fotoliu/scriam {**timp de trei ore / de la 3 la 6/ până se întuneca / dimineaţa**}.
'Last year I used to {sit in the armchair/write} {for 3 hours / from 3 to 6 / until it got dark / in the morning}'
'there is a past stretch of time denoted by 'last year' (=RT), improperly included in the time interval of a plurality of events e such that e is an event of the Speaker's staying in his armchair / writing which lasts 3 hours/ stretches from 3 to 6 / lasts until dark'

[6] For the compatibility of total extent modifiers with the single event embedded under a habitual, see also de Swart (1998) for French, Arosio (2003, 2019) for Italian, Arche (2014) for Spanish.

The temporal modifiers embedded under the pluractional (referring to the single events in the series) clearly show that ET is accessible to temporal adjuncts (on the assumption that there is a single RT per clause). The same can be shown with ET modifiers with the perfect aspect (see also Klein 1994, von Stechow 2002a):

(10) a. Ion era deja acolo. Venise **la 3.** (ET modifier)
'Ion was already there. He had come at 3 o'clock.'
b. Nu ştiu când a aflat. Ieri, nu ştia, dar **azi la 3**, vorbise deja cineva cu ea. (RT mod.)
'I don't know when she found out. Yesterday she didn't know but today at 3 o'clock somebody had already told her.'

Generalizations:

(11) ET-modifiers are sensitive to whether the event is presented as 'completed'/ 'terminated' / 'bounded' (the term 'terminated' is used by Giorgi & Pianesi 2004, the term 'bounded' is used by Iatridou et al. 2001):
a. Localizing modifiers and modifiers involving RB or both boundaries (LB and RB), e.g. total extent modifiers → bounded event (see ex. (4))
b. Extent modifiers measuring the LB-RT interval → unbounded event (see (12))
c. LB- localizing modifiers are compatible with both +/-bounded (see ex. (3)-(4))

(12) *Ieri, Maria a stat în fotoliu de 3 ore
yesterday Maria has stayed in armchair from 3 hours

Generalizations so far:

(13) a. Asp_{impf} [Hab [+bounded]] (habitual imperfectives, ex. (9))
b. Asp_{impf}: -bounded (single-event imperfectives, ex. (2), (3))
c. Asp_{pfv}: +bounded (single-event perfectives, ex. (4))

Modifiers of the whole series of events of a pluractional constructions:
Asp_{impf} requires unboundedness of the series

(14) Când am cunoscut-o, Maria **mergea** vara la Paris {***din 1989 până în 1995 / *timp de 6 ani**}.
'When I met her, Maria **used to go** to Paris in summer {*from 1989 until 1995 / *for 6 years}'

Like with single-event imperfectives, modifiers accessing the LB of the series are allowed:

(15) a. Pe atunci, [[mă **întâlneam** cu el seara] **deja de 2 ani**].
around then REFL met.1SG.**IMPF** with him evening-the already from 2 years
'Around that time, I had been meeting him in the evening for 2 years already.'
b. [[Se **scula** la 7 dimineaţa] **din 2014, de când îşi**
REFL woke-up.3S.**IMPF** at 7 morning-the from 2014 from when REFL.3SG.DAT
găsise job tocmai în Berceni]
had-found job right in Berceni
'He had been waking up at 7 o'clock in the morning ever since 2014, when he had found a job as far as Berceni.'

=>

(13)′ a. Asp_{impf} [Hab +bounded]$_{-bounded}$

If Asp_{pfv} is combined with Hab, adjuncts modifying the extent of the whole series of events are allowed (=ET of the series):

(16) a. [[Am mers la bazin **dimineaţa**] {**timp de trei ani / între 2000 şi 2003**}].
have.1 gone to pool morning-the for three years between 2002 and 2003
'I went/used to go to the pool in the morning for three years / between 2001 and 2003'
b. [[Am lucrat **între 6 şi 9 dimineaţa**] {**timp de trei ani / între 2000 şi 2003**}].
have.1 worked between 6 and 9 morning-the for three years /between ...
'I worked/used to work between 6 and 9 in the morning for three years / between 2001 and 2003'
c. [**Din 1993 până în 1999** [Maria a studiat la pian **câte trei ore** zilnic]].
from 1993 until 1999 Maria has studied at piano DISTR 3 hours daily
'From 1993 to 1999 Maria studied the piano 3 hours per day'

(17) Asp_{pfv} [Hab +bounded]$_{+bounded}$

=> The imperfective is actually consistent in both uses in taking unbounded eventualities; the difference between habituals and single-event imperfectives is due to the existence of a further pluractional layer which creates a series of bounded eventualities

Note furthermore that Asp_{impf} can take pluractionals that do not rely on HAB, but contain a quantificational adverbial:

(18) a. Anul trecut mă trezeam {rar / adesea / uneori} la 7.
year-the past REFL woke-up.1.**IMPF** seldom / often / sometimes at 7
'Last year I {rarely/often/sometimes} woke up at 7.'
b. Anul trecut nu mă trezeam niciodată la 7.
year-the past not REFL woke-up.1.**IMPF** never at 7
'Last year I {rarely/often/sometimes} woke up at 7.'
c. De 3 ani mă duc rar pe la ea.
from 3 years REFL go.**PRS**.1SG rarely by at her
'For the last 3 years I haven't been visiting her so often.'

Such derived states are unbounded – they must be able to be continued after RT – therefore modifiers introducing a specific number of occurrences are out (see (19)a), unless embedded under a temporal quantifier that distributes them over parts of an unbounded series – see 'per day' in (19)b:

(19) a. * Anul trecut mă trezeam de 7 ori la 7 dimineaţa.
last-the year REFL woke-up.1SG.IMPF 7 times at 7 morning-the
b. Anul trecut mă spălam pe dinţi de 2 ori pe zi.
last-the year REFL washed.1SG.IMPF on teeth twice per day

2. Accounting for the observed generalizations

The observed generalizations are problematic for a common type of analysis of the imperfective/perfective opposition, which treats these two aspects in a similar way:

(20) a. TT INCL TSit: IMPERFECTIVE (Klein 1994:108)
TT AT TSit: PERFECTIVE

b. Imperfective: $\lambda P_{<i,<s,t>>} \lambda t_i \lambda w_s \exists e (t \subseteq time(e) \& P(e)(w)=1)$ (Kratzer 1998)
'reference time included in event time'
Perfective: $\lambda P_{<i,<s,t>>} \lambda t_i \lambda w_s \exists e (time(e) \subseteq t \& P(e)(w)=1)$
'event time included in reference time'

c. ⟦UNBOUNDED⟧ = $\lambda P \lambda i \exists e [i \subseteq \tau(e) \& P(e)]$ (Pancheva 2003)

⟦BOUNDED⟧ = $\lambda P \lambda i \exists e [\tau(e) \subset i \& P(e)]$

d. Progressive: AST-T WITHIN EV-T (Demirdache & Uribe-Etxebarria 2004)
Simple tenses: AST-T binds EV-T

e. Imperfective: AssertionTime (WITH)IN ET (Arche 2014:797)
Perfective: AssertionTime (Total)OVERLAP ET

f. INCLUDES = $\lambda P_{<v,t>} \lambda t \exists e.\tau(e) \subseteq t \& P(e)$ ("PERFECTIVE")
INCLUDED = $\lambda P_{<v,t>} \lambda t \exists e.t \subseteq \tau(e) \& P(e)$ ("IMPERFECTIVE")
(Paslawska & von Stechow 2003:322)

Under these analyses, since ET modification is in principle possible, it is not clear why it is so constrained for single event imperfectives.

Two possible accounts:
(i) The constraints follow from the fact that Romance past tenses check for homogeneity of their complement (de Swart 1998, Crăiniceanu 2002, Arosio 2003, 2010, 2019)
(ii) The constraints show that the definition of the imperfective given so far is not accurate. It should be replaced with a definition which formalizes the intuition that the RB of the event is not asserted. An analysis which formalizes this intuition has been indeed proposed for the progressive (Dowty 1979, Kearns 1991, Landman 1992, Portner 1998) and extended to the imperfective in general (Bary 2009, Deo 2010, Altshuler 2014, Ferreira 2016): the basic idea is that the continuation of the event beyond RT is in the scope of a modal, takes place under normal circumstances (in inertia worlds).

In the following, I will adopt an account along the lines of (ii).
I will briefly examine (i), showing that it is problematic.
I will adopt (ii) and examine how the revised, Dowty-style semantics of the imperfective can account for the restrictions on ET modification.

2.1 Imperfective Aspect and incompleteness: previous literature

The existence of an intensional component in visible in progressives built on telic predicates:
(21) a. Mary was building a house, but she never finished it
b. Mary was crossing the street when she was hit by a truck

Dowty (1979:149):
(22) [PROG ϕ] is true at <I, w> iff for some interval I′ such that I⊂I′ and I is not a final subinterval for I′ and for all w′ such that w′∈Inr (<I, w>), ϕ is true at <I′, w′>
Inr(<I,w) = inertia worlds for w, at I: "worlds which are exactly like the given world up to the time in question and in which the future course of events after this time develops in ways most compatible with the past course of events"

Landman (1992): in view of examples such as (21)b, the definition of what counts as a normal course of events does not take into account the entire world of evaluation, but focuses on the process at hand => "a notion of inertia world that is not only indexed for a world and an interval, but for an event as well":

(23) "Mary is crossing the street is true in *w* at *i* iff some process of crossing by Mary, *e*, is going on in *w* at *i* and in every inertia world for *w* and *e* at *i*, i.e., in every world where *e* is allowed to follow its normal course, there is an interval surrounding *i* where *Mary cross the street* is true." (Landman 1992: 11)

- The progressive introduces an event that is a stage of a (larger) event which holds in some possible worlds

(24) "An event is a stage of another event if the second can be regarded as a more developed version of the first, that is, if we can point at it and say, "It's the same event in a further stage of development." Thus, not every part of e at an interval is a stage of e; to be a stage, a part has to be big enough and share enough with e so that we can call it a less developed version of e." (Landman 1992: 23)

- PROG is a relation between an event and a property of events:

(25) PROG (e, P) is true in *w* iff there is an event *f* and a world *v* such that the pair <*f,v*> is in the continuation branch of *e* in *w* and *f* is a P-event
$[\text{PROG}(e,P)]_w = 1$ iff $\exists f \exists v (\langle f,v\rangle \in \text{CON}(e,w) \wedge [P]_v(f))$
(modeled after Landman 1992: 27)

- The worlds where the continuation of *e* is considered are based on a notion of event-relativized normality:

(26) A world *v* is a reasonable option of *e* in *w* (notated R(*e,w*)) "iff there is a reasonable chance on the basis of what is internal to *e* in *w* that *e* continues in *w* as far as it does in *v*." (Landman 1992: 25)

The worlds which are reasonable options of *e* in *w*, together with *e*, form the continuation branch of *e* in *w*, which is recursively built as follows (starting with *w* itself): each time an interruption occurs in a world *v*, the search for a more developed event moves to the closest world that is in the set of reasonable chances of *e* in *w*, until all such worlds are exhausted (for details, see Landman 1992: 26-27)

Portner (1998): the absence of interruptions can be represented as *the ordering source* that operates on the set of worlds considered (the modal base), using Kratzer's (1977, 1981, 1991) semantics of modality.

- the modal base: "the set of circumstances relevant to whether *e* is completed": Circ(e)
- the ordering source: "the set of propositions which assert that *e* does not get interrupted": NI(e)

Inertia worlds: the worlds in Circ(e) that are best wrt. the ordering source NI(e)

Portner further argues that Circ must also take into account a property of events, the way in which *e* is described (otherwise, *Mary was crossing the street* and *Mary was walking into the path of an oncoming bus*, which are alternative descriptions for one and the same event, would be indistinguishable)

(27) a. Best(Circ, NI, e, P) = the set of worlds w′ in Circ(e, P) such that there is no w′′ in Circ(e, P) where $w'' <_{NI,e} w'$.

b. PROG(e, P) is true at a world w iff for all worlds w′ in Best(Circ, NI, e, P), there is an event e′ which includes e as a nonfinal subpart, such that P(w′)(e′) is true.
(Portner 1998:46)

Ferreira (2016) applies Portner's analysis to imperfectives in general.

(28) $[\![\text{Imp}]\!] = \lambda\wp.\ \lambda t.\ \lambda w.\ \forall w' \in \text{BEST}(\wp, M, O, w, t)\ \exists e : t \subseteq \tau(e)\ \&\ \wp(w')(e)$

BEST($\wp$, M, O,w, t) = the set of worlds w' in $\cap M(\wp, w, t)$ such that there is no world w'' in $\cap M(\wp, w, t)$ where $w'' <_{O(\wp, w, t)} w'$ (Ferreira 2016: 52-53)

Bary (2009) proposes a semantics based on Dowty's inertia worlds for the Ancient Greek imperfective, which, in her description, is very similar to the Romance imperfective

Altshuler (2014) adopts a version of Landman (1992) for the English progressive: "PROG (...) combines with a set of events *P* and requires an event *e'* that is instantiated in the actual world *w** to be a stage of a *P*-event *e* in a 'near enough' world *w*":

(29) $[\![\text{PROG}]\!] = \lambda P\ \lambda e'\ \exists e\ \exists w\ \text{STAGE}(e,e',w^*,w,P)$

$[\![\text{STAGE}(e,e',w^*,w,P)]\!]^{M,g} = 1$ iff

(i) the history of g*(w)* is the same as the history of g(*w**) up to and including τ (g(*e'*))
(ii) g(*w*) is a reasonable option for g(*e'*) in g(*w**)
(iii) $[\![P]\!]^{M, g}(e, w) = 1$
(iv) g(*e'*) $\subset$ g(*e*) (Altshuler 2014:53)[7]

Deo (2009): the imperfective takes a property of eventualities or intervals and requires it to distribute over parts of an interval that continues, after the RT, in the inertia worlds:

(30) "IMPF applies to a predicate (of eventualities or intervals) *P* to yield a predicate of intervals *i* such that
(a) every inertia future of *i* contains an interval *j* (where *i* is a non-final subinterval of *j*) and
(b) every cell *k* of a contextually determined regular partition of *j*, R^c_j, COINcides with *P* (our note: "k COINcides with P" = either P(k) or there is a P-event whose time ('temporal trace') overlaps with k).
A contextually determined regular partition is a regular partition where the partition-measure is anaphoric on the context." (Deo 2009:491)

For b): COINcides = an interval i coincides with P iff
in case P is a property of eventualities: $\exists e(P(e) \wedge \tau(e) \circ i)$
in case P is a property of intervals: P(i)

In this way, habituality is derived without a HAB operator.
In single-event (continuous/progressive) imperfectives, the partition-measure is set to an infinitesimally small length.
(30)b accounts for the divisiveness of imperfective predicates, at least to a certain threshold:

(31) *The level of the lake was raising ten feet when I arrived (Mittwoch 1988:226)
Ro.: * Nivelul apei se ridica cu 2 metri când am ajuns acolo.
level-the water-the.GEN REFL raise.IMPF with 2 m. when have.1 arrived there

[7] Altshuler proposes that the Russian imperfective differs from the English progressive by the fact that proper part in (29)(iv) is replaced with improper part ('$\subseteq$'). This explains why Russian imperfectives can refer to completed events and do not require coercion with achievements, as opposed to the English progressive:
(i) K nam priezža-l otec
to us arrive.IPF-PST father
'Father came to our place'
The Romanian imperfective behaves like the English progressive.

(32) John was drinking three cups of tea when I arrived (Mittwoch 1988)
= John was sobbing intermittently from the three cups
≠ John drank three cups of tea in succession
Ro. Ion bea ??(din) trei ceşti de ceai când am sosit
Ion drank.IMPF (from) three cups of tea when have.1 arrived

A problem in Deo (2009): the argument of Asp_{impf} is "a property of eventualities **or** intervals". This is due to the fact that she treats Q-Adverbs as delivering properties of intervals

Note that under most accounts, at least single-event imperfectives (i.e. progressive or 'continuous' readings) rely on an operator that takes a property of event(ualitie)s, rather than a property of intervals.

=> in order to achieve a truly unified semantics, we should treat [Q-adv VP] constituents as denoting properties of events, rather than properties of intervals. This is the line followed by **Ferreira (2016)**, who cites examples provided by Schein (1993) and Kratzer (2003) as evidence for the idea that quantification can create a plural event:

(33) a. Unharmoniously, every student sustained a note on the Wurlitzer for sixteen measures.
b. In slow progression, every student struck a note on the Wurlitzer.
(Ferreira 2016:71-72 , < Schein 1993:p. 7)

(34) Three copy editors caught every mistake in the manuscript. (ibid.<Kratzer 2003)
'there is a plural event E of catching mistakes such that for each mistake *x* there is an event of catching *x* included in E, and the agent of E are three copy editors'

=> Ferreira proposes that [*always* VP] denotes a property of plural events (he notates variables ranging over plural events with capitals):[8]

(35) ⟦John always-C smokes⟧ = $\lambda E.\forall e'[C(e') \rightarrow \exists e[e<E \ \& \ smoke(j,e) \ \& \ R(e',e)]] \ \&$
$\exists E'[C^*(E') \ \& \ smoke(j, E) \ \& \ R(E',E)]$ (Ferreira 2016:83)

For HAB as operating on events and yielding states, see **Boneh & Doron** (2011:181):

(36) Hab ~> $\lambda P \lambda s \lambda w$ [INIT (P,s,w) & $\forall w' \in MB_{\tau(s),w} \exists e$ [$\tau(s) \subseteq \tau(e)$ & ITER(P,e,w')]]
'Hab(P) is true of a state s in world w iff s is initiated in w, and for all worlds w' which are worlds close to the ideal world of the modal base $MB_{\tau(s),w}$ there is an event e, which temporally extends the state s, such that e is an iteration of P-events in w'.'

In Boneh & Doron's (2011) analysis, HAB is an adverbial that scopes below Asp and can therefore combine both with the imperfective and the perfective aspect. This corresponds to the way we described the combinations of the Romanian past tenses with HAB (see (14) above).

N.B. Ferreira (2005, 2016) argues that bare habituals do not involve a two-place quantifier, but just a one-place operator over event descriptions that introduces a plural event.

[8] A similar proposal can be found in Del Prete (2011):

(i) ⟦ [sempre C] ⟧ = $\lambda P_{<v,t>}. \lambda e_0. \forall s_1 [C(s_1) \rightarrow \exists e_1 [P(e_1) \wedge \Re(e_1, s_1) \wedge e_1 \subseteq_E e_0]]$

($\Re$ = contextual temporal relation between the eventualities in the restrictor, C, and those in the nuclear scope, $\lambda e.P(e)$)

In any case, it is clear that continuation in inertia worlds holds for imperfective habituals just as it holds for single-event imperfectives:

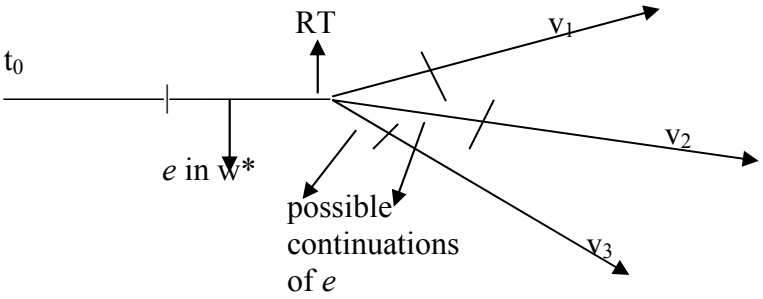
(37) a. Ion fumează
'Ion smokes'
b. Nu mai fumează, s-a lăsat
not more smokes REFL-has left
'He doesn't smoke any longer, he quit.'

We may imagine a situation in which both (37)a and b are compatible with the *same* series of events of Ion smoking in the *actual* world:
- there is a series of smoking events up to a certain moment in the recent past
- Ion dies soon after

=> in this case, the choice between a and b depends only on the existence of a decision to quit smoking and on the likeliness of him sticking to this decision
(37)a is not falsified by the absence of any future occurrence if this is due to the interruption of the normal course of events (here, Ion's death)

2.2 Towards an account

Summing up, I propose to relate the constraints on ET modifiers with the imperfective to the fact that the imperfective introduces an *incomplete* event, which continues indefinitely in inertia worlds (I use this term as a cover term where I include more precise definitions such as those developed by Landman 1992 and Portner 1998):[9]



(38) The Romance imperfective has the semantics of the English progressive, extended to habituals/pluractionals and states, along the lines proposed by Deo (2010), Altshuler (2014) and Ferreira (2016): it introduces an incomplete event
(39) Incomplete events disallow temporal modifiers involving the whole event interval, comprising the RB: extent modifiers, RB-oriented modifiers and temporal location modifiers
(40) The only temporal modifiers allowed are those that make reference to RT or to LB (including those measuring the interval LB-RT)

The restriction in (39) is also found with the English progressive:
(41) *It was raining for 2 hours when I arrived (Mittwoch 1988:226)
(cannot mean: I arrived in the middle of a two-hour downpour)

[9] For the idea that the progressive only asserts the instantiation of a *part* of an event, see also Verkuyl (1999), Arche (2014).

English differs from Romance wrt. (40), requiring the universal perfect for LB-oriented modification:

(42) Ne aştepta de 10 minute / de la 7.
us waited.IMPF.3SG from 10 minutes / from 7
'(S)he {had been waiting / *was waiting} us for 10 minutes / since 7.'

Note that although the VP can contain descriptive content that only characterizes the complete event (see telic predicates: *was creating a unicorn, was drawing a circle, was crossing the street*), temporal modifiers describing the complete event are not allowed:

(43) ?? Sonda călătorea spre Lună în 88 ore (când un meteorit a lovit-o)
spacecraft-the travel.IMPF towards Moon in 88 hours when a meteorite has hit-it
'*The spacecraft was travelling to the Moon in 88 hours (when a meteorite hit it).'

Under our analysis of the imperfective, (39) is equivalent to

(44) The eventuality in the complement of Asp_{impf} does not allow temporal modifiers

2 conceivable explanations for (44):
(i) semantic type incompatibility: either temporal modifiers cannot combine with properties of events or, if they do, the result will no longer be a property of events (recall that under our assumptions Asp_{impf} takes a property of event(ualitie)s as an argument)
(ii) an independent principle of interpretation, requiring that the time of the completed event varies across inertia worlds

Given that even with precise astronomical calculations as in (43) temporal modification of the completed event does not seem to be acceptable, I adopt (i) above.

2.3 Modifiers excluded with single event imperfectives

2.3.1 Temporal location modifiers

(45) Temporal location modifiers (type (i) in §1) take properties of times (are <it,it>) => they do not provide the <v,t> type (property of events) required by Asp_{impf}[10]

Temporal location modifiers are indeed usually considered to modify properties of time intervals – see Dowty (1979), Abusch (1998), von Stechow (2002a), Rathaert (2012), Arosio (2019). This is supported by the fact that they can apply to the RT (see §1): Asp (or the highest aspectual head, in case several Asp layers are assumed) maps the denotation of its complement into a property of times, saturated by the RT.

But if temporal location modifiers are <it,it>, how can they ever specify the ET? (for ET-localizers, see (4) with the perfective, (10)a with the pluperfect, (9) and (16) with the habitual imperfective, (18) with quantificational adverbials under the imperfective)
=> Proposal:

(46) ET-localizing modifiers (type (i)) rely on an operator BOUNDED of type <vt,it> that binds the e variable and introduces the ET-variable[11]

[10] I use the following notations: v for the type event, i for the type time interval; by convention, e,e´... are used for variables of type v and t, t´... for variables of type i.

[11] It is not clear to me whether with atelic eventualities the maximal event interpretation (i.e. it did not rain before 3 or after 4) is an implicature or an entailment. If it is an entailment, the definition of BOUNDED in (47) should specify that the event is maximal (not included in a continuous larger event of type P)

(47) $[\![\text{BOUNDED}]\!] = \lambda P_{v,t}\, \lambda t\, \exists e(P(e) \wedge t{=}\tau(e))$

(48) $[\![\text{rain between 3 and 4}]\!] = [\![\ [\text{BOUNDED rain}]\ [\text{between 3 and 4}]]\!]$ (ET modifier)

$[\![[\text{between 3 and 4}]]\!] = \lambda P_{<i,t>}\, \lambda t\, [\ LB(t) = 3 \wedge RB(t) = 4 \wedge P(t)]$ (durative reading)

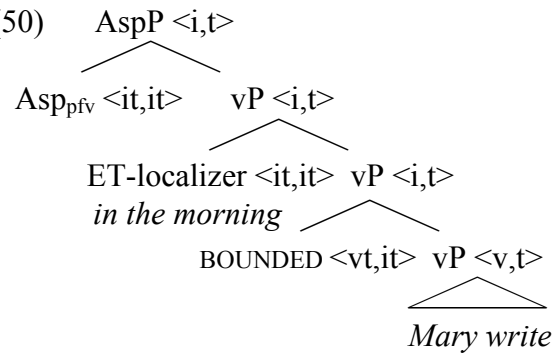
$[\![\text{rain between 3 and 4}]\!] = \lambda t\, \exists e(\text{rain}(e) \wedge t{=}\tau(e) \wedge LB(t) = 3 \wedge RB(t) = 4)$

(49) $[\![\text{It rained between 3 and 4}]\!] = \text{PAST}_1\ (\ [\![\text{PFV}]\!]\ \ [\![\text{rain between 3 and 4}]\!]\ ) =$
$\text{PAST}_1\ (\lambda t\, \exists t'\ (t' \subseteq t \wedge \exists e(\text{rain}(e) \wedge t'{=}\tau(e) \wedge LB(t') = 3 \wedge RB(t') = 4) =$
$\exists t'\ (t' \subseteq \text{PAST}_1 \wedge \exists e(\text{rain}(e) \wedge t'{=}\tau(e) \wedge LB(t') = 3 \wedge RB(t') = 4)\ =$
$\exists e(\text{rain}(e) \wedge \tau(e) \subseteq \text{PAST}_1 \wedge LB(\tau(e)) = 3 \wedge RB(\tau(e)) = 4)$

The entry in (47) can be seen as reflecting a (lower) aspectual head. It differs from the perfective in that it introduces a time variable *identical* to the temporal trace of the event, rather than *including* it. This move was necessary in order to be able to refer to the boundaries of the event.[12]

Event-localizers with perfectives:[13]

(50)



Single-event imperfectives: illicit combination (see the boldfaced level of the tree):

[12] Alternatively, a general rule or type-shifting mechanism could be assumed for the combination of temporal modifiers with event-denoting phrases:

(i) If α is of type <v,t> and β is of type <it, it>, then $\beta(\alpha) = \lambda t.\exists e\ (\alpha(e) \wedge \beta(t) \wedge t{=}\tau(e))$

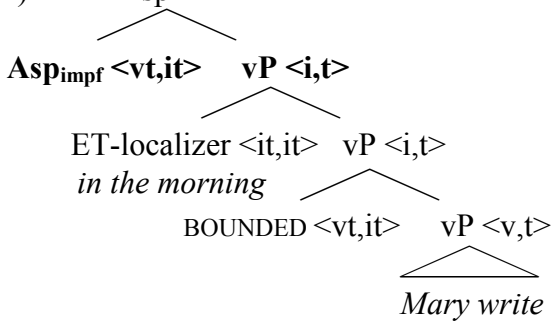
(ii) a. $[\![\text{between 3 and 4}]\!] = \lambda P_{<i,t>}\, \lambda t\ [LB(t) = 3 \wedge RB(t) = 4]$

b. $[\![\text{between 3 and 4}]\!]\ (\ [\![\text{rain}]\!]\ ) = \lambda t.\exists e\ [\text{rain}(e) \wedge LB(t) = 3 \wedge RB(t) = 4 \wedge t{=}\tau(e)]$

Some researchers assume indeed that temporal modifiers can apply to properties of times *or* events, see e.g. Deo (2009:513): "Frame adverbials map properties of eventualities or times to properties of times, and may combine with sentence radicals before any other aspectual operator".
However, see §2.4 below, fn. 16, for a potential problem for such a type-shifting.

[13] As I do not include the Tense-layer, I give the uninflected form of the verb in the trees, under vP.

(51) * AspP



2.3.2 ET-extent modifiers and RB-localizing modifiers

Modifiers of type (ii) and (iii) in §1 include *until*-phrases ('durative' *until,* see Giannakidou 2003 and references therein) and phrases that specify the extent of the whole event, respectively. As such modifiers are sensitive to telicity[14] and do not apply to RT (see (52)), it seems reasonable to assume that they apply to event predicates:

(52) {Între 3 şi 3 şi un sfert / *Timp de un sfert de oră/*Până la 3 şi un sfert} citea. (on the single-event reading)
'{Between 3 and a quarter past 3 / *For a quarter of an hour/*Until a quarter past 3} (s)he was reading'

However, they introduce boundedness of the event, disallowing the further combination with Asp$_{impf}$
=> I propose that such modifiers are similar to the operator BOUNDED; as soon as the event is temporally bounded, the denotation is mapped onto a property of times:

(53) Modifiers of total extent and RB-localizers map properties of events onto properties of times (type <vt,it>, like the operator BOUNDED) => they do no provide the <v,t> type required by Asp$_{impf}$

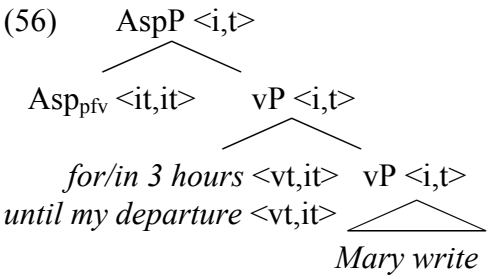
(54) ⟦for 10 minutes⟧ =$\lambda P_{<v,t>}$:P is not quantized. $\lambda t.\exists e(P(e) \wedge length(\tau(e)) = 10' \wedge t=\tau(e))$
⟦in 10 minutes⟧ =$\lambda P_{<v,t>}$:P is quantized. $\lambda t.\exists e(P(e) \wedge length(\tau(e)) = 10' \wedge t=\tau(e))$
⟦until 3⟧ = $\lambda P_{<v,t>}$:P is not quantized. $\lambda t.\exists e(P(e) \wedge t=\tau(e) \wedge RB(t, 3o'clock))$
(cf. Giannakidou 2003 and references therein on 'durative' *until*)

(55) A property P is quantized iff for all e, e′ if P(e) and e′ ⊏ e then ¬P(e′) (Krifka 1989)

[14] Besides being sensitive to atelicity, *for*-durative may also trigger coercion of a telic predicate into an atelic one, suspending culmination:
(i) Juan vació la piscina durante diez minutos. (Arche 2014:802)
Juan emptied.pfv the pool for ten minutes
|≠ the pool became empty

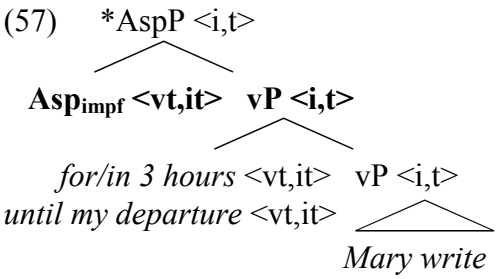
Perfectives:

(56)



Single-event imperfectives: illicit combination (see the boldfaced level of the tree):

(57)



Phrases of the type *from..to*, which indicate both boundaries, probably belong here. In Romanian, *de la* 'from' can appear alone for indicating LB, but *la* 'to' can only indicate RB when preceded by *de la* 'from'-PP => we can assume a complex PP 'from..to'. It appears that these complex phrases cannot modify the RT, so they are not <it,it> (like localizers) but rather <vt,it> (compare (58)a, which does not allow a single-event reading, with (58)b, which has a bona fide localizer):

(58) a. (* Ieri,) de la 3 la 5, citea. (* single event, ✓ habitual)
yesterday from 3 to 5 read.IMPF.3
b. Ieri, între 3 şi 5, citea.
yesterday between 3 and 5 read.IMPF.3
'Yesterday, between 3 and 5, (s)he was reading'

(59) ⟦from 3 to 5⟧ = $\lambda P_{<v,t>}\, \lambda t.\exists e(P(e) \wedge t=\tau(e) \wedge LB(t, 3\text{ o'clock}) \wedge RB(t, 5\text{ o'clock}))$

As the *la* 'to'-P indicates the RB, the complex 'from..to' phrase can be subsumed under the RB-localizer type.

2.4 LB-oriented temporal modifiers with the imperfective

My proposal is based on the idea that no temporal modifiers may characterize the set of events taken as an argument by Asp$_{impf}$. However, we have seen that the *incomplete* event introduced by Asp$_{impf}$ can be further modified by certain temporal adjuncts (see (3), resumed under (60) below):

(60) Când am intrat în cameră, Maria scria/stătea în fotoliu **de la ora 3** (localiz. of LB)
de trei ore. (extent from LB)
when have.1 entered in room Maria wrote.IMPF /sit.IMPF in armchair ...
'When I entered the room, Maria had been {writing/ sitting since 3
in the armchair} for 3 hours'

=> it seems that we need to allow access to the incomplete event, but not for *all* the range of ET-modifiers
There are indeed analyses of the progressive in which access to the incomplete event is allowed:

(61) PROG(**e**, P) is true at a world w iff for all worlds w′ in Best(Circ, NI, e, P), there is an event e′ which includes e as a nonfinal subpart, such that P(w′)(e′) is true.
(Portner 1998:46)

(62) ⟦PROG⟧ = λP **λe′** ∃e ∃w STAGE(e,e′,w*,w,P) (Altshuler 2014:ex.53)

If the structure of imperfectives contains this PROG, we may assume that LB-oriented modifiers apply to the partial event, being of type <vt,vt>:

(63) [LB-oriented modifiers [PROG [VP]]]

The whole constituent will be turned into a property of times by a higher aspectual operator – call it IMPF –, which introduces the time argument that will be bound by RT; this time is the final subinterval of the partial event:

(64) ⟦IMPF⟧ = $\lambda P_{<v,t>}\ \lambda t.\ \exists e\ [P(e) \wedge t \subseteq \tau(e) \wedge \neg\exists t'(t'>t \wedge t' \subseteq \tau(e))]$
(65) [IMPF [LB-oriented modifiers [PROG [vP]]]]

Under this approach, LB-oriented modifiers should be <vt,vt>:

(66) a. ⟦de [la ora 3]⟧ = $\lambda P_{<v,t>}\ \lambda e\ [P(e) \wedge AT\ (LB(\tau(e)), 3\ o'clock)]$
b. ⟦de_{loc}⟧ = $\lambda Q_{<i,t>}\ \lambda P_{<v,t>}\ \lambda e\ [P(e) \wedge Q(LB(\tau(e)))]$
c. ⟦la ora 3⟧ = λt AT (t, 3 o'clock)

(67) a. ⟦de 3 ore⟧ = $\lambda P_{<v,t>}\ \lambda e\ [P(e) \wedge length(\tau(e)) = 3\ hours]$
b. ⟦de_{extent}⟧ = $\lambda t\ \lambda P_{<v,t>}\ \lambda e\ [P(e) \wedge length(\tau(e)) = t]$

Problem: if the result of applying PROG to vP is of type <v,t>, why can't it combine with BOUNDED, extent modifiers and *until*-phrases? If such a combination were allowed, we would obtain a progressive embedded under a perfective. But such a combination, with a lower ProgP-level indicated by LB-modifiers, and a higher BOUNDED layer indicated by a localizing modifier and the perfective aspect, is impossible:

(68) * Ieri, [[Maria a vorbit de o oră] dimineața]
yesterday Maria has spoken from an hour morning-the
Intended: 'Yesterday, Maria had been talking for an hour, in the morning'

Possible solution: IMPF and PROG always come together, due to syntactic selection:

(69) a. Asp_{impf} selects for PROG
b. Asp_{pfv} and pluractional operators (see §2.5 below) select for BOUNDED

As we have seen in §1.2, LB-oriented modifiers differ wrt. the compatibility with the perfective: LB-localizers are compatible with both aspects, LB-RT extent modifiers are incompatible with the perfective.

(70) Ieri, Maria {lucra / a lucrat} de la 5 (LB-localizer)
yesterday Maria worked.IMPF /has worked from at 5
'Yesterday, Maria had been working since 5 / began to work at 5'

(71) Ieri, Maria {lucra / *a lucrat} de 3 ore (LB-RT extent)
yesterday Maria worked.IMPF / has worked from 3 hours
'Yesterday, Maria had been working for 3 hours'

=> for LB-localizers, the <vt,vt> type in (66) is unproblematic; LB-RT extent modifiers, on the other hand, must be assumed to be syntactically specialized for SpecProgP. Crucially, they must occur below Asp_{impf}, because it is this head that introduces the RT involved in their interpretation.[15]

Alternative analysis, with a single aspectual layer: if LB-RT extent modifiers are treated as <it,it>, as in von Stechow (2002b), we may assume a single Asp_{impf}, placed below the LB-RT extent modifiers. This Asp existentially binds the partial event and introduces RT as a time whose RB coincides with the RB of the partial event:

(72) $[\![\text{IMPF}]\!] = \lambda P\, \lambda t\, \exists e\, (t \subseteq \tau(e) \wedge RB(t)=RB(\tau(e)) \wedge \forall w' \in Best(Circ, NI, e, P))$
$\exists e'\, (P(e')(w'))$

According to von Stechow (2002b), LB-oriented extent modifiers take as arguments homogeneous properties of times:

(73) $[\![$ de x-time$]\!] = \lambda P_{<i,t>}$:P is homogeneous. $\lambda t\, \exists t'(XN(t',t) \wedge length(t') = x \wedge P(t'))$
where XN ("extended now") = $\lambda t.\lambda t'$. t is a final subinterval of t'

(74) [Maria [$_{TP}$ scria [de 3 ore [IMPF [t_{Maria} t_{scrie}]]]]]]
$[\![$de 3 ore [IMPF [t_{Maria} t_{scrie}]]$]\!]$ = $\lambda t\, \exists t'(XN(t', t) \wedge length(t')=3h \wedge \exists e\, (t' \subseteq \tau(e) \wedge RB(t')=RB(\tau(e)) \wedge \forall w' \in Best(Circ, NI, e, P))\, \exists' write(e',Maria)(w))$
"the event of Maria's writing is ongoing throughout an interval that begins three hours before the RT and ends at RT"

- The requirement that P is homogeneous is needed in order to rule out bounded events with *de-x-time*:

---

[15] Spanish has a specialized progressive paraphrase, which allows combinations with both the imperfective and the perfective aspects – see (i) for the combination with the perfective:

(i) Marta estuvo coloreando un castillo durante diez minutos, peró no lo termino (Arche 2014: 802)
Marta was.PFV coloring a castle for 10 minutes but not it finished.3
'Marta was coloring a castle (for ten minutes), but she did not finish it.'

LB-RT extent is expressed by the construction *hace x-time que.*. 'makes x-time that...'. This construction is indeed disallowed with the perfective (Maria Teresa Espinal, p.c.):

(ii) Hacía 3 horas que {estaba / *estuvo } coloreando un castillo
made.IMPF.3 3 hours that was.IMPF.3SG was.PFV.3SG coloring a castle

The *que*-clause contains a relativizer whose trace may be asasumed to act as a LB-RT extent modifier (like Ro. *de 3 ore* 'from 3 hours' in (71).

(75) * Ieri, Maria a dormit de 3 ore.
yesterday Maria has slept from 3 hours

Note indeed that the operator BOUNDED(e) creates the property λt.t=τ(e), which is non-homogeneous: no subinterval of τ(e) can be equal to τ(e).[16]

- Note that this semantics does not imply that the event does not extend before the LB expressed by the modifiers. The fact that we normally get this interpretation is accounted for by a conversational implicature (cf. Arosio 2019).
- In this account, LB-localizers can be assumed to occur below Asp_{impf}, specifying the LB of the total event (note that the LB of the total event coincides with the LB of the partial event).

Further research is needed in order to decide between these two alternative analyses of LB-oriented modification.

2.5 The composition of pluractional imperfectives (habituals, constructions with iterative and quantificational adverbials)

At the heart of our account is the idea that Asp_{impf} takes a <v,t> argument (property of event(ualitie)s). But, as we have seen in §1.3, HAB and Q-adverbs can be embedded under Asp_{impf}=>

(76) HAB and Q-adverbs yield properties of events

2.5.1 Habituals

(77) Mă sculam la ora 7
REFL woke-up.IMPF.1S at hour-the 7
'I used to wake u) at 7'
Asp_{imp} [HAB [at 7 o'clock [BOUNDED [I wake up]]]]

As the scope of HAB may contain temporal localizers and other temporal modifiers that create boundedness (see §1.3), the sister of HAB will have an <i,t> denotation under my account
=> HAB will have the type <i,t><v,t>, introducing an eventuality characterized by a certain pattern of bounded events, accessed via their temporal traces. We may represent HAB as a generic quantifier whose restriction may be provided by overt material, as in (78); the restriction consists of a set of time intervals, which are related to the time intervals that represent the temporal traces of the event introduced by the vP (this relation, represented by a variable R contextually set, may be overlap, close succession/precedence, inclusion; in (78), it is close succession):

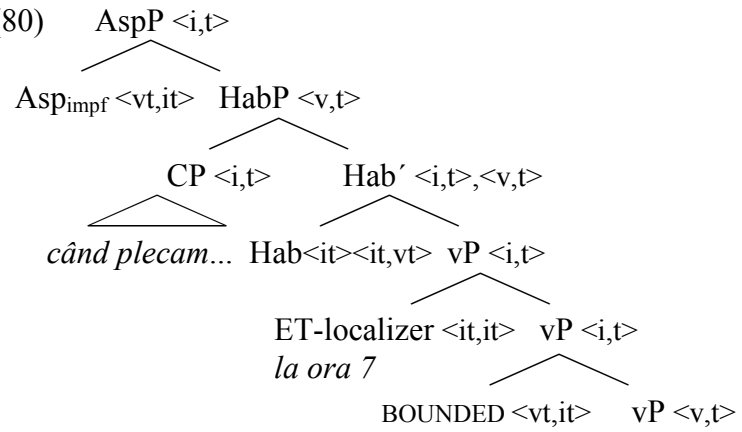
(78) Mă sculam la ora 7 când plecam în excursie.
REFL got-up.IMPF.1SG at hour-the 7 when leave.IMPF.1SG in trip
'I used to get up at seven when I went on a trip'
λe GEN t ((∃e´.go-on-a-trip(e´, Speaker) ∧ t=τ(e) ∧ t⊆ τ(e))
[∃t´ ((∃e´´ (wake-up(e´´, Speaker) ∧ t´=τ(e´´)) ∧ AT (t´, 7 o'clock) ∧ R(t,t´)]

[16] If we allowed *de-x-time* phrases to apply to an event property by the type shifting rule suggested in fn. 12, we would incorrectly rule in (75) (*sleep* being a homogeneous property).

‘‘e is an event such as the subintervals of e when the Speaker goes on a trip stand in a temporal relation (here: close succession) with the time of an event of the Speaker’s waking up at 7’

(79) $[\![\text{HAB}]\!] = \lambda Q_{<i,t>}\, \lambda P_{<i,t>}\, \lambda e.\ \text{GEN}\ t\ ((Q(t) \wedge t \subseteq \tau(e)))\ [\exists t'\ (P(t') \wedge R(t', t))]$

(80)



When an overt restriction is absent, a covert contextual variable C is assumed; for (77), this will be a set of days, as the event of waking up is normally daily:

(81) $[\![$[at 7 o’clock [BOUNDED [I wake up]]]$]\!] = \lambda t.\exists e(\text{wake-up}(e,\text{Speaker}) \wedge t=\tau(e) \wedge \text{AT}(t,\text{7-o'clock}))$

$[\![\text{HAB}$ [[at 7 o’clock [BOUNDED [I wake up]]]]$]\!] = \lambda e.\ \text{GEN}\ t\ ((t \in C \wedge t \subseteq \tau(e))\ [\exists t'\ \exists e'(\text{wake-up}(e,\text{Speaker}) \wedge t'=\tau(e') \wedge \text{AT}(t',\text{7-o'clock}) \wedge R(t',t)]$

‘e is an event such as the relevant subintervals of e (here: days) generally stand in a temporal relation (here: inclusion) with the time of an event of the Speaker’s waking up at 7’

- N.B.: according to Ferreira (2005), habituals may also be of a simpler sort, with no binary quantifier – this explains why, without further material that may introduce a restriction, a singular indefinite cannot be distributed:

  (82) Mary smokes {cigars / #a cigar}
  => he proposes that plural events are already in the lexical denotation of the verb

  If this is true, unmarked habituals of this sort may directly occur as arguments of Asp$_{impf}$, as proposed by Deo (2009) (see §3.2 above).
  The cases we are interested in, with temporal modification referring to the individual events inside the plurality, are not of this sort. Note that temporal modification allows distribution of the indefinite:

  (83) a. Mary smokes a cigar after dinner.
  b. Maria scria o scrisoare în 15 minute. (Ro.)
  Maria wrote.IMPF a letter in 15 minutes
  ‘Maria used to write a letter in 15 minutes’

- The existence of an Asp layer embedded under the imperfective, in habituals, was also proposed by Arche (2014), but she identifies this Asp as perfective and she places it *above* holistic temporal modifiers, rather than below, as I do. She does not provide any semantic composition.

2.5.2 Other quantificational adverbs

(84) Anul trecut mă trezeam {rar / adesea / uneori} la 7.
year-the past REFL woke-up.1.**IMPF** seldom / often / sometimes at 7
'Last year I {rarely/often/sometimes} woke up at 7.'

The derivation is the same, but the quantifier, instead of being GEN, is the one overtly indicaated by the adverb:

(85) ⟦SELDOM [[at 7 o'clock [BOUNDED [I wake up]]]]⟧ = λe. SELDOM t ((t∈C ∧ t⊆ τ(e)) [∃t′ ∃e′(wake-up(e,Speaker) ∧ t′=τ(e′) ∧ AT(t′,7-o'clock) ∧ R(t′,t)]
'e is an event such as the relevant subintervals of e (here: days) rarely stand in a temporal relation (here: inclusion) with the time of an event of the Speaker's waking up at 7'

2.5.3 Quantified temporal adverbs

(86) Maria mă suna {în fiecare luni / după fiecare şedinţă}
Maria me called.IMPF in every Monday after every meeting
'Maria used to call me every Monday / after every meeting'
LF: [Asp_{impf} [[every Monday] λt [Mary called on t]]]

Von Stechow (2002a):
- quantified localizing temporal adjuncts have a restriction relativized to the RT ("the head nouns of temporal quantifiers have a time variable that may be restricted by the tense of the clause"; e.g. only Mondays included in the RT are considered)
- they raise by QR leaving the temporal preposition in situ at LF

Ferreira (2016) proposes that Q-adverbs introduce events.[17]

Following this type of analysis, we may assign *every Monday* an <it><vt> analysis:[18]

(87) ⟦every Monday⟧ = $\lambda P_{<i,t>}$ λE ∀t′(Monday(t′)∧t′⊆τ(E)) → P(t′))

⟦Mary called on t_1⟧ = ∃e (call(e,Mary) ∧ in(τ(e),t_1))

⟦[every Monday] [λt_1[Mary called on t_1] ⟧ = λE (∀t′(Monday(t′)∧t′⊆τ(E)) →
∃e (call(e,Mary) ∧ in(τ(e),t′))

The result is a property of eventualities => it can combine with Asp_{impf} as well as with temporal extent adverbials:
(88) a. [[Maria called me every Monday] for three months].

[17] Ferreira builds on Kratzer's (2003) analysis of *every* in examples of the type in (i):
(i) Three copy editors caught every mistake in the manuscript.
(can describe a situation in which each copy editor caught mistakes in the manuscript, with every mistake being caught by at least one of them)
(ii) ⟦every mistake⟧ = λP.λE.∀x[mistake(x) → ∃*e′*[*e′* < E & P(x)(e′)] &
∃x [mistakes(X) & P(X)(E)]]
⟦caught every mistake⟧ = λP.λE.∀x[mistake(x) → ∃*e′*[*e′* < E & caught(x)(e′)] &
∃x [mistakes(X) & caught(X)(E)]] (Ferreira 2016:76-77, < Kratzer 2003)

[18] This differs from Ferreira (2005, 2016), who treats temporal modifiers as intersective modifiers of events.

b. Maria [suna [Asp_{impf} [[t_{Maria} t_V] în fiecare luni]]]
Maria called.IMPF in every Monday
c. Maria [a [Asp_{pfv} sunat [[BOUNDED [[[t_{Maria} t_V] în fiecare luni] timp de 3 luni]
Maria has called in every Monday for 3 months

The fact that the restriction of quantificational temporal PPs is relativized to the time of the clause (the RT) no longer has to be stipulated, as in von Stechow (2002a), but follows from the inclusion of the times quantified over in the 'plura(ctional)l' event (see 't′⊆τ(E)' in (87))

N.B. Among modifiers that trigger pluractionality, bounded iteratives (e.g. *three times*) cannot be embedded under the imperfective => they may be analyzed as <i,t><i,t> functions:

(89) ⟦three times⟧ =$\lambda P_{<i,t>}$ λt $\exists R$(Partition(R,t) $\wedge$ $\forall t'[t' \in R \rightarrow \exists! t''(t'' \subset t' \wedge P(t''))] \wedge |R|=3$)
Partition(R,t) = a set of non-overlapping convex subintervals of t whose sum is t
't is a time that can be partitioned into 3 subintervals whose member contain a unique time characterized by P'

3. Comparison with the homogeneity-based account

De Swart (1998) (building on Kamp & Rohrer 1983): Romance past tenses do not include aspectual operators, but select certain types of eventuality properties (de Swart refers to French but other Romance languages have a very similar system):
- Imperfect = past tense (T^0) that selects for homogeneous eventualities
- Simple Past = past tense (T^0) that selects for non-homogeneous eventualities
(de Swart does not discuss the compound perfect, which raises additional problems due to an ambiguity between (perfective) past and present perfect; in this paper I gave Ro. examples with the compound perfect, because the simple form is obsolete, it is only used in written narratives and in certain dialects)
This idea is developed by Arosio (2003, 2010, 2019), who replaces 'eventualities' with properties of times (type <i,t>).

- Total extent modifiers and modifiers involving both boundaries create a non-homogeneous property:
(90) [run **for 3 hours**] : if true of an interval I / of an event e, it cannot be true of a proper part of I/e
[stay at home **between 3 and 6**]: if true of an interval I / of an event e, it cannot be true of a proper part of I/e
=> such properties cannot combine with $T_{imperfect}$

Problems:
(i) According to this view, (91)a is more complex than (91)b, requiring coercion from a state to a quantized eventuality (for de Swart) or to a non-homogeneous time property (for Arosio), whereas (91)b does not require any intermediate between T and VP:

(91) a. Maria a fost bolnavă.
Maria has been ill
b. Maria era bolnavă.
Maria was.IMPF ill

But Romance speakers have the intuition that (91)b is not neutral, but requires, in addition, a situation under discussion, which provides a RT that is included in the time span of Maria's illness (see Giorgi & Pianesi's (1995) 'anaphoric' interpretation of the imperfect).
In de Swart's and Arosio's system, this fact cannot be explained.

N.B. For Arosio, dynamic predicates (both telic and atelic) introduce event properties which cannot combine with tenses, but need operators that map them onto properties of times. The progressive/imperfective and perfective aspects are such operators =>

- Imperfective+VP => $\lambda t.\ \exists e(t \subset \tau(e) \wedge [\![VP]\!](e))$, which is homogeneous (if RT is included in ET, any part of RT is included in ET) => can combine with the imperfect T

- Perfective+VP => $\lambda t.\ \exists e(\tau(e) \subseteq t \wedge [\![VP]\!](e))$, which is non-homogeneous (since t (RT) is larger than $\tau(e)$ (ET), it can include sub-intervals which do not contain $\tau(e)$) => cannot combine with the imperfect T

However, the problem remains for states, such as (91)b, because Arosio assumes that stative verbs denote properties of time from the lexicon, so they cannot combine with aspectual operators.
As for (91)a, Arosio proposes that states, in the absence of a temporal adverbial that introduces boundedness, become non-homogeneous by combining with a maximalization operator, which introduces a maximal interval for which the state holds:

(92) Mario fu malato (It.) = MAX (Mario be ill)
Mario was.PFV ill
MAX = $\lambda P\ \lambda t\ (P(t) \wedge \neg\exists t'\ (t \subset t' \wedge P(t'))$ (Arosio 2019:97)[19]
: this property is non-homogeneous => can combine with perfective Ts

For stative predicates, a possible solution to the problem of the anaphoric character of the imperfect, in Arosio's system, could be to give up the assumption that states are not properties of eventualities. If they are <v,t> properties, they will need Asp heads like the other situation types, so both examples in (91) would rely on Asp heads – Asp_{pfv} for (91)a and Asp_{impf} for (91)b – and the use of $Asp_{impf,}$ with its $\tau(e) \subset t$ interpretation, would be responsible for the requirement of a given 'topic time'.

(ii) A further problem which appears with habituals is the way in which the homogeneity requirement of the imperfect can be checked. Arosio (2019:82) claims that habits are temporally homogeneous, but this cannot hold all the way down to all sub-intervals – otherwise, (93) would be fine:[20]

(93) * În ziua aceea (13 decembrie), Marius mergea adesea în provincie (Ro.)
in day-the that 13 December Marius went.IMPF often outside-the-capital

(iii) A problem appears, for Arosio, because of the assumption that extent modifiers attach above Aspect.
The semantics Arosio assumes for *for-x-time* modifiers is the following:

(94) For x time := $\lambda P\ \lambda t\ (\delta_{TIME}(t) = x\ \&\ \forall t'\ (t' \subseteq t \rightarrow P(t'))$ (Arosio 2019:89)

The semantics he assumes for Aspect is

[19] I corrected an error in the formula: he writes '$t \subset t'$', but this would make the formula always false, because we may choose t a as a value for t′ and in this case '$t \subseteq t' \wedge P(t')$' is true.
[20] Cf. Mari et al. (2011:51):
(i) ?On that day at 4 pm Mary used to smoke Marlboros.

(95) a. Perfective := λP λt ∃e. (τ(e)⊆t & P(e)) (Arosio 2019:100)[21]
b. Imperfective: = λP λt ∃e. (t⊂τ(e) & P(e))

As such modifiers introduce boundedness, we predict that (96) should be structurally ambiguous between a and b, each with a distinct reading:

(96) Maria a cântat timp de două ore
Maria has sung for two hours
'Maria sang for 2 hours'
a. [for 2 hours [Asp_{pfv} [Maria sing]]]
λt ((δ_{TIME}(t) = 2 hours & ∀t′ (t′⊆t → ∃e (τ(e)⊆t′ ∧ sing(e,Maria))))
'Any sub-interval of the 2 hours period contains an event of Maria's singing'
b. [for 2 hours [Asp_{impf} [Maria sing]]]
λt ((δ_{TIME}(t) = 2 hours & ∀t′ (t′⊆t → ∃e (t′⊂τ(e)∧ sing(e,Maria))))
'Any subinterval of the 2 hours interval is included in the time of an event of Maria's singing'

The intuitive interpretation 'there is an event of singing by Maria that lasted 2 hours' is not directly reflected in these readings; it may at best be inferred from (96)a, but it is clearly not what is meant by (96)b, where the event of singing may last longer than 2 hours.

(iv) The asymmetry between LB- and RB-modifiers with the imperfect is not explained.

(97) a. Maria era bolnavă {de două zile / de miercuri}
Maria was.IMPF ill from two days from Wednesday
'Maria had been ill for 2 days / since Wednesday.'
b. * Maria era bolnavă {încă două zile / până miercuri}
Maria was.IMPF ill some-more two days until Wednesday
Intended: 'Maria was ill, and her illness would last two more days / until Wednesday'

For LB-extent modifiers, Arosio assumes the following semantics (for readability, I adapted his formulae by writing 'abutting' in the usual way, in the order anterior-posterior: I write *i*⊃⊂*j* = "the right bound of *i* is the left bound of *j*")[22]:

(98) since x time := λPλt∃I(I⊃⊂t & P(I∪t) & δ_{TIME}(I) = x) (Arosio 2019:91)

Under this analysis, if [since x time VP] is true of an interval i and j is a subinterval of i, we can find an x-time interval abutting j which satisfies the VP predicate, by choosing for I in (98) an interval that starts later (the difference between the LB of I′ and the LB of I must be equal with the difference between the LB of j and the LB of I):

|——————Mario's sickness——————
|——————I = 2 days long ———|—i—|
|——————I′ = 2 days long ———|–j–|

=> the property denoted by [since x time VP] is homogeneous and can occur with T_{impf}

The same type of analysis can be applied to LB-localizing adjuncts:

(99) since Wednesday:= λP λt∃I(I⊃⊂t & P(I∪t) & LB(I) = Wednesday)

The result is, again, a homogeneous property.

[21] I replaced the unusual formulations 'τ(e)⊃t' and 't ⊇ τ(e)', in Arosio's formulae, with the standard versions relying on '⊂' and '⊆'.

[22] Arosio writes the relation in the reverse order: "t abuts I"= the right bound of *I* is the left bound of *t*.

However, a similar semantics can be given to modifiers accessing the RB. We may write denotations for [x-more-time]$_{dur}$ and [until]$_{dur}$ which provide homogeneous properties:

(100) [x-more-time]$_{dur}$ = $\lambda P \lambda t \exists I(\ t \supset\subset I \ \& \ P(I \cup t) \ \& \ \delta_{TIME}(I) = x)$

(101) [until Wednesday]$_{dur}$ = $\lambda P \lambda t \exists I(t \supset\subset I \ \& \ P(I \cup t) \ \& \ RB(I) = \text{Wednesday})$

But, as we have seen in (97)b as well as in §2 (ex. (2), (6)a, (14)), we do not find such modifiers under the imperfect (except if embedded under a quantifier/pluractional, see the discussion on habituals, but this is irrelevant, as unboundedness holds for the whole series). The absence of such modifiers does not have a principled account in Arosio's system.

(v) Localizing modifiers with homogeneous predicates are expected to be allowed with the imperfective, because they do not disrupt homogeneity:

(102) Yesterday:= $\lambda P \lambda t. \exists I \ (P(t) \wedge t \subseteq I \ \& \ I = \text{the day before } t^*)$

This predicts that (103)a and (103)b should be equally unmarked (the perfective Asp can be assumed to appear below the adverb in (103)b, producing non-homogeneity as explained above):

(103) a. Maria cânta ieri.
Maria sang.IMPF yesterday
'Maria was singing yesterday'

b. Maria a cântat ieri.
Maria has sung yesterday
'Maria sung yesterday'

However, as explained wrt. (5), the speakers tend to interpret the adverb in (103)a as topical (see the different placement of nuclear stress):

Maria CÂNTA ieri 'Maria was SINGING yesterday'
Maria a cântat IERI 'Maria sung YESTERDAY'

(104) Maria cânta IERI 'Maria was singing YESTERDAY': this has a modal reading, which is futurate – 'Maria *was supposed (at a contextually given past time)* to sing yesterday' (see Dowty 1979, Crăiniceanu 1995:181, Giorgi & Pianesi 1995, 2004). For another possible reading (choice among several given occasions), see the discussion around ex. (5)b.

This difference may be explained if the localizing adverb refers to RT with the imperfect and may refer to ET with the perfective past (see Klein 1994 on the topical status of RT adverbs). In Arosio's system, as both adverbs occur above Asp$_{pfv/impf}$, both will refer to what I call RT and the difference remains unexplained.

4. Conclusions on event time modification

2 types of ET-modification:

(i) modifiers of bounded events:
- rely on a previous boundedness operator (ET localizers) or introduce boundendness themselves (extent, RB-localizers)
- boundedness involves mapping from <v,t> onto <i,t>

(ii) modifiers of unbounded events: LB-oriented (LB-localizers, LB-RT extent)

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