Toward Time Universals Identification in NooJ : A New Model of Time Recognition in Vietnamese

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Plan

I. Objectives

II. Linguistic positions and orientations

III. Annotation with Automatic Processing of Temporality for Vietnamese Component APTVC : the case the day-expressions constructed with Hôm and Ngay.

IV. Construction of Universal Temporal Classes

I. Objectives

- The semantic annotation of temporal expressions with Automatic processing of temporality for vietnamese component APTVC V 0.2.0
- The establishment of Universal Temporal Classes (UTC)
- The implementation of this system in NOOJ to compute temporal relations between processes

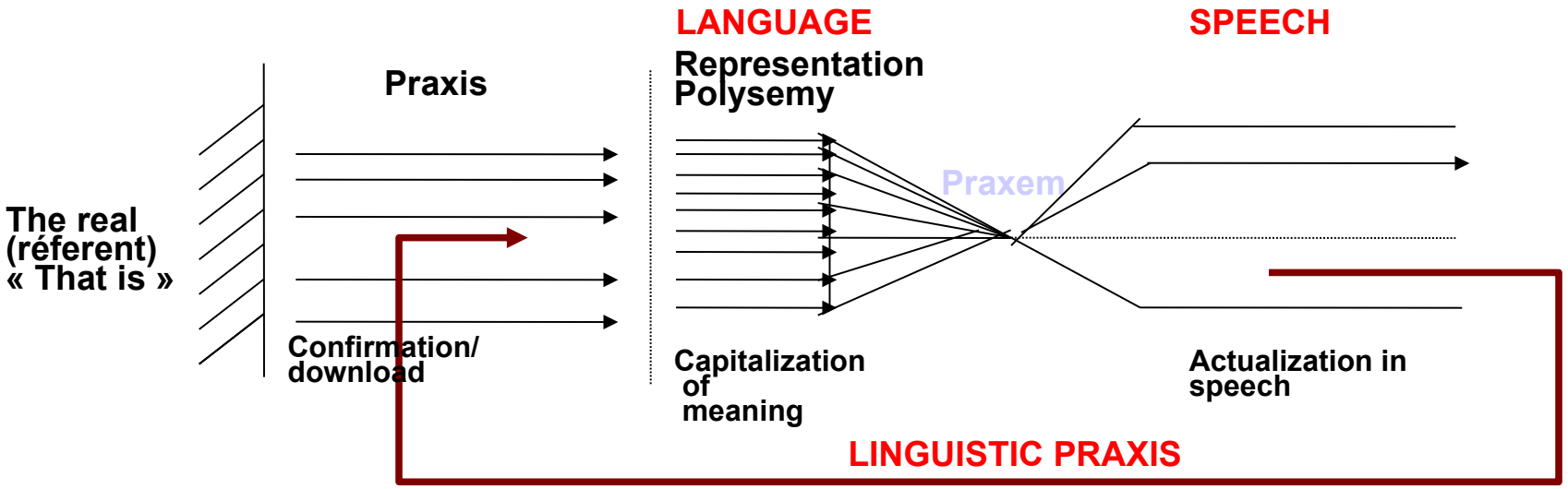
II. Linguistic positions and orientations

Our positions and orientation in linguistics: Praxematic

The main idea praxematic is that humans base their linguistic representations on their praxis (experience).

The aim : the production of global meaning from each pieces of informations (lexical, syntactical, semantical, textual, pragmatical)

A strongly impediment : polysemy



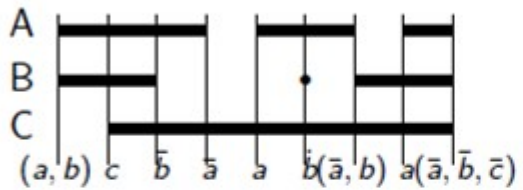
Our framework

- **Linguistics point of view : each temporal marker of a text produces some kind of instructions that had to be joined with the others to produce the temporal meaning (Jacques Bres).**
- **Vietnamese temporality : no verbal tense, aspect and tense markers, temporal frame-adverbial phrases, syntactical position …**
- **TAL point of view : the internal structure of temporal expressions must be investigated in order to construct grammars that can capture general features and be used in automatic processing system.**
  - **Detection : by temporal frames (BOFFO, 2010).**
  - **Annotation : anything which help to understand the exact meaning(s ?) (grammars and corpus analysis) and to allow temporal reasoning .**

Temporal reasoning : based on S-languages theory.

The choice of one annotation for the temporal relations description : S-langages

S-langages
Exemple



son S-mot $(a\bar{a})^3$

son S-mot $b\bar{b}\dot{b}b\bar{b}$

son S-mot $c\bar{c}$

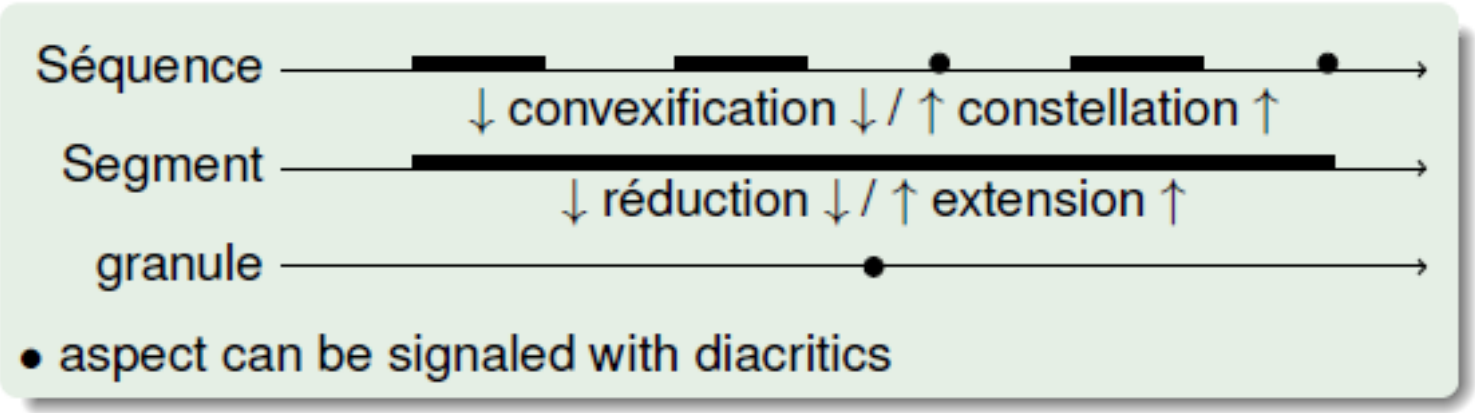
Le S-mot encodant la relation

- les entités : A, B, C
- l'alphabet : $\mathcal{A} = \{a, b, c\}$, le vecteur de Parikh : (6,5,2)
- le S-alphabet :
  $\widehat{\mathcal{A}} = \{(a), (b), (c), (a, b), (b, c), (a, c), (a, b, c)\}$
- description des objets : $(a)^6$, $(b)^5$,$(c)(c)$
- description de la relation: (a,b)(c)(b)(a)(a)(b)(a,b)(a)(a,b,c)
- Le S-univers :
  $\mathcal{L}(6, 5, 2) = \{u \in \widehat{\mathcal{A}}^* || u|_a = 6, |u|_b = 5, |u|_c = 2\}$

Granule

aspectuality and the notion of granule

- some process can be viewed as punctual, or durative or as a series, ...
- The *granule* : a durative indivisible point (specious point)
  - to modelize the neutral aspect and to reduce the complexity of computations.
  - Two granules can be contiguous, that is forbidden for two mathematical points.



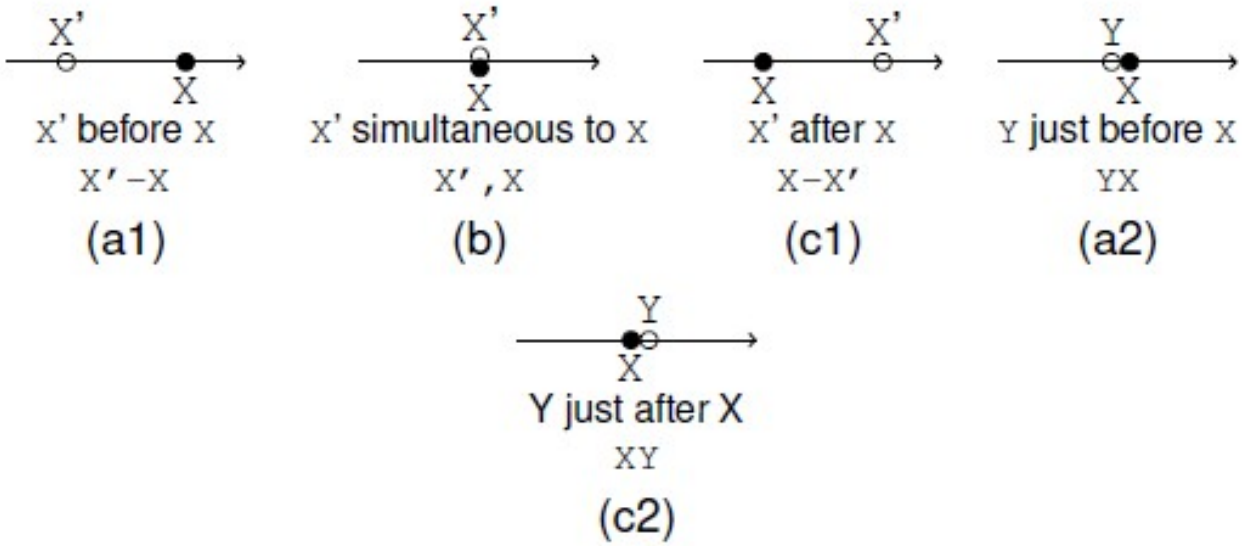
- aspect can be signaled with diacritics

instant : x	ponctual : $\dot{x}$	period : $\bar{x}$	series : $\ddot{\bar{x}}$

- temporal relations motivate the choice of representations

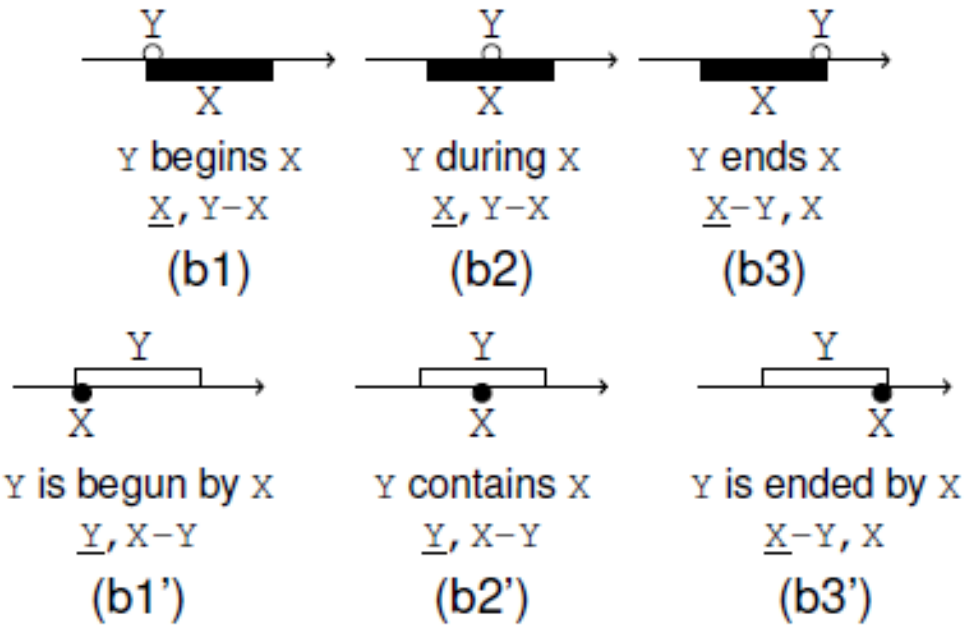
Temporal Relations between 2 granules

relative situations between two granules precedency and contiguity

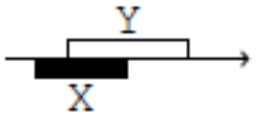


Temporal Relations betwen a granule and a period

inclusions relation : a granule in a period



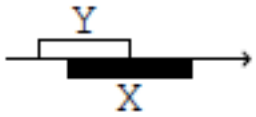
Temporal Relations beetwen two periods : never described in one information



Y begins during X and ends after X

X–Y–X–Y

(bb)



Y begins before X and ends during X

Y–X–Y–X

(bb')

- Simultaneousness is in fact the non before/after relation : all the (b) can be together rewrited as

$$XoY = \textit{neither } (X \textit{ before } Y) \textit{ nor } (Y \textit{ before } X)$$

III. Annotation with Automatic Processing of Temporality for Vietnamese Component APTVC : the case the day-expressions constructed with Hôm and Ngay.

Hôm / Ngày

Hôm and *Ngày* both mean « day » but not in the same way.

H*ôm and Ngày are two nucleus whose build temporal expressions.*

Actually the automatic translation systems have difficulty differencing the constructions with «*hôm* » and « *ngày* », expecially when the co(n)text can't be found in their table-phrase as Google Translation System.

Exemple with Google translation

Fr. Source:

« Aujourd'hui *nous sommes dans une situation économique difficile."* into the *Viet.*

Viet Target:

*"**Hôm nay** chúng ta đang ở trong tình trạng kinh tế khó khăn".*

Hôm nay cannot be associated in this context to ***Aujourd'hui,*** which is used as period. One has to choose between ***ngày nay*** or ***hiện tại***.

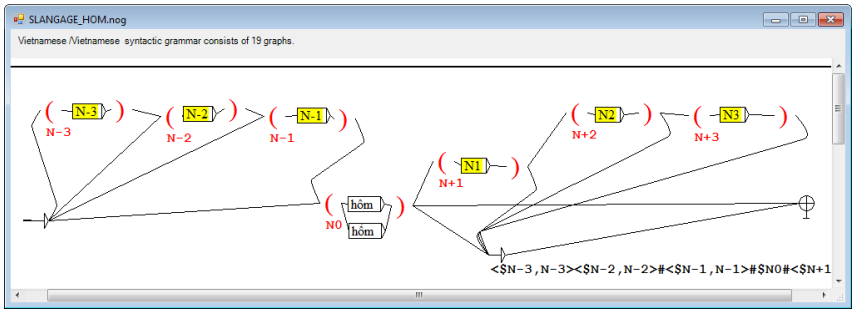
Tables construction of *hôm* & *ngày* temporal expressions

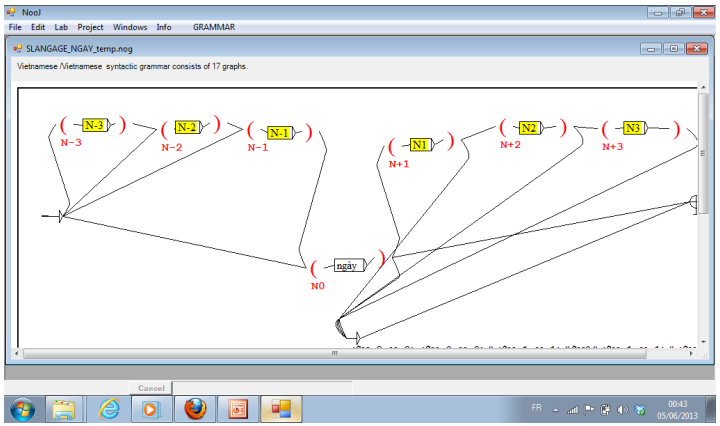
To understand the production of global meaning and also to prepare NOOJ's graphs building , we extract most of temporal expressions constructed with *hôm* & *ngày* nucleus on newspapers corpus (1868 articles of various press) and vietnamese grammar books :

- Manually by linguistic expertise,
- and automaticly with coocurence and mutual information extraction tools: PERL script and T*rameur* tools from Serge Fleury (Paris 3 TAL) and NOOJ's occurences.

N-3	**N-2**	**N-1**	**Nucleus**	**N+1**	**N+2**	**N+3**

Hôm & Ngày graph s





An example of a relevant expression extracted by Viet4Nooj :

N-3 N-2 N-1 N0 N+1

Rất sớm sáng Hôm thứ ba

Very / early / in the morning [DAY]/ on Tuesday

We detected 616 occurrences of «*hôm*» by using the NooJ's frequency functionality and our return rate approximates 99 % .

- Ngay is essentially use for the calendar expressions.

Ex: 2 | ngày | 3| tháng| 9 |năm| 2012

2 | day | 3| month| 9 |year| 2012

We detected arround 1400 occurrences of «Ngay» with NGAY graph.

IV. Construction of Universal Temporal Classes (UTC)

Formalization of UTC by an proposition of algorithm « *package UniversalTemporalClasses* »

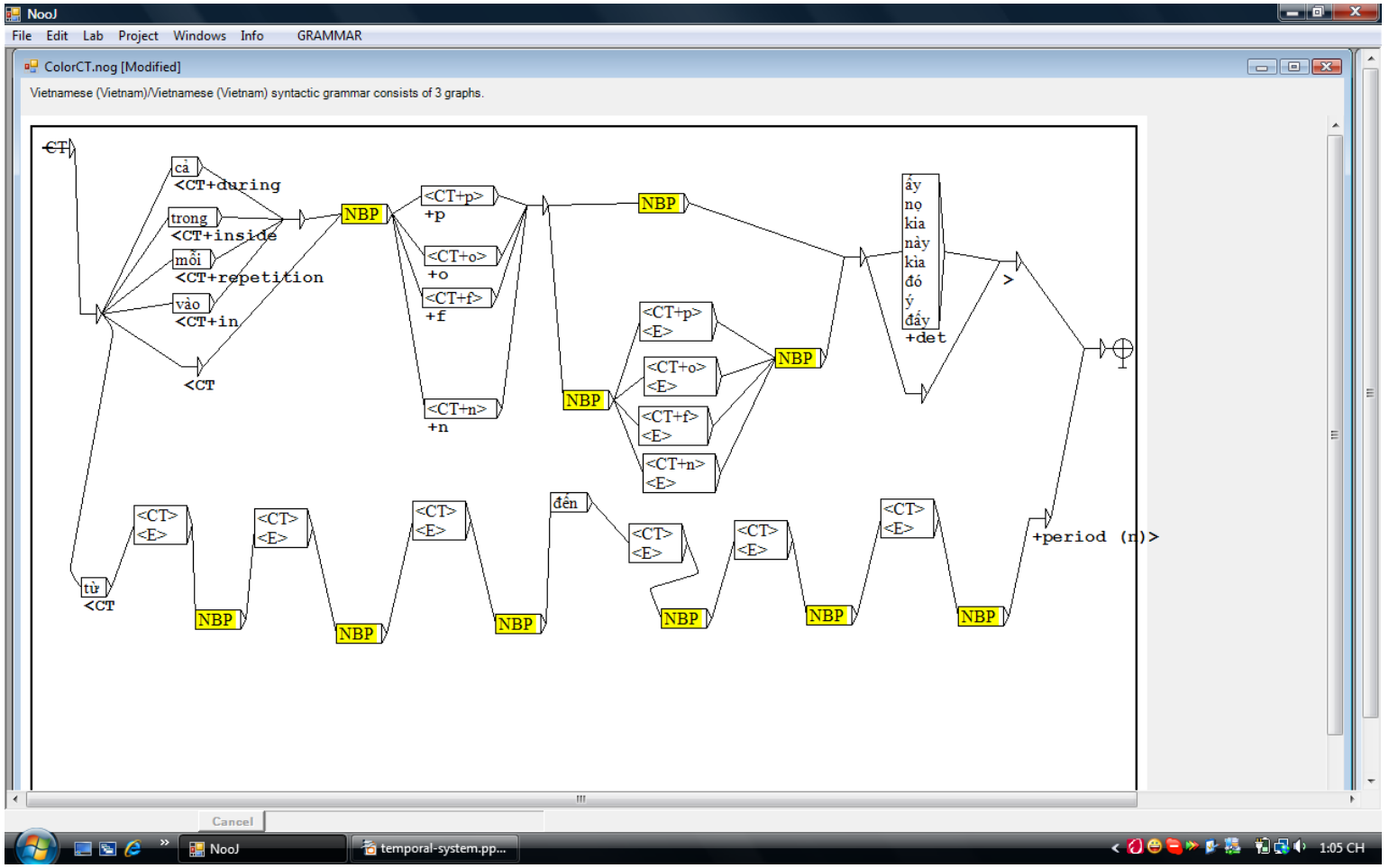
A first list of Temporal TAGS

(Nicolas BOFFO, 2010)

impediment = not exhaustive and complete

Time	Aspect	**TemporalFrameworksTags :**
<Past> **<Present>** **<Future>** **<Neutral>**	**<Accomplished >** **<In progress>** **<Iterative>** **<Terminative>** **<Imminent>**	**<CT+During>,** **<CT+Inside>,** **<CT+Repetition>** **<T+Period>** **<open>** **<close>**

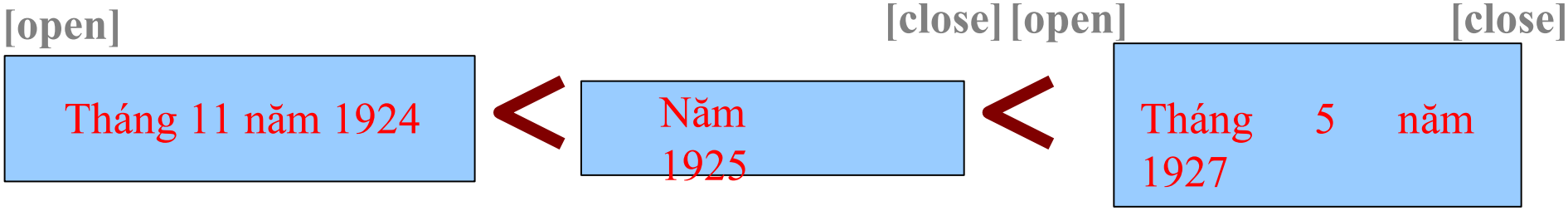
Firts implementation in NOOJ was for Temporal Framework* Graph



Temporal Frames in Biograhy of Ho Chi Minh

[open]Tháng 11 năm 1924, Nguyễn Ái Quốc về Quảng Châu (Trung Quốc) .... Năm 1925, Người **thành lập** Hội Việt Nam Cách mạng Thanh niên .....**[close]**

[open]Tháng 5 năm 1927, Nguyễn Ái Quốc rời Quảng Châu **đi** Mátxcơva (Liên Xô) ,sau đó **đi** Berlin (Đức), **đi** Bruxell (Bỉ) **tham dự** phiên họp mở rộng của Đại hội đồng Liên đoàn chống chiến tranh đế quốc, sau đó **đi** Ý và từ đây về Châu Á.**[close]**



We are creating an
Universal Temporality Package

We wish to implement it in NOOJ

The attributes of our UTC

Based on TimeML and our linguistic approaches:

tid ::= ID

pos ::= 'ADJECTIVE' | 'NOUN' | 'VERB' | 'PREPOSITION' | 'OTHER‘

tense ::= 'FUTURE' | 'INFINITIVE' | 'PAST' | 'PASTPART' | 'PRESENT' | 'PRESPART' | 'NONE'

PraxematicTenseInstruction::[+PAST] ' | ‘ [NEUTRAL] ' | ‘ [+FUTURE]

aspect ::= 'PROGRESSIVE' | 'PERFECTIVE' | 'PERFECTIVE_PROGRESSIVE' | 'NONE' | ‘ **ACCOMPLISHED** ' | ‘**ITERATIVE** ' | ‘**TERMINATIVE** ' | ‘ **IMMINENT**

PraxematicAspectInstruction::= [+TENSION] ' | ‘ [+EXTENSION] ' | ‘ [-INCIDENCE] ' | ‘ [-INCIDENCE][BI-EXTENSION]

TemporalFrameworkValue ::= <CT+During> ' | ‘ <CT+Inside> ' | ‘ <CT+Repetition> ' | ‘ <T+Period> **(to review)**

Phrase ::=<open> ' | ‘ <close>

SyntacticPositionFromNucleus::=[N^0] ' | ‘ [N^{n+1}] ' | ‘[N^{n-1}]

UTC’s attributes

relType ::= 'BEFORE' | 'AFTER' | 'INCLUDES' | 'IS_INCLUDED' | 'DURING' | 'SIMULTANEOUS' | 'IAFTER' | 'IBEFORE' | 'IDENTITY' | 'BEGINS' | 'ENDS' | 'BEGUN_BY' | 'ENDED_BY' | 'DURING_INV'

relType ::= 'MODAL' | 'EVIDENTIAL' | 'NEG_EVIDENTIAL' | 'FACTIVE' | 'COUNTER_FACTIVE' | 'CONDITIONAL'

relType ::= 'INITIATES' | 'CULMINATES' | 'TERMINATES' | 'CONTINUES' | 'REINITIATES'

mod ::= 'BEFORE' | 'AFTER' | 'ON_OR_BEFORE' | 'ON_OR_AFTER' |'LESS_THAN' | 'MORE_THAN' | 'EQUAL_OR_LESS' | 'EQUAL_OR_MORE' | 'START' | 'MID' | 'END' | 'APPROX'

UTC’s attributes (end)

cardinality ::= CDATA

polarity ::= 'NEG' | 'POS' {default, if absent, is 'POS'}

type ::= 'DATE' | 'TIME' | 'DURATION' | 'SET‘

beginPoint ::= IDREF
endPoint ::= IDREF

quant ::= CDATA

freq ::= Duration

value ::= Duration | Date | Time | WeekDate | WeekTime | Season | PartOfYear | PaPrFu

comment ::= CDATA

An exemple UTC analysis

Ex: **|Hôm ||qua|| tôi| đang |xem| TV| thì |điện thoại |reo.**

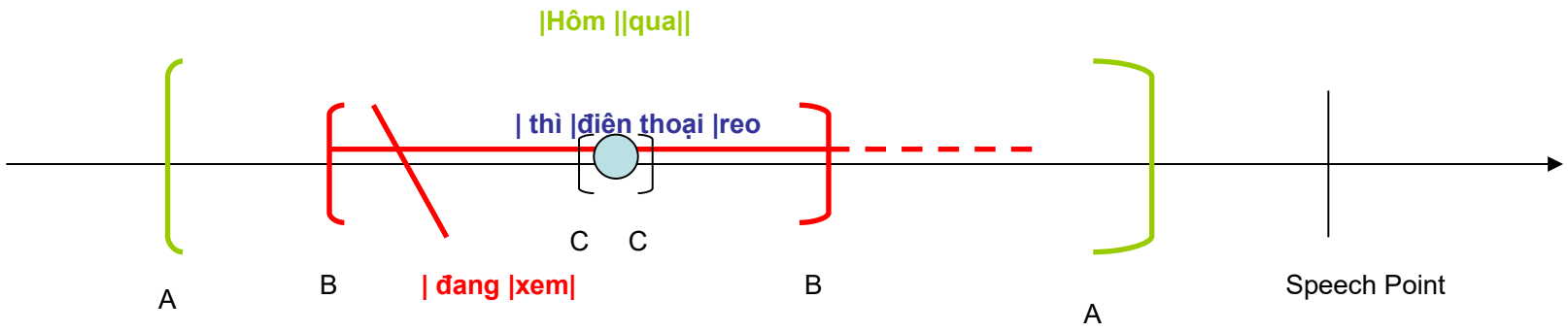
|Day ||to be gone|| I |aspectual mark |watch| TV| then |telephon |ring.

Annotation:

<open> | Hôm<N0> | | qua <N+1><ACCOMPLISHED> | <+PAST> |

| tôi | đang<-INCIDENCE><PROGRESSIVE> | xem<V> | TV |
thì<MID> | điện thoại | reo<+INCIDENCE><ACCOMPLISHED> |
<CLOSE>.

Graphical representation:



Thank you
for your attention!

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