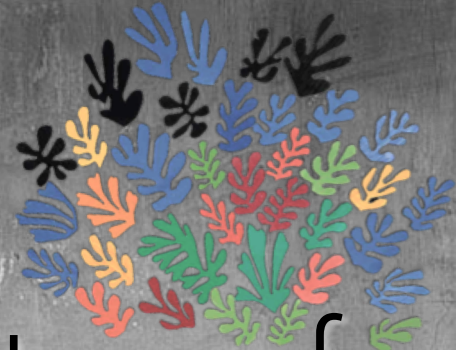


# Time, timelines, cuelists and clotheslines in mixed music with Antescofo



Jean-Louis Giavitto



# A good idea in Score Following (*Arshia Cont*, 2008)

a score following system

machine listening

real-time programming  
language

audio-to-score  
alignment

pitch detection +  
tempo estimation

synchronous  
programming  
(event)

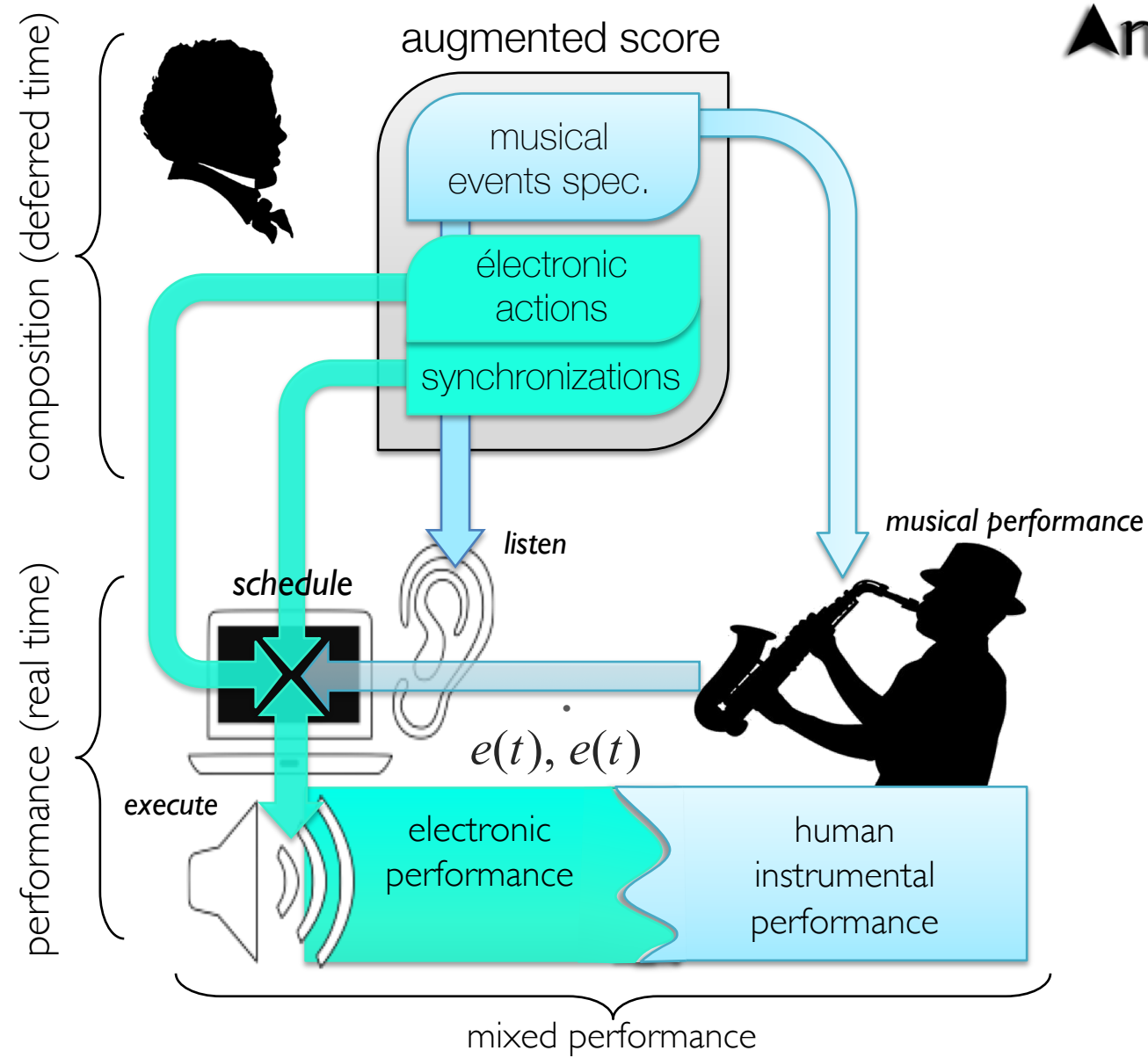
timed system  
(duration)

# The Metronaut application

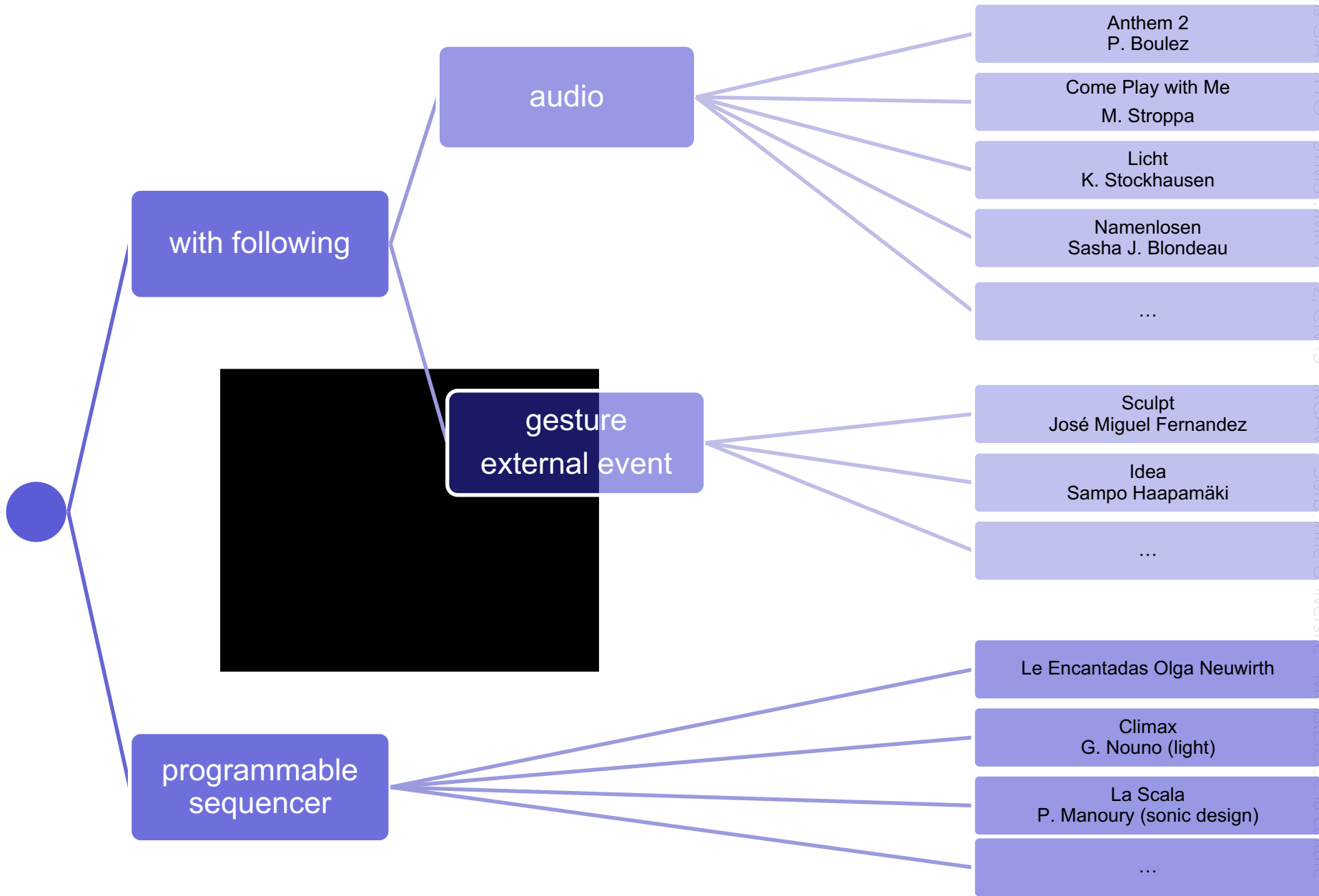
*Tesla ou l'effet d'étrangeté* Julia Blondeau (2014)

alto: Christophe Desjardins, real-time electronic: Antescofo

# Antescofo mixed-music's approach



# A growing repertoire



# Computer music as an experimental enquiry in temporal concepts

- Music makes time audible, and its form and continuity sensible (S. Langer)
- But, if music is the paradigmatic “art of time”, for which kind of time is music an art?
- *Real musical time is only a place of exchange and coincidence between an infinite number of different times.* (Gérard Grisey, *Tempus Ex Machina: A Composer’s reflections on musical time. Contemporary Music Review, 1987*)
- Test the relevance and the effectiveness of temporal notions in musical applications

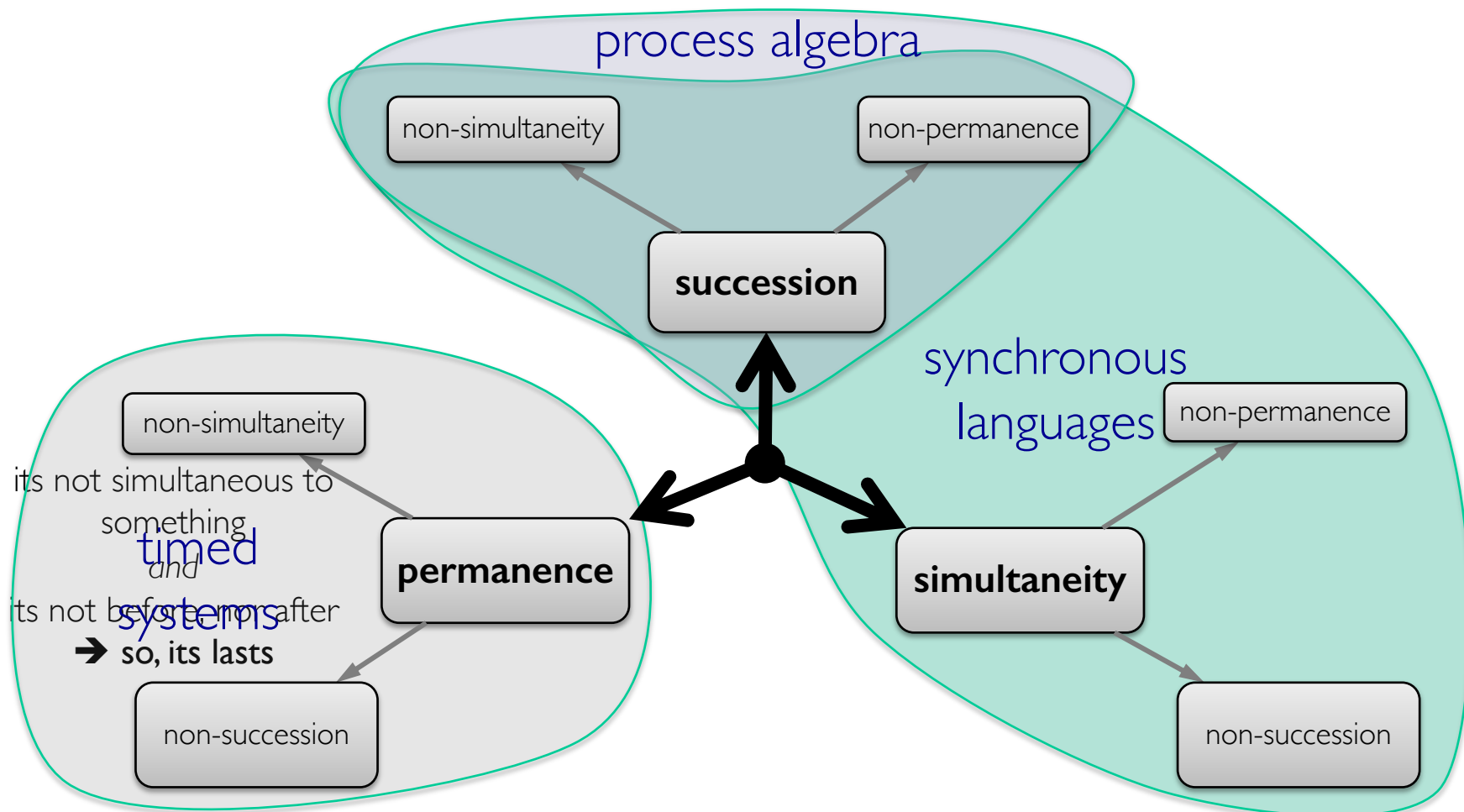
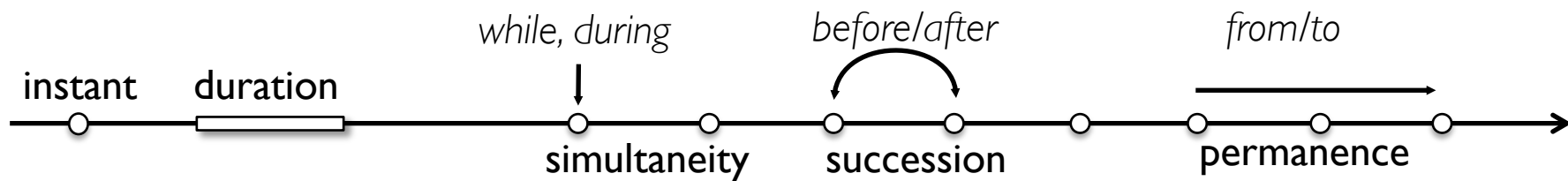
# Expressing Time in Antescofo



SHORPY



# Instant and Duration: Simultaneity, Succession & Permanence



# Can we deal with *instants* only?

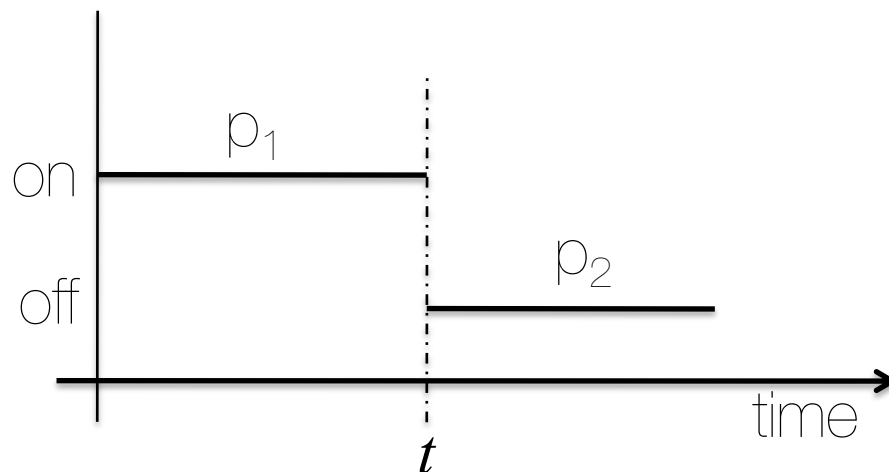
➔ duration as a set of contiguous instants

- evenemential-time

*versus*

- the fluxion: continuous passage of time
  - going twice faster
  - finishing together
  - accelerando
  - rubato
  - tempo
  - etc...

# Can duration be reduced to instant? (in temporal logic)



doing real analysis and topology  
**or**  
making instant and duration  
primitive notions

Timeline, calendar, cuelist, agenda, script... are *clotheslines*



# Instant and event in real time



past event are imutables

an (atomic) event takes place at one instant

futur event are undetermined (but sometimes can be anticipated)

# DATATION VS. TEMPORAL RELATIONSHIPS

# cue-list dated events (chronology)

- 2 datation systems
  - page number in the script
  - act/scene/dialog
- pre-existing
- inter-convertible

<b>SOUND EFFECTS</b>			
<b>Act 1</b>			
1.	Clock ticking fade in	Digital	p3
2.	Clock chiming 12	Digital	p3
3.	Knocking from below	Live, SL	p9
3.5	Clock ticking boost	Digital	p9
3.7	Clock ticking back down	Digital	p9
X	Masha Bangs plate with fork	X	p25
X	Top makes "amazing sound"	X	p26
<b>Act 2</b>			
X	(Clock ticking continues)	X	p29
4.	Doorbell	Live, SR	p33
5.	Wind fade in	Digital	p34
6.	Wind fade up	Digital	p35
7.	Wind fade down	Digital	p35
8.	Knocking from below	Live, SL	p36
X	Tuzenbach knocks on floor	X	p37
9.	Wind fade up	Digital	p41
10.	Wind fade out slowly	Digital	p42
11.	Doorbell, twice	Live, SR	p50
12.	Doorbell	Live, SR	p50
13.	Sleigh Bells	Live, SR	p51
14.	Doorbell	Live, SR	p51
15.	Doorbell	Live, SR	p52
16.	Clock ticking fade out	Digital	p53
<b>Act 3</b>			
17.	Church bell / fire alarm fade in	Digital	p54
18?	[cart goes by house]	Digital	p55
19?	[fire alarm?]	Digital	p58
20?	[fire alarm?]	Digital	p62
21?	[fire alarm?]	Digital	p72
22.	Church bell / fire alarm fade out	Digital	p72
<b>Act 4</b>			
23.	Birds ambience fade in	Digital	p73
24.	Gunshot	Digital	p90
25.	Birds ambience fade out	Digital	p94

# Cue-list of events related by temporal relationships

Q	Event	Notes
<b>Q 1</b>	<b>Preshow</b>	
<b>Call On</b>	Before House is Open	<b>Page 3</b>
<b>Q 5</b>	<b>Preshow Announcement / Into</b>	<b>Notes</b> "Together" High City Skyline ambience - ritzy high-rise apartment
<b>Call On</b>	When Ready	<b>Page 3</b>
<b>Q 10</b>	<b>Door Close</b>	<b>Notes</b>
<b>Call On</b>	Before Kate: "Hello?"	<b>Page 9</b>
<b>Q 15</b>	<b>Phone Ring (TELECUE?)</b>	<b>Notes</b>
<b>Call On</b>	"Maybe that's the need."	<b>Page 13</b>
<b>Q 28</b>	<b>Transition Lead In</b>	<b>Notes</b>
<b>Call On</b>	"I'm worried about Sylvia at the moment"	<b>Page 19</b>
<b>Q 30</b>	<b>Into Scene 2 - Park</b>	<b>Notes</b> "Together" Reprise. Ends on Central Park Ambience - Maybe something with a lead in to underscore before here
<b>Call On</b>	"Hamlet Act III" GO	<b>Page 19</b>
<b>Q 30.5</b>	<b>End of Transition</b>	<b>Notes</b>
<b>Call On</b>	Set in Place	<b>Page 19</b>
<b>Q 31</b>	<b>Dog Barks Bed</b>	<b>Notes</b>
<b>Call On</b>	"Play!" GO "Run Around"	<b>Page 22</b>
<b>Q 31.5</b>	<b>Bowser Aggressive Barks</b>	<b>Notes</b>
<b>Call On</b>	"Bowser and Sylvia"	<b>Page 22</b>
<b>Q 32</b>	<b>Bowser Barks</b>	<b>Notes</b> Short, Fun
<b>Call On</b>	"Look out Bowser, here I come."	<b>Page 22</b>

- temporal relationships
  - before/after
  - during
- beyond total order
- some events are incomparable
- how to give a date to an event? (must be done in real-time)



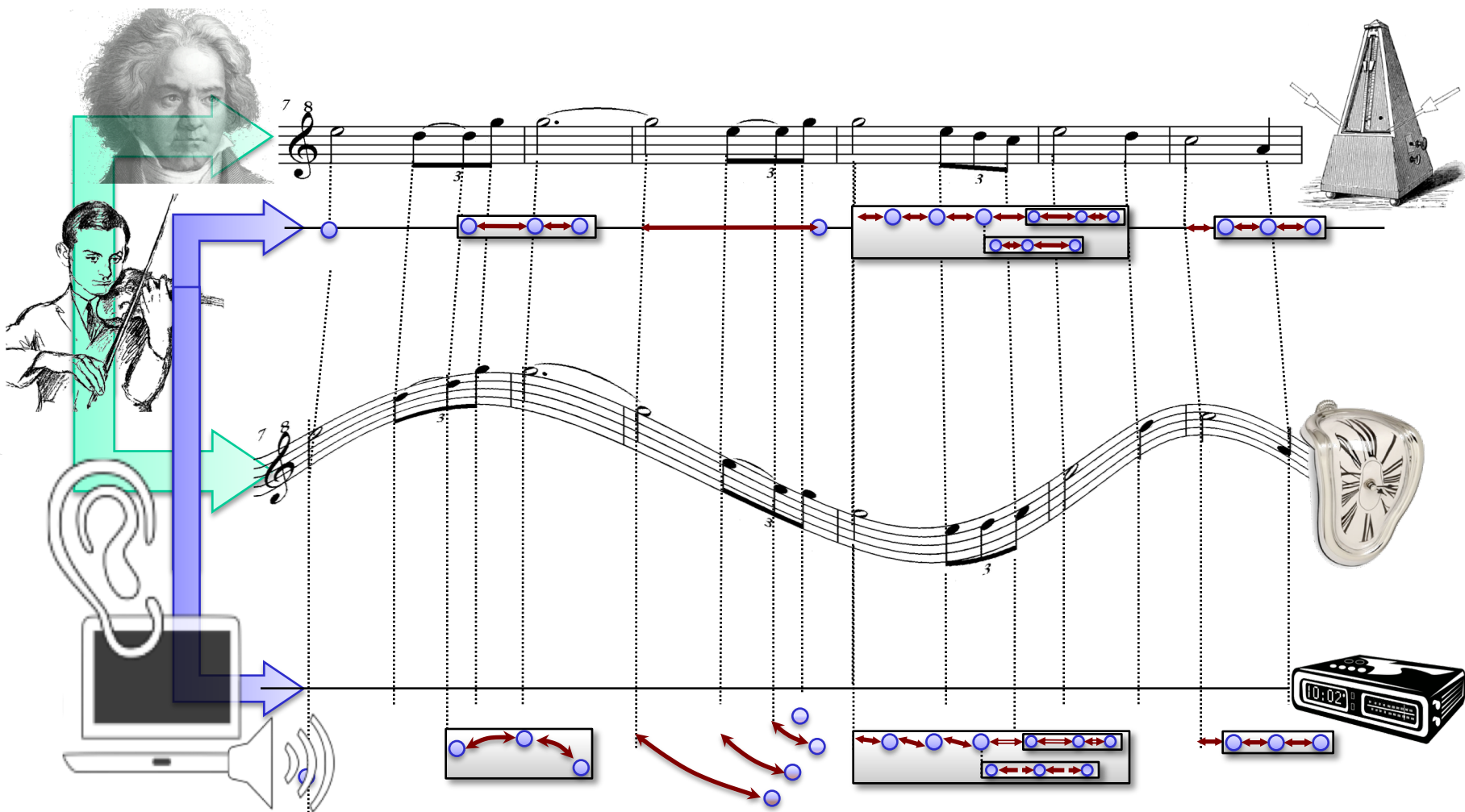
# Datation in Antescofo

date = delay relative to an event :

- events are
  - *musical events*  
specified in the score and detected by the listening machine
  - *logical events*  
defined by a predicate on program's variables
  - *introspective events*  
« some process has died », « some curve reach this point » ...
  - *environmental events*
    - Max/PD messages
    - OSC messages
- delay are
  - *relative* to a tempo
  - tempo is *dynamic*
  - tempo is *inferred from events*

**Interpretation :**  
**reconciling abstract**  
**score and concrete**  
**performance**

# The Multiples Times of Temporal Scenarios



**performance = progression on a timeline**  
*with respect to the progression on another one*



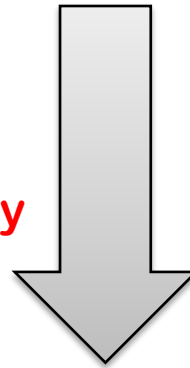
**reference timeline**



**temporal scope**

**=**

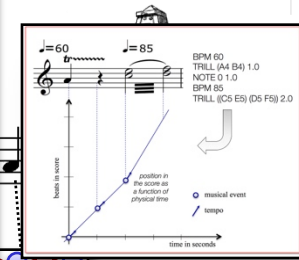
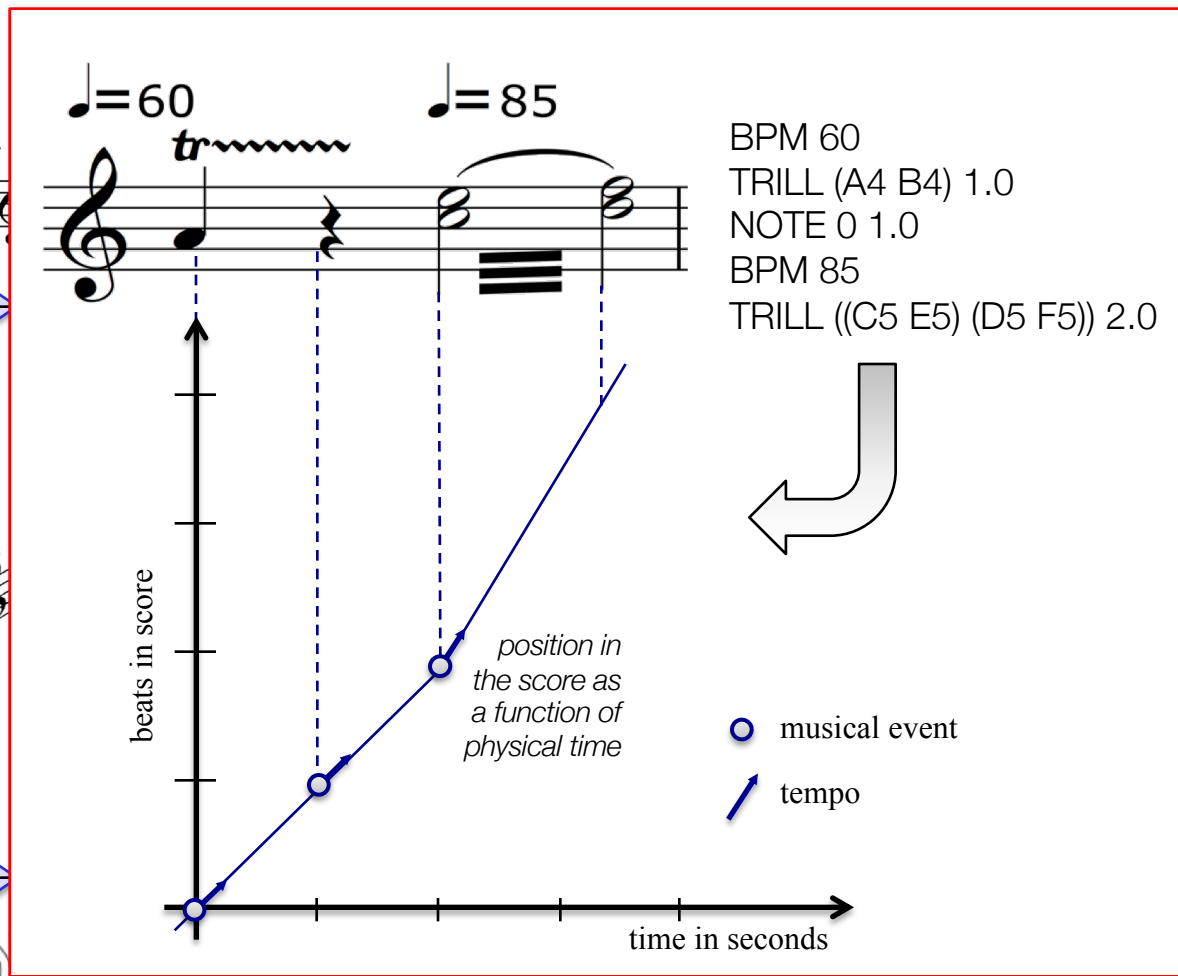
**reference +  
synchronization strategy**



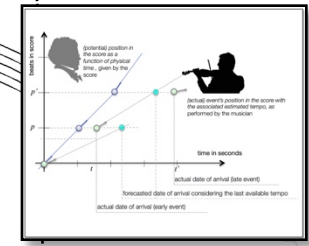
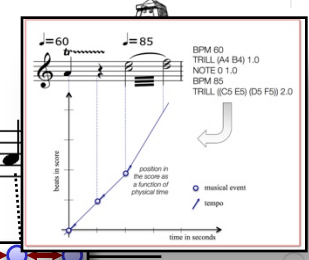
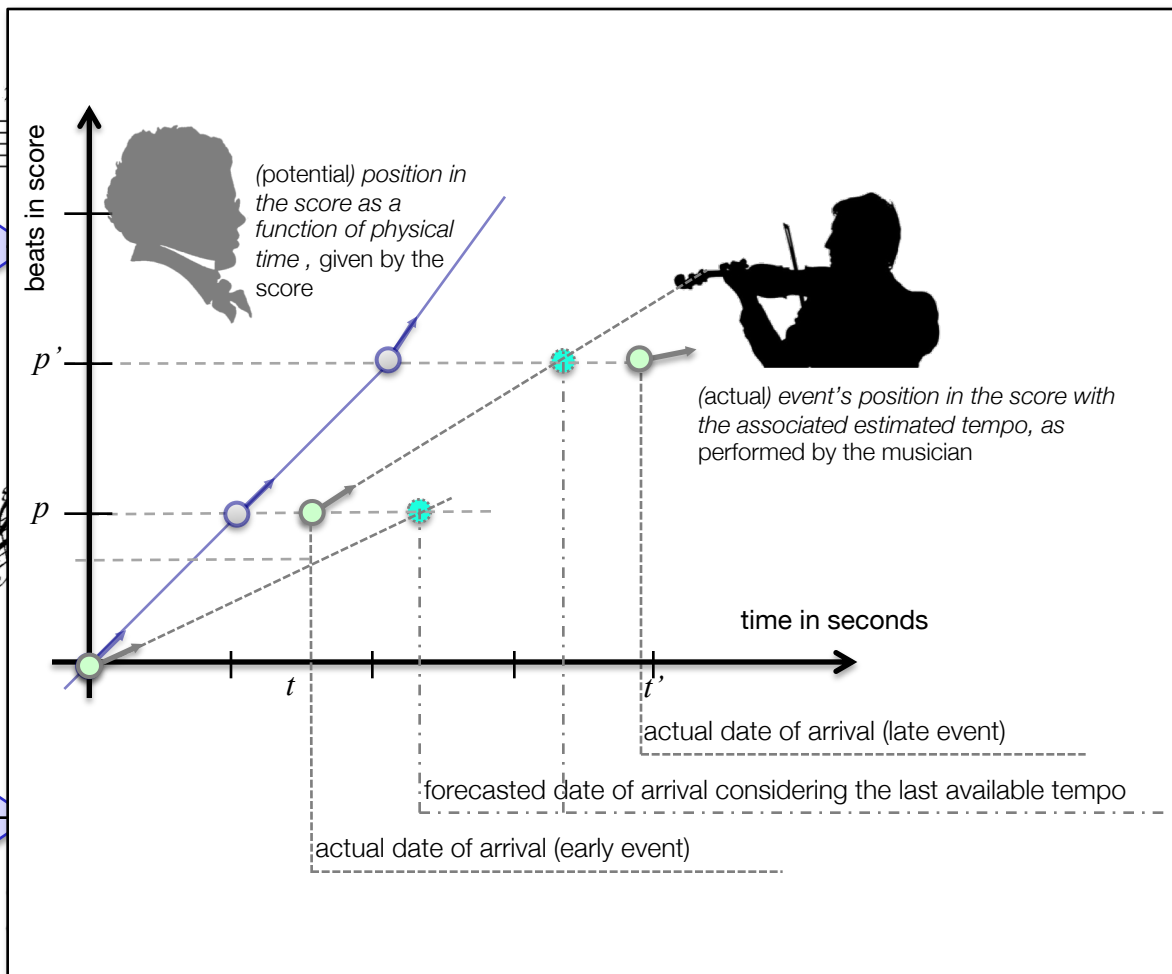
**synchronized timeline**



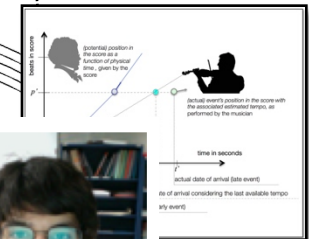
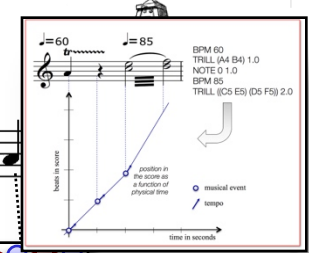
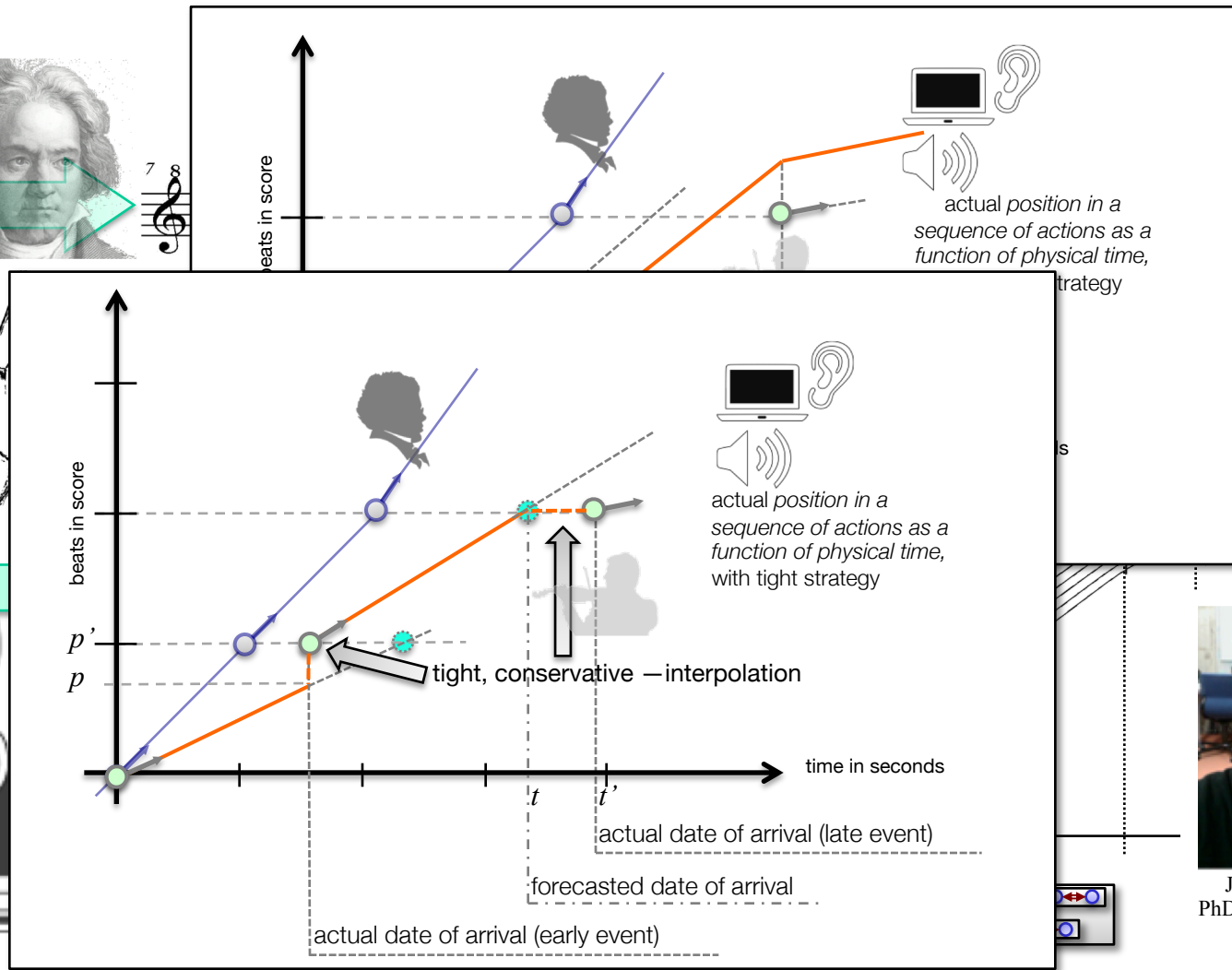
# Time-time diagrams



# Time-time diagrams



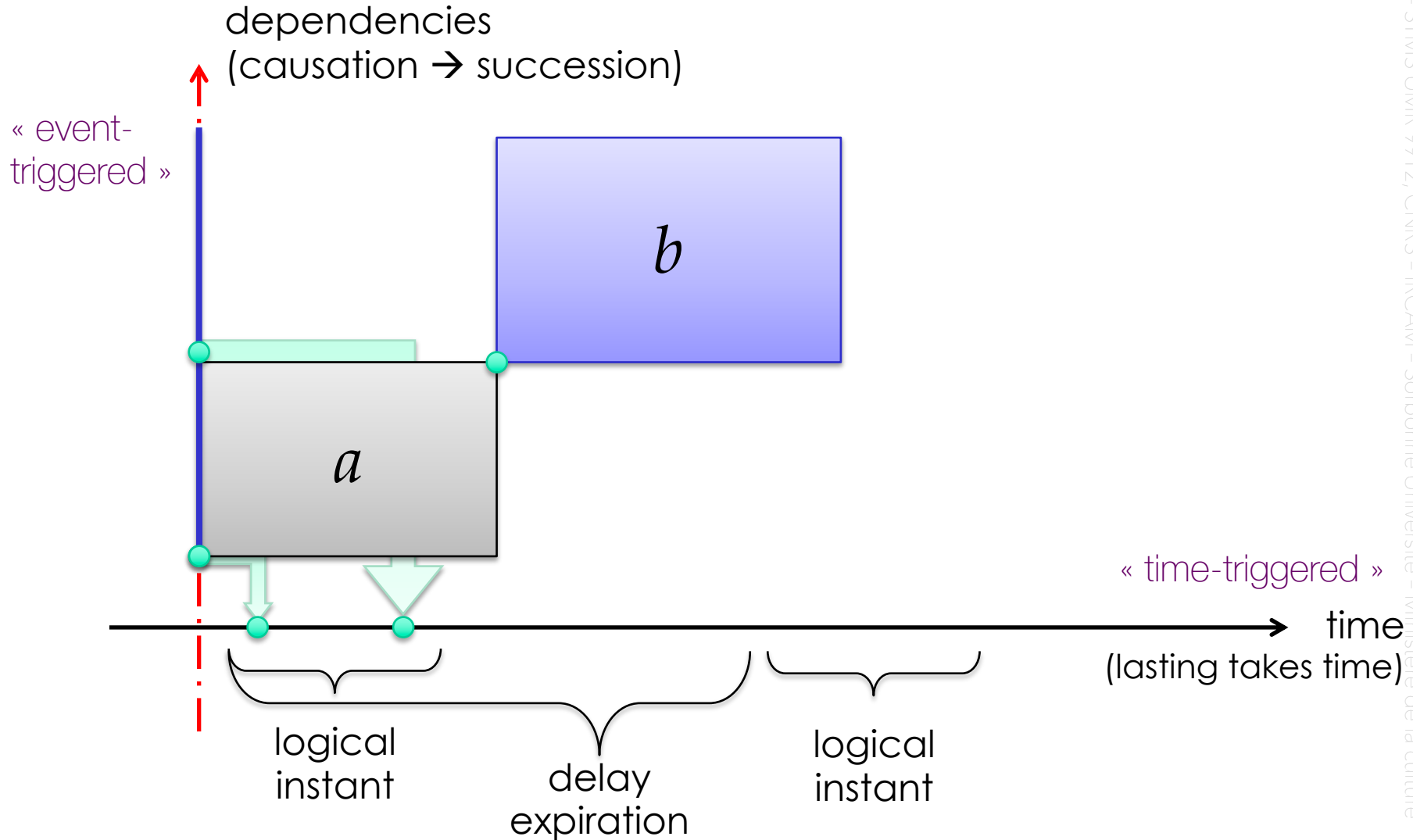
# Time-time diagrams



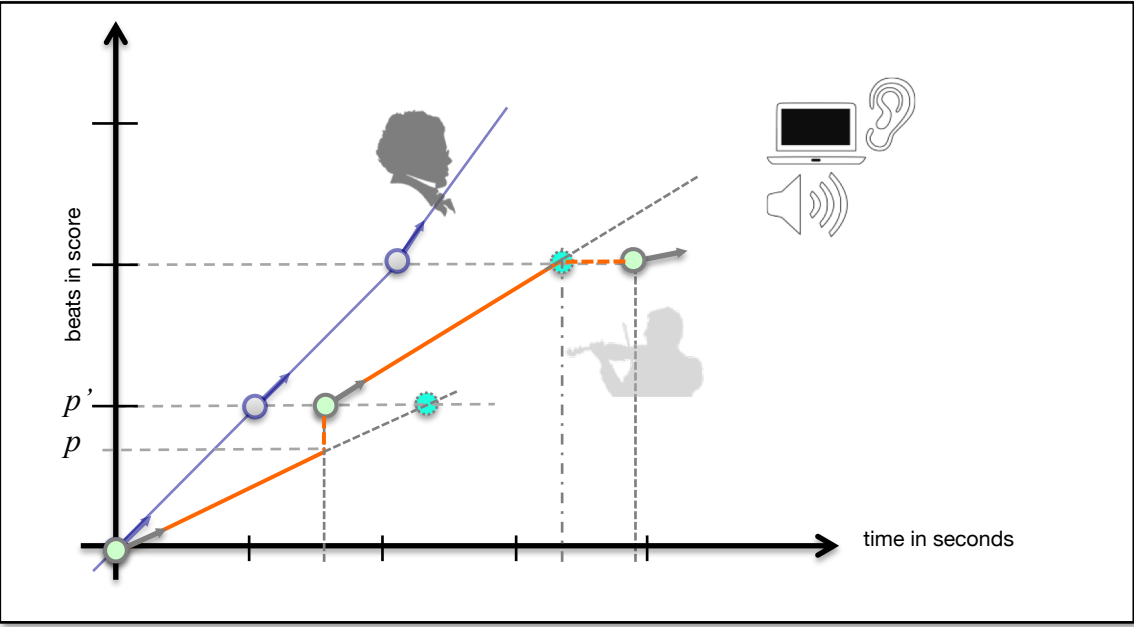
José Echeveste  
PhD, Defended 2015



# The passing of time: causality & duration







# FUNGIBLE TIMES *OR* INCOMPARABLE TIMES ?

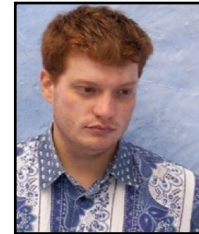
# Subordination of the objective time to the subjective ones and *not the reverse!*

- shared events are not enough:  
duration is not reducible to instants
  - halving a duration
  - accelerando
  - *phrasé* (ex. rubato)
- the “conversion rate” changes in time and is known “after”. The conversion rate is *established with the weaving of time itself*.
  - A-series et B-series,
  - “out of time” (“deferred time”) of the composition *versus* the real-time of the performance
- Subjective time is useful: the score refers to this subjective time, not to physical time in second
- *In fine*, it enables a effective musical interaction between the performer and the computer



# Christopher Trapani

## real-time rhythmic canon à la Nancarrow



Clarinet in B $\flat$

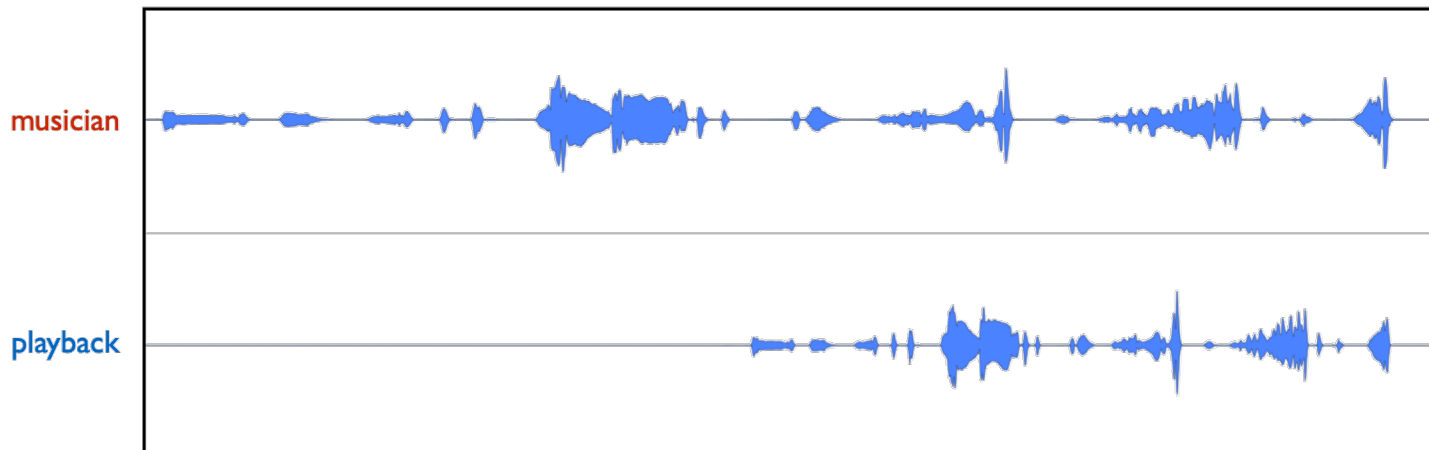
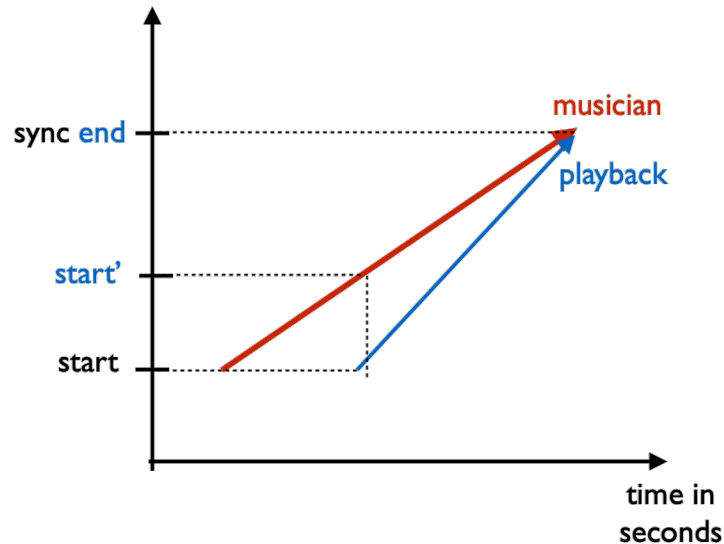
start

start' [playback]

7

sync end

position in beats  
in the score



# Christopher Trapani real-time rhythmic canon à la Nancarrow

SCORE in C

Sketch — ~~7 Nov 2012~~ **3 DEC**

CHRISTOPHER TRAPANI

[X] markers to be placed by Antescofo      (X) possible convergence points

The score consists of two staves: Clarinet in Bb (top) and Clarinet (Cl.) (bottom). The tempo is marked as ca. ♩ = 108. The score includes various musical notations such as triplets, slurs, and dynamic markings (f, mp, p, pp, sfz, mf, n). Annotations include:

- 1B**: A box containing '1B' with a red arrow pointing to a measure in the Clarinet in Bb staff.
- 1 -> A 3/5**: A red horizontal bar above the Clarinet in Bb staff, indicating a convergence point.
- A 2**: A box containing 'A 2' with a red arrow pointing to a measure in the Clarinet staff.
- 1B -> A point d'entrée défini**: A green arrow pointing from the Clarinet staff to the Clarinet in Bb staff.
- B 3**: A box containing 'B 3' with a green arrow pointing to a measure in the Clarinet staff.
- C 4 3 -> D 7/11**: A blue horizontal bar above the Clarinet staff, indicating a convergence point.
- D 5**: A box containing 'D 5' with a blue arrow pointing to a measure in the Clarinet staff.
- 2 -> B point d'entrée défini**: A purple arrow pointing from the Clarinet staff to the Clarinet in Bb staff.
- 1B -> A point d'entrée défini**: A yellow arrow pointing from the Clarinet in Bb staff to the Clarinet staff.
- E 6**: A box containing 'E 6' with a yellow arrow pointing to a measure in the Clarinet staff.
- 7**: A box containing '7' with a yellow arrow pointing to a measure in the Clarinet staff.

