

Cap Hornu 2008

Dynamic Instrumental Arts: The Enactive Approach

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“doing makes sense”

is particularly true in Music and Arts

Enaction, Arts and Creativity.

Until recently, creativity in Arts was synonymous of abstract design.

- In Fine Arts, anybody knows the supremacy of conceptual orientations in Contemporary Arts.
- At the beginning of the use of the computer (70s), the main stream was to praise to the skies the concept of “**immateriality**” allowed by computers, artist dreaming to be free of the constraints of the matter.
- Recently (10 years ago), after the relative failure of such extrême position, the instrumentality and the performance activity, as vectors of such non-writable complexity have been rehabilitated.
- “**Desiging instrument**” becomes a creative activity to program the necessary constraints for artistic creation, and “**playing instrument**” a basic activity to dialog with such constraints.
- “**Tangibility**”, term banished by formal approaches, becomes the basic necessary layer grounding the creative processes.

Enaction, Arts and Creativity: an historical paradigm shift

Nowadays, some foundational concepts appear in Arts:
instrument, inner representation of the instrument, embodied cognition,
performance as a closed-loop playing of a complex dynamic system
Etc.

An exemplary evolution was in Music:
from “**thinking Music**” (Boulez, Composer and musical conductor)
to “**thinking the sounds**” (Mac Adams, Musical psychophysicist)
and finally
“**Thinking the instrument**” (ACROE)

The main assumption is that creativity
does not exist only with formal and symbolic thought and representation
of sensible materials (music, images, gestures, etc...).

Thus Enaction concept fits perfectly to this contemporary historical shift
In Arts

Dynamic Instrumental Arts And Instrumental communication

Dynamic Instrumental Arts

- Arts that aim to produce sensible phenomena evolving in time
- Arts that need (for this production) an instrument, as a physical body which produce them by means of human physical interaction

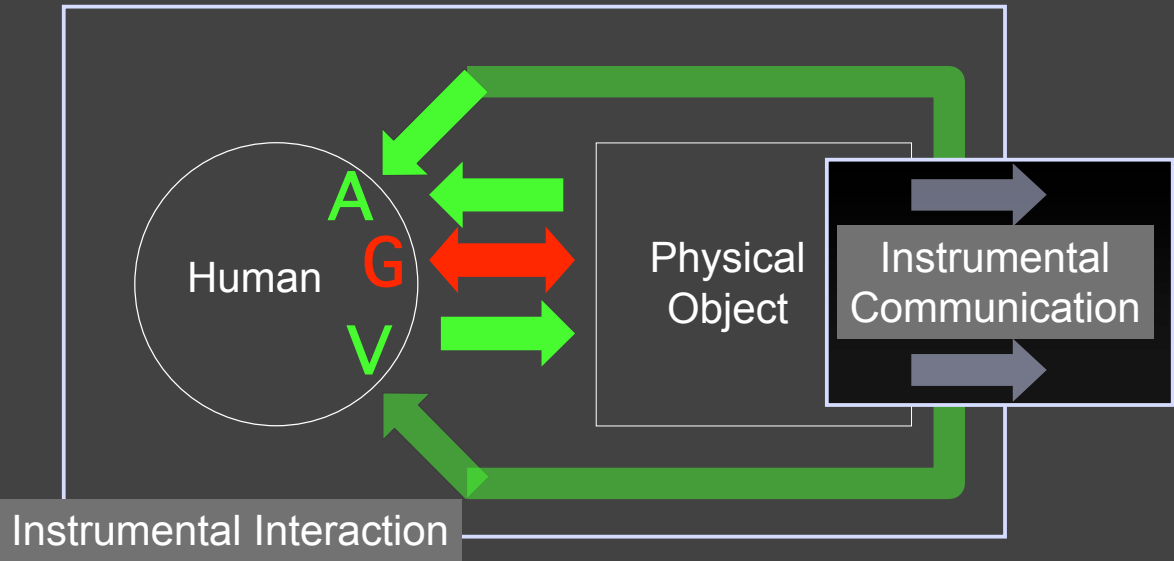
- Musical arts

- Visual Motion arts

- Choreographic arts

From Interaction ...

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... to sense

The Music "case" Sound to sense ...

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Sound

The sound makes sense within
The instrumental interaction

Sense



The Music "case"

•• Sense to sound



Sound



By designing the instrumental conditions

Sense



The Music "case"

•• Music as a whole

And by offering all of these components to others, during a present magic moment



By way of designing the instrumental conditions



Sensible phenomena to sense and vice-versa

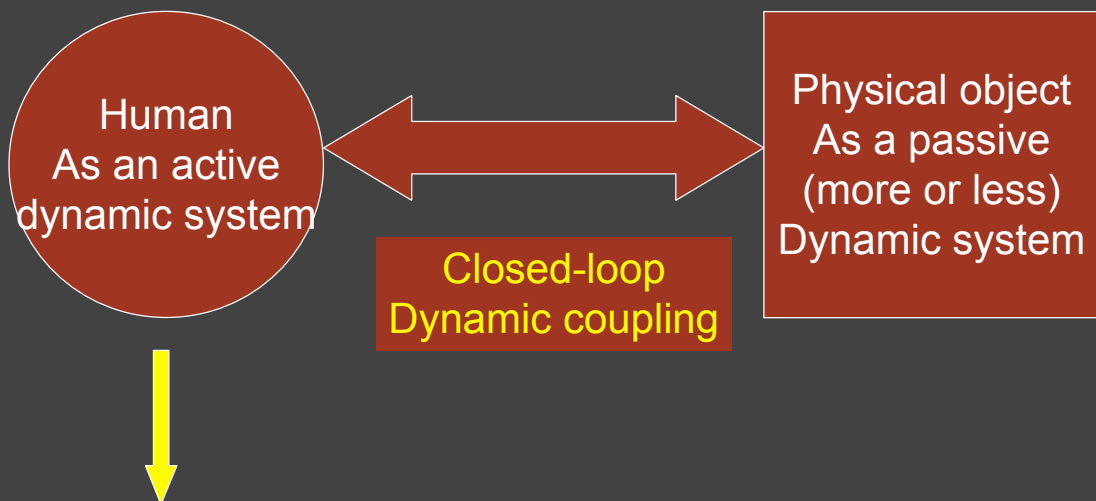
During the instrumental interaction:

Play a cello, rub a surface, mould a paste, etc.

The physical body of the instrumentalist and the instrument are closely dynamically coupled

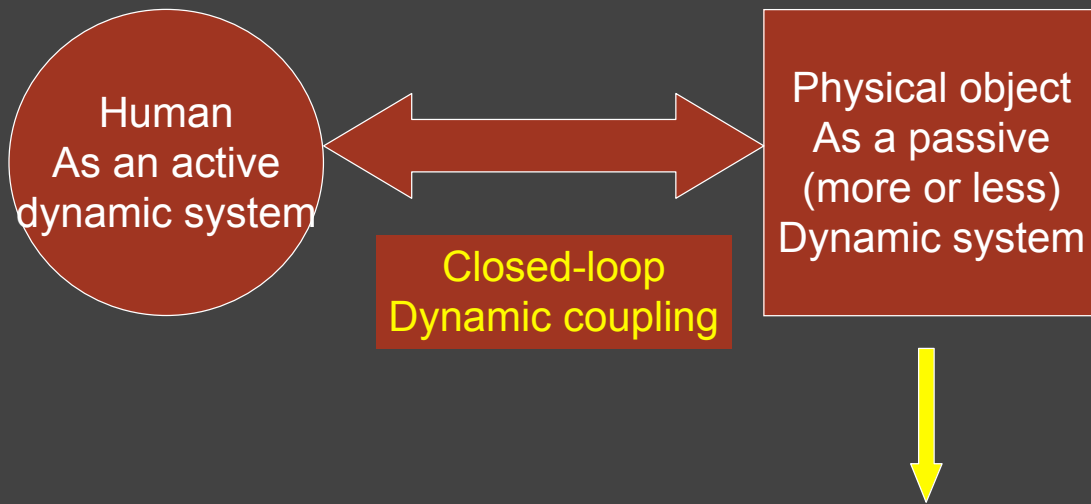
Being able to produce non-predictable emergent effects: timbre changing, sticking, cracking, breaking, etc..

Sensible phenomena to sense and vice-versa



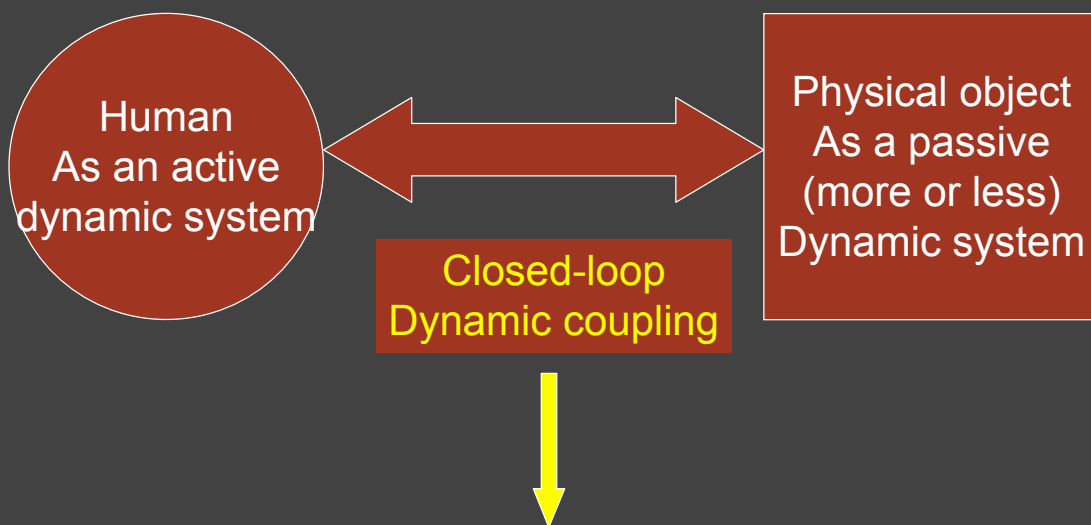
“instrumentalist” is always playing with “chaos”, trying to master it, with more or less success or failure.

Sensible phenomena to sense and vice-versa



*The produced sensible phenomenon engraves, more or less explicitly, this "struggle"
It is a sensible representation of this complex relationship*

Sensible phenomena to sense and vice-versa



*The instrumental dynamic situation is a representation
Of our complex closed - loop relation to the physical world*

Sensible phenomena to sense and vice-versa

- The produced sensible phenomenon can be considered as a representation of a rich production process: the relationship between the human being (transformed in instrumentalist) and an physical part of the world (transformed in an instrument, i.e. producing something)
- By this way, it transmits to the audience in the present, their history, the part of the past engraved in their bodies, modifying them and thus anticipating future.
- And that process plays a critical role in artistic process and artistic appraisal.

my « mascot example »: The finger on the glass

When we are rubbing a crystal glass with a wet finger, the sound produced is Very pure, i.e. very poor!
Thus, why does it look marvelous? Why are we looking enviously the friend Who is able to perform this? Why are we unhappy when we don't success?



my « mascot example »: The finger on the glass

The finger-glass system is typically a complex system able to produce un-predictable emergent effects, transients, bifurcations, stability regions, etc.

- The sound can appear, ••• or not!
- Timbre can change, •• or not!

And all of these effects cannot related simply to only parameters control

- The intensity of the sound is not directly correlated only to the Pressure force or to the finger velocity.
- When the sound is started, then we can relax the pressure and the velocity to maintain it.
- etc.

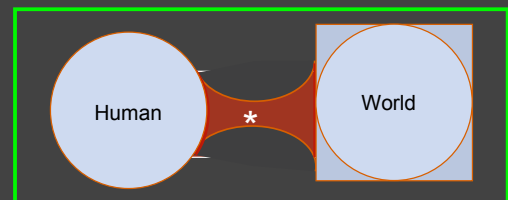
It is the same when we play cello.

The difference between Rostropovitch and myself is that Rostro knows to play With such chaos, relaxing the pressure, increasing or decreasing the velocity Of the bow, at the **right (not moment) state** of this complex dynamic system.

And what about with the computer ? (i.e. electrical representation)

But the described situation, in the mechanical (mechano-optical) world, is non-observable without modifying it drastically. The external observations are not sufficient. To observe the evolution of the parameters of the situation we have to equip the human and the instrument.

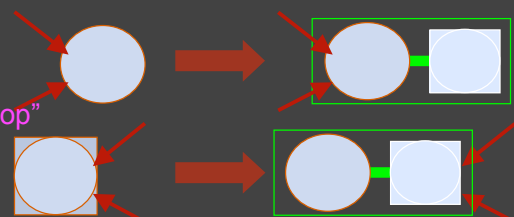
A complex non-separable system



New studies :

- in human sciences: models and methods
More and more ecological ... Enactive
"World in the loop"

- in "world sciences" and coupling:
More and more ecological ... Enactive
"Human as a physical active system in the loop"



* Merci à J.L Florens pour cette représentation

And what about with the computer ? (i.e. electrical representation)

And in Arts (for example), why do we accept to be limited by some material limitations that are more derived from to the building process of the instrument and that could not be useful for the task? Can we able to define a “generalization process”, which will stay in the framework of the instrumental relationship, but which will be able to be not restricted to a very few number of situations?

In other words, can we invent new instruments, ad libitum, preserving the properties of the instrumental interaction and communication, but completing the panoply of the existing ones,

Able to be built

and

Able to be learned

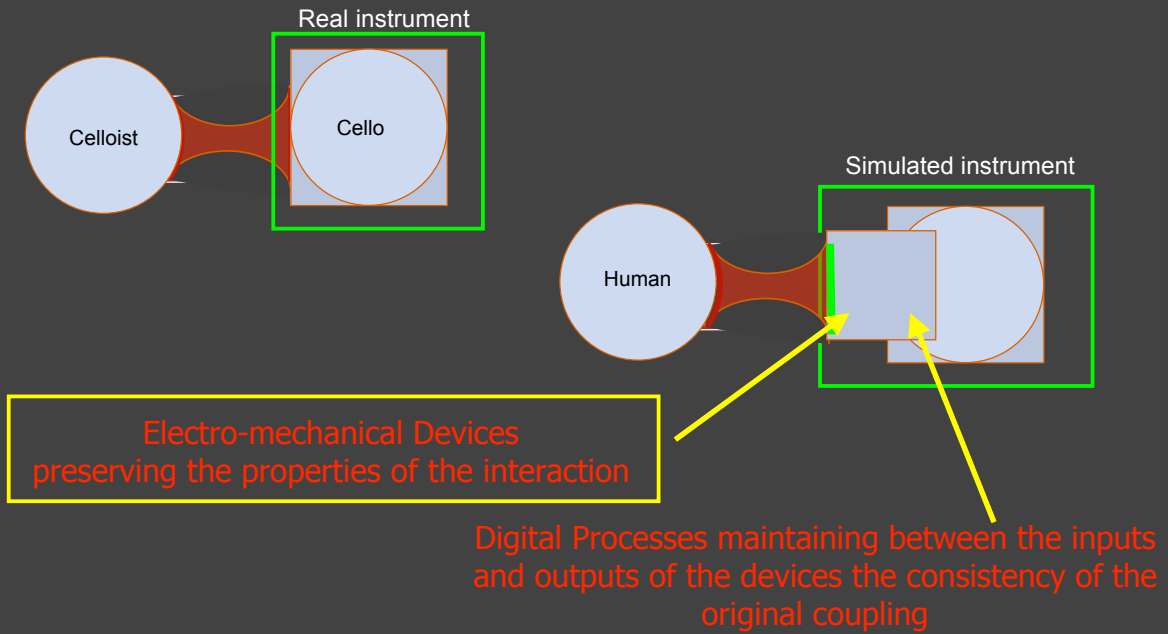
a shorter time than the mechanical ones

In other words, what are the essential properties that must be necessarily preserved and what are the properties that could be eliminated.

And what about with the computer ? (i.e. electrical representation)

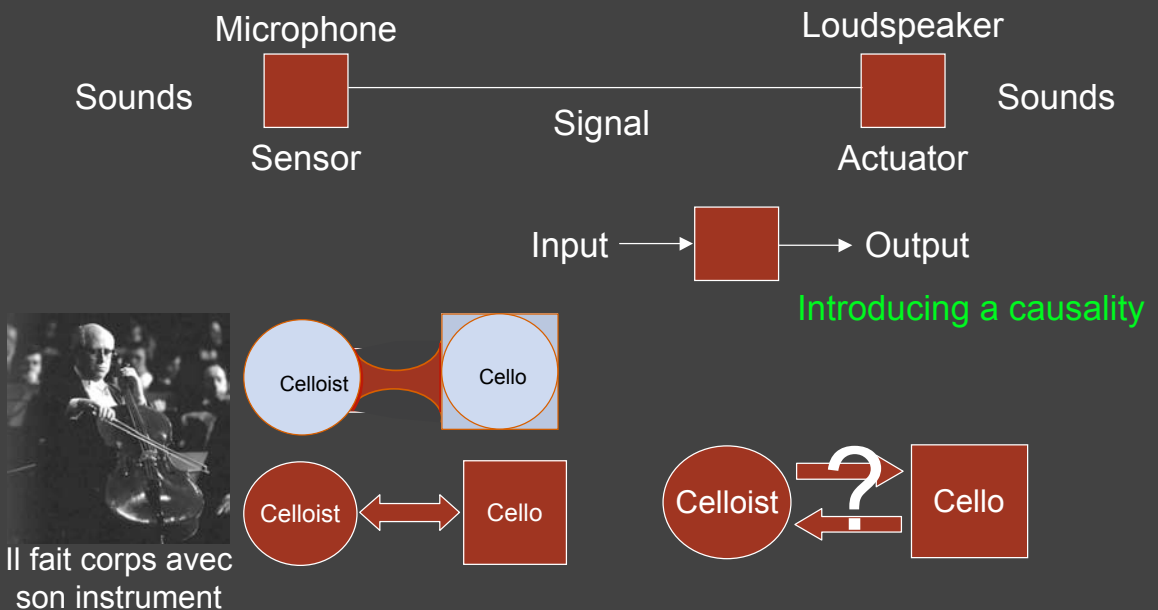
- We have to know more
 - We have to build more
 - We have to experiment more

Electrical machines as a way to represent Not the humans, such as in AI or AL But the instrumental universe i.e. the universe with which we are interacting



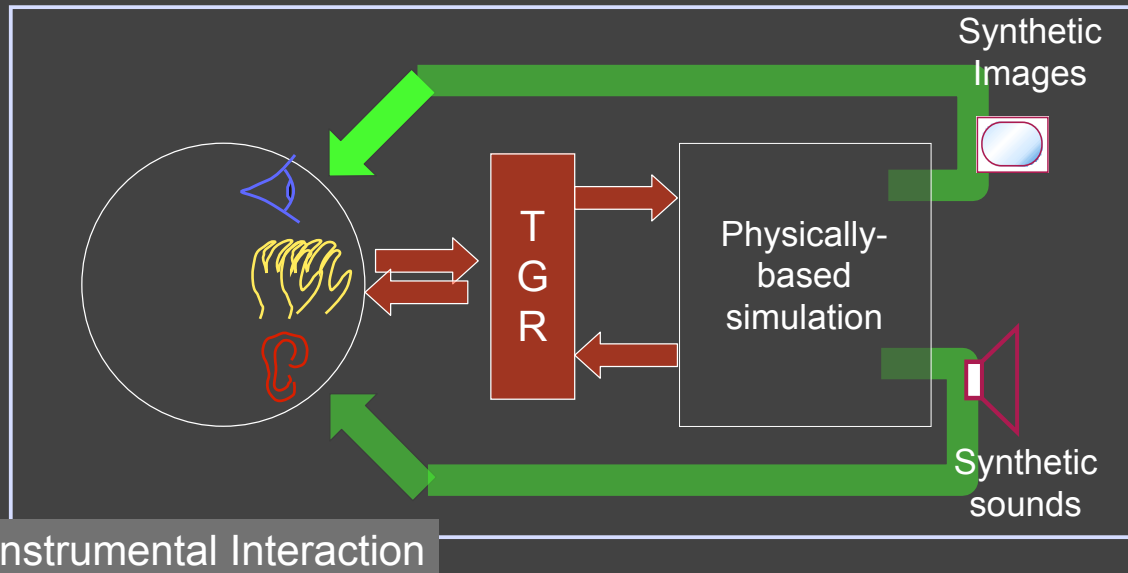
How implement (represent) the instrumental situation? With electrified (computerized) machines? Et Quel est le prix à payer?

Transduction Chain



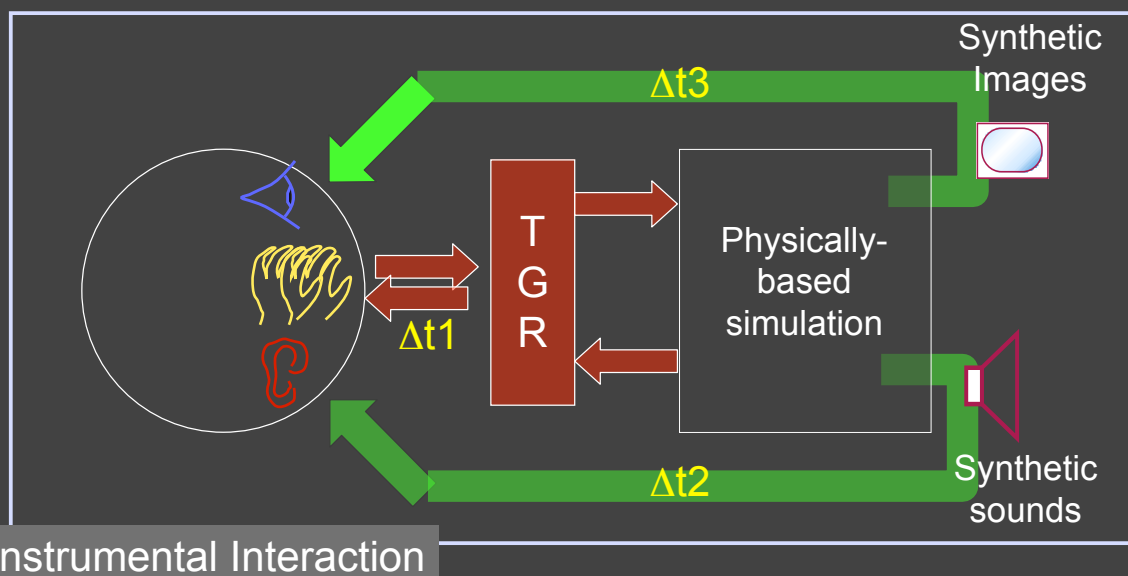
Representation of instrumental situation for Dynamic Instrumental Arts using computer

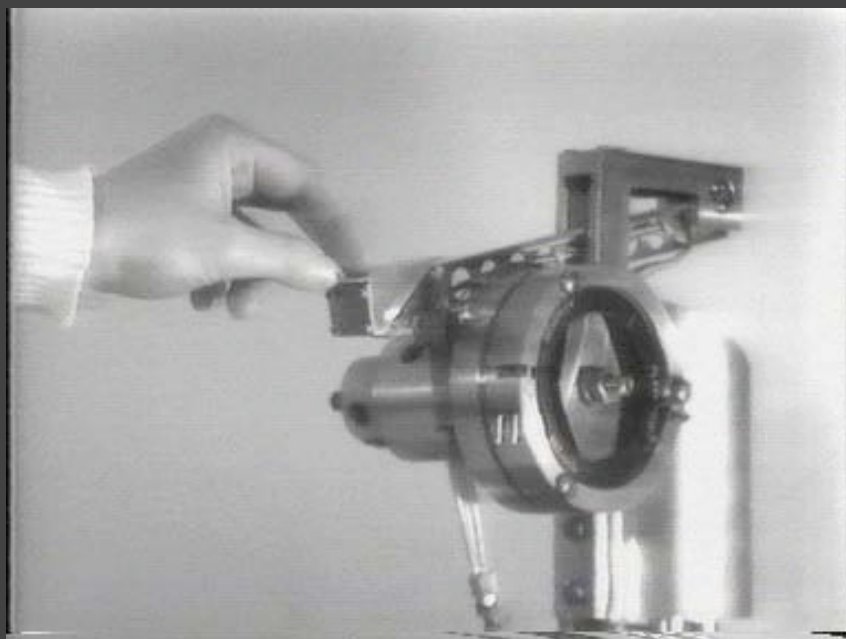
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Interest (1): variation of the delay of the input-output circulations (in mechanical interaction: $\Delta t = 0$)

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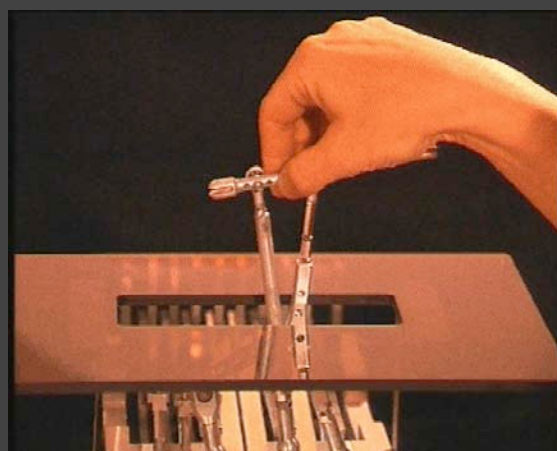


(C. Cadoz, J.L. Florens, A. Luciani)
Video available at Annie.Luciani@imag.fr

« Finger on the glass » & « Cello »

*gestural and acoustical
friction model*

The “finger on the glass”



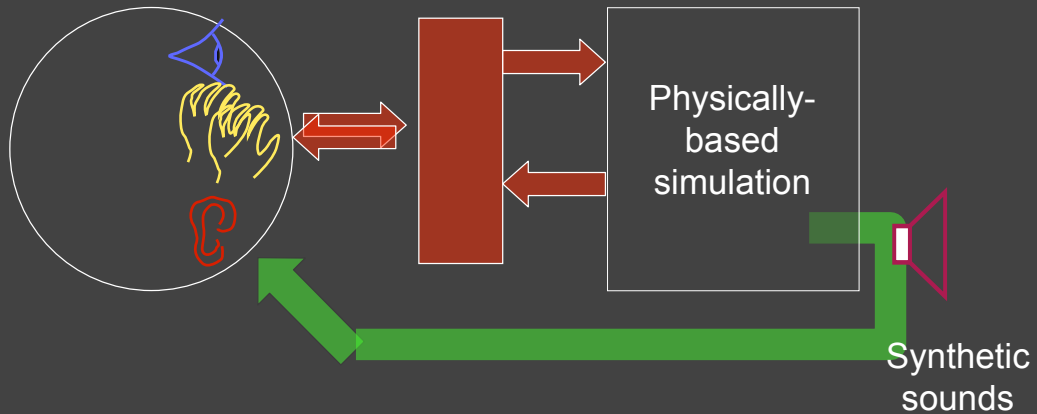
Instrumental playing of virtual
violin and cello

(J.L. Florens, C. Cadoz)
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« Finger on the glass » & « Cello »

Four types of experiments:

1. Without force feedback : only control paradigm
2. With force feedback and no energetic consistency with the sound
3. With force feedback + energetic consistency between gestures and sounds (feedback of the string vibrations on the hands at 2 KHz) **Ergotic relation**
4. With force feedback + energetic consistency between gestures and sounds (feedback of the string vibrations on the hands at 44 KHz) **Ergotic relation**



« Cello » : Learning a difficult pattern

(A. Luciani, J.L. Florens)

Maintaining the continuity of the sound ...

A musical feature

... when changing the bow direction

A gestural and mechanical constraint

Changing the physical parameter that regulates the friction force

4 cases:

(0) No Friction ; (1) Slight Friction ; (3) Normal friction; (4) Very strong friction

With Slight or Normal Friction

Most of the people reach several times the goal

With Exaggerated friction or With Null friction

A very few number of people reach the goal



« Cello » : Learning a difficult pattern

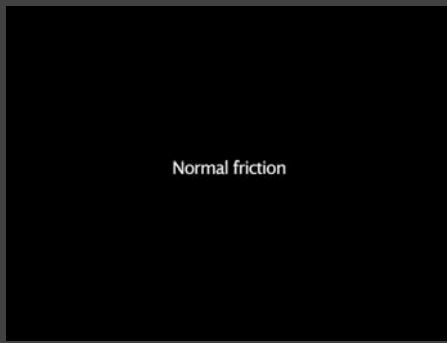
Very Fast Learning (less than 15 minutes) - better than in the real case

People improve very quickly the quality of their gestures

*Fast exploration of a wide range of dynamic strategies
A priori imagined strategies not necessary good*

People learn on the fly “to be within the situation”

*“Relax and let the bow act by itself just before the turn”
Transforming the bow direction changing in soft round turning
Road turns, Möbius movement, elliptic trajectories, ...
Modulating the cinematic of the gestures
Acceleration - deceleration on the point of changing
Relaxing the pressure before or after the turn point, ...*



Adapted Ergotic Relation with the sound:

Enhances instrumental learning and playability

Supported by « on the fly » dynamic adaptation

Supports the success of the goal

When instrumental learning is acquired, haptic sensation can be degraded

Enhances the sense of PRESENCE of the string

“Normal Case” : Rich to feel the string in the hand

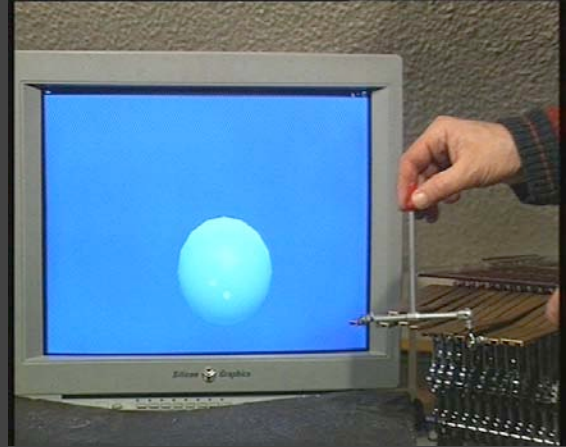
*Strong **Presence** of the String*

Sound - Haptic reinforcement

*Thanks to the 44Khz
haptic simulation
&
Ergotic Sounds*

Dynamics vs. Geometry ?

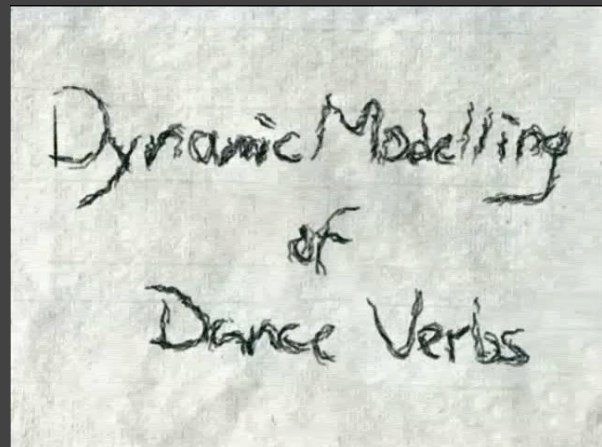
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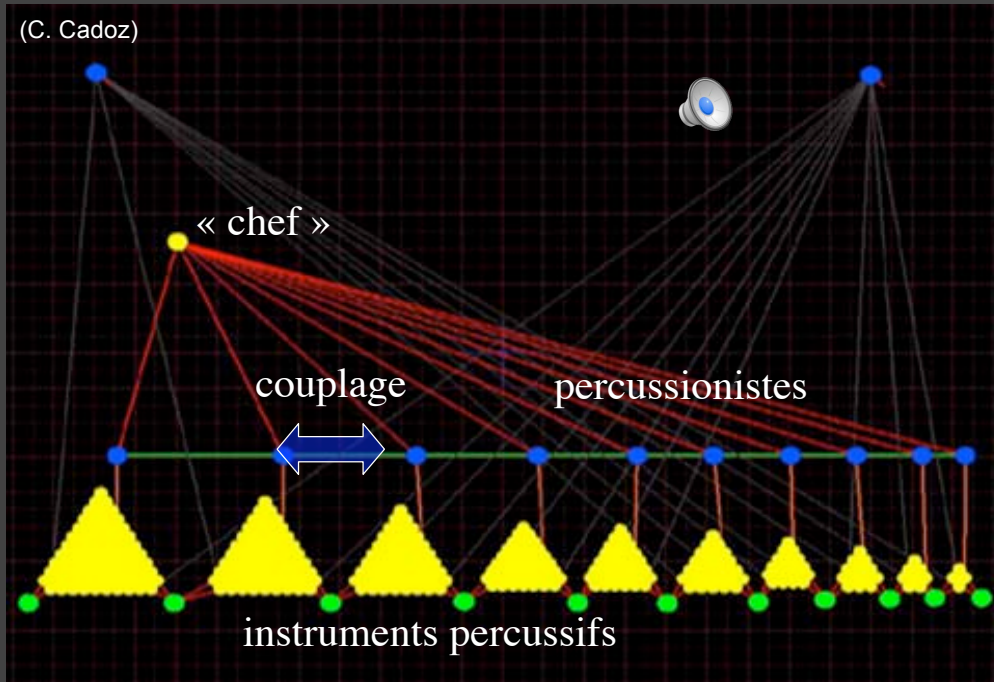
(J.L. Florens)
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**What is true between « hands and sounds »
is true also between the components of the
object(s) that produce the sounds (to be
heard only) or the visual movement (to be
seen, without action)**

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(A. Luciani - C.M Hsieh)
Videos available at Annie.Luciani@imag.fr



Some thoughts to conclude

When a sufficient drop of dynamic (energetic) consistency is achieved, no needs for spatial or symbolic descriptions

Dynamics describes (produces) not « things » but correlation between things.

Gestures and motion are only thinkable by dynamics.

Sounds are acoustical representation of gestures
Visual motions are visual representations of gestures