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Presence, Telepresence
in & with What ?

And How ?

- Telepresence or Telesymbiose

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- T1 -

The concept of Presence appears from the moment where the communication became deeply mediatized. It is in fact synonymous of TELE-Presence.

It supposes that a human being communicates with another (human being or physical universe) who (or which) is not in the same space and time of him.

So, the questions are :

Presence or Telepresence : in and with what kind of universes ?

And How ? Telepresence or Telesymbiose ?

Telepresence supposes that the universes in vis à vis are similar.

Telesymbiose is a more adaptive concept : the two universes try to communicate through adapted means and media.

- T2 -

The central idea is that :

We observe the universe through our theory and through the instruments we built.

And to day, there is an epistemologic break in the two, break adressed under the question rised here of the Presence.

Break in our theory : differently than the Classical Physics, the Quantum mechanics, seems to be unaccessible to the common human sense.

Break in our instruments : we would like to explore, more and more deeply, unaccessible worlds, as well as, worlds assumed as real or imaginary. Unaccessible means unaccessible to our senses and our immediate cognition.

- T3 -

I would like defend here, the idea that Virtual Realities Tools, in a more general sense, not only in the immersive and current devices and implementations, is a sign of this evolution.

Let me draw the history of the progressive transformation of the instrumental chain : from direct action on the world, to Virtual Realities, through Teleoperation.

In the instrumental chain, we act on a physical object, which is a part of our physical universe, which is this thus REAL, through a physical interaction. So we feel it in its sensorial properties : mechanical, visual, auditory, and so on. And this feeling is coherent with our classical knowledge.

- T4 -

Fifty years ago, the manipulation of dangerous materials, such as nuclear materials, began to implement the need of a distant manipulation. With the birth of the distinction between two spaces : the space of the user and the space of the task.

As long as the manipulation remains mechanical, this means « as long as the two spaces are near, in space, in time and in nature », there is no problem of Presence.

The instrumentalist manipulates the block of nuclear matter through a mechanical pentograph ; He feels it mechanically and he sees it through the glass, that separates the two spaces. That is the same case also with the microscope for example.

- T5 et T6 -

But, when this direct communication, even if it was distant, has been replaced by electrical communication between the two spaces, then an epistemological break occurs in our instrumental practices.

From that time, the both spaces can become more and more distant.

Distant means :

- distant in space : far away such as the planet exploration
- unaccessible
- distant in nature :
 - hostile environments
 - dangerous materials for human beings (nuclear materials),
 - dangerous manipulations for the task space : fragile objects and materials

- distant in scale :
 - too small (nanoscale, molecular and biological scale) or too large spaces (planet or galaxy scale, meteoscale, etc.)
- and physically unexistent
 - abstract data : statistics, geometry, mathematical patterns, etc.
 - Imaginary worlds
 - Computer Worlds

Thus Presence Disappears ! ! ! !

And we have to go on its Reconquest, in another instrumental and conceptual context, another than classical theory and instrumental practices.

With the birth of the two physical and functional spaces, the classical instrument has been decomposed in 3 parts :

- the part which is in the user 's space
- the part which is in the task's space
- the communication between both.

- T7 -

So, in each space, we have to complement the absent part :

Firstly, we have to put sensors and their corresponding actuators on both sides

These sensors and actuators, i.e. these transducers, being dedicated to a sensorial functionalities : vision, audition, action. They are separate, rising a major problem : to create a kind of user sensorial shizophreny. The integrity of the human user is splitted in different place according to the different transducers : he hear here, he speaks here, he looks another device, and he acts on another device.

- T8 -

We placed :

- microphone and loudspeakers ; that is « Telephone », and radio
Which reduce the human integrity to be a speaker and auditive man
- cameras on the task space and displays on the user space, to see the task space : that is « Television »,

Which reduce the human integrity to be a visible and a visual man

- mechanical sensors in the user's space, to acquire the user's action and mechanical actuators (teleoperated robots) in the task's space, to perform these actions : that is « Telemanipulation »,

Which reduce the human integrity to be a action man,

- T9 -

After that, the both realities being transformed in signals conveying informations to each side, we insert, why not, layers of signal processing layers on each part.

As long as we could have a good mental representation of the distant world, as long as this distant world remains an « alter ego » space, this reduced information has been sufficient to restore to the user the feeling of Presence of the second space.

- T10 -

Progressively, as the disjonction of the two spaces are continuing, the direct information which circulated between both became insufficient and we have to reconstruct them, so resynthesised, then construct then synthesised.

- T11 -

In spite of this evolution, we remain in front of the lack of the feeling of Presence. More recently, we introduce the last transducer, the last pair of sensors-actuators, called the « force feedback device », aiming the intervent of a material representaions of the matter and the bodies in the communication. We observe then, spontaneously, in the elementary experiments developped now, a kind of bright evidence of Presence, even the simplicity of these experiments.

What it happens ? I will discuss in the second part of my talk about this subject.

Before this discussion, we can observe that finally, one of the half part corresopnds to the basic con figuration of Virtual Realities System, whatever, the simulated world is.

- T12 -

Before this discussion, we can observe that finally, one of the half part corresponds to the basic configuration of Virtual Realities System, whatever, the simulated world is.

- T13 -

So our representation and instrumental communication system became :

A Set of space users, with a generalized instrument : that is simulated & synthetic worlds, sensors & actuators, signal processings,

Which can communicate between them

And which can communicate with task's spaces, composed of the symmetrical components.

- T14 -

We can introduce on a new concept that can be called « integral representation » or « TeleReality ».

So, We can understand now the Virtual Realities concept in a more general sense and use :

V. R. : as an Interface

between human beings with their Sensori-motor

And Cognitive Capabilities

Which have been developed in an ontologic interaction with our real macroscopic Universe

And Other Distant Worlds, having their own features, physical, fonctionnal, structural features, that can be deeply different of our real universe.

- T15 – T16

Thus emerge the concept of Telesymbiosis, that is not the projection of our real universe and not the embedding of ourselves inside another world such as a virtual world, but the symmetrical problem :

HOW can we communicate with distant worlds
From where we are, remaining Ourselves
In Our World
With Our Capabilities

This question addresses the fundamental need to render them as Real
To can bring them back to Our Reality, to Our World.
To be convinced Ourselves of The Reality of these worlds! ! ! !

So, the master words are :
To Create the sensori-motor and cognitive conditions
To convince us of the Reality of Distant Worlds

- T17 -

How ?

The first level of question is ?
What are the minimal sensori-motor Conditions ?

We know that Visual restitution is not sufficient, **despite the despaired quest of visual realism.**

There is a deep perceptuel and cognitive reason
Vision don't convey absolute scale. Alone, vision is without references.

We know that Auditive restitution **runs better that vision for the emergence of the feeling of presence**: the human voice runs more strongly than a photograph to feel instantaneously the illusion of presence.

The both together, is better. But one remains often more or less unsatisfied.

- T18-T19

If we add the action (without haptic perception), we encrease the feeling but we remain under a threshold. We continue to be unsatisfied. It seems we attain a kind of assymptote.

For those who have performed the experiment, when we have the gestural action strongly connected with the gestural perception, something occurs : a sudden and lightened feeling of to be really here for the manipulated object, whatever it is.

The gap between Non-Reality and Reality is suddenly crossed, even without visual and auditive restitution, even with bad visual and auditive restitution. This feeling is robust.

- T20 -

Why ?

For a basic biophysical reason due to the biophysics of the gestural sensori-motor channel itself

1. The haptic modality is the alone modality which is intrinsically perception and action. It is not possible to separate the gestural action and the proprio-tactilo-kinesthetic associated perceptions
2. There are three sensor-motor basic loops
 - Audition – action
 - Vision – action
 - Gestural perception – gestural action

The last is faster than the two first.

- T21 -

These considerations conveyed to elaborate a new theory of action – perception. Currently, we consider today, that senses are separable and that perception is divided into separate domains.

If we consider that the physical reality, even if it can be analysed according to different energy arrays (acoustical, visual) cannot be described by a univoque association of these arrays, that is it is not possible to describe the physical reality by a simple superposition of these different axes,

So, the role of our perceptual system cannot be to simply acquire (in fact it is not possible) these data. But it can be to construct relations between them and to cause the emergence of an organisation. Because these relations cannot be definitely given, they emerge dynamically and then, the action and the motion in the physical reality, in other words, the physical exploration, plays in deep role.