JCOM 2 (3), September 2003

Scientific communication in Italy: an epistemological interpretation

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The aim of the present research is to study the "collective imaginary" produced by the articles within scientific circulation, in order to understand the perception of science that is shaping among the public. It is meant to identify, based on the theoretical background of cognitive science and on a epistemological perspective, the cognitive maps that drive the analysis and the interpretation of scientific knowledge, in order to let the global sense built by single individuals' cognitions and interpretative acts arise; their paradigms of reference and the scientific imaginary being subtended.

The results from this analysis have proven how important the role of collective scientific imaginary can be in a "knowledgeable society". Twelve cognitive maps have been deduced, and they represent the epistemological outlines the articles refer to. They have highlighted an ongoing general transition from mechanicist and reductionist paradigms of reference to other olistic and systemic ones, as well as the new role that technology has attained within our society and its own imaginary. What comes out of all of this, is therefore an always-tighter need for collaboration and cooperation among all the disciplines concurring to the building of our society and our science.

The "ontological" deficiency of the sciences of man lies in our failure to give existence to the imaginary and the idea: we have seen only a reflection where there was duplication, only and outburst of smoke where there was a thermodynamic boiling of steam".

Edgar Morin[1]

Communication is an integral part of the building process of the scientific fact.

Gustavo Guizzardi[2]

Introduction

More often it is heard that we are immersed in a "knowledgeable society"[3]. Every day we are drawn by the sensational news given by the media, flooded by revolutionary novelties, by unimaginable bewildering discoveries: they astonish us and open yesterday's utopian towards today's world of possibilities and tomorrow's feasibility.

So far the scientific circulation has especially regarded the quantitative aspects of knowledge, which have to 'become news". But how does a discovery or a research draw the interest of the media? Undergoing an actual transformation process, on the basis of the 'newsability' criteria such as, for example, those listed by Mario Lenzi in the "Information Code" by Franco Abruzzo[4]:

1. *the amount of novelties and the singularity, also in relation to the type of audience the magazine aims at;*
2. *the practical importance a fact bears in people's life;*

[1] *Op. cit* (8)

[2] *Op. cit* (9)

[3] *Op. cit* (1)

[4] *Op. cit* (2)

3. *the possible consequences on everybody's daily life and interests;*
4. *the physical or simply psychological closeness;*
5. *the possibility to influence emotions and to create a sense of expectancy;*
6. *the forecasted development of an event;*
7. *the exclusivity character.*

It is clearly understood upon reading these latter lines, how scientific matters such as clonation and genetic engineering could become "qualitative news" and monopolize public attention. But, can such a perception of journalism guarantee the authentic 'quality of the news?

It is necessary to link the quantitative and qualitative dimensions of the (scientific) circulation, since scientific culture deeply remolds the perception that men have about themselves and the surrounding world. This will consequently influence the thinking, which occurs in each moment, of realities and fictitious items, interpretations of the world, new researches and future theories.

Our hypothesis

Right within this reference scenario it is understood how the study of perceptions of all "collective imaginary" works that scientific circulation produces and carries, develops and attains importance. According to our hypothesis, these must not be considered "fallacious" products generated by the scarcity of an adequate background, but they should be considered as genuine cognitive maps that steer and lead the analysis and the interpretation of knowledge. In brief, they should be observed as real growth of possibilities that, even if unconsciously, will lead the imaginary of the scientific reader and of our society in the creation of ideas, beliefs and forecasts on the analyzed issues and that will thus influence future research and developments.

The theoretical flow that constituted the background of our work is that of cognitive sciences, which considers social relations as ties that produce and imply knowledge and that regard the social representations they produce as intrinsically dynamic configurations[5]. The cognitive maps representing them are thus the constant

[5] *Op. cit* (3)

variable and mutant product of a continuous alternation of stationary and emerging statuses. Such dynamic background, moreover, is seen with a "double timing" [6] point of view and thus long stability periods of social paradigms of reference are alternated with brief and sudden periods in which breakdown events bring to light new configurations of ideas, explanations and theories, open doors towards the birth of a new qualitatively different universe of reference, in short, of a new paradigm[7].

Therefore, conscious about the limit given by the intrinsic plurality marking social intelligence, so that it cannot be reduced to the production of a single actor, it is been attempted to understand our "social mind"[8] and one's imaginary more in depth especially in this study.

Corriere Scienza, the scientific section of the *Corriere della Sera* – the Italian newspaper scoring the largest distribution – has been then considered as an instrument producing networks and mediating relations between ideas of single individuals (see **figure 1**). According to such a perspective, the analysis of the possible relations between subjects, represented – as we remind – by a scientific section, may concretely contribute to the growth of the global sense built by cognitions and by the interpretative acts of single individuals, and thus their paradigms of reference.

This is because the growth of social intelligence and its imaginary are characterized by the appearance of sense configurations, or better of elements intersubjectively shared by the participants, who act as the background reference to their interaction.

Here is how the "social mind",[9] dynamic self portrait of this relation between each other, gives to the group, to the society and to its identity a shape and a configuration; and here is why only the study of the paradigms built by intersubjective knowledge may let a person experience the most hidden parts of our knowledge society.

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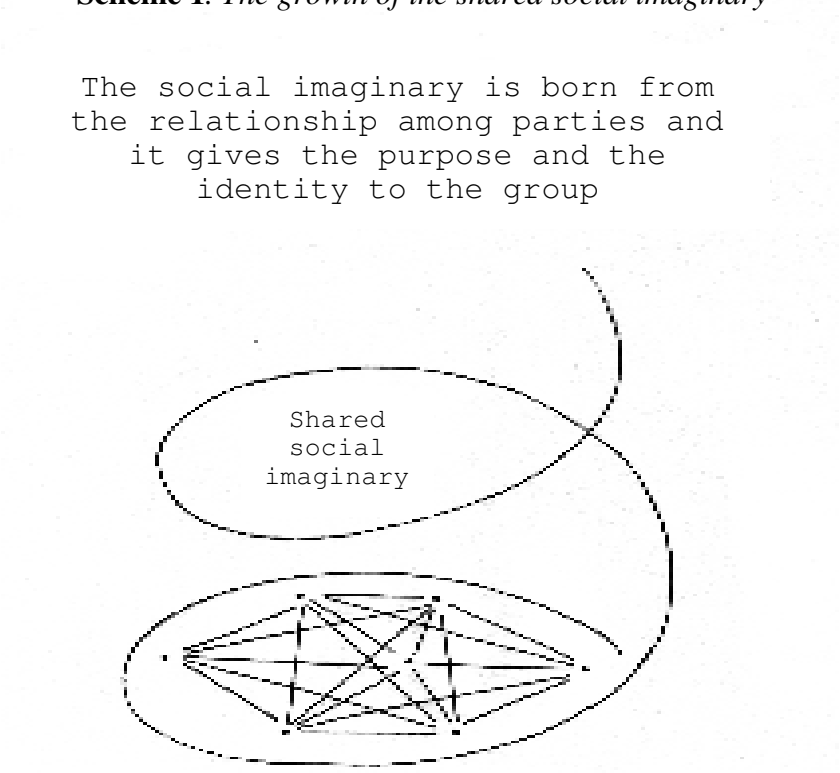
[6] *Op. cit* (3)

[7] *Op. cit* (4)

[8] *Op. cit* (3)

[9] *Op. cit* (3)

Scheme 1. *The growth of the shared social imaginary*



Scheme 2. *Add-ons, annexes and sections of the Corriere della Sera*

ANNEXES of CORRIERE DELLA SERA	FORMAT
Corriere Economia (Soldi)	Newspaper
TrovoCasa	Tabloid
ViviMilano	Tabloid
Sette	Magazine
Tv Sette	Magazine
CorriereLavoro	Tabloid
Io Donna	Magazine
CorriereSalute	Tabloid
Corriere Motori	1-2 inside pages
Corriere Scienza	1-2 inside pages
Agricultura	1 inside page

The section "Corriere Scienza"

Corriere Scienza, compared to the other sections published by the *Corriere* (see **scheme 2**), has consisted of one, maximum two pages inside the national edition (like the sections *Agriculture* and *Motors*). As per the annexes to the *Corriere* in a tabloid format, on the contrary, the average is at least twelve to sixteen pages. This is valid for the five sections that may be purchased with the newspaper at the newsstand from Sunday through Saturday (*ViviMilano*, *TrovoCasa*, *Economia/Soldi*, *Lavoro*, *Salute*). Even greater is the discrepancy between the Corriere Scienza and the actual magazines (*Io Donna*, *Sette* and *Tv Sette*) issued on Thursdays and Saturdays that are composed of at least a hundred pages each. At first sight, it could therefore possible to say that it is a sacrifice of the science in favor of other types of information. This is quite correct, but it also has to take into consideration, in such calculation, the fact that many scientific news are published in the chronicle pages of the Milanese newspaper.

On such purpose I believe it is important to underline that the cognitive maps elaborated with the only support of the section *Corriere Scienza*, represent a valid, feasible background of reference also for the scientific articles "attracted" by the chronicle.

Methodology

In the following pages the results from a constant monitoring performed on *Corriere Scienza*, the Sunday section to *the Corriere della Sera* dedicated to the in depth study of the themes pertaining to "man/technology/nature" as stated in the heading, will be introduced.

A span of time between September 2001 and July 2002 has been taken into account, which is to say that 449 articles published in 47 weeks have been examined.

The research has thus continued in two phases: one phase of selection of the articles and one phase of analysis.

During the first phase, articles relating to the most diverse news (announcements on scientific discoveries, research, studies, etc) having as leading topic the belonging to categories (see **scheme 2**) and matters focus of the present scientific

and ethic interpretation, have bee taken into consideration.

The purpose was to understand which were the most discussed of such themes in the section, or better which ones were capable of evoking passion, interest and debates within the public.

Scheme 3. *Grouping categories of the analyzed articles. Their selection has taken place on the basis of the major issues from the present scientific observations*

CATEGORIES
Artificial intelligence
Genetically Modified Organisms
Clonation, genetics engineering, gene therapies
Evolution
Relationship man-animal
Cognitive sciences
Language
Cosmology

During the second phase, all the articles that were previously selected and subdivided according to the category they belonged to, have been subject to a deep analysis, acc ording to the theoretical background of cognitive sciences[10] and an epistemological perspective[11,12].

Using a comparative analysis of the articles from the same category and an inductive investigative method, twelve cognitive maps have been deduced, and they represent the epistemological outlines the articles refer to. The localization of the main concepts present in each article and their interconnection has allowed to track a possible graphic visualization of the epistemological background of reference for each thematic sector (see **scheme 4** and **5**).

[10] *Op. cit* (3)

[11] *Op. cit* (4)

[12] *Op. cit* (5)

First phase: general results

Before starting the epistemological analysis of the selected articles, I believe it is interesting to understand some data emerged during the first phase of study and in the selection of the articles.

An important thing to notice is the number of "items" that have really been considered for a more in depth evaluation (see **scheme 3**). Out of the 449 published ones, in fact, 70 of them (16% of the total) have been examined in a more analytical way.

Almost all of these appear on the front page or on the last page, thus they are awarded with a certain relevance by the newspaper itself. There are only 13 short articles analyzed.

The selection of the articles has taken place on the basis of two qualitative criteria:

- the degree of pertinence of the contents according to adopted categories (see **scheme 3**);
- the possibility of foreseeing epistemological paradigms of reference, even conflictual ones, which affect the articulation of the news.

Another item of crucial importance is the analysis of the space this section has dedicated to the various sectors with the articles. It has been expressed in terms of percentages, compared to the total number of items.

As it is possible to see from **scheme 3** and even better from **graph 1**, the evolution sector spires on top of the "classification" and it is discussed in 47% of the articles. Following is the OGM sector, with 16%. Finding this latter category relegated at the second position may seem strange, if we think about the intense arguments and the fiery debates that have been occurring on the topic in the last years. This apparent countersense nonetheless becomes more realistic by adding to the "restricted" 16%, another 6% reached by clonation, genetic engineering and genic therapies, as well as the numerous articles appeared during the whole year on the pages of national and international chronicles.

Relevance is also given to both the third position, achieved by the analysis of the

man/animal relation, and the fourth position, attained by Artificial Intelligence.

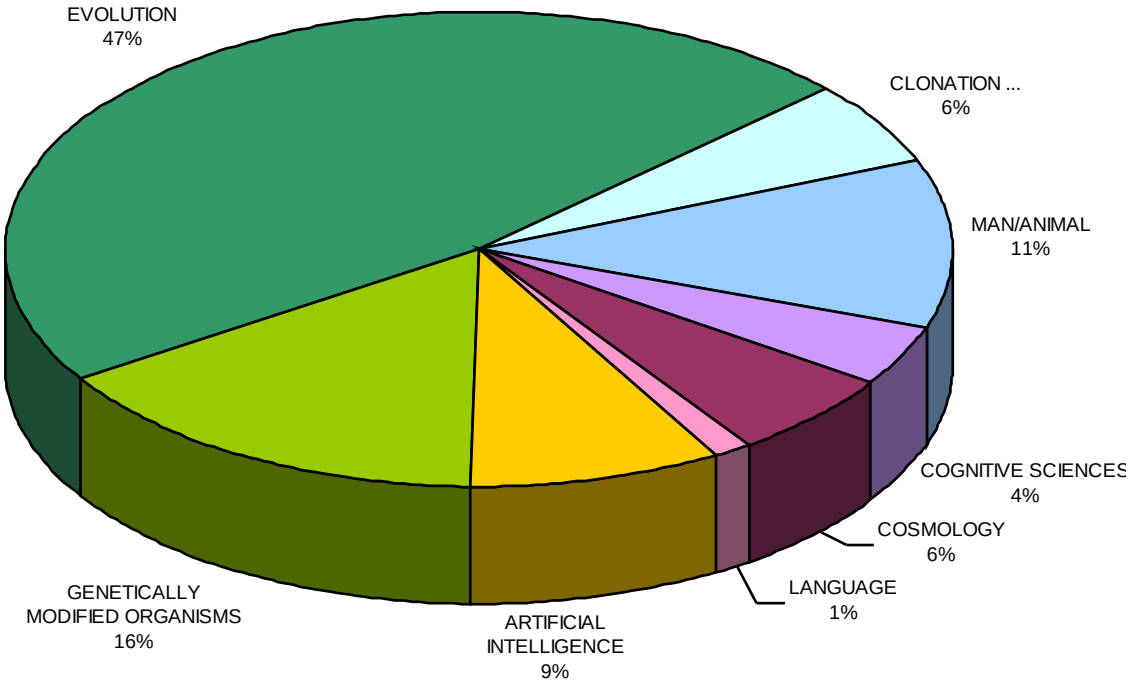
The sectors of cosmology and the already mentioned clonation, genetic engineering and genic therapies have equal position.

To be noticed, in the end, the last two arrivals: cognitive sciences and language - respectively at 4% and at 1% - which are unable to detach from the lowest ratings, even summing up their results.

Scheme 6. *Sectors, number of examined articles per sector and related percentages of presence*

SECTORS	number	percentages
ARTIFICIAL INTELLIGENCE	6	9%
GENETICALLY MODIFIED ORGANISMS	11	16%
EVOLUTION	33	47%
CLONATION, GENETICS ENGINEERING, GENE THERAPIES	4	6%
MAN/ANIMAL	8	11%
COGNITIVE SCIENCES	3	4%
COSMOLOGY	4	6%
LANGUAGE	1	1%
TOTAL	**70**	**100%**

Graph 1. *Space dedicated to the various sectors (in percentage) in the analyzed section from September 2001 to July 2002*



Second phase: epistemological analysis

In the analysis of the cognitive maps elaborated in the more in-depth analytical phase of the selected articles, it is possible to highlight two transversal themes.

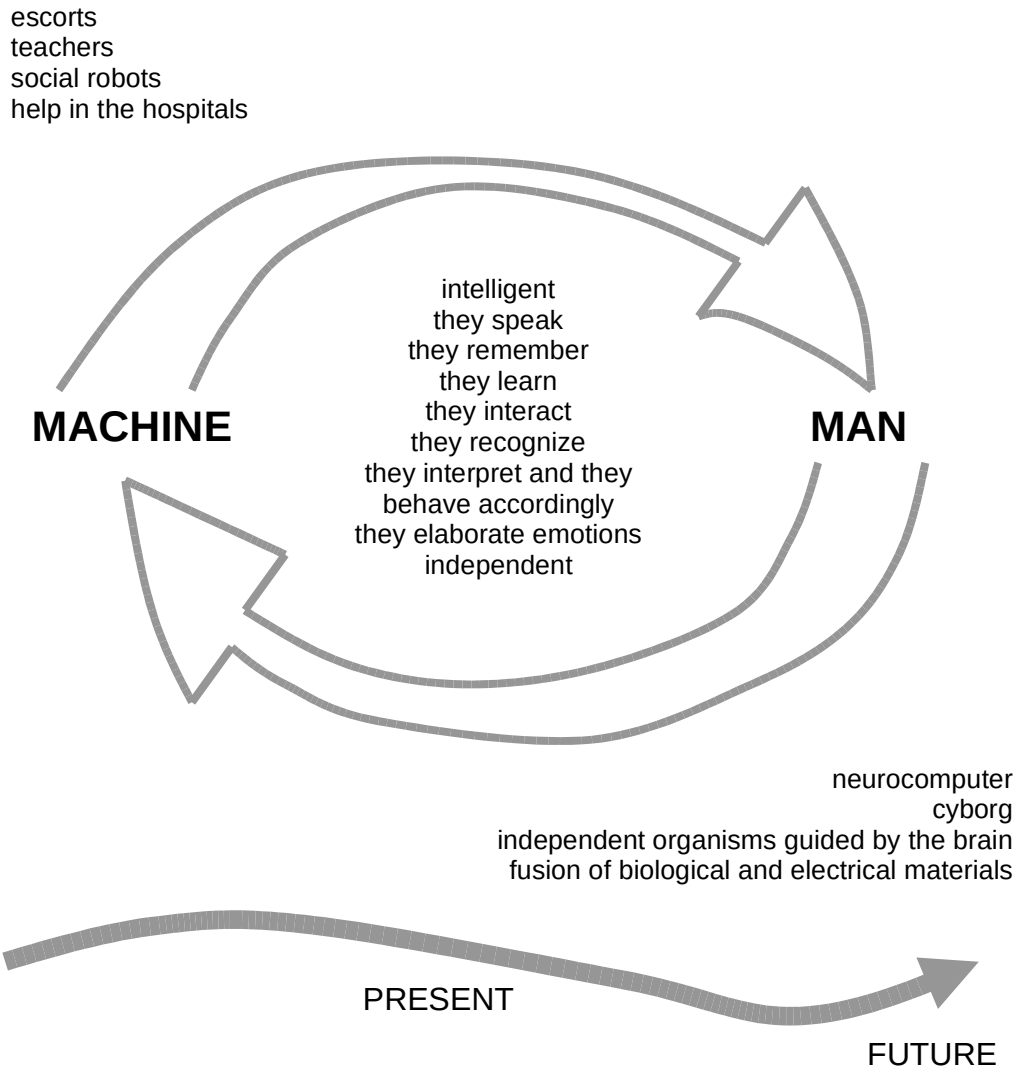
The first and more visible one is about the great role that technology[13] has attained by now within our society and its imaginary: it is strictly related to all that part of collective imaginary regarding the tie between men, nature, genetically modified organisms and artificial intelligence. It has merged them so homogeneously to make them become almost the same thing. Moreover, it is overturning all the temporal coordinates of reference that man has created in his image of evolution, through the construction of sophisticated analytical tools; it has reopened numerous scientific debates; destabilized theoretical systems considered certain until not so long ago. Not only this, but it has also opened new and unthinkable frontiers in the field of

[13] *Op. cit* (6)

knowledge. Upon making us aware of how our knowledge depends on technology, it obliges disciplines independent among themselves ever since Galileo's times to reunify all the strengths in order to stay updated.

If then it is added to this fact that the just analyzed dynamic is still ongoing and may cause unpredictable consequences, it is understandable how its strong protagonism in the collective imaginary is more than justified. Almost as if technology was some sort of "magic wand" capable of resolving any problem and make man continuously progress.

Scheme 4. *A possible epistemological interpretation of the relationship man-machine within the "Artificial Intelligence" category*



The second theme, transversal to the analyzed maps, is less evident than the first one, but bears equal weight, if not higher, in the development of present social representations and such weight will even increase in the future ones. We refer to the general transition that is taking place both in the scientific world and, indirectly, in the imaginary forms inspired to the latter, from mechanicist and reductionist paradigms of reference[14] to other olistic and systemic ones. In all maps there is such a change, in a more or less explicit manner. Each sector, however, manifests it according to different degrees.

Hence, if on one hand, the transformation is barely outlined in cognitive science, where the reductionist logic hardly starts to enter a crisis, in the evolution sector, on the contrary, such change has caused a genuine parceling of the imaginary. Here, in fact, it is possible to witness a modification from a linear logic to a discontinuous and unpredictable idea of evolution[15]. It is interesting to notice how such transition is also accompanied by the questioning of the classical canons of objective and scientific knowledge.

The disciplines that analyze the man-animal relation appear slightly more directed towards the resolution of this big 'jump". In the assisted dynamics, a man doesn't tend to isolate himself from his natural context or to consider himself the first and the best of all human beings any more. Towards the end of this journey, the OGM/ Genetic Engineering category can be found again: the contraposition between mechanicism and organicism is almost entirely outdated. What is still missing, however, is the awareness of such path in terms of collective imaginary. In a very similar context, artificial intelligence can be found[16].

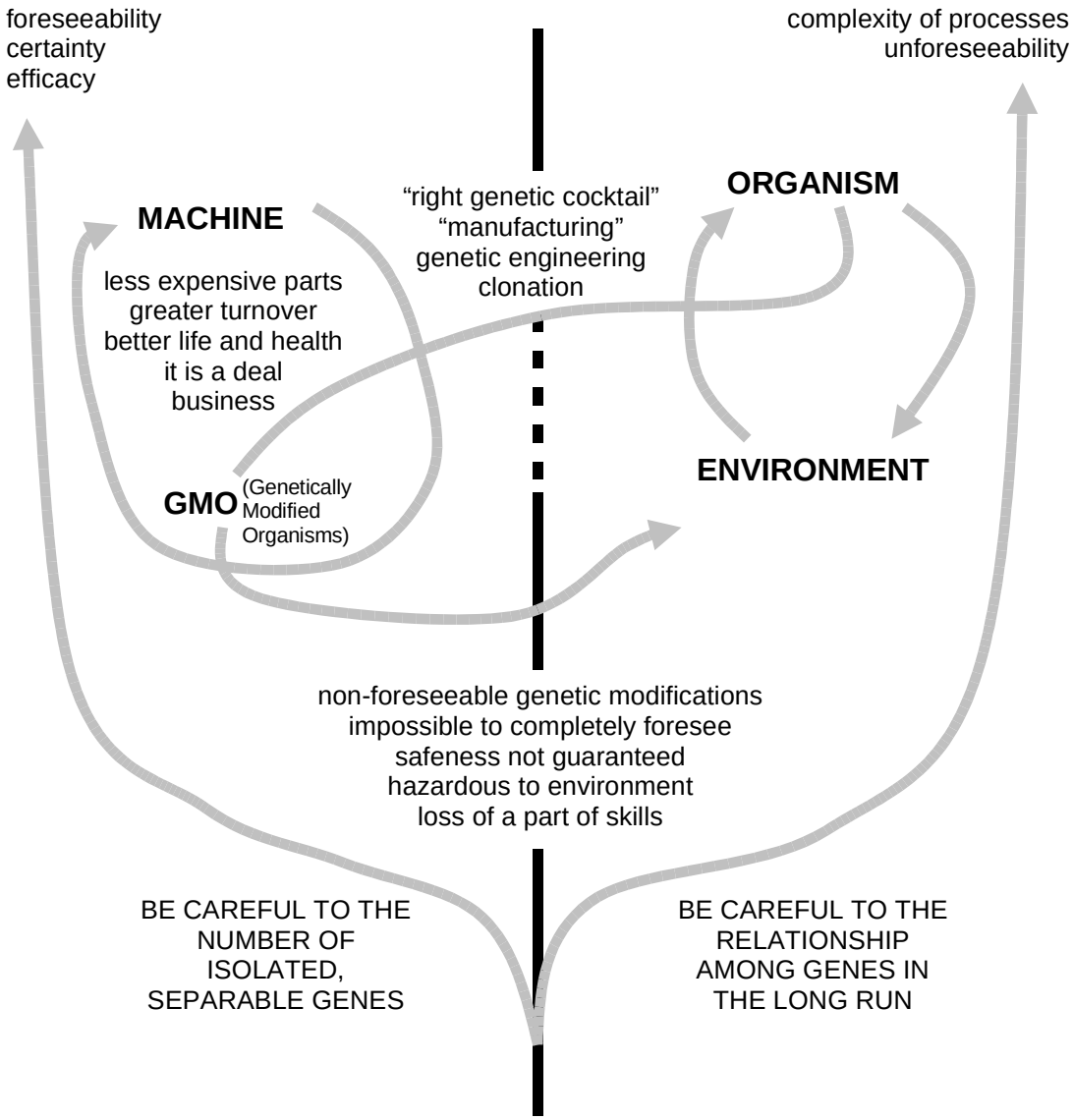
The transition appears, on the other hand, outdated in the sector of cosmology. The difficulty at finding certain theories of reference that corroborate the hypotheses suggested by scientists, have fully enlightened the olistic and systematic logic regulating natural phenomena's dynamics. Parallel to this, a need for collaboration and cooperation among disciplines arises, which makes an interdisciplinarity among them essential.

[14] *Opp. cit* (3), (5)

[15] *Op. cit* (7)

[16] *Op. cit* (6)

Scheme 5. *A possible epistemological interpretation of the "OGM" and "Clonation, genetic engineering, genic therapies" categories*



What comes out from the analysis of these two trends is hence that our science and our knowledge are anything but immobile. In reality they evolve, they change, driven by an endless number of variables that the man himself makes and creates every day[17].

Still today, nevertheless, science aims at perpetuating its laws, considering itself immobile and true, tending to exhaust the real and to try to enclose everything in its mechanicist and reductionist paradigms, considered immune from any kind of error[18].

But what it is imagined and dreamt, the impressions and the ideas originating from the reprocessing that our collective imaginary continuously performs are right that ë rror" that, escaping science's rigid schemes, will produce new desires, new aims and inedited truth, influencing and participating to the building of reality and tomorrow.

It is necessary to consider the skillfulness and the error – viewed so far as a symbol of lack and imperfection – the conditions, the opportunities of new possible mistakes in order to carry out the transition from an epistemology of representation through an epistemology of construction[19].

It is necessary to try to understand how aware our society is of such changes: in other words, how aware is a person of the paradigm towards he is heading and of the changes it has embodied?[20]

It is thus necessary to start perceiving science not like a destination to reach but like a house to build, to co-build, to let emerge through the "us and the devices of our imaginary", a device that, like the mass media, unites single individuals thanks to a web made of the communications media themselves, and whose overall pattern creates the maps of the collective scientific imaginary, or better social representations.

[17] *Op. cit* (5)

[18] *Op. cit* (3)

[19] *Op. cit* (4)

[20] *Op. cit* (1)

Conclusions

Such analysis therefore reveals how important the role of collective imaginary is in a "knowledgeable society" [21]: the future development of society in general, in fact, relies on it.

It is thus understandably clear now, how much responsibility is placed on all the communication and circulation media in existence today, from the press to TV, radio or the Internet. The "mass media", with their very delicate role of knowledge "mediators", are in fact liable for constituting the trampoline that will make all social representations destined to steer individuals into action arise. When everybody will have to make decisions on more complex issues that will lead to highly unpredictable consequences, such representations will make groups and people assume a position.

Who deals with circulation, above all scientific, has thus to be fully aware of such a fact and be courageous enough to bear such responsibility.

Using these intentionally strong statements, to get things straight, we don't mean to "spread insecurity" into who is writing. The discussion arises from the words so well expressed by Stephen J. Gould: "there is nothing in science that cannot be transmitted in a clear, rigorous and honest form" [22], words – we believe – on which whoever wishes to approach writing and circulation should build the essential foundation.

"... and those fading shades on the horizon,
which seemed ghosts at the feeble moonlight
or imaginary shapes crafted by our thought,
at the dawn of the new day they have changed
into firm and safe ground.
Homeland of our new house,
cradle for the questions of all those mysterious winds."

[21] *Op. cit* (3)

[22] *Op. cit* (7)

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