# Towards a New Scientific Paradigm

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Abstract

A dogma is a belief imposed by an authority and held true even if no or little evidence supports it. Dogmas are typical of the religious world, but it is possible to find them also in other fields. When *truths* are enforced by an authority which says that it is using the only scientific method, the risk of facing dogmas is high.

Progress in clinical psychology stems principally from the application of the experimental method in neuropsychology and in behavioral psychology, whereas the vast number of scientific results produced by sociologists and social-psychologists regarding the quality of life, the subjective perception of well-being and satisfaction and its clinical applications, are practically ignored.

Why are these results overlooked?

In his article *"Challenging Dogma in Neuropsychology and Related Disciplines"* Prigatano points to the notion of "scientific dogma". Dogma is a belief imposed by an authority and held true even if no or little evidence supports it. Dogmas are typical of the religious world, but it is possible to find examples in other fields, also in science. When *truths* are enforced by an authority which says that it is using the only scientific method, the risk of facing dogmas is high.

[1] www.sintropia.it

*- Randomization versus clinical observation: a third possibility*

Prigatano starts challenging one of the pillars of neuropsychology: experimental studies which uses randomized groups offer the most convincing evidence of the effectiveness of a treatment.

Prigatano believes that the tendency to stress only the methodological aspects which assure that a study is experimental (and therefore scientific), leads to the production of studies which disregard clinical observations and the understanding of phenomena, and contain little theoretical and practical applications. On the contrary, the breakthroughs of important scientists such as John Hughlings-Jackson and Lurija were based on careful clinical observations and a deep understanding of phenomena, and they lead to findings which have lately been proved true, thanks to modern neuro-image techniques. Prigatano states that, in order to produce scientific knowledge, useful for clinical purposes, it is necessary to make use of quality clinical observations and not only randomized studies. The study of patients who improve thanks to rehabilitation programs, compared to those who do not improve is, according to Prigatano, the method which mostly permits expansion of knowledge in this field.

The careful observation of the phenomena under study is the first step towards any scientific discovery, as it was shown by the fathers of the experimental method: Galileo Galilei, Bacon and Newton; but it is also necessary to be able to control and repeat observations.

Nowadays we observe a polarization: on one side a dogmatic use of the experimental method which Prigatano calls “scientism”, on the other side a qualitative/clinical approach, which has lead to highly important results, but which is widely based on personal intuition which frequently cannot be controlled.

But, if these polarities are both true and false, how can we sort out the problem?

It is interesting to note that the dogma of randomization is generated by the needs of the experimental method, which has the limitation of comparing just a restricted number of groups at a time, and requires that all the other sources of variability be kept under control.

Do other alternatives exist?

John Stuart Mill, in “A System of Logic”, first published in 1843, showed that relations can be investigated in two ways:

- Using the methodology of differences, which is at the base of the experimental method;
- Using the methodology of concomitances, which is at the base of the relational method.

The methodology of differences uses statistical techniques such as t of Student and ANOVA, and requires homogeneous controlled groups (randomized groups) and quantitative measures, while the methodology of concomitances is based on the analysis of dichotomic variables and uses non-parametrical statistical techniques as the Chi Square.

*It is important to note that the relational methodology should not be confused with correlation techniques, such as the r of Pearson, which constitute a first step towards the methodology of concomitances.*

The advantages of the methodology of concomitances are:

- it allows the study of any kind of relation;
- it provides information on the strength of the relations;
- it permits the study of many relations at the same time, producing global and analytical information;
- it handles an unlimited number of qualitative and quantitative variables at the same time;
- it uses “a-poteriori” controls which consent to develop information which can reproduce the complexity of natural phenomena;

- it can simultaneously study different phenomena, enabling interdisciplinary studies;
- it does not require a controlled environment;
- it can work on any type of group, not requiring similar or "randomized" groups.

But why is this method still unknown among psychologists?

Because it requires powerful data processing. The methodology of concomitances has become accessible only recently; whereas experimental methodology, which uses techniques such as ANOVA and t of Student, and just requires pencil and paper calculations, has always been available. This difference has lead to a late start, and the methodology of concomitances is still almost unknown among psychologists.

It is important to say that free downloadable software is now available[2].

The need of psychology to be recognized as scientific, plus the widespread belief that the experimental method is the only scientific method, have lead to overvalue the requirements of this method, and to recognize only the results produced in those fields in which these requirements could be met, such as cognitive and behavioral psychology.

Prigatano asserts that this emphasis on randomization has caused the growth of an orthodox science in which the only parameter of truth is to obey the rule of randomization, even if the results are frequently contradictory. It is interesting to signal a study published on 13 July 2005 by Jama (*Journal of the American Medical Association)*[3], which examined clinical research studies published in three major general clinical journals of high-impact between 1990 and 2003 and cited more than 1000 times in the literature. The outcome is that 1 study out of 3 is contradicted by other research.

[2] Di Corpo U., *Statistical Database*, Syntropy Journal 2005; 2: 61-100.
[3] Ioannidis J.P.A., *Contradicted and Initially Stronger Effects in Highly Cited Clinical Research*, JAMA 2005; 294: 218-228.

Raymond B. Cattell[4], well known for the development of factor analysis techniques widely used in psychology, shows in the introduction to "The Scientific Use of Factor Analysis in Behavioral and Life Sciences" that the use of the experimental method and of ANOVA analysis in life sciences leads to unstable and often non-scientific results.

The dichotomy which Prigatano described among quantitative "experimental scientism" and qualitative "clinical observation", could fall short with the introduction of the methodology of concomitances which could lead to a "change of paradigm", using the words of Thomas Kuhn.

*- From Mechanistic to Life Science*

One of the major criticisms of the method of concomitances is that it does not show the direction of the causal relation. The method of concomitances studies relations, but it does not say in which direction the cause is moving. On the contrary the experimental method, which always divides the study in two moments (before and after the treatment), when it comes across a relation (treatment ► effect) can always state that the treatment is the cause of the observed effect.

It is important to note that the belief that only cause-effect relations exist is based on a dogma which starts from the assumption that times flows in a linear way from the past to the future, and that any present state can be considered as a consequence of causes located in the past. This dogma has led to mechanistic explanations and was proved wrong in 1905 when Einstein introduced his famous "special relativity"[5]. One of the major consequences of special relativity is that past, present and future coexist. This finding has wiped out the dogma of linear time, which flows from the past to the future in a sequence of absolute instants. Other important consequences of special relativity are the energy formulas which always show two solutions: one positive and one negative, one which describes waves which expand from the

[4] Cattell R.B, *The Scientific Use of Factor Analysis in Behavioural and Life Sciences*, Plenum Press, New York 1976.

past towards the future and one which describes waves which expand from the future to the past. These solutions have lead to the discovery of syntropy and of a parallel reality which is now known as antimatter.

Quantum mechanics is a consequence of these findings in which present, past and future coexist. Even if these findings are counterintuitive, they are now commonly used. It is therefore outdated to continue to pretend that only cause-effect relations are “scientific”.

Neuroquantology[6], which considers the properties of living systems a consequence of the laws of quantum physics, opens the way to the possibility that life could respond to causes located in the future. As a consequence, the properties of life cannot be investigated using the experimental method, which permits to study only causes located in the past. It is now clear that the use of the experimental method has lead to omit, in a systematic way, all the basic qualities of life. The experimental method has reduced life to complex mechanisms and has made psychology and medicine blind to the most important qualities of life.

*- Conclusions*

We are now approaching a shift in science. The old mechanistic paradigm has entered a deep crisis, but the alternative is emerging slowly, maybe because of its counter-intuitiveness. It is important to remember that, in order to overcome the geocentric paradigm the main difficulty was that of going beyond our everyday experience of the Sun moving around the Earth. Now, in order to overcome the mechanistic paradigm the main difficulty is that of going beyond our everyday experience of time flowing linearly from the past to the future.

[5] A. Einstein, *Relatività: esposizione divulgativa,* Universale Bollati Boringhieri, Torino 1996.
[6] www.neuroquantology.com

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