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WHAT IS NON-CLASSICAL SCIENCE?

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Abstract. I make an attempt at specifying methodological features under which a theory may be avowed to be non-classical with respect to the extant scientific knowledge. One such feature is the case when a theory suggests a systematic description of objects that display a paradoxical, or unexpected behaviour (usually dubbed 'non-classical objects'), and another, when it proposes a radically new conceptual approach for grasping the nature of familiar phenomena. The first case is realized in quantum theories, and we are faced with the second in the theory of relativity, or in genetics. The "sociological" role of scientific communities is also taken into account. It is shown in the end that some Para science could eventually turn into non-classical science, only if it could be embraced by some consistent methodology of scientific growth. If not, this is an argument for it to be referred to the realm of pseudo-science.

Keywords: non-classical science, demarcation criterion, Para science

The aim of this paper is firstly, an attempt at delineating the conditions to be met for a science (for a scientific theory) to be avowed as non-classical; and secondly, an answer to be reached whether Para sciences could be covered by the notion of non-classical science.

So, what is non-classical science?

An answer to this question, as easy as uninformative, runs to the contention that a science is non-classical when it contains some non-classical theory, or some non-classical representational models. And the usage of the expressions '(non-)classical theory' and '(non-)classical approach' has recently become so usual that it seems nobody cares for their proper sense, relying rather on the context in which they are mentioned.

No doubt, some theory may be defined as non-classical only against the background of a knowledge that has already been construed as classical. So, the notion of 'non-classicalness' is a relative one.

It is, but to the same degree to which the ordinary concept of novelty is also relative. It seems the difference must be sought not in the fact of some extant novelty, but in the specific scope and depth of the theoretic novelty. Each non-classical theory is certainly new with respect to its classical predecessor, while the reverse statement (that each new theory is also a non-classical one) does not merely hold water. There are lots of new conceptions which are *not* qualified as non-classical.

So, we may reach a preliminary agreement that a new theory is at the same time non-classical, if its basic principles, and probably its theoretical apparatus, through which an object of research is constituted display *essential* differences when compared with the cognitive system of our previous knowledge.

But what the display of such essential differences does really mean?

R. Descartes laid the beginning of a new philosophy which buttressed the new science of his time. It could be qualified as non-classical, regarding the previous system of thought. Notwithstanding, Descartes is well known nowadays as a prominent representative of *classical* rationalism. Non-Cartesian epistemology was taken by some thinkers to be a non-classical trend in philosophy.[1)]

It seems that an opposite intellectual shift, from science to philosophy, starts blazing its trail. It is expressed by Ilya Prigogine's pretension for a new scientific revolution whose building blocks are his theory about the constructive rôle of irreversible processes and the non-equilibrium states in physics and chemistry, and his new idea of time (Prigogine, 1996). "Non-linear" (and allegedly non-classical) approach to grasping complex *social* phenomena has been soon adumbrated by enthusiastic philosophers, based on an analogy with Prigogine's conception.

Contemporary physics is undoubtedly a classical example of non-classical science. But even here the expression 'non-classical' is used with unequal "semantical strength" in relation to different theories. Until the middle of 1970's non-classical physics included two fundamental theoretical systems: relativistic theory of space, time and matter, and quantum mechanics. Since then, the term 'non-classical' has been traditionally attributed only to the latter. As if it is tacitly assumed that a theory about things, already known in their phenomenal characteristics, as space and time are, in spite of its theoretical originality (general theory of relativity works with four-dimensional space-time with variable curvature), cannot pass the test of non-classicalness. Only a decade later, since the middle of 1980's, theoretical physicists have started to call quantum mechanics "classical quantum theory". The reason for this conceptual re-assessment was the involvement of novel quantum principles and ideas (like secondary quantification, super-symmetry, breaking of symmetry at relatively low energetic levels, unification strategies, etc.), that have lead to the construction of quantum field theories, granted to possess much more "non-classical content". Lately, the venerable term 'non-classical' is proudly attributed to super-string theories – pushing aside quantum field theories to the bulk of "classical" knowledge" – despite the arguments about their problematic status of genuine scientific theories.[2)]

Thus we witness a strange relativization of the concept of non-classicalness that makes its content vague and dependent on contingent ramifications of theoretical knowledge.

This is why I stick to a more perspicuous idea; namely that a non-classical theory is one that either produces a systematic description of objects that display a paradoxical, or unexpected behaviour (usually dubbed 'non-classical objects'), or when it proposes a

radically new conceptual approach for grasping the nature of familiar phenomena. The first of the two cases is realized in quantum theories, and we are faced with the second in the theory of relativity, genetics, and other of this kind. General theory of relativity, with its four-dimensional curved space-time, tells us an "incommensurable" theoretical story about space and time with regard to the Newtonian one, so it can be accepted as a non-classical theory. Genetics, on its part, draws an "incommensurable" theoretical picture of hereditary mutability with respect to classical Lamarckian theory.

Yet another condition, not of conceptual, but of sociological nature, must be met for the classical/non-classical distinction to be full of meaning. This is the condition that – in addition to the above mentioned two cases – a theory may pretend to be non-classical, when:[1)] it supersedes a classical rival that has been taken to be the right description of the state of affairs of a research field, and[2)] it comes to be supported by a distinguishable and representative scientific community. In other words, the classical theory (e.g. classical mechanics) ought to be the basic theory of an accepted scientific paradigm (the Newtonian one), while the non-classical theory (e.g. the theory of relativity) ought to be the basic theory of a newly embraced paradigm by the scientific community for the same field of research.

Now another problem comes to the fore: If non-classical science covers a wide range of new-born theories, can it meaningfully encompass Para sciences as well?

"Anomalous" phenomena today do not only arouse human curiosity, but are enjoying an increasing public interest. Their scope is quite broad and may be parcelled out into different classes: psy-phenomena, UFO, poltergeist, and so forth. Many authors contend that understanding and reproducing these phenomena require a radical revolution in knowledge, to be exemplified by Para sciences. Their putative miraculous results are envisaged to be of tremendous significance for mankind.

Let us take parapsychology as a paradigmatic example. It seems the common viewpoint of scientists today is that it has so many different features from what counts to be a genuine scientific theory or method, that the answer to our question is prevalently negative. Parapsychology ought to be treated as pseudo-science, rather than as a branch of non-classical science. This solution, on its part, has caused the vigorous reaction of some thinkers, who blame the traditional rational scientific practice of routine and of lack of anthropologically orientated dimensions, so valuable in the contemporary post-modern world.

Traditional epistemology has always been relying on the existence of a *criterion* to demarcate science from pseudo-science. For some time it was a subject of rational belief, which had not been overtly contested, but during the last five decades it turned into a problem, in so far as the different attempts at an explicit formulation of such a criterion have been seriously criticized.

Sir Karl Popper's well-known criterion of demarcation between scientific and pseudo-scientific theories is a single one, based on his falsificationist methodology, but was claimed to be inadequate for its purpose by I. Lakatos (1980: 3), even

out of the context of Para sciences. Mario Bunge's multiple demarcation criterion covered eighth criteria, nicely contrived to leave parapsychology out of the board of the scientific ship. We may agree to this effect with Robert Morris' observation that although Alcock has tried through specific examples to make a case that parapsychology meets all eighth criteria, his arguments have been challenged by others more familiar with parapsychological research (Morris, 1987: 242).

However, application of rigorous criteria to cut conceptual frameworks (such as the Marxist conception of history, psychoanalysis, or parapsychology) out of the body of scientific knowledge is uncertain. The demarcation at the level of practice appears to be more successful, but still seems to be problematic.

As if problems "dissolve", when we abandon the field of philosophy of science, surrounded with a visible, although a distant fence of rationality, and we have a look around from a post-modern viewpoint. The reason is not the notorious post-modern deconstructive attitude towards any global metaphysical enterprise which is meant to provide a rational ground for the needed demarcation. Just on the contrary. The reason lies in the post-modern constructivism. STS-scholars (sociologists, historians, and feminists who dominate the field known as "science and technology studies") usually insist that scientists *do not discover objective facts about the world*. They rather *construct* them in accordance with social, political, and gender interests; scientific theories are pure social constructions without objective content, based on grasped – albeit theoretically expressed – natural and/or social regularities.

Since, according to postmodernists, every form of knowledge is constructed, none can claim absolute validity or superiority over others, and in the particular currently established paradigms of mainstream Western science do not deserve any more authority than biblical creationism, alternative medicine, Eastern mysticism, astrology, and so on. Scientists see this view as debunking science (Brush, 2000: 115).

This ultimate position, even if vigorously defended, has not been embraced by all post-modern scholars, though not so by anti-scientifically minded figures. But what about the efforts directed towards the explication of some demarcation criterion? Their eventual failure would, at least to some extent, undermine scientific rationality.

There are at least three ways out of this methodological predicament.

(i) The consolation that even if extant criteria are more or less vulnerable to criticism, the problem of demarcation has a rational positive solution, to be suggested in the future.

(ii) The demarcation endeavour could be evaded as an explicitly formulated problem through non engaging assumptions of the following kind:

Parapsychology, as currently practiced, does not seem to me to be a genuine science... On the other hand, I think it could become a respectable science (Churchland, 1987: 227).

This could be achieved by the specification of a substantial theory, to give form to its vague aspirations.[3)]

(iii) The solution to the problem of demarcation might be sought not through the articulation of a rigid criterion, because this presupposes a well defined type of rationality which might, being historically embedded, prove to have a restricted application. Classical Cartesian rationality is a good example. We may rely, instead, on specific *epistemic standards* to be followed and satisfied by theories within a common scientific research programme. Such are for instance factuality (falsifiability) of theories, increasing empirical content, cognitive correspondence, etc. I. Lakatos' progressive problem shifts (within his methodology of scientific research programmes) are an example for the assessment of a successful-and-rational development of scientific knowledge. To this effect the demarcation of science from pseudo-science could be comprehended as the inscription of the former within a corroborated meta-theory of scientific growth, and the failure of the latter to do so.

The conclusion can thus be reached that some Para science could eventually turn into non-classical science, in so far as it could be embraced by some consistent methodology of scientific growth. If not, this is an argument for it to be referred to the realm of pseudo-science.

NOTES

1. About non-Cartesian epistemology see, for example, Bachelard (1934: ch. 6). Till 1984 the book underwent 16 editions in France.
2. See for example Prigogine (1996).
3. Cf. Churchland (1987: 235).

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ЩО Е НЕКЛАСИЧЕСКА НАУКА?

Резюме. Правя опит да специфицирам методологични характеристики, според които една теория може да бъде призната за некласическа по отношение на съществуващото научно познание. Такъв е случаят, когато теорията предлага систематизирано описание на обекти, изявяващи парадоксално или неочаквано поведение (обикновено наричани некласически обекти), а в друг случай, когато се предлага радикално нов концептуален подход при схващането на природата на познати феномени. Първият случай се осъществява в квантовите теории, а с втория се срещаме при теорията на относителността или при генетиката. Взема се също предвид и „социологическата“ роля на научните общества. В края на статията се показва, че една паранаука може евентуално да се превърне в некласическа наука само ако би могла да се покрие от консистентна методология на научното развитие. В случай че това не може да стане, това е аргумент, че тя би следвало да се отнесе към сферата на псевдонауката.

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