

CATEGORICAL IMPERATIVE OF SCIENTIFIC RESPONSIBILITY

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Abstract

The paper focuses on two linked key issues of contemporary scientific culture. In the first place, is the lack of concern on the reified character of contemporary science which narrows the level of self-awareness of scientists. The cast or guilt structures, as we are witnessing in the practices modern scientific throughout all domains and scientific associations, altogether with accompanying process of over-specialization compromise this essential feature of scientific objectivity. The specialized knowledge deepens, but deforms the understanding and needs balance. For objective and truthful knowledge is not enough to follow blindly the scientific methods, but to be unaware about the meaning and particularity of general perspective and its inter-relatedness and consistency with the other complementary knowledge. Second, the necessity of broaden the theoretical perspective and general way of thinking in any field of science, above all in natural and engineering sciences, in respect with the complexity of human consciousness (the fundamental pillar, both tool and maker of Science) and of inter-relatedness of all ontological fields of UNiVerse: physical, social, psychological and cultural. The tremendous development and correspondingly power of destruction of human (scientific) culture, urges the necessity of assuming, by the researchers and scientists from any scientific field, the categorical imperative of responsibility for the results and consequences of scientific research, products and by-products, either obvious or accidental. From here the chief task of social and cultural disciplines for the objective (!) critique of ideals and value judgments. The future of human race depends on the openness and maturation of scientific ideology(s).

The common-sense representation of Science presents a magnificent historical institution, booming scaffolding for true knowledge, a guardian of truth, warrantor of prosperity and for the human race development. The rightful replacement of old institutionalized systems for production and spreading the "guiding" beliefs, like religion or mythology, the Science, more careful scrutinized, proves to be not as quite monolithic and epistemic as its idealized representation suggest.

Science is as an historical form of a particular type of collective discourse and human

understanding. But it is, also, a social institution, a network of principles, rules, norms and procedures governing the behavior of a set of individuals: something that certain people *do*, and not only how it is thought as an intellectual ideal-type.

At the same time, there are fundamental differences in practices, constitution, structure, goals, objectives, possibilities, and the research object from various institutionalized forms of scientific knowledge: natural science, engineering, social sciences and the humanities, so we have at least a minimal duty, for draw an operational working scheme of contemporary epistemology divided into these strong enough individualized fields. On first sight, for Natural and Engineering Sciences the responsibility, especial the responsibility of what researchers do, are rather indirect as the potential danger of the prospective usage of produced knowledge, but also as their damaging secondary effects. This was the case of nuclear fission (that we could assume that it was conceived as a solution for the energy problem, but used in its military application form as atomic bomb although historical evidence hardly envisages such an "innocent" perspective), it is that of potential effects of the debated CERN (European Organization for Nuclear Research) experiments, genome engineering, ecological endanger of new industrial technologies by-products and so forth. "We can have all the time there is to study the physics and chemistry of atomic force. But the way societies will use it is unpredictable, and could be finally destructive." (Macfie, p. 144) Likewise, the material world - the object of the natural sciences and engineering - is passive about human action, stable, subject to invariable laws that determinisms and we only have to understand them for controlling it.

In this paper I will try to show that this view on “innocence” of scientific perspective regarding the unintended consequences on its development and its applications is untenable. The ideal of objectivity is not the same as its practical achievement. More than that, the pretensions of universality of this ideal could cause problems relative to different impact within various domains of application. In all cases where scientific perspective occur, there is the duty to question whether or not the very paradigm that supports scientific objectivity, the natural sciences as a determinant of scientific activity, is actually responsible even for the unintended and unpredictable (?) results or consequences.

There is a very popular representation, but by no means less erroneous, both among scientists and the rest of the population, that scientific objectivity is universal panacea, the ultimate solution to solve any problematic situations from world hunger, transport, communication to conflict resolution and moral development of society. A magical aura surrounds objectivity of technology, (allegedly) supported scientifically, as the royal path to achieve any goals. Science is perfect, within it mistakes are unintentional and errors belong to the people and how they use it. But if we look more closely at what is called “technology neutrality” we see that is, in principle, untenable.

Technology is more than “a means to an end”, an instrument of getting the things done or a simply “human activity”. The driving principle of modern technology was to *control* nature, people, and reason (!), a “setting-upon that challenges forth”. The work of modern technology was to “expedite” (unlocks and exposes) and “order”, exhausting, Planet’s resources. “The revealing that rules throughout modern technology has the character of a setting-upon, in the sense of a challenging-forth.” (Heidegger, 1977, p. 16) Modern technology is a type of revealing which “setting-upon” (*stellen*), “order” (*bestellen*), the real (natural resources, physical and chemical structure, “human resources”, “markets” “the military supply” and societies) as “standing-reserve” (*Bestand*), raw materials for the production. The essence of modern technology is *Ge-stell* (the *Enframing*), “framing of the mind”, the expression of human drive for

a “precise” and “scientific” knowledge of the world, in its impulse to “put the world into boxes” and to enclose all of our experiences of the world within categories of understanding, like mathematical equations, physical laws, sets of classifications, that can be controlled. “Only to the extent that man for his part is already challenged to exploit the energies of nature can this ordering revealing happen. If man is challenged, ordered, to do this, then does not man himself belong even more originally than nature within the standing-reserve?” (*idem*, p. 118) Definitely, it is!

Although, chronologically, Natural Sciences of mathematical-type arose long before technology, the modern physical theory of nature contains, *in nuce*, and sets up the very essence of modern technology, which could fully expand only after it gained a solid ground in positivist sciences. Technology incorporates the Natural Sciences particular way of conceiving the word (its central ideologism¹) “that nature reports itself in some way or other that is identifiable through calculation and that it remains orderable as a system of information.” (Heidegger, 1977, p. 23) A system determined only by efficient causality.² In contrast with the ancient, “original” Aristotelian system of four *causa* as “the ways, all belonging at once to each other, of being responsible for something else”, in modern causality things exist and come into existence only insofar as they *can be measured*. It is a big difference between positivist sciences causality and that from human science, given that acting *by nature* is distinct from being *acted on*, i.e. acting *through its nature*.

If the essence of technology lies in *Enframing*, any action cause by it belongs within destining. Since the destining of revealing holds complete sway over man, he is constantly threaten by the “possibility of pursuing and pushing forward nothing but what is revealed in ordering, and of deriving all his standards on this basis.” (*Ibidem*, p. 26) Only if we realize that the essence of technology rules throughout our own orientation within the world we can understand how responsible Natural Sciences, actually, are. After all: “The threat to man does not come in the first instance from the potentially lethal machines and apparatus of technology. The actual threat

has already affected man in his essence. The rule of *Enframing* threatens man with the possibility that it could be denied to him to enter into a more original revealing and hence to experience the call of a more primal truth." (Heidegger, 1977, p. 309) To be responsible is not restricted to moral culpability or effecting fault; it includes also the will of self-awareness. In addition, Social and Human Sciences are more obviously responsible because of ethical ideals charge, more sensitive than cognitive ones. For Social and Human Sciences, responsibility is more obvious and more directly related with the researcher's activities in all its aspects: the responsibility for the employed method, the adequacy to the subject, and the responsibility for subject matter. (Danner, 1986)

The responsibility for the scientific method of research is evidently common for all scientists from both Natural Sciences and Social and Human Sciences. For Social and Human Sciences, the load of personal accountability is bigger because the researcher has more liberty in methodological preference and their usage. The researchers' goals can and have to satisfy them in some sense and express, at some extent, what they want, therefore *they are, to some slight extent, the creators of things for which they take responsibility*. In Social and Human Sciences "our ideals or satisfactions, or the solutions we decide to work out, are simply not hypothetical, for they *happen*; we act on them, theory or no. The difference may be expressed thus: we choose the problems of the normative sciences in the arena of our acts, but those of the natural sciences are presented to us." (Macfie, p. 145) Methods as hermeneutic rules, heuristic, empirical phenomenological research and so forth, are very much influenced by the researcher's sincerity and intention. "The *authority* which calls the scientist to account lies in his own *reason* and in that of his colleagues." (Danner, 1986)

The adequacy to the subject matters is also higher in Social and Human Sciences because "human behavior and actions include and express meaning. In experiencing the world, one discovers and bestows meaning" and involves a complex adequacy of theory and (qualitative) methodologies, to the subject, i.e. human beings, their meaningful behavior and products. "The

authority of responsibility is here the *reason* as well as the *conscience* of scientists and the community in which they live, for together they have to decide what it means for them to be human." (*ibidem*) The Social and Human Sciences accuracy includes, in addition, the accountability laden for actions being good or bad, right or wrong, distinct from basically accuracy of positive sciences bound simply to be correct or incorrect.

The responsibility for the subject matter itself is Social and Human Sciences' specific obligation. It is not the same thing to coin theories concerning the geological history of the Earth programs for domestic machines/computers or to design new types of mechanical devices, as it is to build theories about human history. The latter would affect the perspective of the people over the present social state, would change educational programs, because although theorists are not involved with concrete children in the same way as educators, their presuppositions are relevant for the practical educational responsibility. In this case, again, *reason* and *conscience* remain the chief authorities of imputation. *The irresponsibility of (self-)ignorance is not allowed*. The researcher has no right to refuse to become aware of situation, rationale and condition of oneself (furthermore of what drives itself) and to espouse an obtuse and inadequate perspective. And here it is an insignificant detail omitted in almost every discussion related with scientific research. (Almost) all of researchers have the (minimal) opportunity, conditions and obligation to be responsible, although they, as individuals, are caught, like any other person, in the human living vortex driven by material welfare, self-esteem, or self-entitlement urges. Science is an institution, as well, and this is what responsible behavior in science means. A reliable and trustworthy thinking is expected and required from them. The scientific community creates, influences, induces, and supports many of the present day society values (definitely more powerfully it did in the past).

The human being is values-built and fated to be value-maker. It lives in a values world; it is produced by and produces values. Every person carries its personal, group and age values, and its thinking is driven by them. Every individual

is prone to defend them, consciously or unconsciously, with all cost and any measure, because life worth as it consisting values. At this point, the Natural Sciences are yet again more secured. Although, for modern sciences, in general, and mainly for Social and Human Sciences, the new approaches on subject matter makes difficult to dissociate between "hard" and "soft" sciences, between the realm of natural laws and the realm of culture and meaning, between *naturwissenschaftlich* and *geisteswissenschaftlich* objects, between explaining (*Erklären*) and understanding (*Verstehen*), or between "what it is" and "what it has be" as long as the essence of conscious social beings are values and meaning. Every science of social or cultural institutions and phenomena began from practical consideration. Initially, the immediate and unique reason was to empower to elaborate value judgments about political and economical state measures and the importance and signification of various customs. And although nowadays the primary role of Social and Human Sciences has changed "this modification was not, however, accompanied by a formulation of the logical distinction between «empirical knowledge», i.e., knowledge of what «is», [*das Seiende*] and «normative knowledge», i.e., knowledge of what «should be [*das Seinsollende*]»." (Weber, pp. 12-13) In addition, under the impressive model of the dominant Natural Sciences, the Social and Human Sciences seemed to acquire a similar role: to discover and control the social and cultural law of human endeavors in order to provide appropriate tools for social control and desirable development. But, since the social mechanisms are mastered by prevailing (cultural) norms and ideals, their unstated coincident aims is to discover and create better norms and ideals. But "it can never be the task of an empirical science to provide binding norms and ideals from which directives for immediate practical activity can be derived" because "an empirical science cannot tell anyone what he *should* do - but rather what he can do - and under certain circumstances - what he *wishes* to do."³ (Weber, pp. 13, 15)

This does not mean that value judgments have no place in scientific discourse given their subjective origin. What values and how they are

employed in scientific research is the question? The chief task of social and cultural disciplines is the objective (!) critique of ideals and value judgments. The truthfulness of such undertaking is problematic as long as related values are both implied in subject matter and work as guides for the researcher's perspective and actions. Any human action as rational action is related with the "scope" and "means" categories. A scientific analysis of value judgments should be, in the first place, a descriptive historical endeavor. Its intended purpose is bound to understand the past scopes, ideals and associated lived experiences. It is achieve by questioning the scope's feasibility, the unintended consequences, the derivative costs of available means employed for scopes attainment, the means' conformity when the scopes are given, revealing the real meaning of aimed scope, helping us to become aware of our assessment criteria and their corresponding reliability and worthiness. But, in this entire task, unintended idealogisms are very likely to emerge, as long as researchers have their own cultural appurtenance, were nurtured in a particular value-space, and have their own ideals and aims. The value meaning is impossible to be assessed in a value-free manner, because even within the understanding of lived experience choosing a value is heavily value-loaded and even the assessment process is made possible by these.

As a result the Science of tomorrow can't be limited to simplistic mechanical view of nowadays Natural Sciences perspective. The reality of consciousness is too complex and to heterogeneous, an integral assembly of cognitions, feelings and desires, to be accommodated with a technical positivist view. The *Indeterminacy Principle* of Physics (the philosophical uncertainty principle),⁴ showing that the act of measuring influences the results of measurement, and the *Complementary Principle*, showing that same entity can be equally well-described as two distinct and incompatible realities (e.g. as corpuscle and as a wave), are already a productive gain for physics. Alongside with the logical (mathematical) *Undecidability Theorem* combined with *Incompleteness Theorem* expose that within any formal system exist questions that are neither provable, nor

disprovable on the basis of the axioms that define that system, and the consistency of the axioms (in a sufficiently rich formal system) cannot be proven within the system⁵ (Cf. Bazac), these basic epistemological principles form a core set of limitations to any scientific knowledge.

These principles and theorems emphasize three things. First, the active role of the scientist who interacts with the *observed object* in the act of physical measurement and cognitive evaluation and thus brings it to be revealed *not as it is in itself*. Second, the physical and, much more human, reality, as it is in itself, is a very complex and (conceptual) unassignable thing, (extremely) *dissimilar from what and how it might be represented by our reason*. Last, but not the least, *the truth of any conceptual system is outside the system itself*, i.e. we can't demonstrate neither the truthfulness of the fundamental principles (axioms) of our *Weltanschauung*, nor justify its legitimacy, as a whole. This lesson should be appropriate to a great extent by social researchers.

The scientific and formal reasoning lacks some meaningful aspects of human understanding. For example, it is unable to address a meaningful issue to individuality uniqueness and non-generic realities; the intricacy of societies and traditions are accessible only from within; can't incorporate elements of reality, but only its system as a whole; its requirement for universal and accurate outcome could offer only probable predictions; it fails to self-validate; it can't decide on rival theories compatible with available datum; any positive science has "absolute suppositions" out of all comparison; it overlooks the unconscious, emotional and volitional-compound of thinking and acting; the values and the purposes cannot be rationally validated because they are incommensurable by their nature and can't be subjected to self-evaluation; there are more than one discourse universe, every language determines its own vision and the principles of verbal and formal language are inaccessible to the consciousness; the error can be corrected only randomly because of inter-related unity of ideas and "learning through experience" is unfeasible due to the complexity and rapid changes of modern societies and due to purposes and values maneuverability. (Geller, pp. 186-189, Popoveniuc, 2004)

I am glad that many scientists are already aware about the necessity of a profound reformation of Social and Human Sciences, a sign that, at a planetary level, the human consciousness is ready for different forms of understanding. The "Charter of Transdisciplinarity" stresses this scientific ideal its first articles: "Any attempt to reduce the human being by formally defining what a human being is and subjecting the human being to reductive analyses within a framework of formal structures, no matter what they are, is incompatible with the transdisciplinary vision" and "The recognition of the existence of different levels of reality governed by different types of logic is inherent in the transdisciplinary attitude. Any attempt to reduce reality to a single level governed by a single form of logic does not lie within the scope of transdisciplinarity."⁶ (Freitas *et al.*, 1994, Article 1, 2)

In this view, the postmodern paradigm (ideologism) is both a *pre-* and a *post-*, the necessary conclusion of the old European Enlightenment and the gateway to new horizons of understanding. The postmodernism means the resignation of Reason before an Age overloaded with information, knowledge, cultural clashes and relativism, the natural conclusion of individual rationalism. Whilst (post)modern rationalism ends, postmodern ideologism become self-contradictory.⁷ As a new society of consciousness forerunner, nowadays postmodernism is just the earliest rude and primitive stage of the following evolution of human understanding. But it taught us an invaluable lesson, that we all are prone to idealogisms because these form the very content and the human (rationalizing) structure of understanding, the *how-something-is-known* which is not the *what-is-known* (thing in itself). Every age, every generation has its built-in assumptions (idealogisms) of the way the world is. But much of what we take for granted about the world simply isn't true. However we're locked into these precepts often without even knowing it. And definitely, positive sciences are not the answer, given that its core ideologism, mathematics, is not always suited to the nature of the problem. "There are places where presently available quantitative measures are essential and

places where they are irrelevant and actually misleading.” (Kroeber and Kluckhohn, p. 317) We must become aware there is no objective truth, nor right perspective. “Knowledge (...) is just *human knowledge*, bound to the form of the human intellect, incapable of making contact with the very nature of things, with the things themselves.” (Husserl, p. 18)

It is clear now why human knowledge has to be a *common* and a *responsible* enterprise. It must be *shared*, because it is the only way to break unattested closeness of individual reasoning. We are individuals engaged with this world, formed and using, supporting or changing these structures (of ideologies, moral and behavioral norms, logical and cognitive code and procedures), while interacting and communicating with the world, others and their thoughts. It must be *responsible* because the world and the Other are always prior to my knowledge of them and hence, neither science nor ethics can establish the responsibility as a constitutive factor of science. Responsibility cannot be founded and claimed by a theory of ethics (Levinas) or scientific reasoning, because it is prior to any scientific or ethical theory. Only an alert (phenomenological) state-of-being, can institute responsibility as the driving principle for sciences and human conduct. “We must be aware that *being-to-the-world* is more than an intellectual attitude; the foundation in the lifeworld means more than the foundation of our consciousness. *Being-to-the-world* means also a *being-towards-others*, a *being-to-humanity*. Thus we may formulate the thesis: «Responsibility is an implicit factor of the lifeworld».” (Danner) Modern materialism and, alas, often enough, religion, strips people of the need to feel responsible. Nowadays, ironically, a fully positive science, quantum physics, comes to restore the balance. It re-institutes human being with its consciousness in the middle of the universe as the ultimate ground of all existence. It teaches us, as no discipline or religion done before, that consciousness influences people around us, space, time, matter’s properties, environment, and its own future; that we are all interconnected and connected to the universe at a fundamental level and we are, therefore, responsible for what surrounds us. It weaves the intangible phenomenon of freedom

back into human texture and re-situates responsibility as fundamental element of life. It doesn’t give comforting or clear-cut answers, but it puts the responsibility squarely in man’s lap. The new human sciences ought to be responsible from bottom to top, not just for their appliances and applications. One of the supplementary crucial responsibilities for those involved in scientific realm is to stay alert and open minded towards their own *idola*. Or, if the scope is the understanding of human being, of general evolution of humankind conscious, the only way to achieve objectivity is a shared understanding which necessitates *rigor*, *tolerance* and *open-minding*. (Freitas *et al.*, art. 14)

But, this is not as easy a task as many people imagine. Objectivity, in Social and Human Sciences, can’t be achieved by strictly following some methodological assessment and procedure.

It also necessitates, at the first level of understanding available data, *rigor* in argument for taking into account all existing data, and *accuracy* in their description in order to avoid to force the studied to fit in a pre-existent theoretical framework. At an individual level it requires the effort to surpass the psychological tendency to build a favorable framework in which personal way of being appears in a good light.

At the second level objectivity requires *sincerity* toward others and oneself and *tolerance* – acknowledging the right to ideas and truths opposed to our own and for different ways of being. The social biases affect the understanding because any depiction of human reality is influenced by the cultural paradigm which is in power in that moment. It is easier to surrender your understanding to the dominant paradigm, sustained by the community and influential persons in the field and, than to fight to achieve one by yourself. It requires the ability of (and *life-conditions*!) for *detachment*.

At the third level it requires *critical (self-) doubtness*, the capacity to distrust the most deep certitudes and beliefs and so to be capable of an *openness* disposition to accept the unknown, the unexpected and the unforeseeable. At cognitive level some predisposition such as *aesthetic* (uniformity in explanation) or *logical* (logical consistency) *bias* can distort understanding. The self-reflexivity of human knowledge makes

impossible to envisage any end result and there is no royal path towards understanding what human is or can be. The will for positive objectivity, in Natural Sciences sense, renders entire existence to positively assessable things, and can be a very unsafe path for human culture. The Social and Human Sciences can be exact and positive only if the human choice is seen as merely useful, an ability to find the most efficient way to gather aims prescribed. This means the ideals and values are either reified or dismissed as backward reminiscences of precious stages of human consciousness and society. In the first case, they will be regarded as immovable entities which impel human conducts, analogous with laws and principles from positive sciences. For them it is these results only that may have final or normative value; the subservient human activities are no more than means that can be positively analyzed and characterized. Human being loses its self-poietic (!) ability. In the second case, "the complete elimination of reality-transcending elements from our world would lead us to a «matter-of-factness» which ultimately would mean the decay of the human will." (Mannheim, p. 236) Given that, human understanding is too profound and complex, able to create easily those conditions whereby it may state a meaningful image about itself in terms of an unfalsifiable (flexible) convenient discourse (theory), the idealogisms, as transcendental realities, immanent to human consciousness, but nonetheless the only ones able to institute reality-transcending entities, will last for evermore. In this condition, the future of humankind will depend on how idealogisms will (collectively) evolve and controlled. The future of science will depend on how the imperative of responsibility will be integrated and institutionally promoted in the scientific practice and perspective, whether or not it will become part of the personality of the scientist.

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Endnotes

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2. "It seems as though causality is shrinking into a reporting – a reporting challenged forth – of standing-reserves that must be guaranteed either simultaneously or in sequence." (*Ibidem*)

3. „However, to *judge* the *validity* of such values is a matter of *faith*. It may perhaps be a task for the speculative interpretation of life and the universe in quest of their meaning. But it certainly does not fall within the province of an empirical science...” (Weber, p. 16)
4. In quantum physics uncertainty is not inaccuracy, imprecision, indefiniteness, indeterminateness, indeterminacy or something related with some practical or operational imperfections, but with the very nature of physical reality. It is not a lack of knowledge of an (quantitative part of) phenomenon, an experimental inaccuracy in measurement, some ambiguity in the definition of a quantity, or the impossibility of an individualized (exact) description due to a statistical spread, but a genuine relational physical and epistemological reality.
5. “In fact these theorems might apply to *any system which transposes the reality in a code of signs and significations* which forms the basis of a explanatory formal system... şhenceţ *the ultimate explanation of whatever system, is outside the system itself.*” (Bazac, p. 95)
6. Of course, there are still very “concessive” versions of transdisciplinarity. “Thus, we feel that an objective vision of the new civilization era, though it must be interdisciplinary and include some aspects of philosophy, history, sociology, economics, should be attempted by researchers whose background is technological and systemic.” (Kameoka şi Wierzbicki)
7. As a whole, it is subjected to aforementioned theorems extended applications. The reality is the reality as it can be culturally thought-out; everything is interpretation; so postmodernist view is an interpretation either (although it is dressed-up by a subconscious claim of an exceptional meta-interpretation).