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Models and Representations in Science

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Models and representation in science: for a new image of the objectivity of knowledge

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> Knowledge, like the growth of a plant and the movement of the earth, is a mode of interaction; but it is a mode which renders other modes luminous, important, valuable, capable of direction, causes being translated into means and effects into consequences.
>
> John Dewey, *Experience and Nature*

1 Facts and values: the crisis of "Hume's law"?

The following passage by Hume, taken from *A Treatise of Human Nature* is celebrated:

> In every system of morality, which I have hitherto met with, I have always remark'd, that the author proceeds for some time in the ordinary way of reasoning, and establishes the being of a God, or makes observations concerning human affairs; when of a sudden I am surpriz'd to find, that instead of the usual copulations of propositions, *is*, and *is not*, I meet with no proposition that is not connected with an *ought*, or an *ought not*. This change is imperceptible; but is, however, of the last consequence. For as this *ought*, or *ought not*, expresses some new relation or affirmation, 'tis necessary that it shou'd be observ'd and explain'd; and at the same time that a reason should be given, for what seems altogether inconceivable, how this new relation can be a deduction from others, which are entirely different from it. But as authors do not commonly use this precaution, I shall presume to recommend it to the readers; and am persuaded, that this small attention wou'd subvert all the vulgar systems of morality, and let us see, that the distinction of vice and virtue is not founded merely on the relations of objects, nor is perceiv'd by reason.[1]

In this way Hume introduces what is called "Hume's law", which affirms the existence of a clear and drastic distinction between facts and evaluations, between reason and morality, therefore between the dimension of scientific knowledge and the development of human passions and actions. In short, we

[1] David Hume, *A Treatise of Human Nature*, reprinted from the Original Edition in three volumes and edited, with an analytical index, by L. A. Selby-Bigge, M.A., Oxford, Clarendon Press, 1896. p. 319, italics in the text; the passage is found in the final part of the first section of the first part of the third book.

Models and Representations in Science, edited by Hans-Peter Grosshans.
Comptes Rendus de l'Académie Internationale de Philosophie des Sciences 3 (2025).
F. Minazzi, Models and representation in science, pp. 157–197.

could say more briefly, between the world of objective scientific knowledge and the world of values. Which allows us to immediately identify, *à la* Hume indeed, the traditional 'moralistic fallacy', by which what *'is'* is systematically transformed, surreptitiously, into a *'ought to be'*. Hume's empirical point of view thus allows us to critically denounce a widespread model of metaphysical argument which, in general, unduly contaminates the axiological point of view with the ontological one in order to make a *de facto* situation look like *a de jure* one: '*p*' *must be* true because *p* is good' or, and conversely, '*p*' *must be* false, because *p* is bad'. This refers, at least within the established metaphysical tradition of Western philosophy, to a peculiar (fallacious) form of 'general argument' which assumes the following argumentative model as its privileged model of inference: '*p*' implies '*q*' but *q* is bad, *therefore* '*p*' *must be* false' or, and conversely, '*p*' implies '*q*' but *q* is good, *therefore* '*p*' *must be* true'.

In relation to the circumscribed, but certainly eminent, Humean reflection, Mario Dal Pra observed that

> Hume's doctrine of the radical gap between the world of knowledge and the development of the passions is of great importance for the formulation of his ethical doctrine; in fact, on the basis of the basic ambiguity that characterises the Humean construction, and due to the non-rigorous distinction between the descriptive sphere and the critical-philosophical level, on the one hand it gives rise to a complete 'psychological' autonomy of the world of passions, on the other it expresses the principled opposition to intellectualistic-metaphysical ethics; Hume' general opposition to the metaphysical perspective was in fact determined, in the field of ethics, as an aversion to the *a priori* acceptance of 'duties' imposed on the nature of human beings in the name of the metaphysical and religious tradition and of its claimed absolute validity. Hume's ethics therefore assume a general naturalistic orientation, in the sense that it aims at detecting human values in the autonomous mixture of human passions and natural motives. Undoubtedly, through this doctrine, Hume reached a broader understanding of the values that have been revealed in the complex experience of history and led the way to passing from *a moral philosophy* to *a philosophy of morality*, which by renouncing any claim to cognitive determination in relation to the world of values, is better disposed to consider them as autonomous and spontaneous products of human initiative.[2]

This, as mentioned, certainly helps us to better understand, *analytically*, the overall nature of the innovative, decidedly anti-metaphysical Humean reflection as well as its specific development. On the other hand, this

[2]M. Dal Pra, *Hume e la scienza della natura umana*, Editori Laterza, Rome-Bari 1973, pp. 242–243.

precious observation, *internal* to Hume's philosophy, must not lead us to forget how this acute and innovative anti-metaphysical and also decidedly anti-spiritualist critical stance, subsequently largely influenced and fertilised the very tradition of critical empiricism of modernity (and also of the neo-positivism that itself originated in the Vienna Circle), by leading to the acceptance, often taken for granted and acquired, of the existence of a clear and drastic distinction between facts and evaluations, between scientific knowledge and the sphere of the will and passions. In this way, at least in the context of the logical empiricism of neo-positivist origin, the prohibition on drawing moral conclusions from factual premises is configured as a widespread 'common sense' especially in the analytic field, which has systematically allowed philosophers to denounce the traditional metaphysical fallacy of claiming to be able to derive what *ought to be* from what *is*. This has led many authors to denounce the parallel philosophical attempt to found ethics within the realm of knowledge, by thus configuring a clear and drastic dichotomy between facts and values.

This significant theoretical outcome is also clearly explained in the light of the effective history of Western modernity. In fact, on a concrete historical basis, the 'moralistic fallacy' as Giulio Preti understood, for example, is 'typical of every metaphysical foundation of ethics, but is specific to naturalism. In 'nature' we already locate what we want to draw from it—the model of 'nature' itself is constituted according to the ethical model that ought to follow from it'.[3] The emblematic and disruptive historical events of the seventeenth-century doctrine of natural law, especially in its innovative reading produced during the Enlightenment, which historically gave rise to the disruptive French Revolution—the authentic turning point in Western history—constitute a significant and truly emblematic 'test bench' for this complex tradition of thought which, precisely in this drastic dichotomy between facts and values, finally revealed its peculiar historical-critical guillotine by which it subverted, *ab imis fundamentis*, the traditional medieval world, to implement, in *the world of praxis*, a revolutionary *civil* entrance to Western modernity (naturally with all its multiple and drastic historical-civil antinomies).

This fundamental and decisive historical context must of course never be disregarded, even when we try to critically understand the *philosophical* nature of this conceptual tradition, by identifying both its intrinsic *values* and its, equally intrinsic, *limits*. Its overall *value* is naturally rooted in the ability to culturally and civilly set free scientific knowledge from any prejudicial metaphysical cage, by releasing all the critical potentialities connected with the objective knowledge of the world. Its *limits* on the other

[3]G. Preti, *Alle origini dell'etica contemporanea. Adamo Smith*, Editori Laterza, Bari 1957, p. 184

hand, are to be identified within the historical process of the Enlightenment—also presenting its complexities—which often and willingly ended up by unduly mythologising scientific knowledge itself, by turning particularly its immanent critical nature into a myth, and thus by transforming its inexhaustible criticality (proper and specific to scientific research, which is always open and never concluded), into a dogma and an altogether metaphysical and absolute reality. (In this reconstructive framework post-positivist *scientism* has thus represented, historically speaking, the most widespread cultural and social translation of this myth, which has in fact ended up by elaborating a mythological vision of the scientific enterprise.) It is therefore necessary for us to dig into this subtle, but decisive, and at the same time, cultural, institutional, disciplinary and epistemological 'fissure' using the instruments of criticism in order identify a different perspective, capable of freeing all the immanent critical potential of the scientific and objective knowledge of the world, without, however, falling into an undue dogmatic metaphysical mythologisation of science itself and, therefore, of the immanent critical power of knowledge, which is always open and always revisable.

2 Science and life: *Wertfreiheit* and practical-sensitive activities

If science tends to be—and certainly it cannot but tend to be—*wertfrei*, on the contrary, life can never be *wertfrei*, because living means evaluating. In fact, living always necessarily implies, albeit in a broad sense, the ability to *evaluate*. Better still: it should be said that life always implies the capacity of *being able* to evaluate. In this regard, Preti, in *Retorica e logica*, noted that

> [t]o live is to evaluate—already at the most basic biological level, an organism carries out acts of choice: and these, if we broaden the concept of 'evaluation' are already assessments. And, anyway, a civilisation without axiological instances does not exist, nor is it conceivable. This is why science can hold the central place in a civilization, but it cannot exhaust it or resolve it totally in its own form.[4]

Therefore, the two cultures, namely the rhetorical-axiological culture and the scientific-objective culture, are so intrinsically correlative and are always necessarily interconnected, *with all due respect to* Hume and his famous 'law' (and also to the misleading dichotomy schematically and erroneously

[4]G. Preti, *Retorica e logica*, new edition, amended and enriched with Introduction and notes by Fabio Minazzi, Bompiani, Milan 2018, p. 408, while the quotation that immediately follows in the text is taken from p. 407.

conceived by Snow in his famous little volume[5]). On the other hand, however, it is also true that

> [s]cience operates with a decisive, methodical, ἐποχή of all the axiological considerations. Science does not evaluate. Even when it is normative, when it is making technology, it only points out ways to follow, possible operational procedures according to the ends-in-view: but it says nothing about the value of these ends themselves; nor, ultimately, about the value of the operating procedures themselves.

From this perspective—admittedly dichotomous—we are therefore faced with two radically different and tendentially antithetical polarities, since science produces objective knowledge which then allows us to consider different operational procedures, even by providing us with a precise critical evaluation of their intrinsic rationality. However, science can never go beyond this specific field, because when we actually choose to follow a certain procedure, by opting out of other possible ones, in addition to scientific knowledge, an axiological evaluation comes into play, which does not pertain to knowledge as such, but to our decisions which concerns more directly *our* lives. So much so that in this context different and conflicting axiological evaluations can arise, which can also make certain operational procedures appear as 'more rational' which on the contrary turn out to be 'less rational' at the level of pure objective knowledge, because they might even involve a higher 'cost'. (For example when we decide to buy a certain product and/or certain services from a specific provider that charges higher prices than others, but which is more convenient for us or that we choose because it appeals to us more or for various other reasons: personal, historical-biographical, emotional, etc.) Well, in all these cases the 'rationality' of the choice always implies a purely evaluative procedure which systematically goes beyond the level of the mere *Wertfreiheit* of science.

On the other hand, it could also be observed that the very possibility of evaluating always implies, as mentioned, the specific capacity of *being able* to evaluate. In this way the specific relationship between the dimension of knowledge and the dimension of evaluation cannot fail to appear much more problematic and complex than the drastic and controversial dichotomous 'guillotine' of Humean descent could suggest. Conversely, it also seems that we cannot give up on the historical-civil *value*, specific to this empiricist dichotomous guillotine devised by Hume, which, as has also been mentioned, has historically acquired undoubted merits, precisely because, alongside the

[5]See Charles P. Snow, *The Two Cultures*, first published in 1959 with multiple reprintings, Cambridge, Cambridge University Press. Italian edition: Charles P. Snow, *Le due culture*, translated by Adriano Carugo, *Preface* by Lodovico Geymonat, Feltrinelli, Milan, 1964 with multiple reprintings. Recently this text has been republished by Marsilio (Venice, 2005), without the historical and emblematic *Preface* by Geymonat.

emotional and concrete historical basis of value, there is also the dimension of objective knowledge. This refers to a demonstrated and argued rational truth, thanks to which a complex patrimony of knowledge has historically been built, which has undoubtedly contributed to improving our overall conditions of life and existence.

How then is it possible to recover all the intrinsic critical value of an objective knowledge of the world without renouncing a critically adequate understanding of the axiological dimension of our own life? The critical link between the axiological dimension and the cognitive one, tendentially *wertfrei*, is therefore configured as much more complex and intrinsically problematic than has ever been suspected by the classical tradition of empiricist descent. Certainly, this connection appears today as worthy of an adequate overall and analytical critical and philosophical rethinking. This was certainly also the intention of various authors, at different time in the history of contemporary reflection. Although it would be impossible here to provide an articulated and exhaustive picture of this interesting critical reflection, nevertheless, I will focus, in particular and with some attention, on the contribution outlined by the great and original American instrumentalist John Dewey.

3 History: which tradition? Herodotus, Hume and Dewey

In *Experience and Nature* Dewey investigated the link between existence and value in detail and in an innovative way, by starting from the awareness both that values 'are what they are' and also from the observation that values are always rooted in the concrete experiences of life, in the world of praxis, thus appearing 'as unstable as the forms of clouds'.[6] Of course, *nihil sub sole novum* (*Ecclesiastes*, 1.10), since already an eminent historian like Herodotus, in the third book of his *Histories* (III, 38, 3–4), reports this famous episode referring to Darius:

> When Darius was king, he summoned the Greeks who were with him and asked them for what price they would eat their fathers' dead bodies. They answered that there was no price for which they would do it. Then Darius summoned those Indians who are called Callatiae, who eat their parents, and asked them (the Greeks being present and understanding through interpreters what was said) what would make them willing to burn their fathers at death. The Indians cried aloud, that he should not speak of so horrid an act. So firmly rooted are

[6]See J. Dewey, *Experience and nature*, George Allen & Unwin, London, 1929. The quotations in the text are taken from pp. 396, 399. Italian translation: J. Dewey, *Esperienza e natura*, edited by Piero Bairati, Mursia, Milan 1973, pp. 282–310, quotations which appear in the text are taken from p. 283 and p. 285.

> these beliefs; and it is, I think, rightly said in Pindar's poem that custom is lord of all.[7]

A conclusion, however, reached by Herodotus by having anticipated, in this same passage, that 'if it were proposed to all nations to choose which seemed the best of all customs, each, after examination, would place its own first; so well is each convinced that its own are by far the best.' This is also deeply in keeping with Hume's moderate scepticism, for which, as is well known, man is essentially a *habit-forming animal* since *custom* would always be constitutive of our own experience (although in this specific theoretical context Hume then, paradoxically, misses the intrinsic dynamic value of this very constitutive role of *custom*[8]). But if the frank critical recognition of the absolutely central role played by habits certainly does not eliminate the fruitful and intrinsic critical antinomicity of the Humean position (since Hume, as Dal Pra pointed out, 'is a moralist who prefers instinct to reason' but who, the more he prefers instinct, the more he develops the dimension of reason[9]), on the other hand it does not open at all to any holistic-radical relativism (*à la* Feyerabend[10]), precisely to the extent that our being *habit-forming animals* relates historically, in turn, with the articulated and complex technical-cognitive heritage developed by humanity, *step by step*, in the actual course of its history. Indeed, as Dewey rightly points out, with respect to the values rooted in existence,

> [b]ut a brief course in experience enforces reflection; it requires but brief time to teach that some things sweet in the having are bitter in after-taste and in what they lead to. Primitive innocence does not last. Enjoyment ceases to be a datum and becomes a problem.

[7]See Herodotus *The Histories*, translated by A. D. Godley, Loeb Classical Library Edition, Heinemann, London, 4 volumes in Greek and English, originally published 1920–1925, pp. 398–399.

[8]In this regard, Dal Pra rightly observed that, 'Hume, therefore, anticipated Kant's Copernican revolution of the relationship between the subject and the object of knowledge, even if the activity carried out by the subject in the constitution of knowledge explicitly assumes a character not cognitive but instinctive. And the fact that there still remains a significant distance between Hume's position and that of Kant also results from the question that in the analysis of habits Hume tends to minimise the initiative of the subject. In fact, habit is a modality of the subject that almost seems to materialise itself in the pure and simple repetition of several moments of observation; it could be said, with a paradox, that the instinctive modality of the subject is the very result of the observation of the object and that for that aspect of it that more directly calls into question the initiative and the activity, it is more the initiative and activity of 'nature' and of the subject in his awareness. As is well known, Kant understood both the innovation of the Humean doctrine and its limits with great clarity; these coincide, moreover, with the insufficient analysis of the cognitive structures, already noted several times' (M. Dal Pra, *Hume e la scienza della natura umana, op. cit.*, pp. 152–153)

[9]M. Dal Pra, *Hume e la scienza della natura umana, op. cit*, p. 392.

[10]See Paul K. Feyerabend, *Science in a free society*, Verso Editions/NLB, London, 1978. Italian translation by Libero Sosio, Feltrinelli, Milan 1981, pp. 106–129.

> As a problem, it implies intelligent inquiry into the conditions and consequences of a value-object; that is, criticism. If values were as plentiful as huckleberries, and if the huckleberry-patch were always at hand, the passage of appreciation into criticism would be a senseless procedure. If one thing tired or bored us, we should have only to turn to another. But values are as unstable as the forms of clouds. The things that possess them are exposed to all the contingencies of existence, and they are indifferent to our likings and tastes.[11]

Exactly within this precise context of *lived experiences*, then, *criticism*, namely philosophical reflection, plays its own specific and peculiar role. In this case, according to Dewey, we are in fact in the presence of that rhythm of 'flights and perchings' (*à la* James) with which criticism and critical attitude alternate the emphasis on the immediate and the mediated, on what is enjoyed and consumed and on what, on the other hand, is configured as quite instrumental, by focusing on the different phases of conscious experience. In all these cases

> [t]here occurs in every instance a conflict between the immediate value-object and the ulterior value-object: the given good, and that reached and justified by reflection; the now apparent and the eventual. In knowledge, for example there are beliefs *de facto* and beliefs *de jure*. In morals, there are immediate goods, the desired, and reasonable goods, the desirable. In aesthetics, there are the goods of an undeveloped and perverted taste and there are the goods of cultivated taste. With respect to any of these distinctions, the true, real, final, or objective good is no *more* good as an immediate existence than is the contrasting good, called false, specious, illusory, showy, meretricious, *le faux bon*. The difference in adjectives designates a difference instituted in critical judgment; the validity of the difference between good which is approved and that which is good (immediately) but is *judged bad*, depends therefore upon the value of reflection in general, and of a particular reflective operation in especial.

For Dewey, therefore, philosophical reflection can only coincide with this complex operation, and with 'this critical function become aware of itself and its implications, pursued deliberately and systematically'. Not only that: philosophy, starting from evaluative perceptions, behaviours and also from different situations of belief, progressively expands the range of critical reflection precisely to guarantee greater freedom and security to the very acts of direct selection, of rejection or of approval. Thus, Dewey again points out, philosophy

[11] J. Dewey, *Experience and nature, op. cit.*, p. 398, while all the quotations that follow in the text are taken, respectively, from the following pages: pp.402–403 (italics in the text), pp. 404–405 (italics in the text); p. 407; p. 410; p. 411; p. 412; p. 414; pp. 420–421; p. 424; p. 428; pp. 428–429; p.429; p. 430 (italics in the text); p. 434; p.435; p. 437.

> does not annihilate the difference among beliefs: it does not set up the *fact* that an object believed in is perforce found good as if it were a *reason* for belief. On the contrary: the statement is preliminary. The all-important matter is what lies back of and causes acceptance and rejection; whether or no there is method of discrimination and assessment which makes a difference in what is assented to and denied. Properties and relations that *entitle* an object to be found good in belief are extraneous to the qualities that are its immediate good; they are causal, and hence found only by search into the antecedent and the eventual. The conception that there are some objects or some properties of objects which carry their own adequate credentials upon their face is the snare and delusion of the whole historic tradition regarding knowledge, infecting alike sensational and rational schools, objective realisms and introspective idealisms.

4 Ontological essences or transductive interactions?

Moving within this precise horizon of thought, Dewey therefore seeks to critically overcome all the traditional and multiple 'mental cramps' (*à la* Wittgenstein) specific to the different philosophical traditions (empiricist, rationalistic, realistic and idealistic), to put his eminently *critical* attitude at the centre of philosophical reflection, in order 'to make it clear that there is no such difference as this division assumes between science, morals and aesthetic appreciation'. In this way Dewey wants to underline the critical inadequacy of the traditional dichotomy between facts and values, between knowledge and morals, by aiming at recovering a much more articulated, critical and fruitful horizon of reflection. According to Dewey, it is therefore necessary to be able to critically dismantle the difference, both metaphysical and ontological, which one imagines exists between science, morality and aesthetics, since 'in a moving world solidification is always dangerous'.

In this precise critical context, the role of philosophy consists not so much in competing with science to conquer truth, but in succeeding in 'liberating and clarifying meanings, including those scientifically authenticated'. Operating within this perspective horizon, it is therefore necessary to have the courage to place 'social reform' itself outside an excessively narrow and 'Philistine' context, since it has instead to be reconnected precisely with the 'liberation and expansion of the meanings of which experience is capable'. In short, it is necessary to know how to recapture the concept of 'the richest and fullest experience possible' and then, in this exact perspective, the specific contribution historically provided by philosophy, with its privileged work of conceptual clarification, is rooted precisely in the thorough analyses produced by criticism, in order to be able to recover the complexity and multiplicity of all the interactions that always qualify, structure and characterise human life. Just because 'man needs the earth in order to walk, the sea to swim or

sail, the air to fly. Of necessity he acts within the world, and in order to be, he must in some measures adapt himself as one part of nature to other parts.' Through this progressive and always dynamic 'adaptation' it is then possible to discover the *multiplicity of interactions* that human beings build up in the course of their existence, without falling into the metaphysical trap of the ontologisation of the relations codified in the classic tradition of *ens, verum et bonum*, which constituted an absolute metaphysical object, conceived as coincident as a real and existential metaphysical entity. Again for this reason it is necessary, then, *to know how to* critically *rebuild* our own experience, without however, on the one hand, ever expecting to be godlike, and, on the other hand, without becoming disillusioned with a world which would systematically disappoint us. If anything, for Dewey

> a mind that has opened itself to experience and that has ripened through its discipline knows its own littleness and impotencies; it knows that its wishes and acknowledgments are not final measures of the universe whether in knowledge or in conduct, and hence are, in the end, transient. But it also knows that its juvenile assumption of power and achievement is not a dream to be wholly forgotten. It implies a unity with the universe that is to be preserved. The belief, and the effort of thought and struggle which it inspires are also the doing of the universe, and they in some way, however slight, carry the universe forward. A chastened sense of our importance, apprehension that it is not a yard-stick by which to measure the whole, is consistent with the belief that we and our endeavours are significant not only for themselves but in the whole. Fidelity to the nature to which we belong, as parts however weak, demands that we cherish our desires and ideals till we have converted them into intelligence, revised them in terms of the ways and means which nature makes possible. When we have used our thought to its utmost and have thrown into the moving unbalanced balance of things our puny strength, we know that though the universe slay us still we may trust, for our lot is one with whatever is good in existence. We know that such thought and effort is one condition of the coming into existence of the better. As far as we are concerned it is the only condition, for it alone is in our power. To ask more than this is childish; but to ask less is a recreance no less egotistic, involving no less a cutting of ourselves from the universe than does the expectation that it meet and satisfy our every wish. To ask in good faith as much as this from ourselves is to stir into motion every capacity of imagination, and to exact from action every skill and bravery.'

In this way Dewey delineates the median position of human beings, by which, at the very moment in which they assert that their power is limited, as beings that belong entirely to nature, of which they represent a moment and on which they always depend, nevertheless we can also affirm, with a

'chastened sense of our importance' our own *constructive* role which can even push the universe itself forward a little. Human beings must therefore know how to take part, consciously and critically, in the processes of natural reality themselves, by building, in the words of the sociologist Boaventura De Sousa Santos, a sort of articulated 'ecology of knowledges',[12] by means of which we can never forget the *infinite plurality of interactions* within which human beings can perform their actions and develop their critical reflection. This then led Dewey to critically rethink the link between *belief* and *knowledge* by breaking down the traditional empiricist rigidity of this dichotomy. Indeed, if knowledge has generally been conceived as 'pure objectivity' by attributing to it the role of controlling belief through knowledge, science and truth, Dewey, insisted instead that how this dichotomy itself, which is integral to the Western tradition of philosophy, has to be critically rethought, starting from the epistemological awareness that knowledge itself constitutes, in its turn, 'a case of belief'. For this reason it is therefore necessary to decisively turn our backs on the traditional empiricist theory, totally mythological and metaphysical, according to which our knowledge would draw inspiration from 'innocent sensory data, or from pure logical principles, or from both together, as original starting points and material.' Indeed according to Dewey

> [a]ll knowing and effort to know starts from some belief, some received and asserted meaning which is a deposit of prior experience, personal and communal. In every instance, from passing query to elaborate scientific undertaking, the art of knowing criticises a belief which has passed current as genuine coin, with a view to its revision. It terminates when freer, richer and more secure objects of belief are instituted as goods of immediate acceptance. The operation is one of doing and making in the literal sense. Starting from one good, treated as apparent and questionable, and ending in another which is tested and substantiated, the final act of knowing is acceptance and intellectual appreciation of what is significantly conclusive.

But then, Dewey wonders: 'Is there any intrinsic difference between the relation of scientific inquiry to belief-values, of aesthetic criticism to aesthetic values, and of moral judgments to moral goods? Is there any difference in logical method?'

His answer to this question is on the whole negative, precisely because the evaluation of any belief-value always implies a *comparative* judgment, since, when we affirm that an object 'is good' this may perhaps appear as an absolute statement, especially when it is formulated in the context of action and not so much in the context of reflection. However, this affirmation

[12]See Boaventura De Sousa Santos, *A cruel pedagogia do vírus*, Boitempo Editorial, São Paulo, 2020. Italian translation: *La crudele pedagogia del virus*, translated by E. Vitello, Castelvecchi, Rome 2020.

about the goodness of a given reality is always the result of a comparative process which, in turn, refers to an evaluative comparison exactly because in these cases 'the issues shift to something comparative, relational, causal, intellectual and objective':

> *Immediately* nothing is better or worse than anything else; it is just what it is. Comparison is comparison of things, things in their efficacies, their promotions and hindrances. The better is that which will do more in the way of security, liberation and fecundity for other likings and values.

From this dynamic, interactive and implicitly *transductive*[13] perspective Dewey is, therefore, able to outline a coherent overall conception of a human being, who no longer qualifies as a sort of 'little god' but who instead fully recognises that humanity belongs to nature as a centre of energy that is always interconnected with multiple other centres of interaction and energy. The Western philosophical tradition from Descartes onwards has considered nature as a kind of *alter ego* in relation to ourselves, which would qualify precisely by its absolute otherness and by its overall intrinsic passivity. On the contrary, from this new instrumentalist and transductive point of view, Dewey re-evaluated Spinoza's position, without ever referring to it explicitly, as well as that of the American Indians, according to whom human beings actually constituted a part, albeit infinitesimal, of nature. It is therefore necessary to start from this 'intrinsicity' between man and nature, an 'intrinsicity' which considers humans as a purely natural element, devoid of any exceptionality in the context of naturality. Dewey wrote:

> When man finds he is not a little god in his active powers and accomplishments, he retains his former conceit by hugging to his bosom the notion that nevertheless in some realm, be it knowledge or aesthetic contemplation, he is still outside of and detached from the ongoing sweep of inter-acting and changing events; and being there alone and irresponsible save to himself, is as a god. When he perceives clearly

[13]For the concept of transductivity developed by Dewey it is naturally necessary to refer to the chapter 'Interaction and Transaction' from *The Later Works of John Dewey, 1925–1953*. Volume 16: 1949–1952, *Essays, Typescripts and Knowing and the Known*, written in collaboration with Arthur F. Bentley edited by Jo Ann Boydston, Southern Illinois University Press, Carbondale, 1989/2008, in particular p. 97, where it is specified that 'What we call 'transaction' and what we wish to show as appearing more and more prominently in the recent growth of physics, is, therefore, in technical expression, neither to be understood as if it 'existed' apart from any observation, nor as if it were a manner of observing 'existing in a man's head' in presumed independence of what is observed. The 'transaction' as an object among and along with other objects, is to be understood as unfractured observation—just as it stands, at this era of the world's history, with respect to the observer, the observing, and the observed—and as it is affected by whatever merits or defects it may prove to have when it is judged, as it surely will be in later times, by later manners' (p. 97).

> and adequately that he is within nature, a part of its interactions, he sees that the line to be drawn is not between action and thought, or action and appreciation, but between blind, slavish, meaningless action and action that is free, significant, directed and responsible. Knowledge, like the growth of a plant and the movement of the earth, is a mode of interaction; but it is a mode which renders other modes luminous, important, valuable, capable of direction, causes being translated into means and effects int consequences.

In this way the absolute empiricist dichotomy between facts and evaluations, between knowledge and evaluations is undoubtedly overcome critically by elaborating the model of the transductive interaction which, as we have seen, even assumes the growth of a plant as a heuristic-paradigmatic model to analyse critically the complex interaction between human life and the knowledge of the world itself. The model of the biological growth of plants makes it possible to highlight how growth itself takes place through a continuous critical metabolisation that transforms the inorganic into the organic, ensuring that a plant is in fact able to build the environment in which it lives by interactively *building* its own context as well as by interacting with it. Through this fruitful and innovative approach, the traditional way of understanding the function of philosophy itself also changes, since Dewey consequently conceived 'philosophy as the critical method of developing methods of criticism'. On the one hand, this constituted a fecund revival of the tradition of Western criticism already outlined by Socrates in the fifth century BCE; on the other hand, it referred to a new critical-epistemic paradigm in the name of which the increase of objective knowledge must be able to be explained by the interactions of multiple transductive-transactions that also qualify the mode of growth of a plant and a vegetable.

5 The new perspective of Husserlian phenomenology

In the light of Dewey's critical considerations referred to in the previous paragraph, it is clear that what is called Hume's law has undoubtedly lost much of its heuristic éclat and its original methodological absoluteness. Not so much because the distinction between facts and values may appear today 'hopelessly fuzzy, because factual statements themselves, and the practices of scientific inquiry upon which we rely to decide what is and what is not a fact, presuppose values',[14] since this observation constitutes, in reality, a well-known and somewhat discredited critical stance. If anything, because, as Hilary Putnam added, referring to both W. James and A. E. Singer, '*Knowledge of facts presupposes knowledge of values*' and, conversely

[14]Hilary Putnam, *Reason, Truth and History*, Cambridge University Press, Cambridge, 1981, p. 128. (Italian translation *Ragione, verità e storia* by Alessandro Nicolò Radicati di Brozolo, edited by Salvatore Veca. Il Saggiatore, Milan 1985, p. 140.)

'*Knowledge of values presupposes knowledge of facts*'.[15] It is therefore necessary to critically investigate this connection by identifying, if possible, a different critical path. To do this, we need to go back to the *moralistic fallacy*, to which we referred earlier by pointing out how the naturalists of the eighteenth century, inspired by the Enlightenment, fell into it precisely to the extent that into their concept of 'nature' they inserted whatever they wanted ... to obtain from it. In this case, as we have seen, the very model of 'nature' is constructed, as Preti pointed out, 'according to the ethical model that should be its consequence'. We are thus faced with an obvious *vicious circle*. The indisputable historical fact that precisely this vicious circularity constituted, through the French Revolution, the historical-civil leaven of modernity certainly does not constitute its philosophical justification. If anything, it is only a very important *de facto* datum which, however, does not nullify the unconvincing logical argument that claims to 'be the foundation' of this same vicious circularity. Precisely in order to overcome this critical impasse, which is both logical and historical, the more mature reflection developed during the Enlightenment by Rousseau and Kant finally developed a philosophically shrewder and more sophisticated naturalism. As Preti further observed, beyond the appeal to 'nature' or to 'reason' what appeared essential in this critically more mature reflection created during the Enlightenment is that

> a pure a priori ideal principle is invoked, which at the same time constitutes the foundation and limit of the historical-empirical variations of morals and of opinions about ethics. This supreme norm of conscience, as universal and necessary, faces contingent manifestations: it is a *critical* principle, in the face of which every norm and empirical evaluation, with its limitation, shows its arbitrariness and historical contingency. No norm stands up to the criterion of reason.[16]

On the other hand, from this supreme *ideal* criterion of reason one can naturally deduce no particular norm, no right and therefore, also no particular system of values, no positive morality, no kind of catechism. If we do it, we fall back into the *moralistic fallacy*. It is therefore definitely crucial to reflect on the role and function of this *ideal* criterion of reason by addressing what has been considered the problem of the place of reason in ethics. But, more generally, it is necessary to question the intrinsic nature of human critical rationality as such. For this reason it is imperative to investigate what human rationality consists of.

In the first place, it could be observed how human reason coincides with *logical coherence*, by thus formulating an answer that refers merely to

[15] Hilary Putnam, *The Collapse of the Fact-Value Dichotomy and Other Essays*, Chapter 8 'The Philosophers of Science's Evasion of Values' Harvard University Press, Cambridge, Massachusetts and London, England, 2002, p. 137, italics in the text.

[16] G. Preti, *Le origini dell'etica contemporanea. A. Smith*, op. cit., p. 185.

the *formal* dimension of human rationality. Indeed, logic does not concern only and exclusively the cognitive discourse, but rather it relates, and not only potentially, to any type of possible discourse that can be formulated, in a coherent way, in any field of investigation and reflection. But the formal transversality of this answer reveals its limits, because in this case we are dealing with a purely *formal* rationality, which can certainly make any argument 'rational' (hence also evaluative arguments), but it does not enter into the merits of rationality as such. In fact, this approach, precisely because of its formal limitation, does not make it possible to consider purely evaluative discourse as rational. Indeed, it seems to increase the traditional contrast between the intrinsic rationality of theoretical discourse and the equally intrinsic irrationality of evaluative discourse. However, precisely in relation to this contrast, it would then be worth mentioning an important critical achievement of Hume's, on the basis of which we know that human reason can only *order* the contents on which it reflects, but it can never *create them*. This observation is valid not only for the evaluative field, but also for the theoretical-cognitive field. In every different area of investigation, 'data' are always made available through reason but never produced by it. From this point of view, the ultimate contents of evaluations (attitudes and emotions) are then just as 'irrational' as the 'sensible data' (sensations) that underpin knowledge.

However, if we dismiss this first answer, which insists on the *logical formality* of reason, another sense of rationality can be evoked, which is specific to the typical idea of rationality developed during the Enlightenment and which is related to the logical and methodical reflection concerning what Galilei referred to as 'sensible experiences' i.e., our objective scientific knowledge. As Preti wrote

> [t]he only 'rationality' (in this second sense) of the evaluative discourse lies in the rationality of its cognitive moment, of its motivations. The only disagreements that can be rationally resolved are disagreements of belief. The proof that the accused did not commit the act removes all sense from the discussion about the juridical configuration of the alleged crime.[17]

This has a specific significance, since 'a traditional system of evaluations can be challenged not only by changing attitudes, but also, and more irremediably, if its system of motivations is theoretically false; that is, if science declares it erroneous. The case of witches, although a borderline case, shows very clearly what I mean'.

[17]G. Preti, *Retorica e logica*, op. cit., p. 415, from which the immediately following quotation is also taken.

6 Theoretical disciplines as foundations of normative disciplines

Precisely this different approach to the critical understanding of human rationality makes it possible to perform a significant critical overturning of the traditional empiricist approach, which affirms the existence of an irreducible dichotomy between facts and evaluations. Indeed, if the traditional Humean distinction associated with 'Hume's law' leads us to believe that there is no direct link and no possible critical mediation between facts and evaluations, as well as between knowledge and attitudes, the new phenomenological framework outlined by Edmund Husserl enables us, on the contrary, to affirm that, in reality, precisely the opposite is true, since every evaluative judgment is always rooted in a cognitive judgment. In other words, to quote Husserl, every predicate of value, i.e., every evaluative one, must be considered as 'second-order' predicates, or rather as 'predicates of predicates'. In this perspective, to refer directly to the Husserlian *Logical Investigations*, 'theoretical disciplines' are configured 'as the foundation of normative disciplines.'[18] Husserl critically attacked the traditional empiricist (pre-)judgement on the basis of which facts and values do not present any binding relationship, as they are set within an absolute dichotomy, devoid of mediations and, therefore, completely unrelated. On the contrary, Husserl believed that theoretical disciplines themselves constitute the authentic 'foundation' of normative disciplines. In other words, for Husserl every axiological judgment is always rooted in precise, historically determined and configured cognitive assets. To clarify this innovative point of view, Husserl states, first of all,

> [t]he concept of a normative science in relation to that of a theoretical science. The laws of the former tell us (it is usually held) what shall or should be, though perhaps, under the actual circumstances, it neither is nor can be. The laws of the latter, contrariwise, merely tell us what is.

But what is meant by *should be* in comparison to the simple *be*? What is being stated, when it is argued that a 'soldier should be brave' or that a 'teacher should be qualified' or that 'a sportsman must be trained' or that 'parents must look after their children with love and intelligence' or, again, that 'a doctor must be a good clinician'? Well, Husserl observes,

[18] E. Husserl, *Logical Investigations*, International Library of Philosophy, edited by Jose Bermudez, Tim Crane and Peter Sullivan, translated by J. L. Findlay from the Second German edition of *Logische Untersuchungen* with a new Preface by Michael Dummett and edited with a new Introduction by Dermot Moran, Routledge, London & New York, 1970/2001, 3 vols. Vol. I, *Prolegomena to Pure Logic*, p. 28 and following quotations appearing in the text are taken from pp. 33–34; p. 35 (italics in the text); p. 36; pp. 36–37 (no italics in the text); p. 37; p. 38 (no italics in the text; texts between both square and round brackets not present in the English text); p. 39.

> [i]n all these cases we make our positive evaluation, the attribution of a positive value-predicate, depend on a condition to be fulfilled, whose non-fulfilment entails the corresponding negative predicate.

In short: 'An A should be B' and 'An A that is not B' can only be 'a bad A' precisely because, more generally, 'only an A which is a B is a good A'. This is the general inferential scheme that is used in axiology, which then explains the overall equivalence of the following sentences: 'an A that is B is in general a bad A', 'an A should not be B'; or, again, 'only an A that is not B is a good A'. A cowardly soldier is a bad soldier, just as an unqualified teacher is a bad teacher, as parents unable to take care of their children with love and intelligence are bad parents, as a doctor without clinical knowledge is a bad doctor. To affirm that a soldier should not be cowardly, that a teacher should not be unqualified, that parents should not look after their children without love and intelligence, and that a doctor should not lack a clinical eye, does not, however, imply the falsity of the statement according to which a cowardly soldier is also a bad warrior or that an unqualified teacher is also a bad teacher or, again, that parents unable to take care of their children with love and intelligence are bad parents or that a doctor lacking a clinical eye is a bad doctor. Judgments that relate to *should*, in fact, do not imply any statement about a correspondent *be*, precisely because, logically speaking, a duty and the lack of duty, at least on a logical-formal level, are always mutually exclusive.

> We see from these analyses that each normative proposition presupposes a certain sort of valuation or approval through which the concept of a 'good' or 'bad' (a value or a disvalue) arises in connection with a certain class of objects: in conformity with this, objects divide into good and bad ones. To be able to pass the normative judgement 'A soldier should be brave', I must have some conception of a 'good' soldier, and this concept cannot be founded on an arbitrary nominal definition, but on a general valuation, which permits us to value soldiers as good or bad according to these or those properties. Whether or not this valuation is in any sense 'objectively valid', whether we can draw any distinction between the subjectively and objectively 'good', does not enter into our determination of the sense of should-propositions. It is sufficient that something is held valuable, that an *intention* is effected having the content that something is valuable or good.

From Husserl's perspective on the basis of these considerations, a normative proposition can then be defined as that particular proposition which, in relation to a previous general axiological assumption, which stands as its foundation, by determining a correlative pair of value predicates, is capable of expressing the conditions (necessary or sufficient, or also, at the same time, necessary as well as sufficient) for the possession of a given predicate:

> If we have once drawn a distinction between 'good' and 'bad' in our valuations in a particular sense, and so in a particular sphere, we are naturally concerned to decide the circumstances, the inner or outer properties that are or are not guarantees that a thing is good or bad in this sense: what properties may not be lacking if an object from that sphere is to be accorded the value of 'good'.

In this way it is possible to construct an articulated hierarchy of axiological judgments which refer to a fundamental norm, by configuring a set of norms that form a closed and independent group, which in the end is determined and qualified precisely by the axiological assumption judged as fundamental. Precisely this general normative proposition will then force, consequently, the entities of a given sphere to adapt as much as possible to the specific and constitutive characteristics of the predicate axiologically assumed as positive and fundamental, which generates, precisely, the general norm of that specific group of norms. In this perspective

> [t]he basic norm is the correlate of the definition of 'good' and 'bad' in the sense in question. It tells us on what *basic standard or basic value* all normativisation must be conducted, and does not therefore represent a normative proposition in the strict sense. The relationship of the basic norm to what are, properly speaking, normative propositions, is like the relation between so-called definitions of the number-series and the arithmetical theorems about the relations of numbers which are always referred back to these. The basic norm could also be called a 'definition' of the standard conception of good—e.g. of the morally good—but this would mean departing from the ordinary logical concept of definition.

In any case the idea of a *regulatory discipline* arises just from the totality of the connections existing between different normative propositions. This central and decisive reference for normative disciplines is instead absent in theoretical disciplines, for which the overall unity of their investigations is rooted in the possibility of identifying what arises from the 'inner laws of things' within their 'mutual coherence'. But, as mentioned, for Husserl theoretical disciplines are configured as the authentic foundations of normative disciplines:

> Every normative proposition of, e.g., the form 'An A should be B' implies the theoretical proposition 'Only an A which is B has the properties C', in which 'C' serves to indicate the constitutive content of the standard-setting predicate 'good' (e.g. pleasure, knowledge, whatever, in short, is marked down as good by the valuation fundamental to our given sphere). The new proposition is purely theoretical: it contains no trace of the thought of normativity. If, conversely, a proposition of the latter form is *true*, and thereupon a novel valuation of a C

> as such emerges, and makes a normative relation to the proposition seem requisite, the theoretical proposition assumes the normative form 'Only an A which is B is a good A', i.e., 'An A should be B'. Normative propositions can therefore make an appearance even in theoretical contexts: our theoretical interest in such contexts attaches value to the being of a state of affairs of a sort—to the equilateral form, e.g., of a triangle about to be determined—and then assesses other states of affairs, e.g. one of equiangularity, in relation to this: If the triangle *is to* [*sollen*] be equilateral, it *must* [*müssen*] be equiangular.

However, in the theoretical sphere, Husserl points out again, this possible reformulation carried out through normative propositions is not essential, because in the cognitive field the ultimate and constitutive intention of theoretical reflection is rooted in the possibility of identification based 'on the theoretical coherence of the things themselves' and for this specific reason 'enduring results are not therefore stated in normative form, but in the forms of this objective coherence, in the form, that is, of a general (*generell*) proposition'. In this way Husserl produces a critical overturning not only of the traditional dichotomy between facts and values, connected with the "law of Hume", but also succeeds in criticising the classic epistemological setting of empiricism itself by overturning its terms of reference. Indeed, if the empiricist believes he can justify a specific axiological judgment by appealing to experience, on the contrary the critical perspective inaugurated by Husserlian phenomenology reminds us how each of our axiological judgments is always rooted within a precise and determined *cognitive assets*. Thus, according to the traditional empiricist approach, a particular class of students will be judged by its teachers as more or less 'good' or as more or less 'bad' in regard to the *experience* of teaching, as gained within this particular group of students. In this way empiricism ends up by discharging the overall responsibility of the axiological judgment on the experiential level, conceived as neutral and, basically, as completely passive: the teacher limits himself to objectively recording the 'good' or 'not-good' quality of a class as such. From this perspective, the teacher, as an evaluator, does not perform any specific role because, in fact, he would limit himself to recording, with objectivity and impartiality, the actual and real condition of that particular class.

On the contrary, the phenomenological perspective makes us notice how teachers, at the very moment when they formulate their axiological judgments in relation to a group of students, in reality do not limit themselves at all to considering their first-hand teaching experience within a class-group in a neutral and passive way, since in formulating their judgments they refer to a precise cognitive model (heuristic and paradigmatic) on the basis of which, even before meeting a specific class, they know very well what 'a good class' is in comparison with 'a bad class'. Therefore, their final axiological

judgments do not arise from pure experience, but from a precise comparison of their prejudicial heuristic-cognitive models with the actual experience they make in teaching a specific class.

This is true, more generally, of all our axiological judgments, since all our evaluations are always rooted within a precise and previous theoretical-cognitive horizon. This makes it possible, then, in the first place, to critically highlight the *gnoseological* responsibility itself of all our axiological judgments that do not arise from passive experience, but are the result of an interrelation between our knowledge and our experience. And this is not all: in the second place, this critical horizon configures a much more complex and dynamic relationship, of continuous transductive interrelation, between the evaluative and the cognitive purviews. Knowledge and evaluation are by no means unrelated, rather they affect each other, within the very complexity of experience, which must then be critically unravelled, by understanding the heuristic role exercised by the paradigmatic models of knowledge that we use to construct our experience. Indeed experience, *by itself*, never teaches us anything, if we do not know how to read it, how to interpret it, how to understand it and explain it in the light of a particular theoretical perspective. In the third place and finally, the Husserlian perspective allows us to understand how the development of our technical-cognitive assets necessarily always also have a precise axiological effect, by removing both from human knowledge and from axiology the supposed metaphysical claim that knowledge and axiology can develop in an ahistorical, immutable, absolute dimension, indifferent to the history of human knowledge. On the contrary, it is precisely the intertwining and always changing dynamic between the critical development of our knowledge and the equally mobile and dynamic dimension of our own moral and axiological reflection, which configures a much more articulated and complex life situation, precisely because, as Husserl explicitly writes,

> [e]very normative discipline demands that we know certain non-normative truths: these it takes from certain theoretical sciences, or gets by applying propositions so taken to the constellation of cases determined by its normative interest. This naturally holds, likewise, in the more special case of a technology, and plainly to a greater extent. The theoretical knowledge is there added which will provide a basis for a fruitful realization of ends and means.

From a certain point of view Husserl performed this critical overturning of the traditional empiricist approach by highlighting the *active* critical and epistemological connection, which is also rooted, as already mentioned (see the previous note 8), within repetitiveness itself, apparently neutral and totally passive, triggered by the Humean concept of *custom*. In fact the apparently passive stratification of human experience itself, from which habit

ultimately arises, constitutes, *despite itself*, an *active* element through which experience definitely loses that character of total passivity theorised by Hume from the very first pages of *A Treatise of Human Nature*, to configure, albeit *in a nutshell*, precisely that decisive and strategic 'Copernican revolution' that was later theorised and articulated by Kant in his *Critique of Pure Reason*, with the heuristic introduction of the concept of the *transcendental* as a privileged hermeneutic tool, aiming at a better understanding of the inferential deductive nature of human knowledge itself, which was affirmed with the birth of modern science thanks to Galilei and Newton.[19] This is then also related to a similar need with which the more mature reflection developed during the Enlightenment finally emancipated itself from the *moralistic fallacy*, typical of the doctrine of natural law, by directly appealing to a pure *a priori* and ideal principle which constitutes, as has also been mentioned, the limit and the foundation of the historical-empirical variations of the customs and ethos of a specific historical society. This 'parallelism' between the critical maturation of Kantian transcendentality in a purely epistemological context, and the parallel need of being able to identify the role and function of an ideal principle within the continuous historical variability itself of human events (for which see § 3), then confirms precisely the historical existence of the interconnection between theoretical and normative disciplines, with the former as the foundations of the latter.

7 A new image of the objectivity of knowledge

The new Husserlian conception of the relationship existing between theoretical and normative disciplines is based, in turn, on the overall perspective of Husserl's phenomenology, which started from a critical re-evaluation of the correlation between subject and object in order to highlight ideal purely theoretical truths and their heuristic role within knowledge. Again in this case the stance adopted by phenomenology constitutes a radical critique of traditional empiricism. Nor is that all: from his phenomenological perspective, Husserl also started a radical critical discussion of the previous, traditional metaphysical approach, which relied, alternatively, either on a subject conceived as absolute (consider the tradition of ideal realism, from Plato to Hegel), or conversely on an object conceived in an equally absolute and metaphysical way (in accordance with the metaphysical realism specific to materialism, from Democritus to La Mettrie).

Husserl, referring in a completely original and innovative way to Kantian transcendentality, pluralised it, by identifying multiple *planes of reflection* within which and according to which the different disciplines are constituted.

[19] In relation to this decisive epistemological theme, I refer to my book, in press, *L'epistemologia storico-evolutiva e il neo-realismo logico. (Historical-evolutionary epistemology and logical neo-realism)*.

In this perspective, Husserl maintained and preserved the structure of *intentionality* specific to the Kantian transcendental, according to which both traditional absolute metaphysical idealism as well as traditional absolute and metaphysical realism were *critically* undermined because, instead of referring to unrelated and absolute ideals, or to realities, equally unrelated and absolute, the focus of the investigation was the specific link established by a correlation between the subjective but empty intentionality with which one addresses the world and the effective capacity that the real world (Kant's empirical reality) possesses in being able to possibly 'saturate' albeit to different degrees of saturation, that prospective intentionality itself. From this transcendentalist phenomenological perspective, the conception of scientific knowledge as well as that of the world of praxis changed profoundly. Indeed, as Preti observed, seen in this perspective,

> the 'world' whose framework is constructed by scientific knowledge is a system of objects—and these objects are *noemata* of the first degree, in whose constitution there are no categories (predicates) of value. The world of science is neither beautiful nor ugly, neither good nor bad: the attitude of scientists, as such (at the moment when they are such, and they remain such) is that of belonging to the ascetic ataraxia of the Stoic-Spinozian wise person. For this reason, Scheler is right to say that a human being (as the being who develops science) 'is the ascetic of life'.

But this is not the attitude of life—of any living being, of any person; it cannot even be the definitive attitude of the scientist, or of the philosopher, as a person-who-lives. Life is praxis, and the world of life is a world of values. It is made up of things that are *noemata* of the second order, they are 'good things' (or 'bad things'; it is made up of actions, and works, which aim at realising values, by turning them into facts and things'.[20]

However, Preti's approach here seems to reaffirm the existence of an underlying dichotomy between the world of knowledge (theoretical truth) and the world of life (evaluation and value). Indeed, Preti himself, in *Retorica e logica*, albeit for many and different reasons, always strongly confirmed this dichotomy, although, as emerges also from this quotation, he did not overlook the strategic importance of the new phenomenological approach to the problem of knowledge and the question itself of the normative disciplines. In fact, from the quotation just given, it emerges that the 'world' in both the theoretical and the practical sphere, always constitutes a universal and complex set of relationships which, in the theoretical sphere, focuses precisely on the elements of knowledge (what we have indicated as the technical-scientific assets available to each specific society), while in the

[20]G. Preti, *Retorica e logica*, op. cit., pp. 427–428, while the quotation immediately following in the text is taken from p. 449.

context of praxis the 'world' refers, instead, to a particular and specific set of axiological connections. This should not lead us to forget, as Preti himself never forgets (I will borrow his words again), that

> the axiological culture, by its motivations, by the practical plans themselves that it implies in its tendency to implement values by bringing them into existence, relies on scientific culture: and an axiological picture of the world always presupposes a scientific picture of existence (of nature, history, etc.). The non-coincidence of the picture of the world used by axiological culture with that presented by science produces a historical crisis of civilisation, and therefore represents a dynamic element of change (I always speak within civilisation, that is, on the ground of the reflected cultural life).

It is therefore necessary to focus our attention now on these elements, because these two 'worlds' if they refer to the overall history of the Western tradition, are configured just like the two real 'engines' both privileged and indispensable, *within which* and *thanks to which*, our history has on the whole developed through the centuries. Furthermore, these two different worlds (the theoretical and the axiological) within them present quite peculiar dynamics, which must therefore be studied and comprehended in their specific (albeit relative) autonomy. Thirdly and finally, last but not least, as we have seen, these two 'worlds' also have their own specific and fruitful interrelation, of which a progressive critical awareness has been reached to the extent that the rigid dichotomy between facts and values has been progressively challenged, discussed and criticised, to the point that, by Husserl, its privileged and absolute value was overturned, while this dichotomy was transformed into a flexible heuristic tool for the critical understanding of Western history and of our own human condition. This then also helps us to understand the legitimacy itself with which an author like Preti has in any case decided to hold firm the empiricist dichotomy between theoretical disciplines and the axiological world, by electing it as his privileged heuristic tool to better investigate the developments of the 'two cultures' (the logical-scientific and the axiological) within Western history. As can easily be perceived even from these few considerations, the problem faced is by no means simple and therefore deserves to be analysed critically, with all due caution.

The fundamental point, as I see it, seems to be to recognise, with Husserl, that scientific knowledge constitutes, as we can find again in his *Logical Investigations*, 'purely theoretical truths, ideal in character, rooted in their own semantic content and not straying beyond it. They can accordingly not be affected by any actual or imagined change in the world of *matter of fact*.'[21]

[21] E. Husserl, *Logical Investigations*, op. cit., Vol. I, p. 97 (no italics in the text). The quotations that follow in the text are taken from the following pages, again from the first volume: p. 125 (italics in the text); p. 119; p. 113; p. 112; pp. 130–131 ('not' and 'its' in

In which the whole critical distance that exists between the phenomenological and empiricist approaches re-emerges. From this point of view, in fact, the heart of scientific knowledge is not rooted in experience, nor is it possible any longer to conceive scientific knowledge as a product of experience. On the contrary, the value of scientific knowledge is instead rooted in those 'purely theoretical truths, ideal in character' which are formed precisely within the ambit of *meaning* without ever transcending it. If a human being defined by empiricism is a person who learns from experience, for Husserl, on the contrary human beings learn only by virtue of their own critical intelligence, with which they challenge, question and interpret the world, even that of experience, through *open meanings* by means of which *intentionality* strives to identify *ideal laws* capable of pointing out *objective links between things*. This naturally also implies a very different kind of anthropology, since for Husserl it is evident that the superiority of human beings over other living forms is based on their intelligence itself:

> Man's superiority lies in his intelligence. He is not solely a being who brings perception and experience to bear on external situations: he also thinks, employs concepts, to overcome the narrow limits of his intuition. Through conceptual knowledge he penetrates to rigorous causal laws, which permit him to foresee the course of future phenomena, to reconstruct the course of past phenomena, to calculate the possible reactions of environing things in advance, and to dominate them practically, and all this to a vastly greater extent, and with vastly more confidence, than would otherwise be possible. *Science d'ou prevoyance, prevoyance d'ou action*, as Comte tellingly remarks. Whatever misery the one-sidedly overstrained yearning to know may bring to the individual thinker, and that not seldom, the fruits, the treasures of science ultimately accrue to the whole of humanity.

Science, which has ideal truths as its privileged content, therefore originates by an effort of thought and ideas with which we are able to reflect in an innovative—today we would say counterfactual—way on the world of experience itself. This accentuation of the role of ideas, thoughts and intelligence in no way negates the value and function of experience, only it places the function of experience not at the beginning of knowledge, but at the always fundamental moment of its experimental verification. From this perspective, Husserl's vision comes clearly into conflict with the traditional Baconian image of science, according to which scientific knowledge is rooted, *primarily*, in the context of the sense experience of the world. On the other hand, for Husserl, as already for Kant, scientific knowledge cannot even be configured, if we do not understand the fundamental heuristic role played

italics in the text, the other italics are mine); p. 132 (no italics in the text); p. 133; p. 149 (italics in the text).

by human intelligence, by our ability to succeed in challenging the world in the light of some ideal truths with which we test our ability to understand the objective links between the things of the world. Of course, due to the phenomenological correlativity that exists between subject and object, it is not possible to "attribute" the cognitive capacity of knowledge to the ideal component alone. In fact, if the latter can actually elaborate, by means of *meanings*, an *ideal* understanding of the world, it is then necessary to submit this merely ideal explanation of the world to a check, to a verification, and also to a possible falsification. But this decisive experimental check is no longer configured *near the source* of science, but *near the conclusion* of scientific inference. Consequently, the constitutive inference of scientific reasoning is no longer the *inductivist* one variously theorised by almost every empiricism of modernity (including the anti-metaphysical verification principle of twentieth-century logical empiricism), but the one of *deductive* inference through which scientific knowledge is configured as an inference capable of making a *computational synthesis of critical integration of reality* which, by constructing virtually and eidetically objective data, makes it possible, in fact, to achieve some *objective knowledge* of the physical world that we can and must subsequently critically test (precisely through verifications and/or falsifications) performed through an accurate and rigorous experimental critical mediation of the different theoretical predictions. This exactly constitutes the decisive innovation of the Kantian transcendentalist stance, which theorised the decisive role of the 'Copernican revolution' precisely to underline how any 'object' of knowledge is such only and solely within a very precise theoretical perspective, within a specific and rigorous conceptual and linguistic universe. The fundamental Kantian swerve, to which Husserl himself refers in a theoretically privileged way—beyond and also *against* his own brief and often reticent explicit acknowledgments—is on a clear collision course with the traditional empiricist image of science that from Hume onwards (but also, and above all, from Francis Bacon onwards) has instead ended up by constituting a sort of widespread common sense for the epistemologists of the last few centuries. Husserl follows exactly the hermeneutic path inaugurated by Kant, by pointing out how, without doubt, animals' actions (which certainly humans share with mammals as a class to which the human species belongs) are largely based on representations and judgments derived inductively and directly from experience (it would suffice to mention—to give just one emblematic example—Aristotelian physics, which constitutes an intelligent rationalisation of the world of common experience). But alongside these fundamental and indispensable actions that put us on a par with animals, there is also an intelligent understanding of the world that requires, instead, a counterfactual reflection, in order to produce original computational syntheses of the critical integration of the experience

itself, as human beings have begun to do systematically, from the birth of modern science onwards. In this case we then focus on identifying some certain 'ideal objects ideationally apprehended in the correlates of our acts' precisely because

> [e]ach truth stands as an ideal unit over against an endless, unbounded possibility of correct statements which have its form and its matter in common. Each actual judgement, which belongs to this ideal manifold, will fulfil, either in its mere form or in its matter, the ideal conditions for its own possible inward evidence. The laws of pure logic are truths rooted in the concept of truth, and in concepts essentially related to this concept. They state, in relation to possible acts of judgement, and on the basis of their mere form, the ideal conditions of the possibility or impossibility of their inner evidence. Of these two sorts of conditions of the inwardly evident, the former relates to the special constitution of the sorts of psychical being which the psychology of the period recognizes, psychological induction being limited by experience. The other conditions, however, have the character of ideal laws, and hold generally for every possible consciousness.

There is therefore an evident discrepancy between the psychological-empirical conception of the world and its objective-ideal conception, which in turn refers to the gap existing between the descriptive psychology as defined by empiricist systems and the epistemology of the critical-rationalist system outlined by Husserl:

> The distinction between the psychological mode of treatment, whose terms function as class-terms for mental states, and the objective or ideal mode of treatment where the same terms stand for ideal genera and species, is not a subsidiary, or a merely subjective distinction. It determines the difference between essentially distinct sciences. Pure logic and arithmetic, as sciences dealing with the ideal singulars belonging to certain genera (or of what is founded a priori in the ideal essence of these genera) are separated from psychology, which deals with the individual singulars belonging to certain empirical classes.

Why? Precisely because scientific analyses (and, consequently, also epistemological ones as critical meta-reflections concerning individual disciplines) constitute 'analyses of meaning, and not in any degree psychological ones. Not individual phenomena, but forms of intentional unities are subjected to analysis, not experiences of syllogising, but syllogisms.'

In this way the transcendentalist analysis, inaugurated by Kant and subsequently freely further developed by Husserl from his phenomenological perspective, is placed on a different level of epistemological investigation, which is critically and in a completely original way detached from the traditional plane of the empiricist tradition. Indeed, for Husserl,

> [t]he question is not how experience, whether naive or scientific, arises, but what must be its content if it is to have objective validity: we must ask on what ideal elements and laws such *objective validity of knowledge of the real* is founded—more generally, on what any knowledge is founded—and how the performance involved in knowledge should be properly understood. We are, in other words, *not* interested in the origins and changes of our world-presentation, but in the objective right which the world-presentation of science claims as against any other world-presentation, which leads it to call *its* world the objectively true one. Psychology looks for perspicuous explanations of the formation of world-presentations. World-science (the sum total of the different sciences of the real) wishes to know perspicuously what obtains *in reality*, what makes up the true, the actual world. Epistemology, however, wishes to grasp perspicuously, from an objectively ideal standpoint, in what the possibility of perspicuous knowledge of the real consists, the possibility of science and of knowledge in general.

This then leads Husserl to emphasise the role and function of *objective ideality* through which scientific knowledge is established, since the latter, as it should now be evident, does not arise, *passively*, from experience, but is developed, instead, starting from an *objective ideality* through which it is possible to delineate, counterfactually, a theory by virtue of which one is then able to formulate a deductive computational synthesis that allows us to critically integrate experience itself. As Husserl again points out,

> [b]efore all economising of thought, we must already know our ideal, we must know what science *ideally* aims at, what law-governed connections, what basic laws and derived laws etc., *ideally* are and do, before we can discuss and assess the thought-economical function of knowing them.

Which then helps to better understand the obvious conflict that cannot fail to arise between the intrinsic 'necessity' of scientific knowledge (connected to the very concept of 'scientific law' and the predictability of scientific theories which, precisely, presuppose when something *must necessarily* happen) and the construction of empirical representations and of accidental convictions themselves, which appear to be instead devoid of connections with a binding force, even though they possess an undeniable average utility.

> The errors of this trend toward thought-economics, are due in the end to the fact, that those who go with it, like all psychologistic thinkers, have an interest in knowledge which stops short at the empirical side of science. They fail in a certain manner to see the wood for the mere trees. They concern themselves with science as a biological phenomenon, and do not see that they are touching upon the epistemological problem of science as ideally unified, objective truth.

As Karl Popper often observed, the theory of special relativity, from its first formulation, had always expected the *curvature* of rays of light as they pass through a strong gravitational field. Precisely this prediction, on the basis of which Einstein accurately established—by rigorous merely deductive inference—how a ray of light should necessarily behave in this specific physical situation (by ignoring a common misconception concerning the constantly rectilinear character of the diffusion of light in infinite space) constituted, at the same time, the main challenge to Einstein's theory and its glory. *The challenge*, because by advancing this prediction Einstein actually made, in the words of Imre Lakatos, his theory of relativity stick its 'neck' out to the cleaver of experience, so to speak. As is well known, this prediction was formulated as early as 1905, but was then experimentally verified only in 1919, which accounts for its *glory*. Indeed, only since then, and of course not surprisingly, was Einstein finally proclaimed one of the greatest physicists in the history of mankind. But it is precisely this point connected with the necessity of scientific prediction that has always constituted the concern of empiricism which, with the classic—and certainly glorious and brilliant—Humean analysis of the cause-effect link, nevertheless shows that *ideal ideational role* of scientific theories themselves, which are by no means reduced to the assets of empirical experience, because, if anything, as we have seen, they rather arise from the awareness of the heuristic function of counterfactual ideals that enable us to delineate those deductive computational syntheses with which objective scientific knowledge is developed.

8 The general conditions of the possibility of science according to Husserl

But what are the ideal conditions for the possibility of science? Husserl did not ignore this problem, explicitly investigating the 'conditions of the possibility of science in general' in which he produced some considerations that must be kept in mind, because they provide the most fruitful key to explain the link between the objective knowledge elaborated by science and the world of axiology. As already elucidated previously, for Husserl 'the essential aim of scientific knowledge can only be achieved through theory, in the strict sense of the nomological sciences.' Husserl therefore felt authorised to replace the question concerning the conditions of possibility of science in general with the question concerning the '*conditions of the possibility of theory in general*'. In this regard we have already seen that, for Husserl,

> [a] theory as such consists of truths, and its form of connection is a deductive one. To answer our question is therefore also to answer the

> more general question as to the conditions of the possibility of *truth in general*, and again of *deductive unity* in general.[22]

Of course, it does not escape Husserl that by investigating this a further question is raised more directly connected with a quite necessary generalisation of the question as to the 'conditions of the possibility of experience'. This is a crucial epistemological challenge that was first identified by Kant in the *Critique of Pure Reason*. Which, if it were still required, confirms that deep underlying connection (often unmentioned by Husserl himself) that exists between Husserlian phenomenology and Kantian criticism, to which I referred earlier. However, Husserl continued, the precise meaning of this question must be further clarified with greater rigor and, in this regard, he added the following:

> It might very well be at first understood *in the subjective sense*, in which case it would be better expressed as a question as to the conditions of the possibility of *theoretical knowledge* in general, or, more generally, of inference in general or knowledge in general, and in the case of any *possible* human being. Such conditions are in part *real*, in part *ideal*. We shall ignore the former, the psychological conditions. Naturally the possibility of knowledge in a psychological regard embraces all the causal conditions on which our thinking depends. *Ideal* conditions for the possibility of knowledge may, as said before, be of two sorts. They are either *noetic* conditions which have their grounds, *a priori*, in the Idea of Knowledge as such, without any regard to the empirical peculiarity of human knowledge as psychologically conditioned, or they are purely *logical* conditions, i.e., they are grounded purely in the 'content' of our knowledge.

It is worth mentioning that this second aspect, which concerns both *noetic* structures and *logical* ones, is at the centre of Husserl's reflection. This appears decisive also for our epistemological reflection. For what reason? Just because, thanks to the *doctrine of intentionality*, a concept (i.e., an *idea*) outlines an objective compass coinciding with its own *noematic* content, which, in fact, determines and qualifies it as that specific idea that becomes part of the different noematic connections that structure the very fabric of objective knowledge, to which we are referring within a specific disciplinary field. Exactly at this point Kant's 'Copernican revolution' comes into play with a fundamental role also in Husserl's reflection.

In the first place, because Kantianism conceives philosophy as a critical meta-reflection that is expressed on previous contents of reflection. This constitutes an important and decisive turning point, also because it annuls philosophy's supposed ability to operate on its own (quite mythical) specific

[22] E. Husserl, *Logical Investigations*, op. cit., Vol. I, p. 149 (italics in the text); the following citations in the text are taken from pp. 149–150 (italics in the text).

object. By losing the reference to its own specific metaphysical object, philosophical reflection, as a critical meta-reflection, then opens up, with conscious epistemological humility, to every discipline with which it can and must confront itself, in order to learn precisely the infinite complexity of the world, which reveals itself in the actual knowledge constructed by humans through science.[23] But by turning to these disciplines to learn and clarify the multiple and different disciplinary contents, philosophy then brings with it its own particular methodical (indeed, philosophical) habit, with which it exercises its *critical meta-reflection* by investigating the meaning and significance of these various disciplines, by studying their meanings, their categories and universes of discourse, the way to pose problems as well as the way to solve them, models of inference, etc., etc., without however ever recognising and identifying itself, uncritically, with a specific scientific conceptual universe as the object of its study. This makes it possible that philosophy investigates a scientific discipline by fully highlighting, from an *epistemological* perspective, the appropriate specifically *conceptual* dimension (a dimension of thought which is often lost sight of or certainly forgotten or neglected, both by the composite tradition of empiricism as well as by that of positivism, not to then mention all the various and different metaphysical traditions which have often denied to science even the quality of *being able to think*, which they naturally considered as their exclusive prerogative. This happened, just to offer an emblematic example, in relation to Heidegger's ontological metaphysics, clearly influenced by Nazi theories—an influence that is now finally overtly recognised and no longer dismissed with a significant shrug of the shoulders ...). Precisely this meta-reflective critical attitude turns out to be profoundly in tune with the theoretical attitude of Husserlian phenomenology, which always addresses positive knowledge (that of the sciences), by inviting us to suspend just the natural orientation and perform a decisive *epoché* that makes it possible to develop the *analytical* plan of Kant's reflection that we have just mentioned.

In the second place, from the perspective of Kant's 'Copernican revolution' also the way of considering a *concept* changes: now it can be conceived, *à la* Husserl, as a *non-representative and non-ontological ideal unity*, with which the multiple data of empirical intuition can be connected. In this way

[23] In *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy*, Third Book: *Phenomenology and the Foundation of Sciences*, translated by T. E. Klein and W. E. Pohl, M. Nijhoff Publishers, The Hague, Boston, London, 1980, Husserl wrote: "Treasures of knowledge may lie in the sciences, indeed, they must lie in them, since we cannot doubt that the claim of their statements to validity is a good one, even though within limits still to be defined. But these treasures of knowledge we do not have; we must first obtain them. For knowledge is insight, is truth drawn from Intuition and thereby completely understood. Only through a work of elucidation and making evident, carried out anew on the given sciences, do we bring out the intrinsic values that are hidden in them." (p. 82).

the concept is transformed into a heuristic criterion for understanding the world, which makes it possible for us to realise a computational deduction by means of which we are able to present a critical integration of experience. This makes it viable, as can be immediately comprehended, the elaboration of a much more articulated critical conception of the same experience, since the latter no longer refers to a merely passive function, because, on the contrary, it requires to be always critically fertilised by thoughts, which are capable of reading and understanding it critically, by bringing it back to a unifying function, coinciding with the concept itself. The object-of-knowledge—coinciding with the different disciplinary objects specific to each discipline—therefore refers to a logical-transcendental function of critical integration of experience, by means of which we are able, in fact, to unify, within a determined universe of (purely conceptual) discourse, proper and specific to a particular discipline, all the multiple intuitive contents.

Consequently, and in the third place, the object of knowledge is no longer configured either as a prerequisite for research, or as a totally separate object from the knowledge developed within a specific disciplinary sphere. If anything, once again deeply in tune with Kant's 'Copernican revolution' the object of knowledge is configured—to express it *à la* Sartre—as a specific 'object-of-knowing' that can never be considered by arbitrarily isolating it from the actual field of its scientific discipline. For what reason? Because outside of that theoretical context it no longer has any existence. For this reason, when we speak, for example, of a concept such as that coinciding with an 'element' we are always expected to immediately specify the different disciplinary ambit to which we refer, because the meaning of the concept of 'element' changes, even profoundly, according to the discipline we are referring to (an 'element' in physics is very different from an element in medicine, biology, maths, music, geometry, etc.). Why are we faced with this multiplicity of elements? Exactly because the object-of-knowing can no longer be imagined as *external* to the act of knowing itself (for example as an 'internal' or 'external' element), because for Husserl it is configured as *a content of the act of knowing itself*, i.e., as a *constitutive polarity of the very objectivity of the ideal unity* through which we objectively study a specific area of the world (physical, biological, mathematical, algebraic, medical, etc.).

From this innovative epistemological and hermeneutic perspective, 'reality', 'existence' and 'truth' itself can no longer be conceived as a sort of archetypal form of reality, presupposed in relation to knowledge, because, if anything, each of them is configured instead, as a *specific modality within the very structures of objective knowledge*, which is constituted by always taking *primarily* into account the specific conditions of a scientific discipline concerning the constitution of the object itself in a specific theoretical

and experimental field. But these constitutive conditions of the object-of-knowledge, conceived as an internal moment of the specific structures of the knowledge developed by the discipline taken into consideration, at the same time provide the conditions of our own experience, which is no longer configured as a neutral and passive dimension, precisely because our experience is formed instead within the ideal tension, with which the world is understood according to its objective necessity.

In this way it seems that Husserlian phenomenology, as an insightful development of the 'Copernican revolution' outlined by Kant, is then able to critically re-establish empiricism itself, by freeing it from all its traditional psychological (and sceptical) limits to inaugurate a new and fruitful perspective and epistemological horizon. In fact, if we assume, with Husserl, the traditional doctrine of *intentionality* as a fundamental structure of human knowledge, then the object-of-knowing can only be configured as a *noema*, that is, as an object that turns out to exist *inside* the act of knowing, precisely because it constitutes the *thought content of that act*, or a content *targeted by intentionality*. Moreover, this decisive Husserlian consideration must also be kept in mind:

> Talk about recognising objects, and talk about fulfilling a meaning-intention, therefore express the same fact, merely from different standpoints. The former adopts the standpoint of the object meant, while the latter has the two acts as its foci of interest. Phenomenologically the acts are always present, while the objects are sometimes non-existent. Talk of fulfilment therefore characterises the *phenomenological* essence of the recognitive relation more satisfactorily. It is a primitive phenomenological fact, that acts of signification [*Signifikation*] and acts of intuition [*Intuition*]can enter into this peculiar relation. Where they do so, where some act of meaning-intention fulfils itself in an intuition, we also say: 'The object of intuition is known through its concept' or 'The correct name has been applied to the object appearing before us.[24]

Indeed, in Husserl's phenomenology the *noema* is configured as the critical synthesis of two different moments: the intentional *morphé* (a function of the critical integration of experience) that addresses the world with a specific intention of significance and the sensory material, the *hyle*, specific to hyletic data, which is precisely targeted by the intentionality of *morphé*, and, however, has the potential ability to saturate (or not) just that specific *project of signification* through which intentionality tries to conceptually

[24]E. Husserl, *Logical Investigations*, op. cit., Vol. II, p. 206, text between square brackets and italics not in the English text. In this regard, see also the Italian translation with German parallel text of the important volume by Husserl, *La teoria del significato.* Introduction, translation, notes and apparatus by Anselmo Caputo, Bompiani, Milan, 2008, with my *Preface* published on pp. 5–21.

understand the world. It is the functions of critical integration of experience which make hyletic data intentional; these, without the presence of *morphé* would be completely 'deaf' and impenetrable. Indeed experience, *by itself*, is always 'deaf' if we are not able to read it as a unity, in the light of some specific theoretical intentionality, as Galileo Galilei, the acknowledged father of modern science, already knew. Galileo observed, in fact, that nature, although the 'observant executrix of God's commands' is nevertheless always 'inexorable and deaf to our entreaties, will not alter or change the course of her effects.'[25] In short, nature for Galileo is 'deaf and inexorable' in relation to human beings, who should then be able, on their own, to critically probe the deafness of matter, in order to understand it *conceptually* with the aim of identifying within it that cogent necessity capable of tracing the multiple 'passions' of a given phenomenon back to a physical law (as argued on the third day of *The Discourses and Mathematical Demonstrations Relating to Two New Sciences*). To achieve this cognitive end, human beings can only count on their intelligence and critical abilities (always connected with a specific force of will as well as with a certain necessary physiological well-being). After all, Galileo's treatment of naturally accelerated motion opens with the following consideration:

> Et prima, definitionem ei, quo utitur natura, oppresses congruentem investigare atque explicare convenit. Quamvis enim aliquam lationis speciem ex arbitrio confinare, et consequentes eius passiones contemplari, non sit inconveniens [...], tamen, whenquidem quidam accelerationis specie graveum descendentium utitur natura, eroundem speculari passiones decrevimus, si eam, quam allaturi sumus de our motu accelerato definitionem, cum essentia motus naturaliter accelerati congruere contigerit. Quod tandem, post diuturnas mentis agitationes, repperisse confidimus; ea potissimum ducti ratione, quia symtomatis, deinceps a nobis demonstratis, first respond to atque congruere videntur ea, qua naturalia experimenta sensi repraesant (VIII, 197)
>
> And first of all it seems desirable to find and explain a definition best fitting natural phenomena. For anyone may invent an arbitrary type of motion and discuss its properties; [...] but we have decided to consider the phenomena of bodies falling with an acceleration such as actually occurs in nature and to make this definition of accelerated motion exhibit the essential features of observed accelerated motions.

[25]The quotes from Galileo are taken from *Letter to the Grand Duchess Christina of Tuscany* (1615) and *Third Letter on the Sunspots* (1613). Italian edition: New reprint of Edizione Nazionale *Le opere di Galileo Galilei*, edited by Antonio Favaro, G. Barbera Editore, Florence 1968 (first edition 1890–1909), 20 volumes in 21 tomes. The first quotation in the text is taken from Volume V, p.316, the second quotation from Volume V, p.218 and the third from Volume VIII, p.197).

> And this, at last, after repeated efforts we trust we have succeeded in doing. In this belief we are confirmed mainly by the consideration that experimental results are seen to agree with and exactly correspond with those properties which have been, one after another, demonstrated by us.[26]

This significant link of congruence that Galileo identified as existing between his innovative physical theory, *ex suppositione*, of naturally accelerated motion and the actual physical properties of this motion, experimentally controlled in the laboratory,[27] is precisely related to the Husserlian problem concerning the possibility that every science has of *being able* to identify objective links existing between the objects within the scope of its analysis. Indeed, it is precisely on this level that the more or less complete 'saturation' of a particular project of giving meaning to the world takes place. This project is originated by the specific intentionality of a scientific theory, by virtue of which a specific functional *morphé* formulates computational syntheses of hyletic data, thus configuring a discipline-specific knowledge, which, as we have seen, always arises from a specific critical integration of our experience. In this perspective, 'nature' can therefore only be configured as a 'correlate of consciousness: Nature *is* only as being constituted in regular concatenations of consciousness.'[28] Which, in fact, allows Husserl to distinguish, within the intentionality, as mentioned, 'between the *components proper* of intentive mental processes and their *intentional correlates'* since 'corresponding in every case to the multiplicity of Data pertaining to the really inherent noetic content, there is a multiplicity of Data, demonstrable in actual pure intuition, in a correlative '*noematic content*' or, in short, in the '*noema*'.' Consequently, for Husserl,

> the 'parenthesis' undergone by perception prevents any judgment about perceived actuality (i.e., any 'judgment' having its basis in unmodified perception, thus taking up into itself its positing). But it does not prevent the judgment about the fact that perception is consciousness *of* an actuality (the positing of which, however, should not be 'effected'; and it does not prevent any description of this perceptually appearing 'actuality' as appearing with the particular

[26] Galileo Galilei, *Dialogues Concerning Two New Sciences*. Translated from the Italian and Latin into English by Henry Crew and Alfonso de Salvio. With an Introduction by Antonio Favaro, Macmillan, New York, 1914. For further analysis of Galileo's epistemological stance see F. Minazzi, *Galileo 'filosofo geometra'*, Rusconi, Milan 1994.

[27] On this theme of the analysis of Galileo's epistemological stance see F. Minazzi, *Galileo 'filosofo geometra'* op. cit. passim.

[28] E. Husserl, *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy*, First Book *General Introduction to a Pure Phenomenology*, Translated by F Kersten, Martinus Nijhoff Publishers, The Hague/Boston/Lancaster, 1983; p.116; p. 213 (italics in the text); p. 214 (italics in the text); pp. 220–221 (italics in the text).

> ways in which it is here intended to, appearing only 'one-sidedly' in this or that orientation; and so forth.

9 The influence of objective scientific knowledge on axiology

Precisely the correlation between the noetic moment and the noematic moment allows us to better investigate not only the overall nature of scientific knowledge, but also the links themselves that can be established, historically, between the 'world' of science and the 'world' of axiology. In truth, many thinkers, from Plato to the present, have variously underlined the fruitful connection that is always established between *life* and *culture*, between *Geist* and *Leben*, between the drives of life and the dimension of rational reflection. In this regard, Preti, a thinker mentored by Banfi[29], took into account, in particular, the reflection of the German philosopher Georg Simmel, whom he came into contact with above all thanks to the mediation of his mentor Banfi. Therefore, in *Retorica e logica* Preti writes:

> Culture, any culture, is born out of life: but, once it has arisen, it exercises a kind of asceticism with respect to life, keeps it in suspension, 'turns its back on it' and elaborates ideal forms of validity that obey immanent criteria, no longer that of their immediate vitality. This is true for the specific and distinct value of truth, as for any other value. But, at this point, the forms of culture put life itself in crisis: they disconcert it at the very moment that they tend to reorganise it within broader, richer, more comprehensive horizons. So they come back to life as 'more life'.[30]

Preti, as a faithful follower of Banfi, thus stresses the rich fundamentally antinomic tension which always arises between *Geist* and *Leben*: if in fact life, as a set of vital drives, requires, in the first place, indeed, to be *lived*, on the other hand, thought performs a sort of radical *epoché* compared to the world of praxis or *Lebenswelt*, by placing it, in fact, in parentheses in order to apparently unfold in a dimension which, while taking root in lived experience, nevertheless is presumed to be configured independently of the experience itself. In this perspective *to live* a given reality (whatever it is) turns out to be fundamentally different from *reflecting* on this reality. Reflection must inevitably move away from life—and its blind impulses—in order to create its own 'critical lenses' in the light of which it addresses

[29]For an overall picture of Banfi's mentoring of Preti and of all the intertwining connections within the 'School of Milan' see, in particular, the following volumes: *Sul bios theoretikós di Giulio Preti*, edited by F. Minazzi, Mimesis, Milan-Udine 2015, 2 Vols.; *Mario Dal Pra nella 'scuola di Milano'*, edited by F. Minazzi, therein 2018 and *Sulla scuola di Milano*, edited by F. Minazzi, Giunti, Florence, 2019.

[30]G. Preti, *Retorica e logica*, op. cit., p. 448, while the quotation that immediately follows in the text is taken from p. 449.

the world as if observing it from a distance. However, the undoubted critical gain that thought cannot fail to acquire in this way, by evading the drives and constraints of experience as such, involves a price: that of abstraction and detachment from the body, flesh and blood, and from *lived experiences* themselves. Ultimately, philosophical reflection itself, precisely in its aspiration to universal criticism, is fuelled by this antinomy and is thus configured as a universal reflection that intends to prescind from time while being unable to do anything but operate in the midst of time ...

As we have seen, for Husserl theoretical disciplines always constituted the foundation of normative disciplines. With the consequence that it can then be deduced that every axiological 'world' always presupposes, as its basis (often unmentioned and hidden) an essential reference to the 'world' of scientific culture. Of course, between these two different 'worlds' or, if you prefer, levels of reflection, multiple relationships can always be established because the axiological culture can be in profound harmony with the scientific knowledge of its time, or it can instead create a discord—more or less serious, more or less profound—between scientific culture and the axiological world. When such a discord occurs, we may be faced with a historical crisis of civilisation that can lead to a catastrophic outcome, or to a revolutionary solution, through which a complete reshuffling of cards is performed in order to shape a new society and new prospects for growth and dynamic development. In this regard, Preti still observes that,

> [a]xiological culture, insofar as it is organised in a system of ethical institutions, tends to close itself in its substantial immutability, in its immanence—as we have seen. And by closing itself it becomes not only extra-vital ('more than life'), but anti-vital ('less life'). And this happens when its real presuppositions have changed, that is when an erroneous image of existence is developed—erroneous precisely from the point of view of knowledge.

Naturally, both of these different worlds have their own specific degrees of 'stickiness' and are also characterised by the specific way in which they are structured and organised. The axiological dimension is thus characterised by a basic contrast which, generally, is established between the dimension of the *Moralität* (which basically refers to the moral conscience of the individual) and its more strictly ethical dimension (the *Sittlichkeit*, to use the Hegelian terminology again, in its turn influenced by the Kantian one) which is recognised, indeed, in the ethical customs of a specific historical society. Generally, at least on the axiological level, the growth and spread of a new specific need for morality constitutes the leaven of a historical society, because this new *Moralität* seeks precisely to establish itself as a hegemonic element by opposing in this way the traditional *ethos* now rooted in a custom perceived as completely 'natural' and, as such, 'unchangeable' (while it is

itself a historical product). The new morality intends precisely to undermine the old ethics in order to be able to establish itself as new ethics that is the expression of a different morality: by subverting the traditional customs, the new morality in fact aims to take their place. In this way morality ends up by historically transforming itself into an ethic which, sooner or later, inevitably, in turn, will be challenged by a new and unexpected morality that will oppose it as an ethical form at that point outdated, obsolete and inadequate for a world which, in the meantime, has changed profoundly. This does not at all open the way to any form of absolute relativism (in itself contradictory) because, if anything, by accepting an interesting critical suggestion of Ludovico Geymonat, expressed in *Scienza e realismo* (1977), it can be observed that, in the course of history, this dialectical relationship between morality and ethos constitutes an interesting series of different cognitive assets specific and peculiar to the civil institutions within which human history unfolds. But in this respect, it is better to quote Geymonat directly. He writes and argues as follows:

> in the first chapter we explained, however, that science cannot be reduced to a collection of theories, each one enclosed in itself; that is, we have said that, to understand the whole meaning of these theories, it is not enough to examine them in isolation one from the other, but it is necessary to place them in what we have called the 'scientific-technical cultural heritage' in continuous evolution, which includes, besides individual theories considered in their completeness, a vast field of non-axiomatisable investigations (investigations ranging: from first explorations of a group of phenomena to attempts to frame them in this or that theory, from the most subtle methodological debates to the analysis of the philosophical implications of axioms assumed on the basis of our deductions, etc.). Well, something similar can be repeated, in our opinion, also for legal systems; that is, if we want to understand their full meaning, we cannot limit ourselves to examining them in isolation one from the other, but we must consider them in a wider framework that includes, in addition to the legal systems themselves, a complex of institutions, of unwritten laws, customs, etc.; therefore, the consideration of the time parameter is essential (as understood by the historical disciplines). We can call this the 'cultural heritage of civil institutions' in order to underline the analogy with the 'scientific-technical cultural heritage.' And just as in order to understand the dynamics of science, we should refer to this kind cultural heritage, so to understand the dynamics of legal systems it seems obvious that we will have to refer, not only to the individual systems considered in their entirety, but to that highly articulated and

> variable framework, to which we have given the name of the 'cultural heritage of civil institutions'.[31]

To adequately understand the complex historical dynamics of this specific 'cultural heritage of civil institutions' it will be necessary to resort to its dialectical analysis, which, of course, can also be employed to understand the specific dynamics of the 'scientific-technical cultural heritage'. In any case, the world of science and that of axiology certainly present a different and specific 'stickiness' precisely because the scientific enterprise has as its vital, main and indispensable fulcrum, precisely *criticism* (while in the axiological ambit, as mentioned above, criticism constitutes, if anything, a moment which, in general, occurs mainly within the traditional dialectic between morality and ethics).

In this regard, Preti, by reflecting on the notions of 'truth' specific to the scientific world and the axiological world—or by analysing their respective 'souls' since the 'soul' that is the form of a culture, constitutes its notion of 'truth'[32]—offered the following, valuable, definition of scientific truth:

> while humanistic-literary truth is a value linked to universal concrete historically determined events/experiences, scientific truth is a value that refers to a *free ideal human universality in general*. 'Free' in the sense that it does not recognise any authority as such—neither of men, nor of scholars, nor of tradition: since even a single scientist can recognise it and assert it against even the most venerable and accredited opinions. 'Ideal' because it is, in a certain sense, abstract, that is (rather) formal: its criteria are formal criteria, in a certain sense a priori with respect to every possible experience and every possible discourse. It is not to the concrete (social) human being that it addresses itself, but to an ideal universally human audience, defined only and exclusively by operating and judging according to these criteria.

The criticism that science appeals to is, therefore, an essentially immanent and radical criticism, whose 'foundation' is provided solely by its own arguments, because it can never appeal to any other authority (either person, institution, or tradition). If, in fact, science appeals to an *auctoritas* it ends up by irremediably crippling its own critical spirit, which can only be fulfilled as a 'free ideal human universality in general'. Precisely for this reason scientific knowledge can never generate an absolute and non-transcendable

[31] L. Geymonat, *Scienza e realismo*, Feltrinelli, Milan 1977[1], 1982[2] (new revised and enlarged edition), pp. 124–125. On the more mature thought of Geymonat, see my third and most recent monograph about Geymonat: F. Minazzi, *Geymonat epistemologo*, Mimesis, Milan-Udine 2010.

[32] G. Preti, *Retorica e logica*, op.cit., p. 379, while the quotations that immediately follow in the text are taken, respectively, from pp. 386–387 (italics in the text) and from pp. 449–450 (italics in the text).

truth, because it can always radically question its own cognitive results. On the other hand, by working in this way, science does not fall into any contradictory absolute relativism, precisely because its knowledge is actually such as it is, or rather it constitutes a kind of *objective knowledge*, which is developed and established within a particular 'regional ontology' determined by the discipline itself whose scientific cognitive assets are possibly being examined.[33] This allows us to better understand the dynamic role that science and its objective knowledge can always exercise in relation to the world of axiology. As Preti further wrote,

> knowledge, as regulated by the autovalue of truth alone, is less sticky than *ethos*: of course, it also tends to be preserved, but the law of truth, with the accentuated asceticism it requires, neutralises most of the reasons for stickiness. Science is more 'unprejudiced' and therefore, by its own office, more responsive to the changes that occur in reality. Therefore, by operating critically against the old pseudo-theoretical basis that supports an archaic system of ethical institutions (and therefore of values), it forces it to change, thereby forcing the entire system to re-motivate itself, and therefore to reorganise itself: with the result that different ethical institutions will arise, and will often be *very* different from the previous ones. And so scientific ascesis is a tool for readjusting *ethos* to the demands of life: it restores its foundation to the world of values, the very condition of its effectiveness—it keeps open the ways of its own self-transcendence. This, and no other, is the primary function of scientific knowledge, *as knowledge*, within the historical dialectic of civilisation.

This then configures the eminently dynamic, critical and *liberating* function of the objective knowledge elaborated by science, precisely in relation to the world of values. It is significant that the objection of 'immorality' towards science and scientific knowledge itself has often been raised in the course of history. To the extent that the 'sacred' values of a society are threatened or vacillate on the verge of an epochal meltdown, then it is precisely science, which is *indifferent to values*, that has been variously judged (and condemned) as materialistic, atheist, mechanistic, anti-social and as socially dangerous. Moreover, there have been scientists and epistemologists who have belittled these criticisms by affirming that science is instead deeply sensitive to values and even intrinsically religious, precisely because there is also an intrinsic religiosity of scientificity itself ... But, as we have seen,

[33]For an original examination of the *L'oggettività e i suoi contesti* I refer both to the exhaustive analysis developed in the homonymous volume by Evandro Agazzi (Bompiani, Milan, 2018) and to my previous monographic study on the epistemological problem of objective knowledge: F. Minazzi, *Le saette dei tartari*, Franco Angeli, Milan, 2004. English version: Evandro Agazzi, *Scientific Objectivity and its Contexts*, Springer International Publishing, Cham, 2014.

science does not constitute a world of values, but rather it is configured, if anything, as a complex form of the objective spirit that is organized and forged around an immanent value such as that of scientific truth and immanent criticism, or rather of the objective knowledge of the world achieved by scientific thought through some arguments that can always be improved and made increasingly rigorous and critical. In this precise sense, then science knows only the concepts of true and false, while it completely ignores the concepts of good, bad, ugly, beautiful, adversable and desirable, as the seventeenth-century philosopher Spinoza already stated with great clarity. He elucidated, with undoubted in-depth analysis and clarity, precisely the pure theoretical ideal value of scientific knowledge. But then Spinoza himself paradoxically ended up by unduly overloading this right and correct image of objective scientific knowledge, by transforming it into an *amor intellectualis* which contrasts with the very 'soul' of scientific research. But the 'square circle' outlined by Spinoza was then actually realised also in subsequent human history whenever either an axiological value was wrongly attributed to science or this was attacked precisely because of its lack of values. Faced with this paradoxical situation, if we return to Husserl's approach, it appears clear that the founding noema of a world is precisely the cognitive and theoretical one, whose propositions are either true or false. In this perspective, as we have seen, the axiological dimension exists only on the condition that the primary object exists. Consider the history of witchcraft: witches were variously persecuted as long as it was believed that a discipline such as witchcraft actually existed and also to the extent that an effective cognitive significance was attributed to this discipline. But when the impossibility of witchcraft was finally realised, the persecution of witches gradually disappeared, precisely because its founding proposition—the theoretical-cognitive one concerning the existence of witches—had lost any possible objective value. Similarly, when the physiological pathological nature of epilepsy was finally recognised, the traditional and widespread belief in the 'sacred disease' gradually disappeared from the cultural horizon and epileptics were no longer persecuted as forces of evil or revered as diviners, because an attempt had finally been made to treat them as sick people.

From all these considerations then follows the *well-argued* consequence that we can express by sharing an insightful conclusive remark by an epistemologist like Geymonat:

> what the masses spontaneously but firmly oppose to those who, on the basis of these findings, set themselves up as a severe critic of scientific-technical progress, to which they would like to oppose a culture 'free' from any scientific contamination, can be summarised in a few lines: to stop this progress by invoking purely moralistic arguments or by trying to counteract old ideas of the world with an idealistic background, is the fruit of mere fantasy and is therefore doomed to failure. The real main

> contradiction of our culture is not between scientific-technical progress and the romantic aspiration to a kind of life that belonged to the pre-scientific era (it might be that it can appear worthy of regret only to those who have not realistically examined all of its aspects, including the most cruel and repugnant ones). The main contradiction of our culture is the contradiction itself (between labour and capital) inherent in the societies within which our culture (the scientific-technical one as well as the humanistic one) takes root and develops. It follows that the means to which one must resort to eradicate the evils generated, within this society, by scientific-technical progress are very different and far more serious than those often proposed by the romantic denigrators of scientific rationality and, with it, of the whole modern world. [In this perspective it is necessary] to initiate a truly new civilisation, which dialectically moves beyond the current one, starting precisely from its contradictions: contradictions that cannot be simplistically denied or veiled as if they were a figment of our imagination, but, on the contrary, should be investigated in depth, exasperated, taken to their extreme consequences, until an authentic solution emerges, which can only consist in a real, courageous, revolutionary process.[34]

From this perspective of a much called-for radical social change on a global level, we can then conclude our brief reflection by affirming, paradoxically, this time with Spinoza, that the authentic value of a scientific truth that is *wertfrei* is rooted precisely in its *critical liberating force*. This is its undoubted historical value, which we cannot renounce, since it is this that has historically helped us to emerge from barbarism ...

[34] L. Geymonat, *Scienza e realismo*, op. cit., pp. 142–143.