The Meaning of Kant's Attitude
Towards the Technical Instruments of Science
in the Atmosphere of Enlightenment

Ana BAZAC[*] iD

ABSTRACT. I mention the main, technophile and technophobe, positions towards technology in the Western 18th century, as the criterion of this paper. Then I show that, however unexpected would this be, the *concept* of technics – opening the *problem* of technics – was explicitly present within the transcendental philosophy. From its multiple meanings outlined in the logic of this philosophy, I focus on the technical instruments of science. Kant considered them optimistically, but insisted that they are only means subordinated to the capability of reason that alone is able to give knowledge. And the vault key of knowledge is the moral law (the moral *telos*) given by the human reason. Thus, answering to Rousseau, Kant indicates that the progress of knowledge is ultimately determined by this moral, and not by the enrichment of cognisance as a result of technical instruments. If we consider them as a model for the treatment of the technical objects in the broad sense of this term, Kant introduced the criticism of the technophile reductionism, while creating the frame of the positivist science and the humanistic philosophy of the 19th century.

Keywords: Kant, technical instruments of science, technic/technology, technophilia and technophobia, moral law

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[*] Professor, Division of Logic, Methodology and Philosophy of Science, Romanian Academy, Romania, ana_bazac@hotmail.com

Prologue: the Kantian meaning of technological optimism

The historical context (de Tocqueville, 1866, 22-26; also, de Vries, 1976[1]) within which Kant worked has deeply influenced his worldview. The reforms-lover Frederick the Great was for him a proof that these reforms are possible, not only logically and through *a posteriori* thinking necessary: and the power of reason gradually defeats irrationality, inhuman behaviours. Kant was a philosopher, always seeking the accurate and consistent reasoning: that was not utopia, of course, but the way toward the solving of cognitive and social problems; nevertheless, the distance between the rigorous demonstrations of theories and the real life was huge and assumed by Kant: the intellectual and the physical work were structurally different and opposed, and thus, even some structural aspects of agency were avoided. However, just in the Kantian understanding, this sidestepping leads to the exclusion of those aspects from the kingdom of the human *universalizable*. Kant was indeed the emblem of Enlightenment by promoting the idea of the human being understood through its universalizable: the human reason *and* the human capacity to behave according to the moral law.

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[1] The relative social backwardness – "Friedrich Wilhelm I had destroyed serfdom in his domains in 1717. The particular code of the great Frederick, as we have seen, purported to abolish it throughout the kingdom; but, in reality, it only made its harshest form, *Leibeigenschaft*, disappear; he preserved it in its softened form, *Erbunterthænigkeit*. It was not until 1809 that it ceased entirely" (de Tocqueville, 1866, p. 355, Note 5, Date of abolition of serfdom in Germany) – of the German states, and here of Prussia, in the 18th century, was accompanied by a quite vivid coagulation of the "public sphere" in the form of learned societies of high-ranking officials, officers, clergymen, university professors of different specialties, physicians and pharmacists, merchants (As Johann Conrad Jacobi (1717–1774) and Robert Motherby (1736–1801), in Horst, 2020) who shared the same commitment to develop not only knowledge but also the ability of citizens to actively promote the modernisation reforms in the administration of the state. In principle, thus theoretically because this was its modern Western constitution, the bourgeois private sphere is opposed to the public sphere. However, in Prussia the members of the learned society saw rather the consensus, the unity of the public sphere of the state – that imposes its own order – with the private one, motivated by and wanting freedom.

And this consensus was not seen by the German intellectuals without problems: but they could and should be solved with the freedom of critique, of the deployment of a state programme of knowledge sharing and education.

The Berlin Wednesday Society in 1783-1798 (*Berliner Mittwochsgesellschaft* (or *Gesellschaft der Freunde der Aufklärung*)) was an example of these societies. Johann Karl Wilhelm Möhsen delivered "What Is to Be Done Towards the Enlightenment of Citizens?" in this society in 1783. This and other papers promoted the critical spirit – result of education and ability of "*bien raisonner*" as Frederick the Great insisted – therefore the formation of modern members of society, of citizens. Hence, the entire Enlightenment age was "a pedagogical age" (Munzel, 2012).

Science[2] and technology[3] (and "even the empirical knowledge of humankind" (Kant, 1998 (AA3. KrV. A850/B878), p. 701) were the direct manifestation of the human knowledge. Their advancement proved the power of the human reason to construct "means" for the "essential ends of the human reason" (*Ibidem* (KrV. A839/B867), p. 695), with the *sine qua non* help of metaphysics. This position was not technophile in the present meaning of this word, that is, it does not deduce the solving of social problems only from the scientific-technological progress. But it was optimistic, emphasising that the scientific discoveries and technological innovations would bring a higher capacity of humans to develop the rationality of their behaviours. Science and arts are main parts and drivers of culture that "ennobles humanity": but their results concern the human *species*, not a certain time interval when the progress is only fragmentary and "offers no guarantee against regression" (Kant, 2006b (Anth. AA 07: 325 and 326), p. 240).

This was a general viewpoint in Enlightenment. However, there was also a pessimistic stance, for instance that of J.-J. Rousseau (MDCCCLVI[4]) – we have doubts

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[2] Kant distinguished between *science* as concrete cognitive endeavour arising from a scheme (internal organisation of research and concepts and ideas) that follows empirically accidental intentions whose objects are not known before, and *philosophy* whose scheme is given by an idea in which reason gives *a priori* the ends and does not expect them from the empirical research. The internal organisation of science gives it a "technical unity", while that of philosophy gives to this unique, special knowledge an "architectonic unity" because it is based on the "essential ends of reason "(the moral ones) (Kant, 1998 (KrV. A 833/B 861), p. 692 sqq, esp. A839/B867, p. 695).

  (See also Gabriele Gava, "Kant's Definition of Science in the Architectonic of Pure Reason and the Essential Ends of Reason," *Kant Studien*, 2014; 105(3): 372–393).

[3] Here, *technology* in its contemporary meaning, as application of scientific knowledge. But Kant used the term technology – shortened as *die Technik* – as *methodology* of theoretical and practical problems, inserted either within the sciences or in the practical process of fabrication (Kant, 1987 (KU. AA 05:198), p. 388: "practical propositions that in their content deal merely with the possibility of a presented object (through voluntary action) are only applications of a complete theoretical cognition and cannot form a special part of a science. A practical geometry as a separate science [of geometry] is an absurdity". And indeed, in its instrumental meaning of application of science, technology is the application of many types of methodology: of the process of knowing, of the practical applications, of the technical objects. (See also Aigner, 2020, p. 16).

  Regarding *science and technology*, Leibniz (2012, 485, 491; 487, 489) considered them independently one to the other, 1) highlighting the separate development of mechanical arts/inventions and "rather by chance" or having a "superficial considerations than to the depth of mathematics" and 2) emphasising the real origin of the technological inventions: science, i.e., in the form of "geometrical" as deep understanding correlations and the "combinatorial" as transposition in symbolic calculus.

[4] And more related to the material side, Leibniz, *op. cit.*, p. 616, put the question and answered: "after so many inventions of our century do we die less often, or are we more secure from diseases?"… "we would often be happy, long-lived, and disease-free, if it sometimes occurred to men to be wise; if they reasoned seriously, if they used divine favours".

to call it veritable technophobia because the author himself considered it, when the *Discourse* was re-edited, as "poor" (Rousseau, *ibidem*, 465) –: the progress of sciences and arts did never (as in examples of Egypt, ancient Greece and Rome) lead to the raise of manners and morals, and in modern times their application – as the printing press (*Ibidem*, 475) – generates troubles and did nothing add to the human genuine happiness, but corrupts it.

Kant considered this question theoretically: *firstly*, the concrete morals and the level of science and technology are different problems and have no a direct mutual influence; *secondly*, the betterment of morals is directly depending on the degree the humans internalise the moral principles which are categorical imperatives, transcendental and arising from the power of the human reason; *thirdly*, this also means that the technical objects themselves reflect this degree and thus correspond to the human ends. In this way, the human and social problems globally, depending on many hypothetical causes, are ultimately solved not by the material marvels made by humans[5] but by their conscious self-control according to the criteria of moral categorical – since transcendentally created by reason – imperatives.

Kant showed that Rousseau's pessimistic position was related to his paradigmatic theory of the good state of nature versus the evil state of civilisation marked by the transmission, by the multitude of individuals, of their freedom to choose to leaders: thus, by the presumption that man is good by nature and perverted by the society based on the social contract of transfer of power. Kant mentioned the real experience of ancient and modern times which would "disconcert every thinking person and make him doubt whether our species will ever fare better", and that nevertheless, Rousseau – and thus any logical thinking – would not profess the "return to the woods" but rather to use the model of state of nature in order to correct the present state of things (Kant, 2006b (Anth. AA 07: 325, 326, 326), pp. 239-240).

Letting aside his deep appreciation of Rousseau, Kant criticised his theory about the relationship between the progress of science and art and that of morals. Concretely, Kant explicitly considered Rousseau's paper in *Anthropology*, from the standpoint of the predominance of culture over "the crudity of mere personal force" of man, (Kant, 2006b (Anth. AA 07: 323, and 324), p. 237). As a result, "the human being is destined by his reason to live in a society with human beings in it and to cultivate himself, to civilise himself, and to moralize himself by means of the arts and sciences", *ibidem*, AA 07: 324 and 325, p. 238.

[5] Humans have, of course, a "*technical* predisposition" to manipulate things, but at the same time they have, besides a *pragmatic* one ("to use other human beings skillfully, for our own purposes"), a strange predisposition related to sociability that "presupposes freedom" (but at the same time that could manipulate other human beings, so that is a technical skill): a *moral* one to treat others and ourselves "according to the principle of freedom under laws", Kant, 2006b (Anth. AA 07: 241), p. 143, and AA 07: 322, p. 235. Also, Kant, 1987 (KU. AA 22: 120), p. 203.

And, according to the naïve approach of the objective world in Aristotle and pre-industrial τέχνη, but also in the industrial age, technics are instruments, and the human reason seems to being subjugated to the instrumental need, the need to consider everything as a means. In order to doing what? Again, as if warning the following centuries, Kant explained in the most consistent manner to which ends are the technological means justified.

Introduction

Already in the 17th century an entire field of European researchers in various branches of science flourished[6]. But the artisans' technical skills and results surpassed the scientific knowledge based on the decomposition of movement and its mechanical laws. While the concept of *machine* became common in philosophy (Bazac, 2010) and science, the construction of machines or mechanical structures remained the privilege of artisans. The philosophers cherished the concept of machine as the model of gearing the various forms and parts of a system within a single coherent and functioning unit.

But in order to conceive of and practically make machines, they had to learn from artisans[7].

Kant was not a "philosopher- inventor- engineer, capable of uniting theoretical knowledge to practical knowledge of the material world and those who could work it— a new sort of persona" (Jones, 2016, 30), because his goal was to understand and reveal the formation of knowledge and not the practical application of technical knowledge. He was consonant with most of philosophers and, more, with the

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[6] Through the net and means of *knowledge communication* in his epoch, the so-called *knowledge in transit*, the dynamic system of recipients and means of communication of the texts, symbols, meanings. See Secord, 2004.

[7] Leibniz thought to a calculating machine, thus not physical but of symbolic calculus to perform arithmetical "certainty" "prepared by observation rather than by meditation" and easing/simplifying the "geometrical" understanding of things that itself is the key of material objects by its selection of forms allowing profound meditation (Leibniz, 2012, 488; and 495: "This is indeed the reason, if I am not mistaken, why the ancients thought so much to contemplate forms separated from matter, and why they did…divine things") and to even build it. In order to do this, he had to follow the artisanal secret in the Paris manufactures, (Jones, 2018).

The artisanal knowledge, related not only to calculating machines, included: propositional knowledge as resulting from a long experience with materials, "discernment, or the acuity of senses in making judgments about perceptions" of different properties of materials, "dexterity in doing work with hands", "knowledge of the social world where other artisanal knowledge and skills can be found", Jones, 2016, pp. 35-36.

learned society that benefitted from the separation of physical and intellectual labour. He contemplated the signs of ardent physical labour and its results, including the technical discoveries, from the distance given by his total urban-centred and intellectual life-centred outlook.[8] And he could not remove too much from his

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[8] However – and this is cardinal as an example of changes within the worldview of the intellectuals who were fully framed by the very old *exclusivist* tradition of rationalism, of reason as the human being's main feature covering all the others, and thus, of the qualitative superiority of contemplative activities towards the practical ones – Kant looked critically at his own imprisonment in his condition: not only in his personal *Remarks* related to his 1764 popular philosophy book *Observations on the Feeling of the Beautiful and the Sublime*, and where he many times expressly repeated that his awakening from the mechanically assumed disdain towards common people in the name of the privilege of knowledge was due to Rousseau, but also in the works of the critical period.

The main paradigms of these works were just:

1) "dualism", i.e. theory of the *sine qua non* intertwining of the contents of appearances given by experience to our outer perceptions with the principles as "transcendental objects" conceived from concepts and which lack concrete determination but which substantiate our cognition, as "an unknown ground of those appearances that supply us with our empirical concepts" (Kant 1998 (AA 3, KrV, A379, A 380), p. 431);

2) transcendental idealism, that is to say mediation of ideas between we, the knowing subjects, and the external things; thus, we know: a) not directly the external world and b) we know what and how this external world appears empirically, so c) we know ideas formed through the above dualism; and the topic of transcendental dualism is just the formation of knowledge from an epistemological, and not a psychological standpoint;

3) the grounding and formation of ideas are natural, ontological, but the responsibility of ideas depends on the moral assumptions of humans;

4) the moral ideas are based on transcendental moral principles, grounding the moral assumptions, so these moral assumptions – obviously generated by empirical conditions which are the basis of hypothetical maxims – are evaluated by humans according to the moral transcendental principles embedded within the human consciousness as its formal conditions of knowing the difference between the good and the evil, according to the moral end of the human person that is his reason-to-be ("vocation");

5) but concretely, this evaluation is the result of the empirical conditions of people, of their social place and their level of education; which are low for the majority of the population;

6) therefore, if the solution for attaining a general tendency toward morals according to the moral principles is the enlightening reforms and the contribution of the learned strata tot them, these strata should take over the philosophical understanding of social equality within a successful civil union of all both in a *Staatsrecht* and a cosmopolitic *Völkerbund*;

7) the interdependence between the empirical data and the knowledge from concepts is the epistemological grounding of priority of moral thinking over the theoretical, epistemological, because the ultimate reason-to-be of theory is the practical, the human life according to the moral ends of the human being; therefore, the moral philosophy, grounding with its *a priori* principles the practical moral science, is preeminent over the theoretical philosophy (Kant 1998 (A 840/ B 868), p. 695).

Consequently, his example could nevertheless be thought by Kant as a necessary and possible path of intellectuals. Anyway, he knew very well the state of things in Prussia and not only there. Just from this knowledge arrived he to the understanding of the necessity and possibility of convergence between

personal Remarks milieu of destination and reception of his works. Instead, he provided theoretical messages concerning the criteria of freedom of critical thinking and of moral rigour, based on the principle of man-technology asymmetry and every man's capacity to behave according to the moral categorical imperative.

Kant wrote in a clear natural language, with direct explanations and not substituting the philosophical analysis/explanation with metaphors. He did not focus on *methodology* in order to get away from the traditional sensible instrumental meaning of τέχνη, but because (the cognitive) methodology was the way to arrive to objects: which, as technical objects as such, were not in the task of philosophy to being understood, he believed. The technical objects were not undetermined "things", but concrete, determined things: created by the human focus and by the human knowledge to transpose ideas, design *into reality*. The two versants of creation – the foundational/ the knowing, and its manifestation as making – were treated by Kant as methodology. This treatment was epistemological: methodology was the scaffold /skeleton of the deployment of epistemology. The (technical) objects belong to the ontological treatment, although the objects as such are constitutive elements of the epistemological relations.

The interest for the technical object, thus not for the process, methodology, organisation leading to it – keys of technics, but outside the technical object as such – involves a holistic approach of its integral reality (not of its decomposition and re-composition of its "matter" and form) in relation with the maker, the subject. The reason-to-be of the technical object is just its instrumentality for the subject, its beneficial relation with the subject. If this feature of the subject-object relation is dislocated, both the object and the subject change.

A metaphorical use of "technics"

We start from Kant's use of the word "technics" (*Technik*) in a *metaphorical sense* – actually borrowing the ancient meaning as *art*, ability to putting into effect the creative ideas of making –. In the ancient meaning there are two aspects: one is the creative ideas and the other is the ability to transpose them into practice. The

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the modern "civil sense" and the "natural sense" of human relations. For this understanding, as well as the knowledge of real state of things and the self-reflection on the evolution of his intellectual attitude towards the common people, see Bemerkungen zu den Beobachtungen über das Gefühl des Schönen und Erhabenen / Remarks on the observations on the feeling of the beautiful and the sublime (1764-1765), in AA 20: (Handschriftlicher Nachlaß) 24, 39, 40, 41, 44, 48, 102, 151, 153, 176.

Also, Michael Kryluk, "Reflection 6593: Kant's Rousseau and the Vocation of the Human Being", *Kant Studien*, 2023; 114(4): 728–758.

philosophical task Kant gave to himself was to understand the way through which the object is known by the subject, thus knowledge as such. But what does knowledge entail in order to arriving at creative ideas? Well, to know an object means to understand the *internal deployment of its constitutive causality*. Only by knowing the deployment of the internal causality of things can the humans imagine objects and materially transpose them into reality, thus having the capacity of generating/ making new objects as nature has[9].

The approach of the internal causality of objects is called *methodology*, namely, manner to know or survey the elements, steps, and links in the knowledge of the constitution of cause-effect structure of the objects. The humans approach methodologically every object. Just this approach guarantees the knowledge of things and is its sign.

Kant considered that the ability to focus on methodology, on the methodical deciphering of the internal causality of objects is a "technical" ability, that conducts to a direct description of the structure and functioning of an object, and only by having this ability can the humans make intentional objects. The deciphering as such was a technical theoretical perspicacity, while the transposition of such a theoretical ability into practice was a practical aptitude[10]. This model of the human beings as: 1. *"technical" beings*[11] and 2. *creative beings*[12], was transposed on *nature*. But this transposition was made with the term exclusively related to humans, "technic".

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[9] Kant, 2006b (Anth. AA 07: 198), p. 167, the body is a "machine" that generates and processes "mechanically" movements and affects.

[10] The (1) "*technical-practical* reason" or *instrumental* reason based on a hypothetical imperative and thus, a given empirical goal that imposes a certain action / "(which prescribes means: for the purposes of sense-objects)" (thus it is determination of the will) with (2) the "*theoretical-speculative reason*" that concerns the determination of objects, and here the eternal and necessary objects, and (3) the "*moral-practical reason*" emphasizing the principles of a good human life based on the categorical imperative form the world of ideas subjacent to our knowledge of reality/the world (Kant, 1993 (OP. AA 22: 52), p. 212).

Therefore (*ibidem* (AA 21: 12), p. 220), "Technical-practical reason contains skill and arts. Moral-practical, duties".

And (*ibidem*, AA 21: 23, and AA 21: 24, p. 227) the "difference between the principles and laws of technical-practical or moral-practical reason": the first concerns the freedom of a man in the world, the second, God as a *rational concept of freedom*, connecting the manifold with the categorical imperative of a person. (But, (AA 21: 17), p. 223: "There is an object of moral-practical reason which contains the principle of all human duties "as if divine commands," without it being the case that one may assume, for the sake of this principle, a particular substance existing outside man").

But these two kinds of reason intertwin.

[11] Because they are rational in a theoretical and practical sense, thus in virtue of their reason to search for and know the causality of things in a methodical manner.

[12] Expanding the reality by generating new objects, just because they transpose into practice their methodological (technical) knowledge.

Kant spoke about the *technic of nature* (Kant, 1987 (KU. AA05: 390-391), p. 271), nature having both *technica naturalis and technica intentionalis*) as:

(a) its internal articulation of its elements – thus as an internal "mechanism" with unintentional purpose – and

(b) as a system aiming to purposes, *as if* nature would have been a conscious rational being that knows itself, specifically that it understands its internal causality and deploys this in order to generate and regenerate, to create as an artist does.

Therefore, the metaphor[13] of technic of nature was based on two comparisons: a) (having technical skills) the humans are like nature, they produce; b) nature is like humans, it appears as to having knowledge of its own internal deployment of causality.

The precise use of "technic"

Everything is – and must be – treated "technically", namely, scientifically, decomposed and analysed so that to emphasise the constitutive laws of the functioning of every system. Thus, every system has its own technicity, its internal articulation for its duration, and, on the ground of the interest of humans to grasp it, the researchers in different domains developed the *instrumental reason* that is subordinated to the content of knowledge and to the pursuit of the practical purpose of knowing this content, being therefore "artists of reason" (Kant, 1998 (A839/B867), p. 695). Consequently, the sciences in different domains, and even philosophy in its "scholastic meaning" (as sure cognition from things/from ideas[14]) until Kant, aimed only a coherence of their cognition, their "logical perfection of cognition" (Kant, 1998 (A838/B866,) p. 694), thus their technique of "skills for certain arbitrary ends" (Kant, 1998 (A839/B867), p. 695[15]).

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[13] The metaphorical use of technics / technology is based on its literal meaning: as both a *way* of doing (or as rules of procedures) and as a *means* of doing (tools, devices, apparatuses); these aspects are intertwined, but the Greek etymology suggests that technology would be the discourse about technical means, thus including procedures, i.e., a set of precepts about the technical objects and procedures to implement them. This understanding is common in many countries, though the difference is not so harsh nowadays.

[14] This understanding means a twofold amphiboly: that the proof of things is what we do know about them, and that things are the proof of cognition.

[15] Again: Kant was interested to substantiate the sciences and their instrumental reason, and developed the metaphysics as "science" (Kant, 1998 (A841/B 869), p. 695) that mediates every science and every empirical knowledge with its own scientific (thus, technical) approach of "rational cognition": "from mere concepts" (*ibidem*), that is to say in a *meta* epistemological – transcendental – consideration of the "system of all concepts and principles that are related to objects in general, without assuming objects that would be given" (*ibidem*, A845/B873 p. 698), and relating all cognition "to the essential ends of human reason (*teleologia rationis humanae*)" (*ibidem*, A839/B867, p. 695), skills for these essential ends.

In contemporary terms, Kant's technics means both:

1) *technique* as *ability* of reason a) to *disclose* the causality and internal articulation of things / to put order, namely to ordering concepts according to the infinite series of sense and experience data and ordering these series under concepts, and also b) to *make* objects on the basis of scientific ability/technique;

2) "technical" as *internal articulation* of things;

3) *technical* as *methodology* of scientific/technical knowledge, thus as a *meta* mental level of structuring the cognitive process from the standpoint of its efficiency, thus as an instrument for giving the frame necessary to know something;

4) *technical* as *feature* of objects;

5) while in a narrow sense, actually literally – *technical objects* as *man-made or artificial technical objects*[16].

Concerning *technology*, it reclaims all of these meanings, as an automatic synonym, being nowadays more than its etymological meaning in Beckmann[17] as discourse about technical objects and procedures.

Obviously, my paper cannot consider all these meanings, but only one, chosen here in the frame of the man-made technical objects, thus a kind of 5': *the technical instruments of science*[18].

The transcendental level of our understanding and even of the constitution of the consciousness is a level of formal structure: components (concepts, ideas, judgements) and procedures of the formation of knowledge, level whose logical layer is rather an internal one in it.

[16] There is a significant difference between the artificial objects as *purpose/goal* of making, and as *means* of making: both in productive activities and research. Obviously, every artificial object is both purpose and means, but the purpose implies that it is the end of conception and realization, while the means is only an intermediary end.

[17] Kant knew the word technology at least from *Anleitung zur Technologie*, 1777, written by Johann Beckmann (1739-1811) who coined this word as a science of crafts and craftsmanship, as they are included within economy. To have craftsmanship involves knowing the methodology used by crafts, that meaning also the technical objects: tools and the objects of work ("*naturalia*").

[18] The paper draws attention on an aspect related to the most visible aspect of technics and that may help to understand one of the greatest general concerns nowadays.

Technical objects

For Kant, every object the humans focus on is "technical" – namely, approached from the interest to be known so as to being arranged in their mental scape of cognisance in order to use this knowledge in the everyday life –; or, every object is approached through their internal methodology of the process of knowing: giving a more and more coloured and large "world"[19].

The technical objects, which are the technically seen objects, are considered both empirically and rationally, with (and from) abstract concepts, that is, they are decomposed and their causes are known, therefore their relations and laws of functioning as they appear to the humans. This way of knowing is /gives the peculiarity of technology as both man-made objects and their methodology of knowing, making, and preserving.

Methodology is also a technical object, considered scientifically in Beckmann as "technology", and without the awareness of technical objects there is no science as a systematic knowledge of the *system* of

1. *upstream*, 2. *fulfilment of knowing and practical application*, 3. *downstream*; neither of the principles of this knowledge and nor of its results. The methodology of crafts integrated within the knowledge of administration (the so-called cameralist

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[19] Already in the Inaugural Dissertation, the "world" is given by our knowledge, but only as reality meaningful for us, not as existence, and is objective: (Kant, 1992, 377 sqq) "the notion of a world should not seem merely arbitrary and made up, as in mathematics, only for the sake of the deducible consequences"; (*ibidem*, 391). "But the world regarded as phenomenon, that is, in respect to the sensibility of the human mind, acknowledges no principle of form but a subjective one, that is, a certain mental law by which it is necessary that all things qualified for being objects of the senses would seem to pertain *necessarily* to the same whole". And further: "the principle of the form of the sensible world, it will comprise only *actual* things in as far as thought of as possibly falling under sense-perception". (The translation uses the word "actual" for expressing "real existence"/"existence in fact", thus not simply existence, that is the ontic basis of the ontological meanings, but existence that is ontologically significant, namely *reality*) (MSI. AA 02: 389 and 398).

For Kant, reality exists as a result of our experience mentally processed with the help of *a priori* elements; connected to this standpoint of knowledge, the phenomenological viewpoint expresses the same ontological-gnoseological description of reality as the meanings people discover following complex judgements. Reality is according to these meanings (information and significances) existing and forming within the mind in the complex process of judging with both empirical and abstract concepts and ideas; and, once formed (transcendentally) these concepts and ideas exist, so they are objective, being criteria of knowledge, thus of reality, and following our experience positioned according to the meanings from a "worldview"/paradigm. See (Kant, 1993 (OP. AA 21: 87), p. 250) – as the last expression of this theory – an experience "presupposes a formal *a priori* principle and a system). Observation and experiment, as an aggregate of perceptions, are far from founding the Hippocratic proposition: There is experience".

science (Garner, 2017)) was intended for the elite who was to lead the German society in high-ranking posts (Wakefield, 2017). On the one hand, this science of "technology" seemed to have nothing to do with the principles a "true science" aims at and promotes. On the other hand, the systemic outlook was an early[20] notice of the integrative meanings of technology and of the dialectic of continuity and discontinuity in sciences (which could share and transfer particular views and principles) (Hock, 2017).

Therefore, technology had in fact all the five meanings mentioned above.

The technical instruments of science

For thinkers, the scientific technical instruments were one of the most astonishing and, at the same time, problematic artificial objects: because they allowed the extension of physical and "combinatorial"[21] capability of researchers, although the power of "contemplation", of thinking was the force of knowledge[22]; they were only *means*, but without which the scientific knowledge could hardly be conceived.

The scientific instruments were compared with the productive machines[23] which were anterior to them, and whose spontaneous practical models[24] generated

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[20] However, already in 1728 Christian Wolff (1679-1754) discussed the words *technica* or (*aut*) *technologia* as a part of practical philosophy – that is, of the "effective science directing the free actions through the most general rules" – as "science of arts and works of arts, or in other words, of the organs of the body, especially of the hands, the works of men they are done" (Wolfio, MDCCXXXV, § 70 and 71, p. 22).

That "or" was the follow-up of the use of these words in Middle Ages and Renaissance focussing on instruments, including on machines, as an art or artifice (*astutia, impostura, frauda*), necessary and existent everywhere in the human affairs (see Carnino et Hilaire-Pérez, 2017, pp. 13-36; but also, Aigner, 2020, 95, quoting Wilfried Seibicke, 1968. *Technik. Versuch einer Geschichte der Wortfamilie um τέχνη in Deutschland vom 16. Jahrhundert bis etwa 1830*. Düsseldorf: VDI Verlag, especially his underline that the Stoic definition of τέχνη as a system of rules became prevalent in the 17th century). Also, Maar, 2023.

[21] Leibniz, p. 488: "in the arithmetical instrument, which transfers all the labor of the soul into the wheels".

[22] Kant, 1998, Preface to the second edition (KrV. B.XXIII), p. 113: "Copernicus assumed (with certainty) at the beginning only as a hypothesis (the central laws of the motion of the heavenly bodies)".

[23] Leibniz, *ibidem*: "As nor are they easily enunciated, nor immediately understood by any hearer or spectator, whence we have an elegant example in the *weaving machine*, now frequented here and there…". (I underlined, AB).

Or, it was about the *stocking frame*, discovered in 1589. (See Friedman, 2024).

[24] Leibniz, pp. 488, 489: "it is easier to condense into a body than vapor raised from things by heat; examples of bathrooms they were before their eyes, yet no one of the Greeks and Romans came to mind the spirit to draw out of the wine, although he was a witness"… "From this it can be understood that sometimes people look far away, but do not see what is before their feet".

in researchers theoretical ideas covering a larger and larger area of things. At the same time, if the instruments were not based on a conscious theoretical thinking, they still were primitive and did not lead to certainty[25]. On the contrary, the principles – through rules – organise the investigated process and systems. Anyway, the scientific technical instruments were integrated in a different type of endeavour: Kant distinguished, though he observed their blurred boundaries, art as free arts[26].

Kant sketched a frame for the latter analysis of the scientific instruments. He was not original in 1755 (Kant, 2012 (NTH. AA 01: 215-369) by emphasising many times the dependence of development of astronomical knowledge on "periscopes" (*Sehrohre*, AA 01: 253), telescope (*Fernglas*, *Ferngläser*, AA 01: 289, 294), once more mentioning this relation in *Anthropology* (Kant, 2006b (AA 07: 134), § 5, p. 25, and AA 07: 178, p. 78). Telescopes were seen as *sine qua non*, material conditions of confirmation, in their evolution (see 294), of their ability to emphasise new information and to contribute to physic predictions, but with inherent limits in front of theory. The creative initiative (in imagination and theory) belonged to scientists, irrevocably, but nevertheless the scientific instruments started to show their power to reveal reality[27]. And this, because: 1) the knowledge of what the things are (and letting aside that we cannot know really the things as they exist, the things in themselves) cannot anyhow be realised only by senses, and 2) the senses themselves are limited and need their artificial prolongation, the "prosthetics"[28] of technology; 3) however, as prosthetics not only substitutes the missing or damaged organs and senses but also enhances them, so the scientific instruments can show absolutely new unseen/unfelt and un-imagined things[29].

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[25] *Ibidem*, p. 491: "we ourselves had above objected to the telescope of a plebeian man unlearned in mathematics being necessary, is not so certain as some think".

[26] Distinction of "occupation that is agreeable on its own account", from the crafts, "mercenary art we regard as labor, i.e., as an occupation that on its own account is disagreeable (burdensome) and that attracts us only through its effect (e.g., pay), so that people can be coerced into it" (Kant, 1987 (§ 43, 3) (KU. AA 05: 304), p. 171).

And he discerned between this (social) type of coercion and that internal to every art, including the free ones, called "mechanism" (*ibidem*: "In poetry, for example, it is correctness and richness of language, as well as prosody and meter", and thinking upon it is transcendental, too.)

(Obviously, Leibniz spoke about the technical scientific instruments – as telescopes and microscopes, 492-493.)

[27] Kant, 1993 (OP. AA 21: 88), p. 251, the barometer as the intermediary of von Humboldt's observation of specific movements in the atmosphere.

[28] Stiegler, 1998: permanently transformed and transforming the human, showing through this transformation the default, the lack of man towards the features fulfilled by technics.

[29] However, first, the scientific instruments are those which help the intellectual activity of mind's memorisation: utensils for writing / drawing (The compass and ruler are not only instruments to measure – as they are described immediately – but first to draw, i.e. to exhibit in forms what our

Instead of conclusions

Obviously, Kant did not see all the meanings or consequences of technology we experience nowadays. Even manifested as procedures and methodology, and not only as tools materialising them, the instrumental reason substantiating all the tools, devices, instruments and imbued within them was seen as a clear illustration of the power of the human intellect. And even though both the biological systems[30] as a machine and the instruments without which scientific observations could not be made had a novel, special and paradoxical capacity to perform *as if* by themselves[31], in fact they had not the *autonomous will*[32] that is compulsory for the action to perform, to make.[33] The *model* of the technical instruments of science whose advance

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a priori imagination conceive, for example, "the line and the right angle". We see here a new type of mediation: that between memory and reasoning. Kant did not focus on this, but on the simpler instruments which measure (somehow engraving new signs/ideas in the mind): "compass and ruler" (Immanuel Kant, 1987 (KU. AA05: 198), p. 388).

[30] For instance, the body.

[31] This is the extension of Kant's functionalism in the understanding of cognition: cognition (actually, consciousness) is a complex of structures ("nerves" and "the brain") with specific roles which fulfill the reason-to-be of the entire system; and conversely, this entire system shapes the roles of different structures and their interdependence. (Kant called the roles as "principles" and "faculties"). The early modern functionalism was the result of both the development of scientific and philosophical research of determinism and the technological ingeniousness of playing around mechanisms. This functionalism challenged the "spontaneity" of mind, but Kant – forerunning the present science – conceived it as a "phenomenon" that is the result of the processes of cognition; but it is not neutral, because it involves reason, and reason with its moral principles have the power to conduct the "spontaneous" combination and construction of the human comprehension. Differently put, the human being has an autonomous will that can select and judge the hypothetical situations.

[32] This autonomous will, sign of reason in the broad sense of both cognition "*ex datis*" and "*ex principiis*" (Kant, 1998 (A835 / B 863), p. 1172), is thus related to the self-feeling/self-consciousness of the "I."
    The instruments of Kant's time did not have, obviously, the "I". But this distinctive feature is still valid today. See Dieter Schönecker, "Kant's Argument from Moral Feelings: Why Practical Reason Cannot Be Artificial", in *Kant and Artificial Intelligence*, Edited by Hyeongjoo Kim and Dieter Schönecker, Berlin/Boston: Walter de Gruyter GmbH, 2022, 169-188 (p. 185: "To say that a computer feels is like saying that a planet flies just because it moves through space").
    Accordingly, as Kant showed, only the humans are responsible, thus including for the use of instruments. But if the Enlightenment spirit was (at least moderately) optimistic concerning the development of the human responsibility, and the technical instruments of science as beneficial means were the model for all the technical instruments of humans, can this perspective still be consistent, valid? This question, obviously not discussed here, was felt by Kant. For example – and this example is of our highest interest – he spoke about the "diabolical arts" of producing and using "the means" of war (Kant, 2006c, p. 68; ZeF, AA 08:347).

[33] Their autonomy is related only to their functions which depended on the human subject who transformed them from potentiality to actuality.

helped and will help the thinkers to deeper viewing the causality of things suggested him that other technical tools would and will lead to similar betterment of the human practice. And concerning J.-J. Rouseau's newly put problem – that the modern improvement of cognisance and technology did not conduct to better morals – Kant emphasised one of the methodological aspects of the *human development-context* dialectic: the hypothetical conjunctures – including the changes in the creation of the objects of civilisation – might well influence the humans, but there is a fundamental basis of their autonomy, just because of the autonomy (spontaneity, freedom) of the human moral-practical reason capable to conceive the categorical imperative[34]. And just because of the human autonomy towards contexts, their behaviour – their cognitive endeavour and practical transposition of their cognition in/through morals – is modelled by rational moral imperatives and is able to transpose them into hypothetical ones and maxims.

However, the instrumental reason proved to be subordinated to contradictory particular (hypothetical) goals. And this situation led Kant to once more: 1) insist on the subordination of the theoretical reason to the practical one, and 2) promote the autonomy of instrumental reason, and of the different realms of instrumental and moral reason, and at the same time the precedence and main determinative role of the moral-practical reason over the instrumental-practical one[35].

Resulting from his ethical theory transcendentally inferred, Kant was an optimist. A moderate one, of course, because, as a result of their life in unpropitious conditions – including from the standpoint of their still exiguous instruments – the human relationships were mostly aggressive and oppressive and people were immersed in their "*self-incurred* immaturity" (Kant, 2006a (WA. AA 8: 35), p. 3), but nevertheless the human beings could transcend this through education: essentially, if they impose to themselves, by the exercise of their reason, their mutual treatment as ends and not only as means; thus, if they substantiate their hypothetical subjective maxims with the universal requirements and features given by their ability to reason beyond the constraints of the empirical[36].

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[34] "It is not the concept of freedom which founds the categorical imperative but the latter first founds the concept of freedom. Not technical-practical but moral-practical reason contains the principle of God. Likewise, nature in the world does not lead to God (e.g. through its beautiful order) but the reverse", Kant, 1993, OP. AA 22:60, p. 217.

[35] The practical cognition/reason giving rules which "prescribe action as a means to an effect, which is its purpose". And although these rules appear as subjective to the subject, as maxims, they are objective, as imperatives, when they hold "for the will of every rational being", Kant, 2015, Book 1, Chapter 1, Definition (KpV. AA 05:20 and AA 05: 21), pp. 17 and 18.

[36] Kant, 1997 (GMS. AA 4: 388, 389), pp. 1-2.

Consequently, the solution against the social evil was not the technical progress and neither the ability to think and judge from concepts as if this ability would assure the confirmation of man's truth no matter the contents of his judgements. On the contrary, the human gift of thinking transcendentally is proven by the moral *telos* of its concrete use.

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Academy Edition (Akademie Textausgabe, AA), all online
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NTH   Allgemeine Naturgeschichte und Theorie des Himmels / Universal Natural History and Theory of the Heavens
FM/Lose Blätter   Bemerkungen zu den Beobachtungen über das Gefühl des Schönen
und   Erhabenen/Remarks on the observations on the feeling of the beautiful and the sublime
KrV   Kritik der reinen Vernunft / Critique of Pure Reason
WA   Beantwortung der Frage: Was ist Aufklärung? / An Answer to the Question: .What Is Enlightenment
GMS   Grundlegung zur Metaphysik der Sitten / Groundwork of the Metaphysics of Morals
KpV   Kritik der praktischen Vernunft / Critique of Practical Reason
KU   Kritik der Urteilskraft / Critique of Judgment
ZeF   Zum ewigen Frieden. Ein philosophischer Entwurf / Toward Perpetual Peace: A Philosophical Sketch
Anth   Anthropologie in pragmatischer Hinsicht / Anthropology from a Pragmatic Point of View
OP   Opus Postumum

Aigner, Franziska (2020). *Kant and technics: From the* Critique of Pure Reason *to the* Opus Postumum. Kingston University London, Submitted in partial fulfillment of the requirements of the Centre for Research in Modern European Philosophy (CRMEP), Kingston University, for the degree of Doctor of Philosophy in Philosophy, June, from https://www.academia.edu/98700872/Kant_and_technics_from_the_Critique_of_Pure_Reason_to_theOpus_Postumum.
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The *morally acceptable* or *inacceptable* must not result from hypothetical particular interests, and neither from a vulgar meaning of duty – namely, imposed from outside – but only if they (the morally acceptable or inacceptable) do not infringe the internal command of reason, the categorical imperative to never treat the others only as a means. The pressure to accept intellectually what is opposed to the categorical imperative cannot be legitimated by the human reason. On the contrary, only what is morally acceptable from the standpoint of moral reason can be accepted intellectually.

The human conscience is not a constant, obviously, but what gives it coherence in its practical transposition is just and only the "transcendentally" created moral criteria. If these criteria are not applied, moral becomes arbitrary, far away from its reason-to-be highlighted by its Greek etymology.

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