

KANT'S HUMAN SELF-DETERMINATION AND HEISENBERG'S UNCERTAINTY (OF KNOWLEDGE)

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ABSTRACT: Kant's necessity of human self-determination by the knowledge of objectively knowable, where human self-knowledge (*Selbsterkenntnis*) rules over the knowledge of an external world, needs to be re-interpreted in the light of uncertainty in quantum mechanics – setting limits on the knowledge of all the parameters, i.e., on human's ability to understand and describe the world objectively. Heisenberg's principle, the fact that we cannot know the present in all its parameters, radicalizes Kant's self-determination. In a situation in which man is no longer able to prescribe the *universal*, unconditionally valid laws, to the Other (nature), and where the indeterminacy (*the uncertainties of the microscopic structure of the whole world*) is valid in (and as the) principle, new limits and demands posed by Heisenberg's uncertainty could be a "model" for re-interpreting Kant's self-determination.

KEYWORDS: Kant – Heisenberg – self-determination – uncertainty – knowledge

The historical fact that Kant's philosophy is the first true, philosophical attempt at the complete self-determination of human being, gives us a right to consider the knowledge of the "external world" (transcendentally founded by Kant's philosophy) as one of aspects of the self-determination. Therefore, we hold, Heisenberg's uncertainty (*the principle of indeterminacy*) of knowledge in quantum mechanics, its determined and undetermined theoretical and practical consequences, is very important for a new re-examination of not only the possibilities and limits of Kant's transcendental knowledge foundation, but also of the entire problem of self-determination. This certainly does not mean that understanding the whole Kant's self-determination program is reduced to the "boundaries" of one random or possible Heisenberg's predecessor, nor we intend to hold firmly to the already observed similarities and differences between their theories, but only to try to compare these two radical revolutions in thinking, with an

emphasis on the new limits and demands posed by the uncertainty principle, as a “model” for the re-interpretation of Kant’s question on the human self-determination.¹

I. Kant and the necessity of human self-determination by knowledge. Kant precisely formulates the primacy of human self-knowledge over the knowledge of an external world: “we can cognize of things *a priori* only what we ourselves have put into them” (Kant 1787/1998, B XVIII). The *Critique of Pure Reason*, in which *knowledge* (excluding all knowledge of anything else) *knows itself*, presents, inter alia, one emphasized *methodical* and *immanent* self-determination of human as the subject of every possible objective knowledge. The self-determining role of human within self-knowledge of knowledge (court of justice of the theoretical reason [*Vernunft*]) does not just justify the aim itself (“the limitation of all even possible speculative cognition of reason to mere objects of *experience*” [Kant, B XXVI]), but also determines the entire Kant’s philosophical enlightenment, and definitely “fixes” the enlightened task of human’s taking over his own freedom.

Additionally, developing the problem of human self-determination in all its aspects, Kant was forced into a very precise, critical determining the transcendental method and, on the other hand, the conceptuality applicable to this autonomous, only to humans *given task* of self-determination. Finally, examining the limits of human’s cognitive abilities, Kant, following examples of natural science and showing the possibility of synthetic *a priori* judgments as conditions for the establishment of metaphysics as a pure science, justifies his own understanding of man as self-determining *homo metaphysicus*.

Hence, a revolutionism of the transcendental metaphysics foundation not only

- 1) justified the already established way of knowing natural sciences, but it also, radically changed:
- 2) the previous metaphysical way of thinking, and, later,

¹ We have no space here to deal with the problem of human self-determination in the practical sphere (morality, politics, law), i.e. the sphere of freedom, where Kant requires total determination of all the maxims.

3) determined the way of self-understanding and self-determination of human within social sciences.

Since then, there has been a “war” on that basis between philosophy and these two forms of science (Flyvbjerg 2001). The head of this conflict, everyone agrees, is man as a self-determining being.

Observed from a position of the Kantian model of natural sciences, paradoxical and challenging at the same time, is the historical fact that Kant’s determination of the conditions of possibilities of knowledge in general – “The conditions of the *possibility of experience* in general are at the same time conditions of the *possibility of the objects of experience*” (Kant, A 158/B 197) – has completely been questioned by natural sciences during the first decades of the 20th century.

A reason (*Grund*) for “complete annihilation” of Kant’s study about synthetic *a priori* judgments as conditions of the possibility of the knowledge objectivity, by discoveries (Heisenberg 1959, 81) of “atomic” science, Heisenberg finds in both – the Cartesian dualistic predestination of the Kantian cognitive criterion – possible experience² –, and the imprecise determinacy of Kant’s conception of synthetic apriority (laws of causality, matter conservation, action and reaction, gravity). All of them are relative, valid within certain limits, and have practical, not metaphysical significance (82).

Let us remind that, for Kant, even an exemplary Newtonian mathematized physics, which insists on the objectivity of its own knowledge, cannot be isolated from the other human knowledge. In that way, as it turns out, it remains trapped by the subjective spirit of the new-age metaphysics of “naive realism” (appearance is thing in itself) (Mittelstaedt 2004, 213). Due to the interconnection of all the knowledge, according to Kant, it is necessary to, using the objectivity criterion, establish a hierarchy within the human complete knowledge. This hierarchy is hidden background of both – the transcendental turn itself and the issue of human self-determination possibility.

² “The *possibility of experience* is therefore that which gives all of our cognitions *a priori* objective reality” (Kant, A 156/B 195).

In *Metaphysical Foundations of Natural Science*, sketching the abovementioned hierarchy of sciences, Kant equates on the conceptual level – nature with lawfulness, i.e., with the necessity of “all the determinations of a thing” (Kant 2004, 4). In such a way, he strictly binds pure natural science, unlike the applied sciences, to *a priori* knowledge (knowing something “from its mere possibility” [6]), i.e., because of its apodictic certainty, knowledge is predestinated by the “metaphysics of nature” (5). On the other hand, physics self-isolation, in addition to initial metaphysical foundation, is impossible because of its mathematical objectivity. Kant is more than clear on this issue: “in any special doctrine of nature there can be only as much proper science as there is mathematics therein” (6). Chemistry, unlike physics, due to its empirical character and impossibility for the complete determination of its object, “always leaves us dissatisfied” (Bennett 2017, 2). However, psychology is in much more difficult situation. Why?

Kant’s decisive differentiation of the scientific levels, the binding of the mathematics applications to spatial rather than temporal appearances, not only establishes the mutual conditionality of metaphysics, physics, and mathematics, but also determines specific “scientific” level of psychology. Namely,

1) phenomena of “internal senses”, breaking up the framework of objectivity, do not allow in any way *mathematization* of knowledge about them,

2) *experimentally unrepeatable*, and

3) determined by the observational effect by which “even observation by itself already changes and displaces the state of the observed object” (Kant 2004, 7). Hence, psychology, in terms of science, is possible only as a “natural description of the soul” (*Ibid*).

So, in contrast to the position of our internal apperception and observation, the objectivity of an observer of external nature, based on the distance of the observer’s eye, is valid as “independence on the physical conditionality of an observer” (Mittelstaedt 2004, 215).

Hence, according to Kant, the task of critical philosophy is to free itself and all the sciences from all the traditional subjective prejudices. Performing that transcendental liberation, in the field of finite human knowledge, involved, in short, a replacement of the traditional absoluteness of space and time with their subjective, but

generally valid, synthetic “apriority” (Wahsner 2005, 26). This meant that the physics objects are not the very things, but bearers of certain characteristics observed by the subject, subsequently mathematically objectified. “The knowledge subject” self-recognizes as determined object and determining subject simultaneously. In this way, self-determination of cognitive powers not only explains the great *flourishing of natural sciences* in the modern world, but, to a certain extent, also justifies their deserved reign over metaphysics and humanities. According to Kant, naturalists (Galileo, first of all) were the first capable to see “that reason has insight only into what it itself produces according to its own design” (Kant, B XIII). In other words, naturalists, prescribing their own laws to the Other (Nature), became the first true enlighteners, who got the human out of “self-incurred immaturity” (Kant 1784, 1). An exit from the state of immaturity is possible only by the human self-determination. Applying strictly the rational laws of reason, objective observation, mathematical and experimental methods, naturalists, therefore, by their own cognitive skills “compelled” nature to answer their questions and accept their laws as its own. This enlightening breakthrough meant that man (by his finite knowledge) finally conquered nature, i.e., that his self-knowledge determines not only the subject of knowledge, but also (in a hidden way) determines objective knowledge itself, and not *vice versa*. In this breakthrough event, the subject of knowledge, therefore, managed to radically change his cognitive position and perspective. This is a justification of the demand for the overcoming of humans *biological instinct* for *conatus essendi* by the intelligible (practical) *principle* of self-determination. More precisely, the human being is “an animal endowed with the capacity of reason (*animal rationabile*)” and “can make out of himself a rational animal (*animal rationale*)” (Kant 2006, 226). How?

Namely, in his own natural determinacy, among all other beings, man, as a being that does not possess a sharpened self-defense organ, is incapable for self-preservation. The exit from this deficiency Kant finds in the insight that this mere naturalness “in the form and organization of his *hand*, his *fingers*, and *fingertips*” (227) is characterized by indeterminate proto-form of possible intelligibility. Hand itself, with natural abundance of usability (the human being is “not suited for one way of manipulating things but undetermined for every way” [228]) places man in nature by *raising him above it*. Thereby, man is determined by indeterminate hands, opened for a lot of

determinations, and they themselves precisely predict human power of self-determination. In that way, man as the outgrowth of nature, after heteronomy epochs, is by natural necessity predestinated to overcome indeterminacy of his own hand (by self-determination), and, *by the freedom of reason to determine* himself, and to become his own lawgiver. In fact, his self-determination is always his possibility.

The fact that Kant concentrated his entire philosophy around the question of human self-determination despite human's natural indeterminacy, regarding possibility of complete knowledge in general, was explained at the crucial point of the *Critique of Pure Reason* – in introducing the transcendental ideal that goes beyond all the ideas of reason. At that point, having in mind potentiality of human total self-determination as well (but not human ultimate perfection), Kant makes his determining insight: “*Everything existing is thoroughly determined*” (Kant, A 573/B 601). This ontological *total determination* of being is a challenge to which finite knowledge cannot answer within the boundaries of possible experience. That is because total knowledge has to consist of all the *possible* determinations, “thoroughgoing determination is consequently a concept that we can never exhibit *in concreto* in its totality” (*Ibid*). This means that possibility of the knowledge totality of a being determination must be necessarily pre-supposed. However, since the very idea of the totality of cognitive determinations of a certain being is “itself still indeterminate” (*Ibid*), the only way for its total determination is “the concept of an individual object that is thoroughly determined merely through the idea, and then must be called an ideal of pure reason” (Kant, A 574/B 602). In such a way, the transcendental ideal, by its *a priori* determinacy, enables, to the finite cognitive subject, total determination of each individual being, within the boundaries of possible experience. The factual indeterminacy of the total knowledge (as well as that of the hand) stands complementarily with *a priori*, logical determination of the transcendental ideal (of reason). Thus, it is a condition for the possibility of particular and total determination of any knowable object, even human himself. If knowledge requires a complete determination of an appearance, then the self-knowledge requires the complete self-determination of the cognitive subject, absolute autonomy and, according to Kant, it is primarily related to the practical, not to theoretical use of reason. However, even there, there is an indeterminacy of Kant's imperatives and moral rules.

II. Heisenberg's uncertainty. According to Heisenberg, mathematical symbols which we use to describe the situation of observation present (that) possible rather than factual. It might be said that they present an *inter-thing* between the possible and the actual (Heisenberg 2009, 132).

The *principle* appearing in Heisenberg's work from 1927 (*The actual content of quantum theoretical kinematics and mechanics*), through the relations and imaginary experiments, showed that "variables can be determined simultaneously only with a characteristic uncertainty", which is the intrinsic reason for "the occurrence of statistical relations in quantum mechanics" (172). In other words, if the position of particle is determined more precisely, the impulse/momentum be known more imprecisely. Planck's quantum of action (constant h) is a lower limit of the accuracy with which simultaneous values of two variables can be known. Namely, taking q_1 as the precision to which the value of q (position) is known, and p_1 as the precision to which the value of p (momentum) can be determined, the relation is $p_1 q_1 \sim h$. Heisenberg says: "if experiments existed that allowed a 'more precise' definition of p and q than that corresponding to equation $[p_1 q_1 \sim h]$, then the quantum theory would be impossible" (179-180). Furthermore, "experiment can never provide precise information on all quantum mechanics variables", but divides them into *more or less precisely known* variables (182). We cannot expect from experiments the simultaneous determination of two "canonically conjugated variables". This limits one performing measurements in the realm of quantum objects – in available knowledge about observed object. The more precise determination of one (variable) reduces precise knowledge of the other, so knowledge is restricted by the uncertainty relation.

The *principle* together with quantum mechanics itself, as well as Heisenberg's philosophy, have been widely interpreted and re-interpreted for a long time. After all, including recent publications dealing with interpretation, re-interpretation, generalization and in particular searching for "violation" of the *principle*, the (total amount of) "uncertainty remains intact" (Jijnasu 2016, 69). The indeterminacy seems to be a "physical reality" which gets an objective character (Heisenberg 2009, 132). The *principle* ("epistemic" version, as given in Jijnasu's recent "simplified review of the four versions" of the uncertainty principle, where its "ontic" side is also highlighted),

limiting joint determinability of the particle's position and momentum³, limits the knowledge obtainable from measurements (Jijnasu 2016, 63), as well as from some new relations (such as Ozawa's [Ozawa 2003]) which are not, as shown later (Bush et al. 2014, Jijnasu 2016), generally valid as their authors claimed.

Explaining his own experience and understanding of the development of "atomic physics in the last 50 years" (Heisenberg 2009, 11), Heisenberg points out, for Kant inadmissible, *dialogueness*, which confirms that even objective natural science arises in the inter-subjective infinity of the finite dialogue (among scientists). To put it briefly, it seems that modern natural science, passing over Kant's transcendentalism in the first half of the 20th century, finds and understands itself "infected with the virus" of the Kantian limitations of psychology in terms of science. Is it really so? Isn't then the quantum mechanics, in a sense, just the "natural description of the soul"? How does it happen that, in the most determinate human's knowledge, at the peak, its determination is conditioned by the *principle of indeterminacy*?

If the observer affects the measured "reality" to the extent that any request for the measuring results *objectivity* is, in itself, too demanding, it is clear that not only the prediction, but also its previously absolutely guaranteed precision of the instant quantitative measurement, are disabled in the classical form. It is, thus, the *observation power*, the ability to change observing object by exposing it to an act of the rest of the world (including experimental mode, evaluation standards, already existing knowledge, etc.). Neutral (and "devoid of all interest" [Kant 1987, 53]) the Kantian observer disappeared from the determining scientific scene. As if *episteme* in which observation "plays a decisive role" took all the characteristics of *techne*, so "the reality varies, depending upon whether we observe it or not" (Heisenberg 1959, 52). Is this new position of the observer, partially, not the radicalization of the glorious transcendental turn which requires that "the objects must conform to our knowledge" (Kant, B XVII)? Does it mean, in the continuity with Kant's turn, that the rigid frames of natural-scientific (Kantian) thinking and language are broken through, and that the problem of the possibility of human self-determination is fully open? It seems that Avram, who

³ Accuracy in the measurement of position-disturbance to momentum caused by position-measurement, due to an interaction of the object with the measuring device (so-called, the "error-disturbance" relation).

goes to a completely unknown land, is coming to the place of Odysseus, who is safely going back to homeland after all the adventures. The problem arises when this departure without a promised return, is attempted to be presented by Odysseus's symbols and cognition means. This comparison of the Greek and the Biblical way of thinking and living might be considered as corresponding to the situation between quantum and classic physics.

Heisenberg claims: "We simply cannot know the present in principle in all its parameters. Therefore all perception is a selection from a totality of possibilities and a limitation of what is possible in the future" (Heisenberg 1927, 197). Unlike Odysseus and Kant, standing at the viewpoint from which it is possible to know all the parameters and consequently to conquer all (possibly) knowable, Avram and quantum mechanics (in a sense) are not able to know the present in its totality, let alone the future. However, this was not the reason to reject the challenge, but to accept it. This is in particular the case because "when searching for harmony in life one must never forget that in the drama of existence we are ourselves both players and spectators" (Bohr's view [Heisenberg 1959, 57]). Therefore, Heisenberg's "re-interpretation" of Kant's "interpretation" of the conditions for thinking possibility in natural sciences seems to be necessary.

The main question is: in which way, and to what extent, one radically new scientific experience and knowledge of quantum mechanics changes Kant's determination of human self-determination?

III. Impact of Heisenberg's uncertainty on the human self-determination. The Kantian "impossible" experimental research (Kant, B XVIII f.) and new forms of knowledge mathematization necessarily broke through "the boundaries of possible experience" and made the request for a different logic and conceptuality. And, above all, for *interpretation*. In contrast to the Kantian aspiration towards the total, systemic determinacy of scientific concepts, the new science had to (almost necessarily) presuppose the impossibility of their complete determination and, against Kant, admit the constitutive role of the imagination – not only in the construction of certain imaginary and experimental models and solutions, but also in the very core of the (all-conditioning) language. That which was understood as a lack and incompleteness (for

Kant and classical physics) now appears as unavoidable reality and advantage. This advantage is an advantage in the anti-Kantian sense: based on (almost Nietzsche's) endless possibility of understanding (*Verstehen*), science renounced every possible closed systemic solution and a definite conceptual taking over the whole.

In new, atomic, science, attempted to *understand* phenomena and, at least, to recognize how (and whether) they follow from the general natural laws, researchers "have to deal with parts of nature into which [they] can penetrate only by using the most elaborate tools" (Heisenberg 1959, 57). New scientific experience implies that *language becomes condition of the possibility of knowledge*. Ordinary/everyday language, as it is well known, cannot easily be used when speaking about quantum mechanics and its essentially *classical* experimental results (which then should be described in an ordinary way/language). Consequently, ordinary understanding and describing phenomena cannot easily be used to explain what exactly means to know system's/particle's property just "partly" (position-momentum, i.e., relation between the precision to which one value is known and the precision to which the other value can be determined). Or, what exactly means that *the probability function*, written down to represent "the experimental situation at the time of the measurement, including even the possible errors of the measurement", describing "a whole ensemble of possible events" (during the observation), and is found to be changeable (discontinuously) by the observation itself, combines "subjective and objective elements" and, in fact, represents "a mixture of two things, partly a fact and partly our knowledge of a fact" (Heisenberg 1959, 47, 53-54). *Everyday* observation and Kant's understanding man as observing being are not applicable to the world of quantum objects, characterized by the particle-wave dualism, quantum jumps, and probabilities. Therefore, the Copenhagen interpretation of quantum mechanics intended to indicate how to speak and how to think about quantum phenomena, and to explicate discrepancies (such as those of the continuous-discontinuous/wave-particle dualism). The interpretation assumes using the classical concepts (necessary for connecting of appearances) to describe experimental conditions (equipment and the world not belonging to examined object) and results. The order: nature-man-science, justifies both – ideal of complete objectivity (classical physics) and paradox of quantum mechanics, i.e. applying the classical concepts (instead of departing from them and introducing new ones for return

to an *objective*, non statistical, description of nature) to describe situation in new research area, as well as the wish “to understand a certain phenomenon”, and “to recognize how this phenomenon follows from the general laws of nature” (55-56). By contrast, Weinberg (2005, 32-33) states, “the Copenhagen interpretation describes what happens when an observer makes a measurement, but the observer and the act of measurement are themselves treated classically. This is surely wrong: Physicists and their apparatus must be governed by the same quantum mechanical rules that govern everything else in the universe”.

A reason for incomprehensibility of quantum mechanics fundamental concepts lies in the fact that the different ways of existence and givenness set the limits on the terms’ applicability. This does not mean only that a notion which is adequate to a particular object area is not unconditionally transferable to all other areas, but it also means (very important for Kant) that there are no universal categories as *a priori* crystallizations of the logical functions of understanding (*Verstand*). For Heisenberg, “the applicability of classical kinematic and mechanical concepts cannot be deduced either from the laws that govern our thinking, or from experience” (Heisenberg 1927, 196).

More of that, and completely in contrast to Kant⁴, Heisenberg points out that, thanks to the unpredictability of the knowledge spread, we cannot in advance predict the limits for application of our key classic concepts, such as *existence, space and time*. A new type of registrator, a measuring apparatus, and not Kant’s living observer, differently acts and “cognizes” its “object” (particles). Neither it nor its object are shaped by space and time as *a priori* forms of the human sensibility. The new one, unknown to Kant, is a result of a technical way of cognition and, as such, incomparable

⁴ It is important to point out that Heisenberg (1959, 78-84) in his *Physics and Philosophy* gives his own insight into “thesis that all knowledge is ultimately founded in experience” which has led “to a postulate concerning the logical clarification of any statement about nature”; and considers Kant’s *empirical* knowledge and his *a priori* knowledge, *analytic* and *synthetic* propositions, and in particular the law of causality, which “is reduced to the method of scientific research; it is the condition which makes science possible”, and then “is ‘a priori’ and is not derived from experience”. He deals with re-interpretations of the Kantian *a priori*, as “indirectly connected with experience in so far as it has been formed through the development of the human mind in a very distant past”, Hegel’s way of re-interpretation “there is no reason to consider the perceptions rather than the things as given”, etc.

with *a priori* forms of sensibility and understanding. Therefore, the technical knowledge directly affects new human self-determination. As no “elementary” particle can be categorically determined completely and no fundamental concept can be uniquely defined once for all, so even the human self-determination cannot be given once and for all. The boundaries of knowledge are now specified by the language limits much more than in Kant’s time. The obtained results no longer concern only possible experience, but, more than anything, *possible understanding*; they in themselves require their own interpretation. Thus, the limits of human self-determination and knowledge are now in the tangled knot of language-conditionality of thinking. It is a *hermeneutical turn*. More precisely, any new experience, every new result, every new notion re-determines not only the observed reality at the “moment” of observation, but also every already existing theory and conceptuality, and, ultimately, the observer himself – as *homo hermeneuticus*.

If quantum mechanics definitely rejected a neutral position of the observer, and showed his necessary subjective involvement in the knowledge itself, it is sure that no one scientific knowledge of this type can be artificially cut off from its subject. The basic tendency of Kant’s transcendentalism is reversed: the subjectivized object has replaced the objectifying subject. This crucial event indicates a reverse in the human self-determination itself. The impossibility to be sure in the prediction of the development of natural sciences, witnesses that human self-determination is much more difficult now than it was in Kant’s time.

By contrast to Kant’s necessary, complete ontological and cognitive determination of thing, that elementary in quantum physics appears in two, mutually exclusive, “complementary” pictures⁵. Moving from one to the other, and back, we get “the right impression of the strange kind of reality behind our atomic experiments” (Bohr’s concept [Heisenberg 1959, 50]). This strange kind of “Being” (*Sein*) is, at the same time, the face and the other side of the human knowledge. New radical finding, that we cannot jointly define the two properties⁶ of the elementary (particle), and that

⁵ The object cannot be a particle and a wave at the same time. Therefore, object’s complementary properties can be only *separately* analyzed (and cannot be measured or observed simultaneously), since never appear at the same time.

⁶ The error-disturbance relation, linked to one measurement.

determination and probability of one means losing determination and probability of the other to be precisely determined, undoubtedly disables every possibility of the whole system knowledge, since: “still we must know both for determining the behavior of the system” (*Ibid*).

On the other hand, the indeterminacy and the unpredictability of a state between two observations in atom⁷ make meaningless the application of Kant’s favorite law – the law of causality. To answer the question Why? (e.g. why a particle was emitted from the atom at the particular time), in the microsphere, “we would have to know the microscopic structure of the whole world including ourselves, and that is impossible” (Heisenberg 1959, 82).

Thus, the foundations of Kant’s scientific objectivity, space, time, categories, law of causality, and transcendental ideal have only “a limited range of applicability” (*Ibid*).

Heisenberg’s renowned conclusion: “*For the first time in the course of history, human on this Earth stands still only over against himself alone*” (Heisenberg 1957, 179), presents completely new frame of human’s self-knowledge, but also a paradox of the self-determination. It is only in such a situation in which everything is different, strange, transcendently disabled in the possibility itself, human’s self-determination is in the position to completely absorb classical determination of the rest of the world, and to self-determine absolutely. Right there, at the peak of the possibility for self-determination, we face the paradox⁸. The indeterminacy, i.e., unsharpness, an intrinsic resistance of the particle (observed object, always “observed within the accuracy of the experiment” [Heisenberg 1959, 47]), does not allow sharpening the knowledge of it. Just when it manages to meet only itself in everything, human encounters an insurmountable resistance to its own absolute self-determination. Therefore, neither

⁷ “The only task of physics is to describe the relation between observations” (Heisenberg 1927, 197). At the same time, “we cannot completely objectify the result of an observation, we cannot describe what ‘happens’ between this observation and the next” (Heisenberg 1959, 51), since “‘happens’ is restricted to the observation” (52).

⁸ A resistance of the uncertainty principle, everything what it theoretically and practically carries with (and in) itself, appears as the last but insurmountable obstacle to the possible total and totalizing tyranny and violence of knowledge (Horkheimer/Adorno), i.e., to an autistic human autonomy. In this way, the circle of human autonomy is closed identically as opened by Antigone’s original autonomy.

the harmonious eternal cosmos, nor the tectonic natural forces, nor the omnipotent God, nor the Kantian world of things in themselves, with all their (un)knowable laws, so directly (by their resistance) affected the human self-determination as it was done by the Copenhagen interpretation of quantum mechanics.⁹

If man, as human being, adding (in all his own subjectivity) all possible determinations (Nietzsche), remains, according to Heisenberg, not only without all the aforementioned opponents (cosmos, nature, God, thing in itself), but, crucial and without any possible partner in Being, the humanity in general enters the epoch of winner without defeated. Man remains only with the hardest of all liberations – (stoic) liberation from himself. An opponent or partner relationship with the absolute Other is not possible, since man “*encounters everywhere only himself*” (Carson 2010, 112). Apparently, only the other man remains (as *alter ego*), as a possible challenge of self-determination. But, the boundary between two humans in a newly created situation is not comparable to the boundary between two freedoms (Kant’s), which mutually self-restrict as much as they self-determine themselves. Now, both of them are in a network, without the possibility of mutual self-limitation.

All this requires a new “foundation” of human, a completion of the project that Descartes only sketched and Kant further developed in his philosophy. The reconciliation of man with himself, as the sole task of his time, and as the last stage of the reconciliation of self-knowledge and knowledge, according to Heisenberg (1957, 281), is the only goal left to the humanity: “The road to this goal will be long and hard, and we do not know which stations of suffering still lie on it”.¹⁰

⁹ The human self-determination is affected (perhaps, even more) by: some different views on quantum mechanics/formalism even among the Copenhagen interpreters, completely different understanding and views on quantum mechanics (Bohr’s and Einstein’s view) and many discussions and objections of the Interpretation over the decades, Weinberg’s (2005, 33): “So where do the probabilistic rules of the Copenhagen interpretation come from?”, and the answer: “The real difficulty is that it is also deterministic, or more precisely, that it combines a probabilistic interpretation with deterministic dynamics”, together with all the attempts to test validity of the *principle*; which all shows dynamics of the human thought around the knowledge limitation...

¹⁰ Similarly to this, Heidegger will argue that the era of overcoming metaphysics will be more difficult and will last longer than the reign of metaphysics itself.

The signs of that reconciliation are more incomprehensible than Jaspers's "ciphers of transcendence". Still, a mean of reconciliation remains traditional: almighty mathematization in which formulas "no longer portray nature, but rather our knowledge of nature" (Heisenberg 1961, 228). The knowledge, therefore, interprets and mathematicizes itself. In this self-relationship, it must be able (from its position) to re-interpret the entire history of science and to establish it as a true, continuous history.

Following Heisenberg, Weizsäcker adds that man tries to penetrate the objective truth of nature, but in the core of its unreachable depth, unexpectedly, as in a mirror, he sees himself (Wisser 1967, 237). This human self-finding at the place where the thought of previous epochs finds God, Nature, or that transcendent in general, no longer leaves any Kantian place for the faith. Here we encounter a new paradox. Although the limitation of the Kantian forms of space and time follows the spirit of Kant's critique and the limitation of knowledge (in order to leave a room for faith), new discoveries are settled down in those areas, which, according to Kant, did not allow the knowledge to apply its forms to them. The immanence of knowledge has broken through a circle of the possible experience and started to conquer a "space" of *transcendent* (if it is possible to do so within knowledge itself). How and with what right? Kant, by the determinacy of the possibility of knowledge with the powers of knowledge, proves that our cognitive forms, our methods and concepts have no application in the sphere of transcendent. Now, atomic physics also shows that cognitive forms, methods and concepts of classical physics are not (fully) applicable to its newly discovered area. Only, that area is no longer an area of transcendence, but an area of the human self-reflecting determination.

The fact that with elementary particle we do not find out (any) thing in itself justifies the comparison of the quantum mechanics results with the *Critique of Pure Reason*. Within both settings, scientist is "thrown back to himself" to search for better questions and "more original answers" (Wisser 1967, 237). The interpretation of experimental results (Heisenberg) comes on the place of critique (Kant). By this change, constructive interpretative justification of scientific results and theories starts to play a role of critical rejection (traditional dogmatic metaphysics). The problem becomes more pronounced with an insight into the impossibility of the ultimate success of interpretation. Not only that the result of an experiment is not an objective knowledge

of a reality, but also its mathematical presentation and, particularly, interpretation indicate incompleteness. Thus, self-determination requires a new self-limitation. On the other hand, the end of dogmatic metaphysics has a lot in common with destruction of the scientific myth about objective science. The true question remaining in a shadow is the question of loss of the last asylum for truth. Let us remind the new-age subject-object relation became the cornerstone of being that faced infinite uncertainty of the Copernican universe, due to the methodically constructed double guarantee: Cartesian neutrality of the subject and independence of the object. Paradoxically, it was precisely the epoch of the Cartesian subjectivism that found its own justification in the objectivity of complete knowledge. On its safe ground, the primacy of natural science as an objective truth was established. However, with the quantum mechanics and its development at the beginning of the previous century, the entire ideal of objectivity collapsed. Man was left without lawfulness as a guarantor of truth and the key support for his own self-determination.

As the 19th century ended and the 20th began with the radicalization of Kant's psychological self-observation and affirmed continuous variability of the subject (Bergson), we moved from the strictly logical Kantian, through the positivistic factual, into (with knowledge and self-determination) the field of *possible*, under the wing of the principle of *inclusion of third*. Metaphysical and positivistic dogmatism, for this *possible*, have the same limits. If instruments "register" only that what is quantitatively possible, the Kantian "the thoroughgoing determination of all things" (Kant, A 577/ B 605), even of a man, has to be replaced with statistical probability as a reconciliation of "objective and subjective elements" (Heisenberg 1959, 53). As Aristotelian *potentia*, as the only predictable one, the probability (function) describes "ensemble of possible events" (54). In this process of facing the possible, the chosen factual event, probability function, existing knowledge, mathematization mode, the corresponding conceptuality are changing continuously and mutually. They all refer only to the "time" of observation, not to the time between two or more observations. A condensed name of this variability, in which, just like in a game, we have mutual determination of the observer, the object, and the technical device of the observation, the wholeness of the rest of the world, wholeness of knowledge and language, the transition of the possible to the factual in the course of observation itself, is *quantum jump* (*Ibid*). In this game, the power

of Kant's transcendental unity of apperception is excluded. The subject is simultaneously the observer and the player. Nevertheless, he cannot completely foresee further development of the game. "The game is worthwhile insofar as we don't know that will be the end" (Martin 1988, 9).

Unlike Descartes' understanding of the method, Gadamer (2001, 30) claims that the Greek term *methodos*

"is not a tool for objectifying and dominating something; rather, it is a matter of our participating in an association with the things with which we are dealing. This meaning of 'method' as 'going along with' presupposes that we are already find ourselves in the middle of the game and can occupy no neutral standpoint – even if we strive very hard for objectivity and put our prejudices at risk".

Our knowledge is the interpretation of this (whole) event, and nothing more.

Unlike a man of the traditional dualisms (man-nature, subject-object), who discovers and prescribes laws to nature, i.e., to the *objective reality*, modern man, scientist, does not allow himself so *naïve* possibility. On the contrary, "natural science no longer stands over against nature as a spectator but cognizes itself as a part of the inter-game between man and nature" (Heisenberg 1957, 285). The mutuality of the game appears as the *third* one within Descartes' dualism. It is that which rises both man and nature (subject and object), into a new, (im)possible experience. All this was accompanied by Heisenberg's clear insight that in addition to man's involvement in nature, and the method of scientific research itself prevailed the new-age distance of the subject and object and thus "changes and re-forms its object" (*Ibid*). This disappearance of anything that separates the subject of knowledge from the object of knowledge, the impossibility of their self-isolation, is shown, after all, as a final reconciliation of knowledge and *unio mystica*, West and East. The conclusion following from this is: "*The natural-scientific picture of the world ceases to be truly natural-scientific*" (*Ibid*).

Conclusion. Kant's autonomy of personality (its dignity) is based on the transcendently proven objectivity of scientific laws and moral imperatives, and *vice versa*: self-determination is "guarantor both for objectivity and for generality of knowledge" (Brandt 2007, 47). In the basis of Kant's understanding of knowledge and

knowable, stands his absolute trust in space and time as forms of sensibility able to receive and shape everything that has been given to them, i.e. everything what can be an object of experience.

Heisenberg's uncertainty of knowledge, i.e., a possibility of a total knowledge of a thing, briefly expressed through: limitedness of joint determinability/sharpening of particle's position and momentum; interaction of observed object and measuring instrument, i.e., unavoidable disturbance on the observed object, controllable in the amount by Heisenberg's relation only; formalism dealing with our knowledge of the object rather than with the object itself; becomes more "real" than all listed (in limiting human's ability to understand and describe the world), and the only takes an "objective" character.

For Kant it was self-understandable that we have the possibility for complete knowledge about anything and everything (given), but it is put into question, i.e. transformed with a new radicalization in thinking. "Reality" came out from the rule of Kant's theory and, it could be said, began to rule modern ways of thinking. "Relativization" of the space, time, causality and synthetic *a priori* judgments, keeping their validity within the boundaries of possible experience, requires new forms of determining knowledge and human self-determination. The problem of an absolute validity of any knowledge ("it will never be possible by pure reason to arrive at some absolute truth" [Heisenberg 1959, 84]), method, concept, and understanding are relativized as well.

Unlike Kant's vision, in which man self-determination gets its own realization by moral autonomy, i.e. with obedience to universal laws of his own reason, we are no longer in a position to prescribe *universal* laws (to anything). This could mean that, if not completely revoked, the Enlightenment and Kantian self-enlightenment (by means of knowledge) are largely limited (and represent particular cases of general indeterminacy). However, if, in contrast to required complete self-determination, we take into consideration Kant's insight in the impossibility of full perfection of any individual man (while possible perfection of the humanity is presupposed), we are in a situation similar to that valid in the world of quantum objects, i.e., in situation of *one measurement*.

Significantly changed meaning of the *observation*¹¹, an impossible escape from “the paradox of quantum theory, namely, the necessity of using the classic concepts” (Heisenberg 1959, 56), as well as the uncertainties which “may be called subjective in so far as they refer to our incomplete knowledge of the world” (53), actualize the problem of human self-determination in many aspects. Martin Heidegger, who pointed one of those aspects out in the same way (and in the same year) as his friend Heisenberg, claims: “The *possibility* stands higher than reality” (Heidegger 2001, 38).

The latest achievements – technological and others, the “existence” of the digitalized virtual world, radicalize position of Heisenberg’s indeterminacy (of knowledge), which consequently means an additional need for re-interpretation of the Enlightenment-Kantian project of human self-determination.

An “excuse” of Heisenberg’s science, asserting that new science is not interested in the universe “as a whole”, and that its large part “including ourselves, does not belong to the object” (Heisenberg 1959, 52), is not acceptable from the point of view of man who should be self-determined (by knowledge, including knowledge of “a whole”), as well as from the point that “unusual” should become “usual” in the self-determination. Therefore, the Kantian human self-determination is still actual, even in the sense of that “objective” (uncertainty), and might be considered in the frame of Heisenberg’s (50), complementary, “playing with both pictures” (objectivity and intersubjectivity). This is in accordance with Weizsäcker’s “Nature is earlier than man, but man is earlier than natural science”, which justifies both classical “ideal of complete objectivity” and the paradox of quantum theory (56). *Homo metaphysicus* is earlier than *homo hermeneuticus*, and the question of his self-determination is more human than the interpretation of a measuring result, but also metaphysical questions by their own indeterminacy (Kant) necessarily require their hermeneutical relativization (Heisenberg).

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¹¹ “The observation, on the other hand, enforces the description in space and time but breaks the determined continuity of the probability function by changing our knowledge of the system” (Heisenberg 1959, 50).

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