

SCIENCE, ART AND REVELATION

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INTRODUCTION

Erwin Schrödinger was a thinker of great intuitions. Many of them, as it is well known, would end up being consolidated as large discoveries, theories and even new scientific disciplines. This paper also stems from Schrödinger's intuitions: it proposes a definition of the *scientific method* itself, of its limitations and of a suspicion that classifies the different relevant forms of the general concept of knowledge.

STIMULUS TO KNOWLEDGE

Let us assume a mind perceiving some part of the world, that is to say, some complexity. The mere perception of a complexity may produce some disturbance in the mind. This is the initial stimulus. We shall say that the *mind produces knowledge when it makes an image of the complexity*. We already have a definition, and here is the first corollary: knowledge is necessarily finite whilst complexity is presumably infinite.

Let us now concentrate our interest on the very process of constructing knowledge, on the fact of proceeding to make images, on the method. The path to be followed largely depends on the *degree of complexity* involved in each particular case. It is not necessary to establish a precise measurement of the complexity to be able to accept that there are different degrees of complexity. A straight line, a molecule, a crystal, a cell, a brain, a passion and the spirit are symbols of the language associated with events of a growing complexity. So, then, science takes care of the lowest levels of complexity. And the various scientific disciplines go further, they are harder, more rigorous, precise and prestigious the simpler the objects of knowledge are. That is why science began considering complexity as an exception concealing the true rule: the simplicity. From this point of view, perhaps we could say that any other form of knowledge is the alternative to the impotence of scientific knowledge, its continuation through other means. Let us mention two cases.

Art is a form of knowledge because it involves making images of events in the world, a form which, furthermore, accepts dealing with a complexity like, for example, love passion. Who is capable of establishing what the biophysics-chemicals-mathematics of love are? Knowledge of a divine origin is dedicated, for example, to the ventures and misfortunes of the spirit. And who dares to establish what the biophysics-chemicals-mathematics of the spirit are? The goal of this article [1] is to express a strong suspicion concerning these three forms of knowledge. But let us not rush into things. In accordance with what we understand by knowledge, we now define the essence of the scientific, artistic and divine forms. In fact, it is a matter of identifying the fundamental principles tacitly assumed by these methods.

SCIENCE

Today, with all the historic perspective in front of us, it seems to me that the scientific method is based on three fundamental principles, (1) *the principle of objectivication of the world*; (2) *the principle of intelligibility of the world*; and (3) *the dialectic principle between the minds and the world*.

Schrödinger wrote brilliant pages in *Mind and Matter* [2] concerning the two first principles. The principle of objectivication is the principle of separability between mind and matter, the knowledge-creating entity and the knowledge-object entity, the subject and the object, the observer and the observed, the thinker and thought. According to Schrödinger, it is a matter of a principle equivalent to the *hypothesis of the real world* and this, in turn, implies the following simplification: the thinker stands back with his own ego until managing to become an entity external to the world and, therefore, not involved in the world. The mind creates objective knowledge and relegates itself to the category of pure anecdote. And the mind, in return for this altruism excluded from the world it represents, makes universal knowledge, that is to say an image of the complexity problem that is accessible to any other mind. In other words, the mind is the creator of the material world and of scientific knowledge, though in this knowledge, in the completed work, it is nothing more than a marginated and insignificant accessory which can be done away with without the total effect losing the slightest bit of merit. The principle of objectivication legitimizes the presumption that nothing of the thinker remains in what is thought, that the fact of thinking does not affect the state of what is thought: all in all, that science is independent from the ventures and misfortunes of scientists. This principle is not deduced from anything previous, its truth is not demonstrable. It could even be false, and some people proclaim it be so, brandishing other principles. That is precisely why it is a principle that we can either assume or not. Science assumes it. And it cannot be said that it has done badly. This principle has given rise to the science accumulated up to now, and nobody questions its reputation, although some paradoxes stem from it. Let us quote an example from a magnificent passage by Galenus in which Democritus confronts the *intellect* and the *senses* in an argument about what is real [2]. The intellect says:

"Apparently color, sweetness, bitterness exist; in reality, only atoms and voids exist." The senses respond: "Poor intellect, you are a wretch. We have given you evidence of yourself, and now you want to beat us? Your victory is your downfall."

The crafty senses may well be right. The mistake made by the intellect was to take the principle of objectivication too far, that is, to excessively high levels of complexity, where the subject and the object become mixed up, where the mind wants to know about itself.

The second principle of the scientific method is the principle of intelligibility. It is a matter of the scientist's initial support. His prime faith needs to be based on the fact that *nature can be understood*, that the world is intelligible. A rigorous discussion about the idea of intelligibility would force us to diverge [1]. A complexity is intelligible if it is possible to compress it into a certain eventuality, in other words, if the idea itself is not a representation of chance. In this sense, *comprehension* is the capacity of *compression*. For example, a projectile in a field of gravity delineates a parabola. A hundred thousand positions of this projectile, a hundred thousand observations, can be reduced to the bare laws of Newton and some initial conditions or, if you like, to the brief mathematic equation of a parabola. Moreover, this compression, this comprehension, allows us to predict any of the

projectile's positions. The process is intelligible. (Strangely enough it is worth nothing that what *is* unintelligible are Newton's laws, that is the casualism of the last causality). On the other hand, any Sunday's football league results are unintelligible. There is no possible reduction. The most compact way of giving the results are the results themselves. And there is no induction capable of making predictions. There is chance but not science. In science, if a company is a failure, if we do not manage to understand some complexity, the principle of intelligibility tells us that we are to blame. There is no excuse for not trying again, for choosing another path, for inventing something else. Neither is the principle - just like any principle - demonstrable; that is why it had to be invented first and assumed second. Science is the only form of knowledge that declares that it accepts this principle, unlike other forms which - take good note - even invite us to adopt the opposing principle: unintelligibilities exist, mystery exists. The scientist, deep-down in his spirit, in his moments of meta-scientific reflection, secretly allows himself to doubt (rather more in the case of the veteran scientist than of the young aggressive researcher), though once again adopts this attitude to manage to gain the minimum dose of positivism necessary to be able to open the door of the laboratory, library or lecture hall. However, it is an attitude that torments the sensitive scientist. Why on earth must everything be intelligible? Our hearts drop when we stop looking through an astronomy telescope. All things considered, the human mind is but a minute event of the world: are you sure you have the faculty to know of any other? We feel a similar sensation when we take a look through an electron microscope.

Both principles mentioned are necessary to be able to build scientific knowledge, but I am afraid they are not sufficient. There is one demarcation criterion lacking to delimit the competence of things scientific, a criterion that allows a third principle to be established, a principle which, in turn, swells into the motor of scientific advancement. It is a matter of Popper's [3] falsability principle and the dialectic principle, as we may call it [1].

Indeterminism is a scientific attitude compatible with the advancement of knowledge of the world. And determinism is a scientific attitude compatible with the description of the world.

Indeterminism is the attitude of the of the creating scientist, that is to say, the scientist who sets himself the goal of making a finite number of events intelligible on the basis of any theory (that is, in principle, considering the open and infinite ensemble of all possible knowledge). The creator works whilst something is unintelligible and goes into crisis mode when everything is intelligible. The last assertion is the only definitively enunciable one given a finite ensemble of events and the infinite ensemble of knowledge.

Determinism is the attitude of the applying scientist, that is to say, the scientist who sets himself the goal of making any event intelligible, armed with a finite heritage of knowledge (that supplied by the creator, for example). The applier works whilst everything is intelligible and goes into crisis mode when something is unintelligible. And here the last affirmation is the only definitively enunciable one in a world of finite knowledge and infinite events.

It is a matter, therefore, of two semi-universal research projects that resolve each others moments of crisis. The creating-applying dialect allows us to talk of a universal research project as a result of which knowledge can advance.

ART

I am struck by a concern referring to a complexity so enormous that any scientific representation project is unthinkable. For example, a love passion. I would like to consider this concern, give it shape, project it, make an image of it. Here we have a few alternatives: I start running, speed up, do a breath-taking double somersault and land with my arms out and a big smile on my face, or I sing, dance, recite, write, paint or fabricate some object... So, there is not just a single solution. And the path I choose to represent my particular complexity simply depends on my minor or major skills.

What am I trying to get at with this strange way dealing with complexity? What is the purpose of this strange knowledge? Perhaps it would be easier to begin with what I am *not* trying to get at. I am not trying to design a theory capable of predicting a new "falling in love" situation or explaining it on the basis of some data. I want, it is true, to make an image of the event, but I do not claim that this image is independent from my mental mechanisms or want to enunciate propositions. Its intelligibility does not bother me. It is not my intention either to study the observations in great detail or accumulate experiences. Almost on the contrary, I like my mind being the protagonist of the knowledge I shall make. The unintelligibility and complexity of the event which is the object of my interest is the guarantee that my project will not be short circuited by another (scientific-philosophic) like the one discussed previously. Moreover, I appreciate the freshness of the raw information that spontaneously invades me, and in principle I consider it sufficient. If not, I refuse to commit myself to other observation programs. My project does not begin with any method, I do not impose initial limitations on the way I grasp the complexity; instead I throw myself directly on top of it to compose a finite image of its infinity, to obtain a simple projection from which this complexity, when appropriate, is reducible. In such a way we arrive at what I really am trying to get at in this second procedure. Now it is not a matter of the complexity being intelligible, but approximately recoverable. Recoverable for whom? The terms recoverable and reducible obviously refer to myself. The mission of this finite knowledge is to activate, just like a signal, my internal mechanisms that *shout out* the original complexity once again. It is a matter, therefore, in principle and fundamentally, of self-communication: I have made an image through which my mind is communicating with itself. The question now is: does this representation serve to communicate my particular complexity to other minds? Given an image made by a mind, is there not at least one other - faced with its contemplation - capable of deducing the original complexity? And it is precisely here, in this belief, where the only working hypothesis of this second procedure lies. Why don't we call it art. Art is a form of knowledge the method of which is based on a single principle: *the principle of the communicability of unintelligible complexities.*

This belief, then, would be the fundamental hypothesis of art. Art is a form of knowledge (perhaps the most eager and spirited in terms of the complexity of the world) which refers to two minds. The artistic act is essentially a binary act and its consummation is, for a scientist, a sort of strange miracle, because a clearly insufficient tip is capable of dragging an infinitude. The simple displacement of an intelligibility does not make this less so, though it does contribute to lightening the concern. A mind learns, through art, that it is not alone in relation to a certain complexity. Then emotion and complicity are great.

REVELATION

Science allows me to know simple complexities and, in return for this limitation, scientific knowledge is useful to me for guiding my interaction with the world. Art allows me to know superior complexities and, in return for this gratification, I accept that this knowledge is not very useful for guiding my interaction with the world, my behavior. Is there a form of knowledge that dares to tackle great complexities and, at the same time, that is applicable to our everyday lives? Let us imagine a complexity like the mind, human nature or the spirit. Universally applicable knowledge must be objective and intelligible but, where does the mind place itself to see itself objectively? How can a complexity be intelligible for another that is equally or at least as complex? Is there a fast and drastic exit that avoids both difficulties? This yields to a third form of knowledge: the divine knowledge, let us say, a new form based on three principles: (1) *Let it be a being external to man for whom everything is objective*; and (2) *for whom everything is intelligible*. (3) *Let us assume that this entity wants to give us (reveal to us) his knowledge*.

Objectivity and intelligibility exist but they are God's: it is not a requisite for man, there is mystery. Man does or does not accept the principle, is or is not a believer, has or does not have faith. The demarcation criterion of things divine broaches the whole of the universe and its history and thus loses its reason for being. There is no dialectic that is of interest to the advancement (?) of divine knowledge. No world event can contradict divine knowledge. Religions or intuitions are examples of divine knowledge.

THE SUSPICION

Let's gather our strengths together. Three forms of knowledge were defined by their respective fundamental principles. And each form is, because of its specific fundamental principles, a pure form. In other words, the three forms are different, disjunctive, and independent. However, the mentioned natural regions are obviously inhabited by a continuous profusion of other complexities that cannot be dealt with by one of the three forms. The mind (and its manifestations) represents a complexity of rather unclear location. So, it seems to me that the time has come to reveal my suspicion: There is no fourth form of "pure" knowledge. In other words, any form of knowledge is a combination of these three pure forms.

Confirmation of this suspicion would indeed imply that any complexity should be dealt with by a linear combination of the three, unique forms of pure knowledge. The space (the method) of knowledge has, according to this idea, only three dimensions, so every form of knowledge is representable in this space by a point, whose coordinates are just the weight contributed by each one of the pure forms. For example, when Philosophy announces that it will take care of everything, it grants itself license to wander around all the corners of this space. Depending on the space it frequents, a thinker may become more of a scientist, of an artist and - who would say so - more illuminated. And that may all be very well, for example, if he reflects on matter, on beauty or on heaven. Respectively! Some concepts justly, indistinctly and enrichingly circulate throughout the whole knowledge space. Finally, confirmation of the announced suspicion is equivalent to, so I believe, the conquest of a good critical scheme. Because setting a certain area for the complexities means setting a certain similar region of the space of knowledge. Architecture or design are debated so as not to fall outside a certain sector of the scientific-artistic plane; certain sacred scripts (like the Bible) justly occupy a separate volume near the artistic-divine plane, rubbing on the divine axis. And

some wise men dedicated to interpreting their predecessors (theologians, talmudists and cabbalists) attempt to displace this volume accordingly towards the scientific abscissa. Man throughout his history, has fought for his bodily health on the scientific-divine plane, gradually moving closer to the scientific axis, and does not trust, for example, an economy with artistic ingredients or scientific theories of reincarnation. Every complexity organizes the space of the method of knowledge into territories. Some will be ideal, others will be superstitious, hope-giving, fraudulent, ingenious or audacious ... Thus, once a concern has been perceived, set within a complexity, what part of the space of the method should be addressed? That is the question.

REFERENCES

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- 3 Popper KR (1980) *La lógica de la investigación*. Tecnos, Madrid