Science without law

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Abstract: The notion of 'law' as an incarnation of *lógos*, the basic possibility of truth statements, lies at the root of epistemology. Over time western sciences forged a tight alliance with technology that facilitated the worldwide proliferation of such thought. In its purest form it is the quest for a unified theory, on the far side it would be a 'science without law'.
Arguing for the second option, this essay takes a pragmatist approach: science should be conducted after ethical and aesthetical guidelines, not as a quest for universal truths; the choice between theories remains always free, putting the burden of responsibility for such decisions on the whole scientific endeavor.

1 Sublime lawfulness

"*En archē ēn ho lógos...*" — "In the beginning was the word, and the word was with god, and the word was (a) god."
The opening verse of the Gospel of John indeed serves as a convincing original myth for a text-based culture that has built its society around science and technology. The greek *lógos* usually translates as 'word', but can also mean 'thought', 'reason', or 'law'.[1] Faced with the immensity and brutality of raw nature, a feeble and fearful animal species called *homo sapiens* rose and seized the *lógos.* It is the ability of reason to grasp eternal truths. It is knowledge that is universal and ever expanding. It is also the perfect analogue of an immortal and immutable soul that separates us from the beasts. And the laws of nature, discovered by the enlightened sciences of modern age, are finally a viable replacement for the god-image of earlier belief systems. They explain how the universe expanded and how it will end, they are in command of such titanic powers as the sun or black holes. By claiming the *lógos* mortal humans gained access to an eternal mental realm of universal truth, thus lightening a divine spark inside their mind. Does this sound religious? It will be argued that this is exactly how modern science fueled by epistemology works.

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[1] see 'nomos' in Parr (2010)

But to gain this mental power, our weaker, mortal part, what we share with other animals, had to be dissected by force. This intellectual martyrdom, the splitting of the self, created two vastly separated domains: sensibility/reason, animal/human, object/subject, nature/culture, particular/universal. Humans since then have the possibility to grasp a type of reality that by far exceeds the mortal senses, staring right back into the origin of the universe, putting their minds into black holes, or entering the innards of atoms. Such staggering intuition about the innermost secrets of the cosmos evokes awe and veneration, a feeling of unlimited, god-like power. The joy of experiencing reality being re-written as an abstract but exact representation within the own mind is truly *sublime*. In turn sublimity is the utter humiliation of animality. Its brutal character was stressed by Kant, who called it "a violence which reason unleashes upon the sensibility with a view to extending its own domain (the practical) and letting sensibility look out beyond itself into the infinite, which is an abyss for it."[2]

The victim here is 'cunning', the ability to act reasonable without prior authorization through a universal codex dictated by pure reason. Opposite of it stands sublime knowledge = objective truth, which has its grounding in western philosophy following Descartes. With him one finds the claim that by turning inward, towards the mental, one can discover unquestionable truths, and be it only that of one's own existence. The intellectual world was thrilled by the sudden possibility to develop a strict machinic theory of ideas, analogous to Newton's *Principia*, the successful subjugation of the outer, material world under mathematical rules. The mind-domain that previously just consisted of reason and soul, the possibilities to grasp on abstract forms and divine spheres, had to be infinitely extended to a whole inner arena that harbors ideas and knowledge and offers enough place for their manipulation.

The emerging competing schools of thought after Descartes that immediately claimed that arena are rationalism, the internal search for universal truth, and empiricism, the notion that such truth can only come from outside. Finally they were skillfully combined and reunited by Kant by putting outer space *inside* the inner domain. With his transcendental method it was possible to attain abstract knowledge about external objects with Cartesian certainty by studying the mere conditions for intuition about them. It was the answer to the question: What must objects be like in order to be known? Such transcendental knowledge is *a priori* because it comes before the sensual inputs, and *synthetic* because it states something true about the world. In the context of an expanding European civilization the question from before can also be rephrased as: What must objects be like to have value for us?[3] The new sciences wholeheartedly welcomed

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[2]Kant, *Critique of Judgement*; quoted after *Delighted to Death*, p. 140, in Land (2011)

[3]This relation between Kant's critical philosophy, colonialism, and capitalism is discussed in *Kant, Capital, and the Prohibition of Incest* (Land, 2011).

this epistemology, since it offered a way to rapidly expand beyond the dull frontiers of scholastic wisdom by assimilating all that was newly found and it helped to finally and definitively defeat the church's hold on science.

The old doctrine of empiricism, that knowledge is directly found out there in nature, is thus revoked by Kant. To say something about an object always demands for *synthesis*, it is 'knowing that' rather than 'knowing of'. Cognitive experience consists of two elements: data and thought; or in Kant's terms: intuitions and concepts. Manifoldness = the particular is *given* while unity = the universal is *made* by collecting and processing sensual data. To enable this process, *objects must already conform to our cognition.* This means the possible existence of objective truth within the mental realm must be hypostasized. The violent procedure of subordinating the world to epistemology constitutes the aforementioned split of the self. Humanity removed cognitive operations and their results from nature and created a separate cultural domain, leaving the individuals with a profound and never-fulfilled desire for the natural. And it is from this moment on the task of philosophy to protect the nature/culture divide and to "provide a permanent matrix of categories into which every possible empirical discovery and cultural development can be fitted without strain."[4]

This 'permanent matrix of categories' takes the form of a law-like framework, which is most obvious within the natural sciences who call it the 'laws of nature'. Much more terminology from legal procedure is borrowed: To assign a thing to a category means to 'accuse' since *katēgoros* is the accuser. A 'thing' itself is always the topic of a debate or trial, something to be decided about, linked to the old germanic word for assembly: the *Thing*. It is *that is the case*, but a 'case', like in a legal procedure, is something that has to be settled within a group of stakeholders.[5] The French *chose* and the Spanish *cosa* derive from the same origin. We gather 'evidence' to arrive at 'facts', from *factum*, what is *made*. "*Les faits sont faits*," as Bachelard said.

But the lawful process is not only present rhetorically, it shows itself in the sociology of science too. Von Guericke staged his demonstration with the Magdeburg hemispheres in front of the imperial assembly (Reichstag) including the emperor himself, thus uniting all legal power before him. Boyle in his own vacuum experiments invited honorable gentlemen to serve as witnesses, thereby exactly repeating the legal procedure for conviction in England of that day. Yet Boyle's true witnesses were already non-human, since he meticulously noted the testimonies of inanimate indicators that he deemed much more reliable in his laboratory experiments. In scientific investigations this social function was from this time on in part taken over by objects, jeopardizing the assumed nature/culture

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[4]Rorty (1979), p. 123
[5]The examples 'thing' and 'case' are taken from Penz (2018b).

divide. A process of 'purification', the strict intellectual separation of the natural and the cultural that is also visible in the vast divide bewteen natural sciences and humanities, was instantiated in turn to protect it.[6]

2 Veni, vidi, vici

But how many laws should the book of nature contain? The rationalism of Leibniz had a very reduced rule for judgement: *"Omnibus ex nihilo ducendis sufficit unum,"* one suffices in order to get everything from nothing. What Leibniz thought of was a single founding principle, maybe like that of representation of knowledge, the split of object/subject. This principle is again foundational in the quantum philosophy of Wheeler (1983) as the Heisenberg cut, the divide between the system under view and the observer-participator.

Following instead Kant the case is settled in three stages: The external object is subordinated to the scientific value-system to be judged upon (1st critique), then the categorical imperative establishes a kind of super-law, a *lógos* from logics, that derives itself solely from a purity of concept (2nd critique), finally the enforcement of the law is extended as far as possible into foreign territory by declaring war against any *ignorabimus*: everything *must* be known (3rd critique).[7] Since we have no reason to believe that this epistemological method can be successfully applied to all elements of cognition, we just *assume* it. And if we prevail, we are rewarded by the sublime delight of the conqueror, who won utter submission of totality before the faculty of judgement. Modern epistemology thus presents itself as a Kantian *veni, vidi, vici*, a violent conquest of phenomena instead of a peaceful inquiry. The enlightenment project is totalitarian because the process of cognition is already decided before it begins.

It is very important to stress that Kant in his *Critique of Judgement* (3rd critique) just *assumes* submission of the totality of worldly phenomena under his epistemological legislation. Although nature shows itself in great manifoldness, she *must* follow universal laws in order for us to have the possibility of structured experience. We thus arrive at the necessity of universal jurisdiction just out of a *principle of purposiveness*: the whole world has to serve our demands. This echoes the cultural mandate of the Genesis, but it is also tantamount to confuse the means with the ends. Just because we use abstract rules to cope with our environment does not mean that nature comes already prepared for our purposes by following universal laws.

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[6]Latour (1991), see especially §2.5 for the example of Boyle
[7]This systematics follows *Kant, Capital, and the Prohibition of Incest* (Land, 2011).

So what happens if we do *not* force nature under our cognitive will? Can we drop any notion of objectivity? Instead of proving truths we then will just justify statements in front of a learned community. This means, as Sellars said, that "science is rational not because it has a *foundation*, but because it is a self-correcting enterprise."[8]

3 Alliance with technology

But let's stay with traditional epistemology for a little while longer. The elements of cognition employed by it deserve fitting metaphors. Rorty (1979) calls them the *Mirror of Nature*, where the gathered data is displayed, and the *Eye of the Mind*, which critically examines, purifies, and synthesizes. Such expressions already testify for a form of 'spectator theory of knowledge', where a careful and mostly passive observer is able to formulate true statements about an external system that, as a precaution against refutation, already statistically contain unavoidable disturbances.

Yet in the next moment the cautious scientific observer leaves his passive role and re-enters the productive cycle as an inventor and engineer. The successful transfer of knowledge to technology is not only a further proof of the validity of a theory but also a handy argument for the whole representational project, silencing critics with a simplistic Dawkinsian "it works, b***s!"[9] Even the church of that time was compelled to approve the technologically useful parts of the Copernican doctrine during the Galileo/Bellarmine debate. Of course this was without them accepting the 'objectivity' of Galileo's heretical claims, since those were in open conflict with the ecclesian value-system. Irrespective of the church's standpoint the new navigational tools spread over the world via networks of conquest and trade and in turn led to the wider acceptance of the modern scientific worldview. The proliferation of scientific fact must thus be seen as a positive feedback-loop, where knowledge leads to new technology that in turn aids the expansion of the included knowledge.

The example of Boyle's vacuum pump is again especially instructive. His mechanic witnesses in form of scientific instruments reliably confirm his theories in every repetition, but they only exist in the protected environment of the laboratory. Experiments are performed under a strict *ceteris paribus* (all other things held constant), the clause that already safeguards the law from any intervention. Science is based on esoteric practice and is essentially limited to epistemological save-spaces. But through scientific exchange in form of articles, engineering designs, and devices the findings spread and can soon be

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[8]quoted after Rorty (1979), p. 180
[9]https://www.youtube.com/watch?v=OOtFSDKrq88

confirmed in every center of learning of Western culture. In parallel the vacuum pump gets more and more technologically refined and transforms from a costly but fragile assembly of pistons and tubes into a cheap and reliable black-box. Universities and schools are crucial nodes in this network of proliferation, teaching and trade work as the motors. A standardized and ubiquitous technical practice is finally the irrefutable proof for the universal validity of a physical law.[10]

Phrased provocatively, the Standard Model is thus not the most accurate theory of matter but is more like the instruction manual for the CERN particle accelerator. The recent findings in particle physics are still as exciting, they just lose their claim of universal validity, if 'universal validity' is meant to be more than: if one builds another device like the CERN accelerator, it will perform similarly.

Laws of nature are the basis for our own creations and for our dominance upon earth. Unable to change a law of nature, humanity is in total command again when it comes to construction and engineering. Knowledge of the laws brings also their mastery and thus god-like abilities. No sign is left of the frail creature from the dark ages of humanity. But is it really lawfulness that reigns the universe, or are the primordial powers just what they are, with all law-like parts added artificially to give us a feeling of universal understanding? And what would be the implications for science if there is no objective truth?

4 Beyond epistemology

A leap beyond epistemology means to "drop the notion of epistemology as the quest, initiated by Descartes, for those privileged items of consciousness which are the touchstones of truth."[11] If scientific truth is really seen as being a matter of justification, no 'theory of knowledge' is in demand any more. Rather the question arises: What is deemed as justified? It cannot be a call for accurate mirroring = precise representation, since this presupposes that the universe is made up of clearly distinguishable, intelligible elements and that knowledge about their configuration yields answers to all possible questions. But how can simple correspondence go wrong? A statement like "the cat is on the mat" can hardly be refuted, is it then not a true statement about reality, a perfect mirror? But such a statement can also be called 'objective' because agreement about it can easily be reached between everyone who perceives the situation at hand. And the process of arriving at such a conclusion is called 'rational' because it employs methods

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[10]The whole passage is after Latour (1991), §2.5.
[11]Rorty (1979), p. 210

that are generally considered reliable. Nothing more enters than mere opinions, backed by explanatory justifications, to arrive at a 'truth' that can be as simple as that the cat is on the mat or as intricate as a theory of elementary particles.

Are we then talking about fantasies, are we invoking some dangerous 'idealism' that makes us lose all grip with the real world? The advocated view states that what is real is just what it *is*, not more, not less. It has no preferred representation, there is no canonical notation for what happens. To assume an underlying structure, like epistemology does, would in fact diminish the manifoldness of natural phenomena. In focusing on only one description we lose the ability to use other, incommensurable vocabularies. "The desire for a theory of knowledge is a desire for constraint."[12] Using the full power of many vocabularies instead could unleash an intellectual overdrive that accesses the full spectrum of cultural production instead of sorting out most parts as incompatible. Collective cognition could accelerate in the form of an *uninhibited synthesis*, as Land (2011) calls it.

If on the contrary one assumes a continued, linear growth of knowledge, a representation of reality that over time gets always more accurate, the absurd situation of Jorge Luis Borges' "On Rigor in Science" arises. In this short story the art of cartography in a fictitious empire rises to such mastery that the most accurate map actually contains every single detail and consequently also covers the whole terrain of the empire, or rather constitutes a clone on the empire itself. The usefulness of such a map is highly questionable, and such might be a theory about every element of the universe, since the only way to achieve such a representation is to exactly duplicate the whole universe. Epistemology will protest at this point, stating that the infinite manifoldness of natural phenomena *can* be the consequence of a finite set of rules, like the beauty of a fractal originates from a simple mathematical formula.

In its most drastic form this program is called reductionism. Here one does not only assume validity of universal laws of nature for all animate and inanimate matter and all times, but even their convergence to one simple and elegant set of such laws within a single intellectual domain, preferably physics. It is further thought that this dialectic process advances by itself just by the use of scientific inquiry and argument, an intellectual evolution with a truth-motor. Finally broad agreement will be reached among everyone..., well, everyone sharing the same intellectual tradition of western, reductionist sciences. And even then some might have to be persuaded by a little more than equations on the whiteboard. Since the process inevitably involves money, reputation, and careers a *ceteris paribus* of interests is clearly not fulfilled.

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[12]Rorty (1979), p. 315

The sciences led by epistemology try to draw up schemes and maps for the world by the criterion of accuracy and compatibility, not mainly usefulness. Every statement will be relative to the chosen scheme, of which in reductionism we allow only one. Clearly then 'relativity', not being in direct contact with reality, is a verdict that must be delivered on this kind of science. In trying to escape the dualism scheme/world (culture/nature), one does not lose touch with reality, it is quite the opposite: we establish a direct connection (*not* representation) between what we believe and what affects us.[13]

Of course a certain relativity remains, the one of words in relation to sentences and of sentences in relation to language. But that is just the quintessence of Wittgenstein's *Philosophical Investigations* (1953), that the meaning of a word *is* its use in the language. In the same sense this holds for all elements of a scientific theory: A theoretical particle is never something out there, much less the representation of something real within the mind, it *is* exactly and only what role it assumes within the respective theory. The use of a certain particle-concept might lead to new and more advanced foundational theories or technological breakthroughs, but at no stage this signifies that the particle *is real*. One should be careful not to deduce from this that then a particle is "only text" or "only discourse", but what it is can *also* be found in text and discourse. The particle's being is connected to everyday experience, scientific and technological practice, as well as social discourse. This makes it a 'quasi-object' between the poles of nature/culture, object/subject, universal/constructed. To give a full account of the particle-self we have to map its winding trajectory between all those poles, its polymorphic appearance in all fields it relates to. Such an account amounts to everything but reductionism.[14]

5 Let freedom reign

It was argued that Enlightenment, after fighting back the myths of the dark ages, fell itself under the epistemological spell of the existence of universal truth.[15] But what alternative to a science on the noble quest of finding the eternal laws of the universe do we have? Obviously just what science and technology already are and always were, a means for humanity to better cope with the world instead of an end in themselves. To choose a theory because of an assumed necessary real instead of pragmatic criteria is to render ourselves helpless when confronted with the adversities of human existence. Instead of intelligent beings we would be mere things shoved around by reality. In reclaiming the freedom to choose alternative theories, we regain our free will but also

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[13]This thought is due to Davidson, see Rorty (1979), §6.6.
[14]These ideas are after Latour (1991) and are also re-expressed in Penz (2018b), §3.
[15]This is the basic theme in Horkheimer–Adorno (1944).

accept responsibility for our intellectual choices.[16] What is then left from reality? The real is the result of consensual intuition, an ongoing dialogue, and a shared commitment towards a certain world-project. It is not only what *is* but also what *can be*.

This viewpoint has one first immense consequence for science: There can never again be an argument of the kind "I am just doing science," in order to be exempted from moral considerations. Since we are condemned to be free, to make real choices, we carry a responsibility for every such decision. A science without morality is then inconceivable and ethical considerations must be integrated into the process from the beginning to the end. Since the strict separation of objective and subjective inputs will be given up, most of the usual 'scientific method' must be revised. The only way to act responsible is to be sure about what we are doing and why we are doing it, i.e., to oversee the whole web of relations into which our research is embedded. A new way of ethical scientific conduct will be the result of such an intellectual inquiry. It can be hoped that de-humanizing factors of science can be avoided and that academia is finally able to approach other schools of thought with respect instead of utter disdain.[17]

A second consequence comes from the sentiment that we might lose something by sticking to just one universal set of laws, to a singular descriptive language for nature. The old stories and myths were already streamlined into a coherent picture of the world long ago, into a single scientific narrative fitting the demands of a monolithic world-order expressed by an equally singular set of economic rules. A pluralistic and kaleidoscopic science on the other side would select its content by rules following aesthetic concerns too, extending its reach into all directions that are deemed interesting, acknowledging only an anarchism of methods in the sense of Feyerabend (1993). What we can expect from this is certainly spontaneity, creativity, and conviviality. Taken together with the first, ethical consequence, the new sciences have the chance of attachment to actual and pressing problems, transforming themselves into something that Illich (1973) called *Tools for Conviviality*.

Finally, what we perceive in the world can keep its dignity, does not have to conform to our schemes and theories, will not be re-presented, re-produced, and such re-pressed. The phenomena can, like Benjamin (1935) expressed it, keep their '*aura*'.

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[16]These arguments follow Sartre's existencialism, see Rorty (1979), §8.3.

[17]Above all further *epistemicide*, the annihilation of 'non-scientific' forms of knowledge, a term coined by de Sousa Santos (2014), must be avoided.

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