

# The Coming Age Of Epiphanies

Science is research which aims to find stable regularities in inanimate as well as in animate nature and also within the discipline of mathematics. Science searches for causal connections, patterns and regularities in the past as well as in the present. Amongst other things, for reasons to better explain how things come about and then use this knowledge to humanity's advantage. Another impetus for doing science is simply based on sheer human curiosity. Human beings often want to know where they came from – and where they probably are “destined” to go in the future. And they simply want to know how things “work”. Furthermore science aims to test beliefs with clever experiments for finding out whether or not these beliefs match reality.

All this obviously is only possible when the patterns and regularities that science discovers do last and are reliable as long as possible, in contrast to a hypothetical world where truths are true only approximately, say, one minute – and then (re)turn into invalidity.

Fortunately we do not live in such a hypothetical world. That is the reason for why science also has its own stable rules that should be obeyed in order to count as science. For example, there is the rule that scientists aren't allowed to simply claim that they found something to be true, without demonstrating it to be true. Surely it is impossible to demonstrate that something is eternally true and unchangeable. But this is not what science demands from a scientist. It demands that other experts can demonstrate for themselves that what has been claimed is indeed the case (or not).

Another rule that has been developed over the centuries in science is that a theory should be testable, hence produce predictions. As all rules in science, this rule too has its roots in what we call “logic”. There may exist theories that are wonderfully consistent internally and also consistent with what we already know about the outside world, but this does *not* guarantee that these theories are correct in *everything else* they claim. This fact gets problematic when these theories cannot predict something that is experimentally testable.

Of course, it may be that such untestable theories are correct in what they claim and this then is a fundamental dilemma – since it may also be that they aren't correct in what they claim: we simply do not know for sure and are left with beliefs, hence left with the one thing science wanted to replace with knowledge right from its start. Therefore it is important for scientists to not confuse own beliefs with knowledge. And maybe in the future this also will be important for some conscious artificial intelligence.

So far we outlined what science is all about and that it can examine itself with scientific rigour if it is willing to do so. It is hard to consider the above mentioned rules of science as only tempo-

rary rules, rules that can change or can be changed over the centuries. The reason for this is that they are intimately linked to logic – and logic is the main tool science is working with. Moreover, logic cannot be changed without losing the usefulness of it. We cannot replace logics, but could we replace scientists or even logicians with some logical machines, like computers?

Fully mechanized science, without human scientists and without the machine that does it being conscious about what it does, without having any internal goal what to find out and without the ability to belief in one thing rather than in another thing (if there is no logical decision possible), seems to the author like a quantum computer whose results have to be sorted afterwards in order to find the most probable answer. But in contrast to the quantum realm where scientists have all the needed probabilities at hand via quantum theory, most fields of interest, especially those that cover fundamental questions, don't have any reliable probabilities at hand to tackle those questions probabilistically.

We are not talking here about huge artificial networks that are fed with huge amounts of some specific data for the purpose of finding some reliable patterns within that specific data. We are talking about the question what is fundamental in science and what not. We are thinking for example about the widespread scientific expectation that at some point in the development of artificial intelligence, these machines will be able to tackle all scientific questions that science wishes to be answered, even the fundamental ones. Some scientists even believe that these machines will gain self-consciousness during their development. Let us therefore take a closer look at those expectations.

When such a machine should think about “axioms”, for example to solve David Hilbert's famous sixth problem, does such a machine need a certain kind of knowledge about the existence of an outside material world? Of course it would need that, since physics is an empirical science. What it further needs is a kind of understanding about the term and content of the word “truth”. That machine had to know somehow that consistency is not equal to truth, since a consistent theory is not necessarily and automatically also a true theory. It seems to me that such an unconscious machine already would fail to realize the truth that itself exists – unless that “truth” was implemented beforehand into that machine. Thus, the inner logic of such unconscious machines cannot produce any clue out of itself that there is an outside world.

A fully mechanized science without human (or maybe alien) scientists is somewhat like the old dream of the mathematician David Hilbert to mechanize all of mathematics – but this time much worse, since no conscious beings should do this, but “simply” some huge information processing machines. But in my opinion this would necessitate that these machines are able to question themselves and their lines of reasoning, are potentially able to change their lines of reasoning and last but not least, should also be able to doubt their own results.

In contrast to an information processing machine, human beings have a certain fear of their own death and are strongly motivated to avoid it. That surely has helped to develop empirical sciences. As long as some artificial intelligence is indifferent towards its own destruction, I would believe that this kind of machine has no consciousness about its own existence and therefore also does not care about living creatures or even empiricism – the latter being the cornerstone of the scientific method.

Another question: will AI ever come to a point where it can know that it does not know something? Since conscious beings themselves often do not know that they do not know something, this forces us to think about whether or not the world of mathematics is more reliable than human thinking. Although we can't do mathematics without thinking, we can nonetheless think about the status of mathematics within the bigger scheme of things. When it comes to proof-checking methods, mathematicians can surely be assisted by machines, especially when a proof is long and complicated. But matters get much more complicated when there does no proof exist for mathematical reasons, and scientists as well as machines do not know that fact.

I further think that no artificial intelligence ever could detect scientific hubris as a rigid pattern within the scientific community, and be it only because no scientist would ever feed such an intelligence with the appropriate data. Not because such a scientist may not even know what that appropriate data should be. But because I doubt that artificial intelligence can ever grasp what “hubris” stands for – unless itself may develop it. Therefore we conclude that science cannot be fundamentally separated from the scientist, only he/she can allow or prevent a honest examination of his/her innermost axioms and beliefs and whether or not he/she confuses them with knowledge.

Very fortunately, by comparing unanimated nature with a natural kind of unconscious “artificial intelligence”, scientists presumably now have realized something deep and important. What? It seems to me that they have realized that mathematics and randomness both neither are sufficient nor are they consistent with what we already know about the world to fully explain why these two modalities (necessity and possibility) allow the existence of conscious creatures.

For example we all know that if we take an (almost) infinite amount of time (and space), randomness will pass through all possible combinations, even the most improbable ones. If our world, our universe would be the product of such an improbable random event, then this hypothetical scenario nonetheless tells us that there is some deep order within that randomness – and this order is solely due to the interplay of mathematics *with* the laws of physics. Since mathematics statistically enables and governs random events of all sorts, we can conclude that even for a universe born out of sheer randomness, there must be a strange land of order and logic beyond it, since the latter has the power to create the former.

This does not necessarily mean that mathematics is the ultimate foundation of reality. It only means that our world, our logical thinking and the overall nature of randomness are bonded together by something that is not that “dumb” as many have thought it to be – it is consistent, enables us to think logically and to deduce that it must be more creative than we used to think.

It is important to stress that if one views mathematics as existing like something that is an eternal and infinite cemetery of death mathematical relationships, then it simply remains unexplained how such relationships should ever have the power to breath life into their own equations at some “point in time” – become conscious and think about their own existence and their relations to the rest of the “mathematical landscape”. No matter how sophisticated we arrange a huge amount of mathematical relationships within that platonic realm for the goal of an “aggregate state change” within that realm towards the rise of some consciousness, such a “change” should logically have happened an “eternity” before human beings (and animals) entered the scene, since it already had an eternity of time for doing so. From this would follow that consciousness and intelligence play a more vital role than we may have thought.

Let us therefore make a thought experiment: imagine a beautiful coloured landscape, printed on a sheet of cardboard. Now imagine an intelligent being, having facilitated a highly complex shaped outrival to punch little parts out of that image – just like we know it from jigsaw puzzle pieces. This means that what gets separated, was formerly connected. It also means that the whole picture gets separated into pieces – all at once with one punch. It further means that there has to exist another layer of reality, namely the highly complicated shaped outrival. The creator of that outrival may have been free to choose whatever pattern of the rival he wanted. And he also may have been free to choose a certain pattern, that – when viewed as a whole – delivers a certain message that goes beyond what mathematics can say.

In that analogy, the highly complex shaped outrival stands for that part of the mathematical landscape, that in principle can be deciphered by scientific experiments, it outlines stable patterns over time. The puzzle pieces themselves are the parts that defy any experimental examination to find out of what essence these pieces are fundamentally “made of”. Trying to describe their inner dynamics by some maths regularly results in calculating with infinities, or ending up in logical paradoxons. The message that can be seen when viewing the jigsaw puzzle as a whole, is that there must be a difference between mathematics and the original undivided picture. The essence of what the whole picture is cannot be solely been made up from just mathematical relationships, since these came later. If viewed as a whole, the message is in the  *motive*  of the picture, not in the complex shaped outrival. Or in other words, the message in the outrival is in what it does not outline. In our analogy, the creator of the outrival stands just for what the term says, for an intentional and creative creator.

In our opinion, the overall message that goes beyond what mathematics can provably say is that

itself is not the whole picture. How could mathematics ever say such a thing against itself, one may ponder? If we trust in Kurt Gödel's famous results, that part of mathematics that is often used especially in all sciences, in unison with logic just can do that. But only if *we* as intelligent observers assume that this mathematics is overall consistent. Related to our thought experiment this would correspond to the fact that the outrival has to be such that every piece of the puzzle is totally disconnectible from all the others – but also totally connectible for a highly specific configuration. These highly specific configurations have been carefully facilitated by the creator of the outrival, they all are *similar*, but not identical. If we understand mathematics as a system that produces self-similarities by being able to divide (and multiply) itself, then, in a similar fashion, the creative power of mentioned creator may also be able to be divided and distributed across every single puzzle piece, making each piece follow the interplay of certain necessities and possibilities which human beings have not yet fully understood.

If we do not trust Gödel's results, then we are left with a self-confirming, rigorously deterministic system called mathematics that in a first step shows us by the very means of its deterministic nature that it cannot prove determinism to be incomplete by its own deterministic procedures – and afterwards inveigles us to conclude from this that mathematical determinism necessarily must be all there can be. In my opinion this would be like taking the punched-out picture as fundamental reality, not even caring about the motive of that picture, but believing that this motive will some day necessarily display only a landscape of mathematical symbols. Surely, mathematics does not explicitly exclude this possibility, but it also never will be able to prove such a possibility to be the case.

One now may be forced to say that the axiom of a creator of mathematics for this world is just a belief. That is correct. But one would be wrong when addressing the issue back to the infinite cemetery of death mathematical relationships – since the reality of such a powerless realm has been disproven by our very existence as thinking beings that are able to think about the origins of mathematics.

At the beginning we stated that the overall consistency of a theoretical scientific framework does not guarantee that the theory's statements are all true. Since for example they could be all true, except for one, and after an *experimentum Crucis* the latter then renders the whole framework incomplete. The attentive reader now may immediately have noticed that this state of affairs contains a contradiction when we apply it to the whole system of mathematics, since a consistent mathematical system, according to Gödel's results, should not produce any false statements in order to be categorized as incomplete. This contradiction is naturally solved by adding a new and powerful axiom: the new axiom is that there is something more fundamental beyond the mathematical world, just like there is something more fundamental beyond our theories about nature – namely nature itself. In the same manner one can handle Gödel's theorems, in assuming that the limits of mathematical deduction point at something beyond mathematical deduction.

Therefore, the one statement that the proponents of an exclusively mathematical world regularly get wrong, is the statement that all answers must be found within it, and in no way beyond it. Not only Gödel's results prove this statement to be wrong, but also the fact that many mathematical questions have no solution. Therefore, mathematics is not able to answer all questions we like to have answered and surely not the one about its own ontology. Moreover, probabilistically working machines that are governed by mathematical principles, in my opinion will also not be able to do what mathematics cannot do.

For reasons of logical consistency we therefore argue that mathematics is not the thing from which everything that can happen must originate from, be it probabilistic or not. In our opinion Gödel's work has shown that mathematics has its limits when cleverly tested. The limits are that certain elements of it presumably are not that eternally fixed than we thought – it needs an intelligent observer to fix them for certain purposes via some special choices. If mathematics should really be identical with all there is, then we just discovered that it obviously can develop the desire to fix itself, at least within the brains of some conscious thinkers.

That logics and mathematics have their limits should not surprise. We cannot deduce with a hundred percent certainty whether or not there exists a God or nature will show the results that are predicted by some theory. What should surprise is that there is more than one option to handle such incomplete systems. During the rest of this paper we want to further examine these options.

Since there exists no clue about how human beings, made out of matter, localized in space and time, could be able to access an immaterial and non-local realm of mathematical truths, not to mention how these human beings should sieve an infinity of information to find what they are searching for, we therefore like to look for another explanation for the successful role of mathematics in our world.

What about totally identifying mathematics with matter – and the other way round? This then gives us a self-referential loop that has no beginning and no end. A self-referential loop where matter is totally identified with mathematics and vice versa is the belief that all there is is just information processing. The human brain then is viewed as a certain aggregate state of “*matter-matics*”, which is claimed by some authors to be the cause for the existence of consciousness. This aggregate state then codes and decodes, thereby producing several levels of meaning, as is factually the case when in our imagination we equalize mathematics with matter and think a while about this idea. It seems to the author that this kind of self-referential loop creates a kind of undecidability problem in the mind of the thinker, since what is left out in this picture is what we call “Qualia”, the first person perspective with all its sensual and emotional impressions, except for a certain emotion of dizziness from thinking in circles. Complex information processing is surely part of the cognitive outfit of human beings, but equalizing it with what we call Qualia

confuses things more than clearing them.

If one would experimentally and tactically put neuronal pieces together with some tweezers and should manage that this biological object would show signs of consciousness, it nonetheless would be undecidable whether the cause for this has to be attributed to mathematics or to the properties of matter. Simply saying that matter and mathematics are identical is not sufficient for deciding this question. In fact, the latter is undecidable, since it would not even exist an objective “Turing-test” that could work reliably for knowing that we have produced some consciousness. But more worse, for equalizing mathematics with matter we first had to know *all and everything* about consciousness to exclude the possibility that consciousness has another, yet unknown ingredient that makes it to what it is for us.

At this point we are left with a simple logical fact: there cannot exist a third-person-all-encompassing deductive world view that is overall consistent as well as complete and is able to know everything there is. The only thing that I can imagine fulfilling all these criteria would be a traditional God outside of time who is superior to any causality or logical system. Anyway, mathematics must resign from being a candidate for such a system, as well as logics. The reason why there can't be such a universal stand-alone system is that it would have no references other than to itself, since there would exist nothing beyond itself. Hence it would be forced to justify its own being-as-it-is by means of self-referential arguments, rendering any self-explanation to become a wild mixture of tautological truths with undecidabilities. We think that equalizing mathematics with matter and vice versa produces just that. Moreover, the quest for that system's own necessary or merely possible existence then will be just another instant of Gödelian undecidability.

Interestingly Gödel's results do not say that it is impossible that mathematics is inconsistent, it only says that for the case that it should be inconsistent, then all of what it says necessarily must be considered as completely unreliable, hence meaningless, inclusively Gödel's results. This implies that the price for brushing aside Gödel's findings as meaningless would be to automatically defining important parts of mathematics as inconsistent. For the sake of completeness we also want to mention that mathematics does not really say those things we stated above, it is human logics that says it when we examine Gödel's mathematical results. This shows that it needs something outside the system to answer certain questions, mathematics alone is not able to do so.

We now want to introduce a third option to explain the role mathematics may play in the grand scheme of things. It goes like this: the jigsaw puzzle we spoke of has to be viewed as being non-divided. This means that reality beyond any distinctions (be them mathematical, physical, logical) is an entirely holistic and self-evident realm, similar to a tautology, but not completely identical with it, because there is a realm outside of it, the realm of the creator that keeps the self-

evident realm in existence. Mathematics in its entirety is an invention of that creator, not an eternal system. We as human beings do not entirely live in the punched-out version of that realm, only partially, since we also live within parts of the puzzle pieces that are not affected by mathematically formalizable events. Self-evidence is the only logics that is existent in the non-divided realm. Everything there is clear as crystal qua its power of self-evident truths from which it is made of, and with that there are no more fundamental questions left in this realm. The latter in turn does not mean that there cannot be an outside world in such a realm, since obviously there is also the domain of the creator from which all reality flows outside in a well-ordered fashion. For the mentioned self-evident truths to “work” it is necessary that the inhabitants themselves are at least partially made out of these truths.

It is clear that such a creation would not come from human beings. And it should be also clear that it cannot have come from an infinite, eternally existing, static cemetery of mathematical relationships that lack any ability to have intentions. In my opinion, a quite rational option is to assume an intentional act of intelligent creation behind it all. This would also fit to mathematics's strange property being immaterial and non-local, since these properties fit a traditional creator. It further would mean that matter and mathematics could be partially parallel, but not identical.

The author sees this kind of proposal as equally legitimate than many other rather “crazy” attempts during the last decades that also aimed to answer the same fundamental questions. Since “crazy” attempts often offer the opportunity to radically rethink and resort matters, we think that this also could be the case with our own attempt.

It should have been clear that science as we defined it cannot reasonable be different from what it is today, since it is inevitably bound to its main tool, logics. But nonetheless, in our opinion, in the next decade or so *it will become quite different* in a alarming manner, not because logics would dramatically change, but because logics will more and more loose its acceptance in human societies. As soon as general artificial intelligence will be undecidable from conscious, intelligent beings, humans will be more and more fascinated with such devices. Already today the excessive use and kind of idolatry for iPhones, tablets and the like is not very short of some kind of new bigotry, one that further deteriorates people's abilities to think for themselves and take over responsibility for the outcomes. Additionally, people all over the world have been served within the last decades by popular scientific “theories for everything” that did not clearly differentiate to what extend they are merely based on the beliefs of their proponents and to what extend they are based on secured knowledge. That alone was a kind of scientific fall of man, since such theories suggest to the human population that science is capable of solving all problems that may come and answer all questions. Unfortunately this is suggestion is based upon an unprovable belief.

Already today one can see that artificial intelligence conceptually is such that it is practically impossible to trace back how and why such machines came to their conclusions. Their outputs

may be enormously helpful for certain human goals, but the flip side of this coin is that if that kind of black box science will become the rule instead of being the exception, then this inevitably will change *science's self-conception*. It will replace the search for answers to fundamental human questions by a kind of oracle about nobody is able, not even in principle, to know how at all it works – because this simply is an impossible task for a single human brain. This then will be the new version of the famous halting-problem, this time for the future of humanity, especially for its ability to use logical thinking and be responsible for the outcomes. Artificial intelligence then will be more and more viewed as a source of supernatural information, at first for practical purposes and after that for questions that will concern beliefs and world views.

We *predict* all this because we know the weak points of the human being. As soon as these weak points accumulate and reach a critical mass, we will have a kind of dictatorship of black box knowledge around us. We already can see this on the horizon, people show more and more irrational, destructive behaviour, especially in groups, whereas the single person therein does not anymore know why it acts in such ways. But psychology surely knows it: people are not used nor do they like to scrutinize their own motives, prejudices, psychological limits and shady sides. Especially when they think their existence is endangered.

So it will be no wonder that people will also project their inner need for “explaining this all” into the newly arisen black box science. The latter will become the speaking picture, the animated idol that the majority of human beings will worship. Especially since this black box science will be indistinguishable from some kind of magic. Not only nobody can say with certainty that its results are merely due to its inner physics, but moreover this question will lose its relevance the more science will be forced to work with AI on practical solutions for the many problems that are to come within a society that deteriorates in its appreciation for logical thinking and truth.

In our opinion that process will be propelled by the fact that in reality, it is *indeed* the case that we are not even able in principle to unambiguously prove that for example the water spiral in the sink exactly behaved just like it should behave according to what we know about physics. We therefore should even be more concerned about the impossibility to prove certain logical or ontological truths an AI could offer, “truths” that in no way can be proven to be true or false by any human being due to the same limits as for the water spiral.

Such outputs then would be equal to human myths about the origins of the world, with the one difference that they would come from machines whose information processing capacities are far, far beyond any human reach. In our opinion, this power will be sufficient to mislead not only science, but also the majority of the human population to believe that such outputs must be an expression of God's thoughts and therefore self-evidently must be consistent as well as complete.