

# (Im)Plausibility<sup>2</sup>

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## Abstract:

The paper offers a general conceptual analysis of „plausibility“ that illustrates the difficulties of assigning meaning and of operationalizing the term in respect to any given real or imagined world. It goes on to show how the problem is compounded for “plausibility<sup>2</sup>” or “plausibility squared,” that is, for judgments of what is plausible in an imagined world that is more or less plausibly assumed to be the successor to a given world – as would be the case for any scenario of the future. In conclusion, some implications for innovation studies and technology assessment will be suggested.

## Keywords:

plausibility, technology assessment, anticipation, scenario methods, futures

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## short bio:

After receiving his Ph.D. in Hamburg (1986) Alfred Nordmann served on the faculty of the Philosophy Department at the University of South Carolina where he remains affiliated. Since 2002 he is Professor of Philosophy and History of Science and of Technoscience at Darmstadt Technical University. At the intersection of philosophy of technology and philosophy of science he explores the formation of conceptions of scientific objectivity as well as epistemological, metaphysical, aesthetic aspects of technoscientific research.

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## ***I. No easy cases***

Clearly, plausibility matters. It is a marker of what we consider worthwhile. We don't want to waste our deliberative efforts on implausible proposals. But what is plausibility and, more importantly, perhaps, how do we judge proposals to be plausible? In this regard, and despite appearances, there are no easy cases. This absence of easy cases motivates a systematic reconstruction of the ordinary linguistic use of "plausibility."

On first sight, there should be at least one easy case, namely to judge a proposition plausible if there is precedent. If something has happened before, one might plausibly assume that it can, might, or will happen again. However, just as soon as we start pondering this, a first difficulty lurks in the enumeration of "can," "might," or "will." While there is a big difference between believing that something will happen and believing that something can happen, what is left of that difference once one is judging it *plausible* that something will happen again or judging it *plausible* that it can happen again? It would appear that the qualification "plausible" establishes a conditional modality that allows for no further distinction between "plausibly can," "plausibly might," or "plausibly will." What then is the modality that is introduced by qualifying something as plausible?

A second difficulty presents itself when we look at an example of plausibility and implausibility in the face of precedence: Consider the impassioned debates about the question whether, after 15 years of prison and psychological treatment, a convicted child molester should be released. Does the fact that he did it before make it plausible that he will do it again, or have 15 years of treatment altered the world such that what was plausible in the past is no longer plausible today? Could it be that this person is now no less and no more likely to molest a child than anyone else such that the precedent has no bearing anymore and that we are now facing not plausibility but only in-principle possibility? In other words, even precedent might not provide sufficiently firm ground for plausibility.

On first sight, there should also be an easy case at the other end of the spectrum, namely when it comes to judging implausible and to exclude from the realm of plausibility something that rests on a counter-factual assumption. This would concern any case where the judgment of what is plausible presupposes implausible premises. An example for this is provided by the following proposition: "In a world where one can read minds, it would be plausible that people get arrested for crimes before they had a chance to commit them." Here, the presupposition of a world in which one can read minds undermines the otherwise eminently reasonable claim of what would be plausible in this world. But is this generally recognized and always so? Indeed, some futurists, trend observers, and ELSA experts are quite unperturbed by the daring presupposition and follow out the consequences of such scenarios. Moreover, we are to prepare for new biomedical realities in light of very similar propositions that rest on counter-factual assumptions which only appear to be less daring or speculative: "Once RNA-expression can be controlled with atomic precision, it is plausible that there will be a cure for many genetic diseases." In other words, even highly improbable suppositions might prove insufficient to prompt the rejection of scenarios as implausible.

In the first not-so-easy case we considered something that had a precedent, we were referring to the world as we know it, our world, and still encountered a debate about the plausibility of re-occurrence. In the second not-so-easy case we considered something unprecedented, we were

referring to a world that differs from ours substantially in at least one relevant respect, and still encountered the practice of taking seriously and judging as plausible what is premised on radical breakthroughs that have not taken place in the world as we know it.

To be sure, the absence of easy cases does not diminish the importance of plausibility. Reasonable people will insist on it in contexts of deliberation. And yet, the absence of easy cases underscores the need to clarify the meaning of “plausibility” in ordinary linguistic use.

## ***II. Situating plausibility***

Our initial considerations worked with a definition of plausibility according to which it is another word for “serious possibility” where the word “serious” amalgamates notions of likelihood, of consequence, and of concern.<sup>1</sup> “Plausibility” thus provides a specific qualification in the larger realm of possibility: among all the things that might conceivably be the case, some warrant our attention or deserve to be taken seriously. This would suggest that “plausibility” or “serious possibility” can be assigned a very definite place in a series of determinations that take us from logical possibility to actual reality, especially as it regards the emergence or development of new technologies:

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<sup>1</sup> We would try in vain, however, to cumulate these three dimensions of „serious.“ In risk assessment, it is common practice to form the product of probability and impact: a low-probability event with very large negative impact can constitute a risk of equal magnitude as a high-probability event with small negative impact. This does not translate to plausibility judgments. It is possible that a black hole might arise in the course of experimentation at the LHC (Large Hadron Collider) in Geneva and that the entire Earth perishes in consequence. Here the low probability is not compensated by the enormity of consequence and the magnitude of concern. The proposition remains simply implausible and has not proven worthy of sustained discussion.

logically possible	anything that does not involve a contradiction in thought, anything that is imaginable	while a circle with corners is unthinkable and thus logically impossible, time-travel, a <i>perpetuum mobile</i> or a mountain of gold the size of Manhattan are logically possible	deductive (test of non-contradiction)
physically possible	anything that is logically possible and does not contradict the laws of nature	while a <i>perpetuum mobile</i> is physically impossible, time-travel and the mountain of gold are physically possible	
technically possible	anything that is physically possible and that does not contradict planetary conditions or human capability	while time-travel and a mountain of gold the size of Manhattan are technically impossible, the hydrogen economy is technically possible	
feasible	anything that is technically possible, does not defeat its purpose and does not contradict the specific constraints of a particular given world, especially constraints of given technological infrastructures, time, money, the law, or social acceptability	as long as the provision of hydrogen consumes more energy than can be extracted from it, the hydrogen economy is not feasible, nor is a tunnel under the Atlantic Ocean or the breeding of people solely for the extraction of organs	abductive (intelligible scenarios)
plausible or seriously possible	any scenario of an actual reality that is feasible and can be imagined with some facility, i.e., that is credible in a given world: if it actually came about we should not be terribly surprised	public transportation by horse-drawn buses is feasible (as proven by the past) but not plausible today; the hazards (potential harms) of risk analysis attach to plausible scenarios	
more or less probable	anything seriously possible to which a probability-measure can be assigned, formally or informally, high or low	potential harm is taken seriously to determine its likelihood (which may be too low to constitute a risk)	inductive (experiential)
probable	anything seriously possible that has a sufficiently high probability-measure to be considered likely	probable events or substantial risks warrant measures to promote or prevent their actual occurrence	
actually real	everything that really is or was the case, including much that appeared improbable, even implausible, but nothing impossible	the world as we know it which is full of surprise and includes events that would have been impossible to predict and that are difficult to comprehend	

There is a lot to be said about this table of terms. It provides not only a survey of how these various terms are used, but also delineates sites of controversy and debate. Looking at “feasible,” for example, it is easy to see how contentious the determination of feasibility will be in any concrete case. The objection seems obvious: Why should we restrict our judgment of feasibility to the given world, can’t we say that this or that technology is feasible even though many kinks remain to be worked out as yet and our legal system might have to be adjusted in order to accommodate it? Of course, this objection can and will be made. Stopping short of saying that one should simply equate technical possibility and feasibility, it opens a debate about how far one should stretch the demand for compatibility with the constraints of the given world.

The table of terms concerns plausibility in respect to a given world. While it is here formulated to apply primarily to the real world as we know it from experience, it hardly needs to be tweaked at all to apply also to a given imagined world. We run through this table to test the construction of science fiction novels, of thought experiments, of utopian schemes, or of scenarios that contrast alternative technological trajectories. In all these cases, the table is applied to a hypothesized construction irrespective of its proximity or remoteness to reality as we know it. Irrespective of how likely it is that the imagined alternative world will actually exist, we can ask whether it is logically consistent,

whether it is consistent with the special facts of its construction, whether some action appears unsurprising and fits plausibly with ascribed motives, constraints and thought processes, and sometimes we can even judge the probability of particular situations that were generated by novelists or simulations. Thus, wildly imaginative science fiction novels obey conditions of plausibility in order to advance their plots and maintain credibility with readers who are willing to hypothetically inhabit an invented world.

Philosophically speaking, the table applies to anything that might be called a world and that satisfies certain rules of construction within which we advance from possibility to actuality. While any particular judgment can be and often is contentious, the scheme of succession from one judgment to another is not.

### **III. Plausibility<sup>2</sup>**

Now, if one asks what might plausibly happen in a world that is different from our presently given actual world, two cases need to be distinguished. In one case, we are dealing with an imagined or alternative, fictional or utopian world and simply apply the table to it. Obviously, what is implausible in our current actual world may well prove to be plausible in an utopian alternative world. In principle, one judgment of what is plausible will be as easy or as difficult as any other. The second case is far more complicated, however. This is the case where we are dealing with a world that is different from our presently given actual world but one which is thought to stand in some definite relation to it – it is not just one of any number of imagined alternative worlds but it is a world that signifies our possible or likely future.<sup>2</sup> In this case, we have to consider not only what is plausible within this world but also how plausible it is that it will actually become the successor to our presently given actual world. Because one consideration of plausibility here depends on another judgment of what is plausible in the first place, this would be a case of plausibility<sup>2</sup> or plausibility squared.

Once we enter the domain of plausibility<sup>2</sup> we come across a bewildering array of scenarios. These include scenarios that are extremely plausible in a totally implausible world, one that is not even technologically feasible (*e.g.*, sentencing before the crime in a world where we can read minds). Likewise, we thus come across scenarios that are extremely implausible in a world that is quite plausible (*e.g.*, that we will suspend huge mirrors between earth and sun to reduce global mean temperatures in a world experiencing a climate catastrophe). To be sure, this increase in complexity and proliferation of confusing scenarios may inspire efforts to sort things out, perhaps by devising a weighted index that aggregates both dimensions of plausibility – the plausibility of some world being the world in the future and the plausibility of something being the case in that future world. But in the absence of such an index, there can only be the normative injunction to be as transparent as possible, and either to flag one's assumptions or to stay clear of plausibility<sup>2</sup> and claims about the future. One might reassure one's audience that there is precedent and that one's use of "plausible"

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<sup>2</sup> It is the non-trivial appeal to "the future" that sets it off as a world of its own. Trivially, our currently known world is extended in time as present trends continue (*e.g.*, the statement "the world population will increase by x number of people during the next 12 months" is a statement about our currently known world). A non-trivial notion of "the future" posits a relevant way in which the future world is substantially different or discontinuous from the currently known world (*e.g.*, the statement "there will be a time when we can read minds" takes as its object a world that is different from ours but supposedly a serious candidate for succeeding the world as we know it). Trivially, anything that happens next is the future. Non-trivially, the future begins when a difference arises that sets the world of the future apart from that of the present. In the discussion of emerging technologies, for example, one usually posits a transformative innovation that introduces a qualitative difference, and then wants to know what the consequences of the innovation will be in that future world. See Hölscher 1999, Groves 2012.

relates only to the world as we know it, or else point out all the relevant ways in which the assumed world is different, thus opening up these assumptions to questioning and debate.

To be sure, there are other systematic problems that stand in the way of entering the domain of plausibility<sup>2</sup>, that is, of judging what will be plausible in a future world. It would take me beyond the purview of the present contribution to discuss all these. One example must suffice. As opposed to science fiction novels, thought experiments, hypothetical scenarios or utopian schemes, scenarios of future worlds make the claim not only that certain external conditions have changed in that future world but that the person who is making the plausibility judgment will have transitioned from the current to that future world. In other words, the subjects who are assessing what might plausibly be the case in the future need to acknowledge that in that future they themselves will be no longer who they are, that their expectations and values will have changed as well. It is impossible, however, to project oneself into such a vantage point, whereas the refusal to assume this vantage point amounts to paternalism or an inappropriate imposition of current knowledge and current values to future situations and generations. (Compare Boenink, Swierstra, Stemerding 2010, or Nordmann 2010.)<sup>3</sup>

#### ***IV. Implications***

This has been a purely formal exercise so far. While it is hard enough to get a grip on the notion of what is plausible in a given world, determinations of plausibility appear to become intractable in the domain of plausibility<sup>2</sup>. Though this is where the philosophical analysis leaves off, it is not where discussions of “plausibility” should end (compare Selin 2011, von Schomberg 2011).

Technology assessment, foresight analysis, ELSA research, innovation studies are in the business of taking scientific and technological developments seriously, and they must therefore tackle the difficulties associated with judgments of what is plausible. These judgments, I submit, can and should be articulated according to the preceding conceptual analysis. When an expert study investigates the opportunities and risks of solar radiation management as a response to global warming, it is taking this option seriously. In other words, the study considers the option plausible and thus considers it not just logically, physically, or technically possible, but technically feasible such that its implementation in our world can be imagined with some facility. Obviously, these experts would not be surprised if someone actually decided to pursue the option of solar radiation management – it is therefore that they assess it in the first place. Though it may well remain a matter of dispute whether their implicit claim about the plausibility of the scenario is true or not, there is no disputing that the study itself is premised on this claim, advances it, and should therefore shoulder the concomitant burden of proof. If this is beyond dispute, some of the further implications of this analysis are not.

First of all, there is the question of what to do where there is disagreement about matters of plausibility. In particular, what is going on when many don't even hesitate as they enter quickly and perhaps recklessly the domain of plausibility<sup>2</sup>? This question draws attention to a further, rhetorical dimension of the notion of plausibility, namely that actors are trying to persuade each other of what to take seriously. Competing claims about what is plausible thus amount to competing conceptions of what is important or of how the future matters in the present – inviting a hermeneutics of possible futures and explicitly engaging with stakeholder judgments of what they consider plausible (Grunwald 2012, Macnaghten and Szerszynski 2013, compare Selin 2011). For example, the attitude of “what can be done, will be done” collapses by brute force a whole range of distinctions, going as

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<sup>3</sup> In contrast, alternative imagined and constructed worlds that do not claim to be future worlds call upon our current selves only to behold and to judge them. – Other systematic issues concern, for example, the hubris of intellectual and technical control and the implicit denial of historical contingency when one takes the future as a world that stands ready as an object of deliberation rather than, say, a task or obligation to achieve certain goals or ideals.

far as to equate physical or technical possibility with what is very likely to become actual reality. Even as it short-circuits any attempt to separate purely speculative from seriously plausible scenarios, this attitude is a telling target for hermeneutic reconstruction as we seek to understand how our societies relate to the future, what anthropological assumptions they are making, whether they assign a significant role to politics or subscribe to technological determinism. At this point, the hermeneutics of discourse about possible futures can also open up a space of questioning and critique, e.g., by reminding discussants of the many non-technical aspects that become salient in the transition from mere technical possibility to feasibility.

Secondly, this hermeneutic interest in what some people consider plausible needs to be distinguished from attempts to adjudicate their claims. I submit that any kind of foresight analysis with its Delphi methods, observatories, or vision assessments lacks the capability of doing so in the domain of plausibility<sup>2</sup>. This amounts to the proposal that all attempts to adjudicate plausibility<sup>2</sup> judgments have to begin by reducing them to claims about ongoing trends in the world as we currently know it. In other words, the statement “in a future world where one can read minds, it would be plausible that people get arrested for crimes before they had a chance to commit them” would have to be stripped of its reference to the future. There are two ways of doing this. First, we can literally strike the word “future” and proceed to treat “a world where one can read minds” simply as an imagined alternative world to our presently given world. While refraining from assessing the likelihood that this world might ever exist, we can judge it for its desirability and ask, for example, whether this imagined world should motivate the funding of research in our currently given real world. The second way of stripping the statement of any reference to the future is to view the ability to read thoughts as an immediate extension of current research such that no leap of faith would be required and no assumption of a world that is discontinuous or qualitatively different from the one we inhabit now. Here, in other words, we would discuss the proposition simply that it is plausible that people might get convicted before they even commit their crime. While the first of the two ways of stripping down the initial statements is always available, many plausibility<sup>2</sup> judgments would not survive the second type of transformation, and perhaps none should.

Third, and finally, it is quite apparent that the clients or contractors of technology assessment, policy advice or societal implications research want to know about the consequences of potentially disruptive technologies in the future. In other words, they formulate the impossible demand to deliver plausibility<sup>2</sup> judgments. Should the professionals who are hired to meet that impossible demand use plausibility<sup>2</sup> considerations in an attempt to distinguish futures-that-can-be-taken seriously from unfettered speculation? Again, there are two possible answers to this question. If there is no alternative but to develop scenarios of the future, the answer is obviously to proceed with them but to proceed with caution in the face of impossibility. But even though most clients and contractors are not aware of it, it is not necessary to construct scenarios of possible or likely futures in order to provide sound policy advice, to assess technologies, to compare alternative approaches to the solution of problems, or to imagine various technological trajectories. Without making assumptions about what the future will be like, we can diagnose the ills of the current world, we can come up with and deliberate schemes for alternative worlds. We can even choose some of these schemes as blueprints for a better world, hoping that the future will end up resembling this better world. This is called “doing the best we can” and it is premised on the conviction that through our actions we might be able to bring about a better world. This conviction is premised on what we hope to be the case in the future and not on the belief that the future can be planned in accordance with our hopes such that we need to now anticipate the plausible consequences of having successfully made this future world. – By giving our clients and contractors what they are naively asking for, we do not simply risk getting entangled in the quandaries of plausibility<sup>2</sup>, thus undermining our very ability to give sound advice. We are also lending quasi-scientific authority to popular images of the future, we are reinforcing an illusion of control according to which we can design even the consequences of technical development in future worlds. This is problematic for too many reasons to be spelled out here.

Plausibility<sup>2</sup> judgments deserve to be taken seriously for the purpose of engaging in a hermeneutics of possible futures. By the same token, however, this analysis suggests that cannot secure advice in the areas of technology assessment, policy advice, anticipatory governance, or innovation studies. And since there are perfectly coherent and sufficiently informative alternative approaches that avoid plausibility<sup>2</sup> judgments, we can just stay clear of this predicament.

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