Diversity in Modes of Veridiction in Knowledge Generation for Society. What STEM can learn from the SSH

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DOI 10.5281/zenodo.8314546

TO CITE

Ochsner, M. (2022). Diversity in Modes of Veridiction in Knowledge Generation for Society. What STEM can learn from the SSH. In *Proceedings of the Paris Institute for Advanced Study* (Vol. 17). https://doi.org/10.5281/zenodo.8314546

PUBLICATION DATE

17/05/2022

ABSTRACT

Evaluation of Social Sciences and Humanities in Europe.
Hcéres Colloquium Proceedings - Paris IAS, 16-17 May 2022.
Session 3 "The participation of SSH to Eropean Research" - SSH in interaction : perspectives

Introduction

The quest for integration of the social sciences and humanities (SSH) in Horizon Europe projects already shows that there is a hierarchy within academia with the Sciences, Technology, Engineering and Medicine (STEM) disciplines at the top and the SSH at the bottom (and the arts below the surface). Such a hierarchy is neither healthy nor intelligent for knowledge generation for several reasons. One of them is that, like in many other domains, an analysis, and in our case scientific inquiry, will be more profound the more perspectives are taken; another is that there are different epistemologies (Bonaccorsi, 2018; Bonaccorsi, 2022). Knowledge can be generated in many ways and results will necessarily differ – but if they are confirmed using different epistemologies, we can establish a finding with more confidence. However, in the last few decades, the preference for a specific approach to establishing knowledge has become more accentuated. In particular, the social sciences have also been drifting towards this specific way of “establishing the truth”. This comes hand in hand with a preference for certain epistemologies, i.e. ways of knowledge generation, leading sometimes to strong tensions like, for example, in the German Sociological Association where the members split into two associations, one reflecting the more humanities-

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oriented epistemologies and one the science-oriented; in psychology, the former have been even dying out in the last decade and, for example, at some Swiss universities, psychologists aspire to change the faculty from the philosophical to the natural sciences faculty.

In fact, there is a strong hierarchy between research that establishes "objective" facts, i.e., facts that are made visible through numbers. In a digitalized society, this has become even more important and remains unquestioned. The advantage of rationality and reason with the development of sciences in the wake of the enlightenment have turned into a hegemony of the sciences (read: STEM) over any other way of understanding the world and advancing knowledge. It has become so strong in the last decades that Science has become a dogma in which one has to believe, and which one must not question, with the randomised controlled trial (RCT) as the almost unique way of acceptable knowledge creation. However, as useful as RCTs are, there are limits to this way of creating knowledge. The argument is not that "scientific" methods, and RCTs in particular, are not useful. Quite the opposite; the argument I make here is that Science has become a substitute of Religion where an irrational devotion to a specific kind of rationality masks the possibility of alternatives that are not less rational.

Using loosely the concept of Bruno Latour's "mode of existence" or "modes of veridiction" (Latour, 2012), I argue that if societies want to successfully address the major problem we are facing, climate change, and its consequences like migration, pandemics, warfare, we need to overcome this irrational hierarchy and address the issue from all sides. First of all, the term "sciences" should not be reserved for the natural, technical and life sciences (STEM). The SSH need to complement the STEM disciplines on par not as a support. The SSH are as scientific as "the sciences" and even use similar methods; but they also can address issues RCT-based research fails to address, for example for ethical reasons or due to complexity. Particularly, the strong differentiation between STEM and SSH needs to be overcome; "modernisation" has posited a separation of "human" and "nature"; natural sciences thus address the universal laws of nature. SSH disciplines, according to this idea, concern "human" issues that are not laws and thus not universal and thus not objective. However, this dichotomisation is not tenable anymore given the (scientific) knowledge we have. There is no human outside the environment and no environment without the human – as the environment is a human concept (Morin, 2021). Especially in interdisciplinary research, all aspects of the interrelation of humanity and nature must be integrated.

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Modes of veridictions versus epistemologies

Epistemology is a well-established concept in research on higher education. It describes how knowledge is established. This may differ strongly across but also within disciplines. For example, in more theoretical research, an argument needs to be built that is valid and not contradicted; empirical research establishes knowledge through testing hypotheses, for example through randomized controlled trials, where a treatment is tested on half of the sample while the other half receives no treatment and the hypothesis is tested, whether the treatment has the hypothesised effect or not. In both cases, knowledge is generated but the process how such knowledge is generated is different. Obviously, epistemological decisions are made dependent on the subject. So, even the same scholar might apply different epistemological approaches, even though some clear preferences across disciplines persist (see for a detailed overview Bonaccorsi, 2018).

As knowledge generation is a complex issue, epistemological differences do not concern only how a finding is produced in a single instance but include as well how such findings are confirmed and accepted and thus transformed into established knowledge. Also here, there are differences across disciplines as well as within disciplines, sometimes also simply regarding a specific topic. For example, in some disciplines, double blind peer review is the standard, i.e. any two scholars from the same field decide whether, for example, a manuscript is accepted; in other disciplines, it is not about having a blind process, i.e. any scholar can be consulted for the decision, but rather some accepted and established specialists who decide whether a manuscript is published (see, e.g., also Bonaccorsi, 2018, p. 5–6). Similarly, in some situations, data are tested, and analyses repeated before a finding is published, in other situations it is just formally checked for plausibility, while the validity is tested in the long term through manifold replications in different situations. Diversity in such validation processes is pronounced as research on peer review shows: when comparing peer review status of publications, there is a high ambiguity about whether a publication is seen as peer reviewed or not both if peer review status is author-reported or centralised in an institution. This ambiguity differs strongly across fields (Pölönen et al., 2020). This means that we enter also epistemic differences (Bonaccorsi, 2018), meaning that the knowledge creation can only artificially separated from internal validation processes as a finding becomes only knowledge when it is “established” within the field and, thus, epistemological differences also lead to epistemic differences. Such epistemic differences

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lie at the heart of the hierarchy of disciplines in academia with the STEM at the top considered “science” and the SSH (and the arts even more) at the bottom; often it is even questioned whether the SSH can be considered sciences. However, there is no reason why SSH research should not be considered scientific as their methods do not significantly differ from those in the sciences; it is rather the object and scope that is fundamentally different (e.g., Bonaccorsi, 2018, p. 3). A focus on a specific epistemic culture combined with research evaluation procedures that are selective regarding some processes of knowledge generation and dissemination, for example by using Impact Factors based on a specific restricted publication data set, leads to epistemic injustice (Ma, 2022) and, thus, also to inefficiency in knowledge generation.

My argument here, however, is that the issue is rooted much deeper than in epistemological or epistemic differences, using the term as it is interpreted so far in discussion on higher education policy. To resolve the problem, we need not only investigate how knowledge is generated and validated but also look into the differences in how “truth” is established. This is what Latour calls the “mode of veridiction”. “Truth” as such is not accessible to the human being. But we strive to approach “truth”. In our lives, we differentiate regularly between “true” and “false” or “right” and “wrong”, “good” and “bad” etc. This is not a random process but there are ways to establish inter-subjectively some rules how to differentiate. This is the “mode of veridiction”. In science, the mode of veridiction follows rationality. Scientists have procedures in place where through discussion the argument wins that cannot be proven to be false. In other realms, such as law or politics, other modes of veridiction are in place (e.g., “representation” and “codification”).

This distinction between epistemological (how findings are generated) and epistemic differences (how knowledge is established from the findings) as well as differences in mode of veridiction is of course simplistic; basically, all three terms concern epistemology in a broader sense. However, first, I think the distinction is useful in understanding the relationship between knowledge production, research evaluation, societal impact and interdisciplinarity, second, the distinction follows the interpretations of “epistemology” and “epistemic differences” in the science policy discourse. Thus, my argument is simply that the two often used interpretations are short of another important distinction. In the following, I will describe why.

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The situation of the SSH in European Framework Programmes

The SSH have a marginal place in the European Framework Programmes. SSH disciplines were included only late in the process, starting with the social sciences in FP4 (1994–1998) and accompanied by the humanities (introducing the term SSH) in FP6 (2002–2006). However, SSH was mainly interpreted as economic, socio-economic or policy-oriented research, excluding most disciplines and topics in the SSH (see, e.g., Schögler & König, 2017). Also, for FP8 (Horizon 2020), it was planned to exclude SSH research altogether, but due to an outcry, the SSH were still included and formally even stronger so (König, 2016; Schögler & König, 2017). Of course, European Framework Programmes not only concern thematic research addressed to specific disciplines/topics (the terms change over time, e.g., “societal challenges”, “missions”, “clusters”, i.e., Pillar 2 in Horizon Europe) but includes blue sky research independent of disciplines (Pillar 1). But the share of budget allocated to SSH-specific themes is rather stable around 1% – and a large share of that money does not go to SSH research but industry, interdisciplinary research labelled as SSH but not containing much SSH (up to almost 20% of SSH-flagged projects had no SSH in it, see, e.g., European Commission, DG-Research and Innovation, Kania & Bucksch, 2020). This shows that, within the SSH-specific themes as well as in interdisciplinary collaborations in other themes, SSH scholars take a marginal role.

It is in this context (Pillar 2 in Horizon 2020 and Horizon Europe) that European policy makers speak of “integration of the SSH”. The term already suggests that the effort needs to come from the SSH and that they are the alien part. It is not about “interdisciplinary integration”. What is an important issue in this case is that in the expert panels judging interdisciplinary projects, the specialists for SSH are not academics but experts from industry and NGOs, showing that “SSH integration” in European funding is marked by a gap between rhetoric and practice (EASSH, 2022) and by the idea that SSH are there to lubricate the transfer of (brilliant) technology to the (stupid) public. In original tone – and directed as a benevolent message to the SSH – this sounds like this: “Technical solutions are often preconditions for new policy outcomes, but in themselves insufficient to have a meaningful impact. The lasting societal impacts that policy-makers seek are often equally reliant on insights from social sciences and the humanities” (Paquet, 2020, p. 3). Admittedly, this citation can be read

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in two directions, SSH are on par, or SSH are there to make technical solutions have meaningful impact. Together with the wording of “SSH integration” and a glance at numbers leaves not much doubt about which direction is dominant.

But why is this? The issue is certainly too complex to describe in one paragraph. But relevant for the argument I am making is the following: STEM fields are seen to be rational, objective, explanatory and about the truth (causal relationships) whereas the SSH are seen as based on arguments, being subjective, interpretative and about beliefs. This is reflected in research on research in several ways: First, the distinction between natural and human sciences as conceptualised by Dilthey (1970 /1910) is often used to argue that human sciences are not objective, even though Dilthey’s argument was exactly that they *were* objective just as well, but *differently* (see, e.g., Davenport, 1981). It is also the basis of the idea that there are different epistemic foundations between natural and human sciences (e.g., Bonaccorsi, 2018).

Second, there is a distinction between hard vs soft science, hard meaning objective, testable, and soft often remaining undefined but used in contrast to hard (the terms are old, but one could cite Storer, 1967, as an early sociologist of science systematising the distinction). Third, to the distinction hard vs soft, the distinction urban vs. rural disciplines is added (Becher, 1989), where SSH disciplines are rural whereas STEM fields are urban; while the idea is not necessarily judgemental, it is most often interpreted such that “real” science is urban as it is competitive while rural science is thought not to be so. These distinctions have all their analytical merit and are simple to understand. But they are also easily taken up by scholars and thus reproduced without much reflection. It is obviously questionable whether the soft and rural sciences are indeed soft and rural and the hard sciences really hard and urban (see, for example, Davenport, 1981; Trowler, 2014). Often, these distinctions are used isolated from their theoretical underpinnings and conceptual thinking but used to reaffirm a hierarchy between the objective “sciences” and the non-scientific humanities and social sciences.

This conceptualisation or attitude is also reflected in the idea of “SSH integration”. In particular in Pillar 2 of Horizon Europe, the situation is such that research is perceived to provide solutions to problems. The problems are defined and put forward in a specific way, so that solutions are to be technological. Clear, immediate outcomes are asked. The SSH mainly take the role of bringing the solutions developed by the STEM to the public. However, this comes with two issues: First, focusing on a specific solution for a problem masks the fact that the solution might be in fact another

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problem; or put differently, that the problem is wrongly defined. Second, the SSH are not there to convince or educate the public to implement the technical solutions. Science communication is a profession in its own and SSH scholars are not necessarily better in it than STEM scholars. SSH research has its own value; for example to refine a problem definition: instead of defining climate change as a problem, and finding technical solutions to reduce energy consumption (e.g., develop LEDs to replace lightbulbs), SSH research might investigate the human-nature relation and thus not see "climate change" as the problem but the human-nature relationship. This might mean that instead of finding more energy efficient appliances, one could rather focus on resources consumption in total as it is a zero-sum game. This might resolve the current problem that even if all lightbulbs are replaced by LEDs, energy consumption still keeps increasing, because for the same wattage, people can now put long chains of LEDs to ornament their homes.

Rationalism as a Hegemony

The enlightenment has led to a new way of seeing things in Europe. Before, religion was dominant, and all was interpreted regarding religion. More concretely, Christianism was the hegemonic approach to seeing and interpreting the world. Due to the profound social, economic and technological changes, this hegemony was replaced by rationalism. Rationalism was based on the separation between human and nature. With it came the rise of science as the objective (and positivistic) study of nature as the basis of our understanding and with the notion of Modernity. While this change has brought many advantages, it also comes with some issues that seem to have become more problematic, recently. Modernisation is not clearly defined. It is not clear what "modern" really means and where it is leading to (@latour*enquete_2012). Rather, modernisation comes with an interpretation of Rationalism that is irrational. It is a *belief* in a specific form of rationalism. It is not about rational thinking (or even behaviour) but about a specific way of rationalisation that is unquestioned. Basically, Modernism is linked to the terms efficiency, rationality and accountability. However, the Moderns have never really been efficient, rational nor accountable. Rather, the modern world is based on exploitation: be it during colonialism or in todays "free globalised market", a clear system is visible consisting of small centres and large peripheries that are exploited by the centres (see, e.g., Herkenrath & Bornschier, 2003). Surely, natural resources and animals are exploited. The modern society is not sustainable in its current form, which becomes ever

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more visible, making it clear that resources are not used efficiently, the economy is not rentable without externalising large parts of the costs, and certainly the system is not rational. One central problem of this issue is the separation of the human and nature. This separation, however, is not empirically tenable, nature includes humans and humans are not separable from nature. The human is intricately intertwined with its environment and cannot rationally be separated from it in general terms (Morin, 2021).

However, this separation is at the centre of what is considered "scientific" in the interpretation of "hard" sciences (e.g., Storer, 1967). The idea is to separate single causal relationship out of a complex system; the preferred or exemplary method for "scientific" research is the Randomised Controlled Trial (RCT). The RCT is a very powerful method as it systematises a theoretical idea and controls by means of randomisation and the use of a control group for confounding factors and other factors that might deceive our perception, such as changes over time. It is capable of isolating specific mechanisms and reproducing them in the lab, which helps understanding how things work. The issue is that it comes with the assumption that causality is proven by means of exclusion of confounding factors. However, causality is complex and cannot really be proven but only approached as the world is complex. Often, such isolated causal effects are also not really relevant in the real world because the real world is highly complex and many effects interact. This is one reason why the RCT is such a great model: it helps us to understand single effects in a situation where in the real world we cannot observe them. However, the RCT (and its derivates, in the SSH for example the fixed-effects model) have become a hegemonic paradigm in presenting "scientific" research. It is used in many cases where it does not apply, the focus on the method can lead to wrong claims (Giesselmann & Schmidt-Catran, 2020), and its results are interpreted as if it was the truth – and, which is worse – if the technique is not applied, it is not considered scientific and thus not credible. But in fact, isolating single causal effects is not only reducing the complexity of a process we want to understand but it masks what really matters: the interactions of many processes (Latour, 2021). This issue does not only concern the hierarchy between STEM and SSH but is also transforming the social sciences (Gerring, 2010). Yet, this *belief* in a specific methodology and a specific interpretation of rationality is highly problematic. First, especially in the social sciences and humanities, we usually are not interested in causal effects but in relationships. On the one hand, we cannot prove the first, but we can be quite confident about statements about the second as they are always contextualised. On the other hand, causal effects are often not useful to know. In a recent research project

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on incentives for surveys, I had a funny discussion with a methodologist. We have several experimental conditions for an incentive to participate in a first part of a survey (no incentive and several monetary and non-monetary incentives) and several conditions for an incentive for the second part of the survey to which only participants of the first part are invited (again, no incentive as well as monetary and non-monetary incentives are among the conditions). The methodologist rightly pointed out that in analysing the second incentives, we already have a conditioned sample as our assumption is that the incentive to the first part has an effect on sample composition. So, he suggested a sophisticated model to equal out that bias so that we have the causal effect for the second incentive. We had a long, heated discussion about the usefulness of this approach. My argument was that the result will be a causal effect, but this finding is completely useless.

The reason is that in all worlds I can imagine, there is no possibility of a second incentive under the condition that there is not a first incentive – because "no incentive" is among the conditions. So, our causal effect is an effect that informs us about something that is not possible to exist. Another example I experienced at a conference was a critique that no fixed-effects model was used to show the causal effect of changes in child-caring arrangements. An touchy comment, as policy is usually interested in relationships because the changes in policy relevant domains as, for example, family arrangements are usually due to restrictions. It would be absurd to consult families who lose their grand-parents to stay with the grand-parent family care arrangement because independent of whether the grand-parents live or not, the grand-parents model was most effective.

Second, very often there are ethical restrictions in what we can do in experiments. For example, we cannot just create a cyborg and test in a RCT whether romantic relationships work similarly between humans and cyborgs and humans and humans. Less massive manipulations can already be problematic as restrictions to experiments with animals show.

To conclude, the argument here is that RCTs and the quest for identifying causal mechanisms is highly relevant and we can learn a lot. However, the idea that only mathematised experiments are scientific (Storer, 1967) is highly problematic but unfortunately still dominant. It is certainly everything but rational because it is grounded in a *belief* in a specific form of rationality that is centred on the separation of the human and nature. This belief has replaced the belief in god and "Science" has replaced

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Religion as the hegemonic way of explaining the world. Therefore, I will suggest widening the horizon of what rationality and scientific endeavour entails.

Modes of Veridictions and SSH Integration

Latour's theory of modes of existence (Latour, 2012) that have their own modes of veridiction can help understand what is at stake in the current situation in science policy. Numerous initiatives in changing research culture and especially evaluation indicate that there is a problem in the way how Science is perceived and organised (Commission & Directorate-General for Researc and Innovation, 2021; D.O.R.A., 2013; Hicks et al., 2015). The idea of "SSH Integration" to finally have a stronger societal impact of research shows that the relation between society and scientific research is problematised. I argue that the link has been lost due to the *belief* in Science (and, especially, technology) instead of the pursuit of science.

Latour proposes that there are several domains that each have their own mode of existence and, consequently, their mode of veridiction, i.e. how they identify the "right" from the "wrong", "true" from the "false". For example, in law, the truth is established in relation to a code, the law. The codified law contains the norms so that every member of the society knows what is considered lawful. So, if there is a potential breach of law, the process tests whether the codified law was broken. This means that an action of a person that is judged normatively wrong by the society might be considered lawful as the code does not exclude the specific action (yet). Politics is organised around representation. A decision is a legitimate one if the relevant persons were represented in the decision making. Obviously, who is to be represented differs across political systems. We also see that the political view of the process mentioned above will be different from the one by law: if the majority of the people to be represented define the action as normatively wrong, the process will not be perceived as "just" while according to law, it is "just". This might then lead to a change of the codification of law, for example through a parliamentary decision. Such translations between the modes of veridictions need negotiations in a diplomatic act (Latour, 2012, p. 29).

While the theory seems quite similar to the systems theory by Luhmann (Luhmann, 1984), there are important differences that make this theory more useful in our context: First, the systems are not closed systems, but the domains are potentially unlimited

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(Latour, 2012, p. 477). Second, interactions are more straight forward as one can switch discussing the same object from one mode of veridiction to the other depending on the perspective, i.e., whereas according to Luhmann economic matters are economic and organised around money, and political matters are political and organised around power, according to Latour's theory, economics can interpret politics according to their mode of veridiction and economics can be interpreted politically according to the political mode of veridiction. Third, errors of category can be intuitively identified in many cases, e.g., situations when the mode of veridiction of love are concerned, it would be perceived as an error of category if one would approach it with the mode of veridiction of science (if my best friend falls in love with a person, it would be perceived as absurd if among his friends, we would start a rational discussion and finish with finding the "true" partner for my friend on the condition that the community of friends has found that there is no rational objection).

It follows from the points above that we can think with this theory of sub-modes of veridictions across subfields of domains, an idea not investigated by Latour. We can thus conceptualise different sub-modes of veridiction in the domain of scientific endeavour. Regarding scientific endeavour, the mode of veridiction is based on discussion among specialists who, in a discursive act based on rational argumentation, agree on what can be considered established knowledge. Within this mode of veridiction, we can think of differences in how the discussion is led and moderated. For example, in natural science, discussions revolve around empirical findings, usually formalised through mathematics; in humanities, discussions revolve around logical arguments, in arts about aesthetics. This shows the problem of interdisciplinary research: Researchers acting as evaluators, panel members or colleagues in interdisciplinary projects use different sub-modes of veridictions and, hence, do speak about the same thing but might use a somewhat different language and different criteria. To manage this situation demands for a competence in diplomacy, i.e., in negotiating values and finding a common language by accepting that there are different objectives and approaches but all of them are in their core scientific.

Such a vision would lead the discussion away from an unfounded and usually undisputable (and hence un-scientific in its very meaning) normative setting of what is considered a scientific discipline and what is not and lead it to a discussion on how to define or agree on a process that makes the endeavour a scientific one.

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A characteristic of SSH research is that basically every research topic or discipline has to deal with and/or negotiate between different modes of veridiction (and not only sub-modes of veridictions). Art history has to use the mode of veridiction of scientific endeavour but is concerned with the mode of veridiction of arts. Those modes are different and art history is the integration of the two modes. This applies to literature studies, economics, political science, sociology etc. Whatever SSH research (and arts included) do, more than one mode of veridiction is concerned because the SSH deal with humans. Their object has its own mode of veridiction and they, as scientific disciplines, have to apply the mode of veridiction of science to an object that has a different one. As the SSH disciplines usually have interactions with their objects, they have to reconcile constantly issues stemming from the different modes of veridiction. Of course, this is mostly an unconscious act, but it is intricately linked to SSH research practice. Consequently, SSH researchers are competent in a major aspect of not only interdisciplinary research but also transfer. However, there is still work to do to transform this competence to a more conscious practice by explicating the intrinsic knowledge of diplomacy between different modes or sub-modes of veridiction.

The integration of SSH research into Pillar 2 of the European Framework Programmes thus needs to be understood as a negotiation between different sub-modes of veridiction. A plurality of such sub-modes of veridiction will lead to an increase in diversity of findings and approaches and this is what is needed to resolve societal challenges. SSH research integration thus is not about communication of findings of science to the public, or of integrating the SSH as a foreign object into scientific projects. It is rather about making science inclusive again as disciplines are complementary (Machlup, 1961). The scientists involved (and with scientists, scholars from all disciplines are meant) need to acknowledge the plurality of sub-modes of veridiction to produce research findings; the communication to the public then needs to additionally acknowledge the different modes of veridictions of the potential recipients, users, and co-creators.

Conclusion

In this short paper, I have sketched out an idea as a heuristic of identifying an important issue in the concept of “SSH Integration”. The heuristic is not only useful in understanding why SSH integration has been a challenge for years, it also helps understanding the difficulty of connecting research and society, which currently

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frustrates many researchers, policy makers and the public even though there is a lot of progress made. This idea obviously needs further development as space is too limited to delve into the complex matter. This argumentation is rather meant as food for thought in the context of this conference on research evaluation.

The challenge in integrating STEM and SSH research is thus to end the hegemony of scientific inquiry defined as isolating causal effects by RCT-like approaches. Instead, scientists, scholars, reviewers, and policy makers need to learn to negotiate between and combine different (sub-)modes of veridiction, i.e., ways of approaching "truth". Obviously, all academic inquiry still stands close to Bruno Latours' idea of the mode of veridiction of the sciences as logic and rationality lie at the heart of scientific endeavours. But within this realm, there are different ways of achieving rationality. The current dominant perception of "Science" and "scientific" is leading to a toxic reductionism in the perception of the world and does not do the complexity of the real world justice (see for a more detailed argument Latour, 2021; Latour, 2022). My argument therefore is that evaluation and policy should be careful to keep a diversity or at least plurality in such (sub-)modes of veridiction and, consequently, modes of knowledge generation and dissemination.

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