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ORIGINAL RESEARCH

# Science as a counter to the erosion of truth in society

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**Abstract**
The role of scientific values has taken on new urgency with recent changes in the politics of Western societies. The threat is the erosion of the distinction between true and false in political circles. This could rapidly lead to democracy sliding into populism thence fascism. In the light of this, philosophy and sociology of science should themselves re-examine their role. The main point of the paper is to argue that science could and should push against the erosion of truth in society. Sociological thinking has sometimes tended to erode the difference between science and ordinary thought but it should no longer ignore the political consequences and should, instead, start to take scientific values as a positive resource in society. The philosophical analysis of scientific values, which I will refer to as 'scientific value analysis, or 'SVA', has championed the impact of societal values on science but should also look at the way scientific values could positively affect societal values.

**Keywords** Fascism · Truth · Scientific values · Science as an institution

## 1 Introduction

The role of scientific values has taken on new urgency with recent changes in the politics of Western societies. The threat is the erosion of the distinction between

The third wave work reported here is that of the author along with a sympathetic group originating in Cardiff University and held together by a regular, international, hybrid seminar (face-to-face for Cardiff contributors and Zoom for distant contributors), which meets in person for a workshop when possible (at least annually before Covid). This organisational focus means, among other things, that there are 'pathological' number of self-citations in this piece, exacerbated for joint work by 'C' coming early in the alphabet. In the text I will, from time to time, refer to the group just described as 'we'. Philippe Stamenkovich and Adam Tuboly have acted as ambassadors in helping me navigate the space between the third wave paradigm and that of scientific values analysis. I also benefitted greatly from discussions at the 'The Legacy of the Value-free Ideal of Science' workshop in Uppsala 16–17 February, 2023, and various email exchanges and Zoom's both then and since. All mistakes and infelicities remain my responsibility.

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true and false in political circles. This could rapidly lead to democracy sliding into populism thence fascism. In the light of this, philosophy and sociology of science should themselves re-examine their role. The main point of the paper is to argue that science could and should push against the erosion of truth in society. Sociological thinking has sometimes tended to erode the difference between science and ordinary thought but it should no longer ignore the political consequences of this approach and should start to take scientific values as a positive resource in society. The philosophical analysis of scientific values, which I will refer to as 'scientific value analysis, or 'SVA', has championed the downward impact of societal values on science but, in these days, it should also be looking at things from the bottom up—at the way scientific values could positively affect societal values and help to rescue us from the political peril we face.

This is a contribution to what I take to be an interdisciplinary project and the first and larger part of the paper will explain what I believe to be sociology's main contribution to the matter of values in science. This, I believe to be what we call the third wave project (3W), which grows out of sociology of scientific knowledge. The exposition is mainly covered in Part One. In Part Two I compare 3W more systematically with some features of the philosophical debate about values in science which I am referring to as SVA. The most important dimension of comparison is SVA's concern with the influence of non-epistemic values on science whereas 3W is more concerned with the way scientific values can influence societal values. There are also more minor contrasts.

The third wave has grown from the second wave of science studies which began in the 1960s and '70s, triggered, in part, by Thomas Kuhn's *Structure of Scientific Revolutions;* Kuhn showed how major scientific changes could be seen as cultural changes allowing for the development of a sociology of scientific knowledge. Kuhn's 'paradigms' could be understood as Wittgensteinian 'forms of life' bringing philosophy and social analysis together. Philosopher Peter Winch provided a useful interpretation of the later Wittgenstein and its significance for sociology, though it was intended as criticism, while David Bloor endeavoured to show the way philosophy and sociology merged in the later work of Wittgenstein.[1]

I start Part One by describing the political context of the work in the recent threat to Western societies. To repeat, the threat lies in the erosion of the distinction between true and false in political circles which science has the potential to counter. At the start of Part Two, I argue that SVA, assuming it shares with 3W a desire to resist the growth of fascism in the West, might take note of the possibility that values arising out of the institution of science could affect society in a positive way whereas, currently, SVA seems mostly concerned with encouraging science to take social values into account without taking responsibility for explaining how to set limits in case a society endorses undesired values. Interestingly, Sandra Harding saw the problem as far back as 1995:

> Obviously not every starting point for thought that lies outside a dominant conceptual framework is likely to enlarge our understandings. We can agree with the defenders of weak objectivity that at least some of the interests and values they

[1] See Kuhn (1962), Wittgensteins (1953), Winch (1958), Bloor (1973, 1983), Collins (1985/1992).

> think should be excluded from directing knowledge projects do indeed retard the growth of knowledge- 'Think of Nazi science!" (Harding, 1995, p. 25)

Part Two of the paper also discusses less fundamental differences with 3W. I argue that the institution of science is still defined by the value-free ideal as an 'actor's category', notably where science is being done at the research front. This is an ideal but 'analysts' from both SVA and 3W agree that there can be no science that is free of epistemic values. Both sociologists and philosophers agree that where science is looked at upstream of the research front—for instance in respect of resource allocation—or downstream—the public consumption of science, the value free ideal has little or no application. Often, however, upstream and downstream considerations are not clearly distinguished from the pursuit of truth at the research front. SVA has argued, notably and persuasively, that good science has sometime to be informed by non-epistemic values even at the research front.[2] The idea that science should be free of values has sometimes been referred to as the 'value-free ideal' with the opposite view being the 'value-laden ideal', or 'value-full ideal'. But 3W agrees with the majority of SVA philosophers that when it comes to the proper influence of non-epistemic values on science, the point has to be argued on a case-by-case basis and there are some sciences that should be free of non-epistemic values at their research front.[3] Therefore, the opposite to the value-free ideal should not be a value-laden ideal but a value-tolerant ideal, or just 'value tolerant science', with non-epistemic values allowed to play their part in science when it is appropriate. Part Three of the paper is very brief, posing a question about whether, under the current political circumstances, truth is an epistemic or a non-epistemic value. Each sub-heading is followed by a summary of the content of the corresponding section of the paper.

## 2 Part One: The looming crisis in Western society and values in science

### 2.1 The analysis is set in its currently pressing political context

A society is identified by its culture. Since the end of the Second World War, a central feature of Western societies, such as Britain and the United States of America, has been respect for the distinction between true and false. Hannah Arendt said that the origins of totalitarianism lay in the disappearance of that distinction: '*The ideal subject of totalitarian rule is not the convinced Nazi or the convinced Communist, but people for whom the distinction between fact and fiction (i.e., the reality of experience) and the distinction between true and false (i.e., the standards of thought) no longer exist.*'[4] Fortunately, World War Two ended in victory over the erosion of truth in fascist societies while the end of the Cold War seemed to do the same for left wing totalitarianism.

[2] Though this claim can be found in earlier sociological work such as Collins (2004, pp. 781–782).

[3] Elliot (2022), surveys SVA. See also, Douglas (2009, 2016), Holman and Torsten (2022) and Resnick and Elliot (2023). SVA will be discussed further toward the end of this paper.

[4] Arendt (1951, p. 474).

Unfortunately, the 'taken for granted' quality of the distinction between the true and the false in Western culture has been eroded by recent events such as the Brexit referendum and subsequent successful, pro-Brexit, election campaign in the UK, along with the election of Donald Trump in the US followed by the attempts to overturn the 2020 US election result on spurious grounds. Boris Johnson and his team based their victorious Brexit campaign and election on lies and slogans, while Trump has shocked everyone with the cavalier treatment of truth as his team's icon. (Governance in Russia under Putin also turns on the erosion of truth.) At the moment of writing (mid-2023) Trump has launched a re-election campaign with erosion of truth once more at its heart. Suddenly, after a golden age in which a couple of generations of academics and intellectuals have enjoyed the licence to pick apart the credibility of established knowledge-creating institutions, free of danger to themselves or their societies, it turns out we were hanging by a thread. The Western World has been confronted with the possibility of a renewal of fascism; this is the looming crisis, and it means that philosophy and its near relations have to think more carefully about the origins and role of truth.[5]

To sum up, the central concern of this paper is the basic values that make democratic societies possible and how to nurture them. The most basic value is truth. Without truth there can be no conversation about less fundamental values because, among other things, there can be no meaningful conversation about anything. Science pursues truth and nurturing trust in science in society nurtures truth in society—that is the underlying thesis. Values already figure large in the last four sentences and the idea that science can be value-free in this sense is nonsense. But there is a danger that science will come to seem less trustworthy if science is said to be based on values; citizens disagree about non-epistemic values and might not have faith in a science that advertises itself as pursuing something other than, or in addition to, universal truth. That does not matter when times are politically benign, but these are not such times. That is why our values demand that we re-examine these questions.

## 2.2 The role of science in culture?

### 2.2.1 Science as a bulwark against the erosion of truth in society; a historical sketch of the evolution of social studies of science—the three-wave model

Many large-scale changes have contributed to the creation of an environment in which the erosion of truth could appeal to the electorate in democratic societies. The growing gap between rich and poor is probably the most important.[6] But here we concentrate on the erosion of the idea of science in academic and public life as a contributor to the change in Western societies. We think a refreshed idea of science could contribute to the defence against the looming disaster. Since the start of the golden age, science can no

[5] A 'reading list' emerging from the 'third wave' group and covering these concerns would include, Collins and Evans (2002), Collins (2014), Collins and Evans (2017), Collins et al. (2019, 2022). For the role of Putin and his advisors in the erosion of truth via the exploitation of postmodernism, see Pomerantsev (2014).

[6] Brown (2019), describes, in her introductory chapter, the many changes in Western societies that have led in this direction.

longer be relied on in a straightforward way as a certain source of true and unquestioned knowledge. A field of 'science studies', or 'science and technology studies', started in the 1960s and '70s, combining history, philosophy and sociology of science. One novel feature was real-time, detailed, case studies of science in practice, enriching our understanding of the cultural embedding of knowledge but these, studies along with historical re-analyses of classic experiments and certain precedents in the philosophy of science, made it far harder to treat science as an unproblematic source of truth about the observable world uninfluenced by values. One way of sketching out the changing understanding of science's relationship to society is the 'three wave model'.[7] The model divides the history of 'science studies' into two eras with a third in the making.

*Wave one* is the traditional approach that cast science as a superior form of knowledge standing above society. Its high point was the first decade after WWII, bolstered by the success of radar, by nuclear power supposedly 'too cheap to meter', by penicillin, and many other sciences and technologies that enriched both intellectual and material life. *Wave two* is the reaction to this, perhaps triggered by the intellectual atmosphere of 'the 1960s' in general and Kuhn's *Structure of Scientific Revolutions* in particular, with its revelation that even scientific ideas could undergo cultural shifts and ruptures, so that science was not so isolated from social influence as had been thought. Wave two analysts chose various philosophers to underpin their project, notably the later Wittgenstein, with a Kuhnian paradigm being seen as a 'form of life'. One characteristic of wave two, justified by Wittgenstein's use of examples from the society in which he was immersed, as well as the anthropological tradition in interpretative sociology, was a flourishing of detailed studies of science in real-time practice, the author conducting, among other things, a 45-year-long, semi-immersive, study starting in 1972, of the detection of gravitational waves.[8] The philosophy of science associated with wave one (bear in mind this is a historical sketch and there will be exceptions), tended to take a more distant view of science in the attempt to uncover the logic of say, how a new claim becomes established within the scientific corpus. The interpretative sociology associated with wave two, when it wanted to explore how the boundaries of science were maintained, favoured immersion in the science at a disputed boundary. Investigators would try to make themselves as nearly as possible part of the process by which a new claim is either absorbed or rejected. This provides a very different understanding of the fringes of science, which are easy to reject from the distanced perspective but harder from the immersed perspective, where it becomes obvious that

[7] This is a model put forward by Collins and Evans in a paper published 2002. This paper was triggered, in part, by the way their own and others; 'social constructivist' work was being interpreted by some analysts: it was being taken to mean that science was indistinguishable from ordinary thinking. Among other things this led to support for the anti-vaccination campaign mounted by parents against the use of Measles, Mumps and Rubella (MMR) vaccine. Collins and Evans argued that social constructivism should not lead to the disregard for the special role of scientific experts and scientific procedures in a case like this and that this role must be reconstructed in new ways. Shifting the analytic gaze from scientific truth to expertise was one of those ways. The, 2002, paper continues to be much cited and the ideas that followed from it much used, though it is still notorious in some circles as it argued against what was becoming the established interpretation of science studies.

[8] With initial reports in Collins (1975, 1985/1992) giving rise to the concept of the 'experimenter's regress'. The study continues to be reported in Collins (2004, 2013, 2017). See especially, Chaps. 5 and 14 of Collins (2013) which set out many of the large number of assumptions on which gravitational wave detections are based. For an explanation of the methodology of this kind of work, see Collins (2019).

terms like 'irrational' rarely have a useful explanatory function. This does not mean that the fringe does not have to be demarcated if science is to move forward, but it cannot be done as dismissively as the distanced perspective allows and it becomes a far more challenging and interesting exercise.

Wave two initially flourished in the febrile intellectual atmosphere of the 1960s, with it later becoming, to some extent, associated with the attack on truth from the ramparts of literary criticism, known as 'postmodernism'.[9] One outcome of wave two was the so-called'Science Wars', the attack on social constructivism by philosophers and historians of science with a few natural scientists becoming involved. The notorious 'Sokal hoax' was a product of the science-wars. The science warriors feared the 'dark age' that would arise from the dissolution of respect for scientific thought and, as we now see, they were right to fear it. Unfortunately, their response was to attack wave two and its practitioners head-on and try to move science studies backwards rather than accept that science was a cultural enterprise and work out new ways of establishing the priority of science as a knowledge producer. SVA, we can now see as an example of what would have been a more productive response.

*Wave three* was proposed by Collins and Evans with the intention of accepting the findings of wave two but raising the status of science as a producer of knowledge once more. The first move in wave three was a shift to the analysis of expertise.[10] In contrast to the large literatures on the psychology and philosophy of expertise, the model of expertise developed under wave three took expertise to be a matter of socialisation into a group of experts. This sidestepped the problem of disagreement among experts, avoided the need for prior agreement about what was true and what was not before expertise could be defined, and allowed for changing definitions of expertise over time and location: astronomers and astrologers were experts; brain surgeons and witchdoctors were experts. Expertise could be identified by the Imitation Game (capitalisation indicates our detailed experimental protocol), which was a version of the Turing Test with humans instead of computers doing the pretending: humans were tasked with pretended to belong to cultural communities that they did not belong to.[11] If it made sense to conduct an Imitation Game in respect of a community—if it was possible to fail an Imitation Game—then that community must embody an expertise. Even if Imitation Games are not actually carried out, the *idea* of the imitation game helps with the philosophical question of the meaning of expertise and the meaning of groups and of cultures. An expertise is a culture. The cultural group can be as big as a nation-state (characterised by its 'ubiquitous expertise' –citizens ability to speak their native language, distinguish between clean and dirty, and so on), or as small as a group of hobbyists. This approach does not resolve the question of why scientific

[9] We know that a more careful history of ideas would discuss the many predecessors who contributed two wave two ideas throughout the history of wave one and this is the source of some of the objections to the three-wave model. But here we are trying to contribute to an understanding of the broad drift of the history of ideas, not produce a scholarly accounting. Nevertheless, it is worth mentioning Duhem (1908/1981) as an important predecessor and Fleck's (1979), *Genesis and Development of a Scientific Fact* (first published in German in 1935), as the first case-study which also anticipated much of Kuhn's analysis.

[10] E.g. see Collins and Evans (2007) or Collins (2016) for a summary paper in a philosophy journal.

[11] See, for example, Collins et al. (2006). Between 2011 and 2016 the research on the Imitation Game was supported by European Research Council Advanced Grant (269,463 IMGAME) €2,260,083 '*A new method for cross-cultural and cross-temporal comparison of societies*'.

expertises are to be preferred to other expertises but it enables us to think about how expertises contribute to the culture of society. This growing program, including the Imitation Game and the fractal model to be discussed below, became known as Studies of Expertise and Experience, or SEE.

## 2.3 The fractal model of society

### 2.3.1 The fractal model of society and its uses; a comparison with Durkheim's lectures on professional ethics and civic morals; the fractal model illustrating the downward influence of societal culture on sub-groups, including professions and the upward influence of institutions on society

The approach to expertise and culture outlined in the last paragraphs can be represented by 'the fractal model of society' as shown in Fig. 1. The fractal model allows mutually overlapping and embedded culture/expertise groups of any size and with whatever boundaries one cares to choose so long as *it makes sense to say* that it is possible to pass or fail an Imitation Game in respect of the group. The top level is defined by the ubiquitous expertises of the society as a whole and it is easy to see that an Imitation Game where, say, a French person tries to pretend to be an English person could be

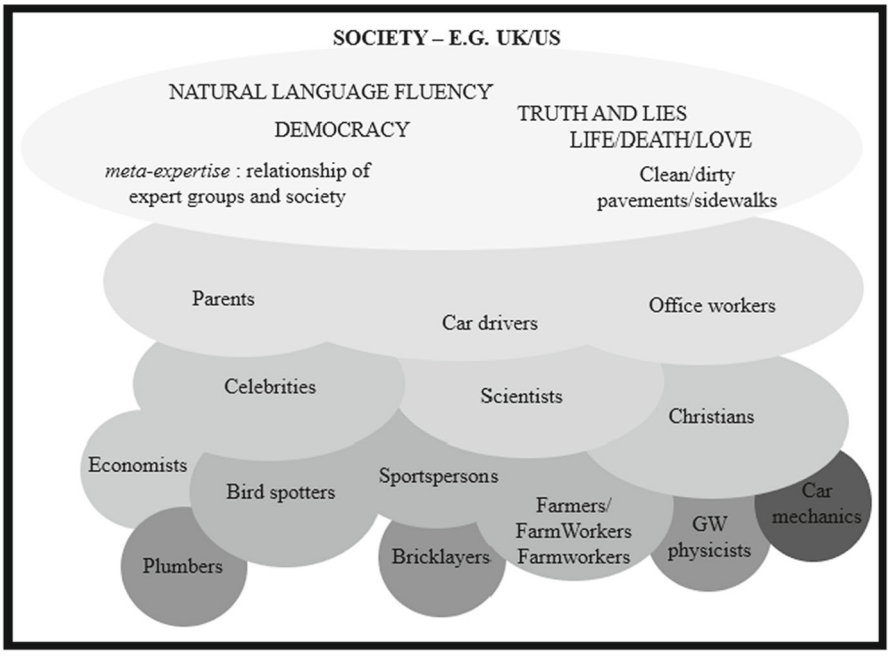


**Fig. 1** The fractal model of society such as that of the US or UK

failed. The author subjected himself to Imitation Games in which he pretended to be a gravitational wave physicist, and that makes perfect sense too.[12]

In Fig. 1 the groups grow smaller and more specialised as we go down the page and at some point they cease to have an identifiable expertise/culture and become mere *set*s of individuals, such as those who have roses tattooed on their arms (but not those who have any kind of tattoo, who are probably a sub-culture identifiable in an Imitation Game). Not *all* mere *set*s are found at the bottom level of the fractal: bigger *sets* which are not groups (at least, not in US or UK society), are 'brown-haired people', or 'people who wear laces in their shoes'; it would not make sense to subject individuals to Imitation Games to find out if they were members of those sets since passing would not require any cultural acuity, merely the ability to lie about the fact of hair-colour or shoe-type. (Currently, ginger-haired people seem to be on the cusp of groupishness in the UK.)

The fractal model is a useful way to think about what a society is: a society involves the top level and the lower levels mutually interacting. All the people in the top level are also found in the lower levels and vice-versa. The fractal model is a primitive description of a society—it turns on sociology's basic units of explanation. Durkheim said, 'treat social facts as things'. The fractal model is a way of thinking about the 'things'—the atoms of social life. The individual human is a molecule, made of these atoms—the social groups in which they become embedded in their passage through life. In terms of physical extension, the atoms are larger than the molecules! The set of social atoms that make up the individual provides the individual's envelope of viable intentions. If I live in 'The West' I can aspire to take out a mortgage; if I live among the Azande, I can aspire to divine a witch; but not *vice-versa* (it may have been different in the US at the time of the Salem witch trials but the fact that some US citizens engage in witchcraft nowadays does not affect the fact that witchcraft is not currently constitutive of US society any more than cricket is constitutive even though it is played by a few citizens. Everything feeds back and forward, so the viable intentions are also the 'formative intentions' that define a society—they make the society, or group, what it is.[13] Social life is not a set of rules, however, it is a set of taken-for-granted ways of being in the world with taken-for-granted intentions and actions. Those fulfilling the role of interrogators and judges in Imitation Games must be especially reflective members of the group in question. Of course, societies and sub-groups are continually in flux, but usually change is slow. What we are seeing in the West is a potentially rapid change which could lead to the viable intentions of the members of all groups, of whatever size, ceasing to include a clear distinction between true and false.

It is important to note that there is feedback in the system, especially notable at time of rapid change when everything becomes loosened up: at such time individuals have some scope to adjust their actions so as to try to push the social things in one direction or another. That is our problem; we are in a time of rapid change and we need to make sure we discourage individuals from pushing in the direction of the further erosion of truth.

[12] E.g. see Giles (2006).

[13] See the analysis of actions in Collins and Kusch (1998), where the term 'formative intentions' is introduced. Sometimes the term 'formative aspirations' is more appropriate.

A series of lectures given by Emile Durkheim starting in the 1890s and continuing through to the early years of the Twentieth century were later collected, edited, translated and published in various editions of a book. English editions of 1958 and 2019 have the title *Professional Ethics and Civic Morals*. Durkheim, like us, was living in a time of rapid change and was concerned with the 'anomie' arising out of industrialisation, causing the old structures of social order to break down. One ameliorating factor, he proposed, was the moral order of the professions. The professions had their own codes of ethics and these could replace, to some extent, the traditional sources of order in society. But professions differ—not all could fulfil that role in the same way. As Durkheim put it:

> As professors, we have duties which are not those of merchants. Those of the industrialist are quite different from those of the soldier, those of the soldier from those of the priest, and so on. … there are as many forms of morals as there are different callings (Durkheim, 2019, p. 5)

Taking Durkheim's insights up to date is a remark by Deirdre McCloskey, ex-tenured member of the Chicago School of economics and colleague of Milton Friedman, and currently a professorial fellow at right-wing thinktank, The Cato Institute. Friedman was one of the principal founders of what is now called 'neoliberalism' and took his advocacy of free markets far enough to claim that if they led to monopolies then monopolies should be endorsed as the most efficient means of distributing goods. McCloskey recently defended Friedman from attack in the course of a debate published in *Harper's Magazine*:

The famous line from [Milton Friedman's] … essay is half of the sentence—the social responsibility of a corporate executive is to make as much money as possible. But the second half of the sentence goes: while conforming to the ethical and legal rules of society. That part always gets left out. On the other hand … It metastasized in business schools. Business schools went from trying to make managers into professionals—like lawyers, professors, and doctors, who acknowledge a deep ethical commitment to their clients, their students, their patients—into making people with a kind of "screw you" attitude. (Contribution by McCloskey (p. 31) in Deneen et al., 2023)

The common thread with Durkheim is the potential role of the professions in maintaining a moral order. One might argue that market fundamentalism arising out of Chicago School economics did much to destroy that role because, in spite of the 'second half of the sentence' attributed to Friedman by McCloskey, free markets can't explain why professions should adhere to moral values: free markets can't explain where moral values come from. One might propose, along with McCloskey, that it was the business schools which took the final step of destroying traditional moral behaviour in business, or that they were just completing what had been started by market theorists, but a more general point is being made here: institutions like the professions could have a role in creating a good society *if* they were a source of moral values.

The fractal model can be thought of as a generalised version of Durkheim's (and McCloskey's) picture of society. Instead of restricting the discussion to formally constituted professions the fractal model allows us to think about the relationship of any

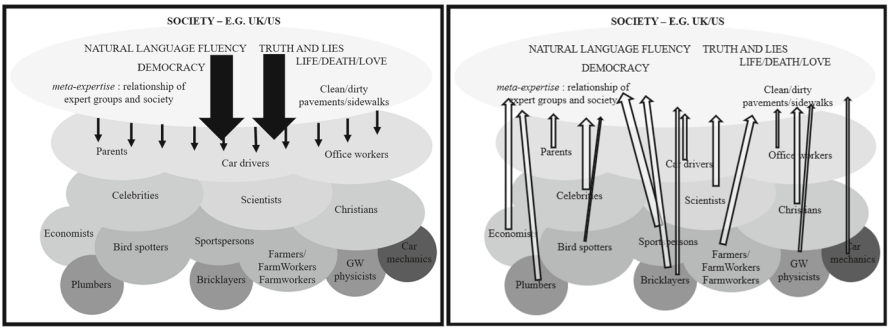


**Fig. 2** The downward influence of existing ubiquitous culture on subgroups (left panel) plus the upward influence of sub-groups on society as a whole (right panel)

cultural sub-group—any social thing—to the ubiquitous expertises, and ubiquitous moral understandings found in the top level.

The left-hand panel of Fig. 2 illustrates the role of pre-existing ubiquitous expertise and ubiquitous moral and social understandings in the formation of sub-groups (including the professions). There can be no sub-groups nor, indeed, any human-like groups at all, without a common language and the associated distinction between the true and the false that makes language possible; without truth being the default, even the names of things would be impossible to transmit and learn. The heavy downward arrows emphasize this general point. These and other ubiquitous expertises are mostly learned in the course of 'primary socialisation' in the nuclear family. The child learns to speak a native language in the course of which they learn, mostly implicitly, the difference between the true and false. This is common to most human societies.

Primary socialisation is the condition for 'secondary socialisation', which takes over in formal education and the world of work. It reveals itself in the way a homogeneous society becomes made up of sub-groups with their specialist cultural and technical expertises all influenced and flavoured by the social and moral culture of the society as a whole. The influence of the less fundamental aspects of culture—the aspects of culture that vary from society to society—is illustrated by the smaller downward arrows in the left-hand panel of Fig. 2. But specialists do not cease to be members of society when they become specialists: the moral culture of the sub-groups continually feeds into the moral life of the parent culture because every member of a sub-group continues to be a member of society and there are no members of society who are not members of sub-groups of one kind or another—this is one sense of 'fractal' in the fractal metaphor.

The looming disaster is the prospect of the difference between the true and false becoming so eroded that it can no longer feed into the sub-groups (and professions) and society collapses into a set of self-interested individuals coalescing here and there as monopolistic centres of power and vulnerable to control and manipulation by a dictatorial regime with Orwellian control over what counts as true.[14] For those

[14] For discussion of the importance of face-to-face relationships in society (and science) and the dangers of social media expressed in terms of the fractal model see Collins et al. (2022), *The Face-to-face Principle: Science, Trust, Democracy and the Internet* (This is an open access book: https://doi.org/10.18573/book7).

with dictatorial ambitions the erosion of truth and of specialist groups of experts is a desirable outcome because of what Arendt points out above—it creates the conditions for the acceptance of any idea that can be used as a focus for discontent and acceptance of charismatic leadership. Groups like science and the law can, on the other hand, act as checks and balances on the slide from populism to fascism. If such groups have power and respect, it makes it difficult for a dictator to interpret 'the will of the people' in any way that suits them. Still more important is the right-hand panel of Fig. 2, which illustrates the way that cultures developed within the sub-groups of society (including the professions mentioned by Durkheim and McCloskey), can feed back up into societal culture as a whole. As intimated, the upward influence, or potential upward influence, that is being stressed here is that of science.

### 2.4 Ubiquitous meta-expertise

#### 2.4.1 Ubiquitous meta-expertise is what we need to change if science is to resist the erosion of truth in society

A feature of the fractal model that is important for the argument is the entry that appears to the bottom left of the top oval of Fig. 1—that element of ubiquitous expertise that comprises, 'meta-expertise: relationship of expert groups and society'. This is the part of citizens' expertise, acquired in early socialisation, that assigns roles to sub-groups. It might lead a member of the Azande to put faith in shamans when crops failed but in most Western societies it will assign roles and a status-order to sub-groups such as doctors, lawyers, car-mechanics, plumbers, and scientists. It is the meta-expertise that enables the citizen to resolve an expertise-related problem by choosing someone socialised into an expertise group to resolve it or advise on it. If science is to fulfil a role in buttressing truth in the West then it will need to be a respected feature of citizens' meta-expertise, which is a complicated way of saying that citizens will mostly need to believe what science says.[15] Among other things, it is important to shift the analytic gaze from its near monopolisation by wave two to allow an understanding of the importance of wave three in its attempt to rescue science from post-modernist academic raiders and those academics who believe that one outcome of wave two is to fold science entirely into democratic politics: this paper is part of a program intended to stop that interpretation.[16] But how to change the meta-expertise of the general public so that science gains in status is a harder problem.

[15] Science will have to modify some of the claims it once made following from the wave one model. Policy-significant science, and even science-in-the-making as has been studied under wave two, does not live up to the retrospective accounts of heroic historical incidents. Science will also have to very careful about explicitly endorsing anything that looks like a politically contested non-epistemic value. There is a reassuring awareness of this kind of point in the SVA literature as discussed in, say, Elliot (2022).

[16] This interpretation of wave two, and its manifestation in the support by certain academics for the popular revolt toward the end of the 1990s against the safety of the Measles, Mumps and Rubella (MMR) vaccine was the trigger for Collins and Evans's 2002 paper.

### 2.4.2 Science as an institution

*An analysis of science as an institution starting from its formative aspiration of finding correspondence truth in respect of the observable world; science's methodology as a set of values for preserving moral truth;comparison with other institutions is invited.*

Some sub-groups in the fractal model, including those we are going to discuss here, are of a kind often referred to as institutions. An institution is made up of characteristic discursive and practical actions among the individuals part-constituted by it. Institutions are not *defined* by what they accomplish because no-one knows how an action will turn out; my attempt to take out a mortgage may fail as might my attempt to divine a witch. But institutions can be recognised and distinguished by the intentions of the actors.[17] We can characterise the institution of science by describing the intentions of quintessential scientists. Collins can draw on his 45-year-long study of gravitational wave detection—which fitted the ideal very closely. Collins, along with readers of this paper, can also draw on their participatory understanding of other sciences and other institutions belonging to Western societies.[18]

The most 'natural' next step in the argument would be a comparative analysis of multiple sub-groups' relationship to truth. But this would be a huge task, one that the 3W group is beginning to think about, but not one on which we have made much progress so far. One can see why the task is so demanding when one considers the three-wave model of science. Each wave has an entirely different concept of science's relationship with truth: the first wave takes it that science delivers truth in respect of the observable world—what I am going to call 'correspondence truth'—via a set of quasi-automatic procedures; the second wave is considered by some to have demonstrated that those procedures cannot deliver the truth, each step being inevitably influenced by social context, leaving science with no special relationship to the truth beyond that of the rest of society; the third wave tries to re-establish a special relationship to the truth based less on science's accomplishments than on its formative aspirations or intentions. Getting to this point has so far taken around a century of observation and analysis of the sciences, including many detailed case studies, with the third wave still developing. There is no reason to think that each sub-group represented in the fractal model– of which there are an indefinite number—does not deserve similar attention if a thoroughgoing comparative analysis is to be achieved. Instead, we'll concentrate on

[17] Their 'formative intentions/aspirations'.

[18] Participant comprehension is central to the methods of interpretative sociology and the social sciences. Those who make use of the findings of the social sciences are often confused about the reliability of methods other than statistical analysis of surveys, reflecting disagreements within the disciplines themselves. Participatory methods are not useful when it comes to, say, judging aggregate voting intentions, but very reliable when it comes to, say, judging the position of the verb in the English sentence. This is because the latter is uniform across the society and therefore a single representative of that society is adequate as a 'native informant' (so long as they are not crazy). Expressed in statistical language, when it is sampled, uniform social behaviour like this has a standard error of zero. The point is worked out in Collins and Evans (2017b). Scientific research groups are generally fairly small, like small tribes, so much of their social life can be well-understood by immersion within them. In Collins's particular case he has also engaged in more or less detailed studies of TEA-laser building, photonics, various aspects of parapsychology including participatory work, molecular biology, automation of sport officiating, including providing contributory understanding, artificial intelligence, speech hesitancy participatory research, and development of the science of Imitation Games, all these being represented by published work.

science, about which we already know quite a lot, making passing reference to other institutions when it seems relevant and when we know something about them from our experience, either specialised or general.

Post-wave two, we know a lot more about science's relationship to correspondence truth: establishing correspondence truth is, at best, a long-term business. But we can say that a central characteristic of science as an institution is *the aspiration* to find correspondence truth—the truth about the observable world—and day-to-day actions in representative science reflect this aspiration whether it is fulfilled or not.[19] In so far as a participatory study can show anything, Collins's study showed that gravitational wave scientists were in search of correspondence truth: a truly detected gravitational wave, and were fearful of announcing anything that might prove unsupportable. It also showed that in order to have a chance of reaching their goal the scientists had to cleave to 'moral truth'—always reporting their results clearly and honestly to each other so as to enable others to criticise their findings or to build on them. The same applies to the institution of science in general: the aspiration to find collective correspondence truth precipitates moral truth. We are not talking here about whether scientists were right to build the atomic bomb or to contribute to work that leads to pollution or global heating, we are talking about science as an institution the aims of which lead to its practitioners trying to tell the truth as a central aspiration. That is the central importance of science in Western democracies whether or not that same science leads to other kinds of goods or harms. Note that we start with the 'social fact' of the institution, not the moral qualities of the individuals: these emerge from induction into the institution and an understanding of the way cleaving to moral truth follows from the search for correspondence truth. What also follows is the development of a series of methodological prescriptions aimed at supporting the initial aims—as set out in Table 1.

The methodological prescriptions found in the lower box of Table 1 are not intended to be an exhaustive list. Some of them would once have been described as 'the logic of scientific discovery' but are nowadays better seen as internal values or aspirations, since close study of the actual procedures of science in action shows that every such 'rule' rests on an indefinite set of assumptions. Philosophers might want to divide the values set out in the third box into different categories, such as direct and indirect, but

[19] This is what I call (for instance in Collins, 2022) the 'aspire to neutrality position' (ATN). This does not mean that there are not individual scientists who violate the institutional norms nor even that there are not some entire sciences that have diverged from these ideas and, perhaps should be thought of as a different kind of activity. For example, economics seem to have become enamoured with the idea that a science should resemble mathematical physics even if, as physicists know, mathematical models do not necessarily correspond to reality; furthermore, aspects of economics, such as the theory of markets, have become disturbingly entangled with politics and the interests of business (Oreskes & Conway, 2011, 2023). Psychology has responded to the demand for publications as a proxy for scientific output in ways that have led to a latent replication crisis becoming realised. One simply has to handle these diversions from normative behaviour as not formative of the institutions under examination or it will become impossible to do the commonsense thing of preferring one institution to another; if one allows the deviants to dominate the analysis, then all institutions become the same, exactly what we are trying to avoid. [See Collins (2017, Chap. 13), for a description of the endearingly innocent campaign of subterfuge designed to prevent premature announcement of the first discovery of gravitational waves and Collins's futile attempts to suggest it could have been done a better way to preserve science's integrity.]

**Table 1** Wave 3's model of science as an institution (referring to SVA in lines 8 and 9)

| **Formative Aspiration** | ⟶ **Formative Imperative** |
|---|---|
| Collectively aspire in expert groups to find **universal correspondence truth** in respect of the observable world | As individuals pursue **moral truth** by reporting findings honestly, accurately and clearly |
| **Methods** *(some were once thought of as 'logic of scientific discovery')* | |
| 1. Assiduous observation and experiment not preconception or revelation:<br>2. Corroboration/replication; falsifiability.<br>3. Expertise and experience vital<br>4. Fair criticism and response in locus of legitimate interpretation (LLI)<br>5. Controlled boundaries round small groups of experts<br>6. Universalism: findings cross-cultural<br>7. Disinterestedness: blind/double blind tests<br>*8. Value-free ideal (for observational and experimental procedures)*<br>*9. Partition non-epistemic values via wider social and political philosophy* | |

the closer one attends to these categories, the harder it seems to draw sharp divisions.[20] The value free ideal (8th line) is a corollary of wanting to tell the truth—one does not want the truth to be affected by external preferences. But this is clear only at the very research front: for example, as soon as one starts to consider the potential wider effects of the work the assiduousness with which the research should be done (e.g. the statistical warrant for announcing a result), becomes a relevant value.[21] Lines 8 and 9 will be revisited in the context of the discussion of SVA.

The gap between aspiration and accomplishment is narrower in the case of moral truth than correspondence truth. This is because moral truth is an internal state of individuals, and we have more control over our internal states than over the outcomes of collective life such as correspondence truth. But it remains that we do not have full control over our internal states. We may be unaware of subtle effects on our determination to tell the truth clearly—subtle effects such as confirmation bias or hidden prejudices. This is why science invents a set of procedures, such as double-blind tests, to try to minimise those effects. Double-blind tests aren't fool proof, for example the real drug may have side effects not shared by the placebo, so patients know which group they are in, but taking the precaution in the first place and worrying about its possible deficiencies indicates the determination to achieve moral truth. When we get to correspondence truth, the procedures are far more elaborate (if still not fool proof), including corroboration via replication, invited criticism and response within bounded groups of experts, and the other long debated procedures, usually thought of under the heading of the 'logic of scientific discovery' but better conceived of as a set of values that aimed at aiding science's aspirations to find correspondence truth and distinguishing it as an institution.

[20] Steel (2010), discusses partition of epistemic values into direct and indirect.

[21] This is an important feature of SVA but was also discussed in Collins (2004, pp. 781–782).

A pressing problem is that the institution of science is under systematic attack from those who want to marketize its procedures, valuing only its economic, or other outputs, rather than its moral accomplishments.[22] It is being argued here that moral culture is an important product of science, perhaps the most important product, because it has the potential to safeguard truth as a foundation of social and political life.

These distortions aside, science, as an institution seems close to unique in its relationship to truth, and potentially uniquely important as an institution in terms of pushing upward so as to maintain truth as a component of the ubiquitous expertise in society's fractal.[23]

## 3 Part Two: the third wave and scientific value analysis

### 3.1 SVA looks at the impact of social values on science; 3W looks at the impact, or potential impact, of science on social values

Scientific value analysis (SVA) can be seen as supported by the second wave of science studies. For example, the current author's, 1981, formulation of the second wave, known as 'the empirical program of relativism' (EPOR), maps neatly onto SVA though SVA takes a more positive approach to 'non-epistemic' values. EPOR has three stages: first, demonstrating the "interpretative flexibility" of experimental data; second, showing the local social mechanisms by which closure is effected; and third, linking the local closure mechanisms to wider social forces. That is, the first part of the work was to examine passages of experimental or observational work, most revealing when they were the subject of dispute, and show how different conclusion could be drawn from the same 'data': this was demonstrating interpretative flexibility and what was brought out was the way that every experiment or observation was densely based on interpretative choices. This work provides tremendously rich support for epistemic values claims of SVA (see for example, Collins, 1985/1992 and Chaps. 5 and 14 of Collins, 2013) and it is surprising it is not used more in that literature.[24] The second stage of EPOR shows how one set of choices, or values, comes to be chosen

[22] Where numerical measures for science's output come to dominate it encourages the profession to concentrate on the measures not the intrinsic ends, and fraud is one outcome along with more and more essentially valueless publications and often unrepeatable findings. For a systematic account of these pressures see Turner and Chubin (2020). For some recent examples, see 'There is a worrying amount of fraud in medical research—And a worrying unwillingness to do anything about it' in *The Economist* weekly edition of February 22, 2023, accessed at https://www.economist.com/science-and-technology/2023/02/22/there-is-a-worrying-amount-of-fraud-in-medical-research.

[23] Table 1 might be a good starting point for a comparative analysis of institutions. In exploring a range of institutions, fair competitive sport seems to come close to science in terms of the top two boxes, and so is serious journalism, though the contents of the third box is, of course, very different in both cases. The law differs in a number of ways: restricted timetables and formats; opening decisions to lay people not experts in the case of jury trials; assigning expert advocates to roles they do not necessarily choose themselves; 5th amendment and other procedural limitations over-ruling truth; unfazed by national differences in what counts as truth; and so on.

[24] Though the case study is from physics, where values are not an obvious feature, the strategy of 'the hard case' suggests that if the value-ladenness of physics can be revealed then the case for more value-related sciences is strengthened.

over another, and how this precipitates an observational conclusion. The third stage of EPOR refers to others' historical research to show how wider values can feed into the choice at the second stage. For this author these wider values (such as the influence of eugenics, shown in Mackenzie's, 1981, study, on those developing the statistical correlation coefficient), were seen as a source of distortion, or potential distortion, whereas the distinct contribution of SVA has been to show that they are necessary in cases where the impact of, say, the choice between type 1 and type 2 statistical errors (inductive risk and see Collins, 2004, pp. 781–782), has marked social consequences, meaning that in such cases they should be endorsed not rejected.

The major difference between 3W and SVA is, as intimated above, that SVA seems concerned solely with the impact of values, notably societal values, on science, whereas the third wave/SEE approach is also concerned with how societal values arise and are maintained. In particular, it is concerned with the impact of institutions, notably the institution of science, upon societal values. In terms of the fractal model, SVA's concern stops with the left-hand panel of Fig. 2 whereas 3W is especially concerned with the right-hand panel.[25] Figure 3 is an aide memoire for the 3W position: science is a bulwark holding back the erosion of truth in society as indicated by the vertical arrow. In this way it also feeds into democracy as indicated by the slim black arrow.[26]

A more complete analysis would bring in the influence of other institutions, including sport and journalism, but as explained, this would be a demanding task.

More minor but nevertheless important differences between SVA and 3W are found in the way biases and bad non-epistemic values are handled. It should be stressed, however, that in terms of upstream and downstream decision-making in science—how the direction of scientific research is chosen and funded, and how the findings of scientific research are put to use—the third wave approach combined with studies of expertise and experience is similar to that of SVA. The remaining significant differences are found at the research front of science: the impact of values on what I'll call 'observational and experimental procedures' (OEP). Here, with its strong concern with the legitimacy of science in the public domain—its strong concern with ubiquitous meta-expertise—3W differs in the way it treats epistemic values and, less significantly, in the way it treats non-epistemic values.

[25] An example of concern with the left-hand panel is Heather Douglas's (2009) remarks:

> Many of the most central values scientists hold are those they developed whilst training to be scientists, and this alone can create divergences between the scientific community and the general public... Thus, even a demographically diverse scientific community may still hold values that clash with the broader public's values. (p. 122)

increasing use of analytic-deliberative methods through which scientists, stakeholders and citizens can collaborate in order to ensure that the non-epistemic values that inform scientific work are the ones endorsed by the society as a whole (p. 123).

The same position is developed further in Douglas's (2016).

[26] Other arrows might represent the role of science as a check and balance on scientific claims that might be made by ruling powers and, for those of a liberal persuasion, the need for science to explore the limits where personal freedom impinges on the freedom of others—e.g., in the case of refusal to be vaccinated. Science also provides an object lesson for how to approach decision-making under conditions of great uncertainty such as continually besets government.

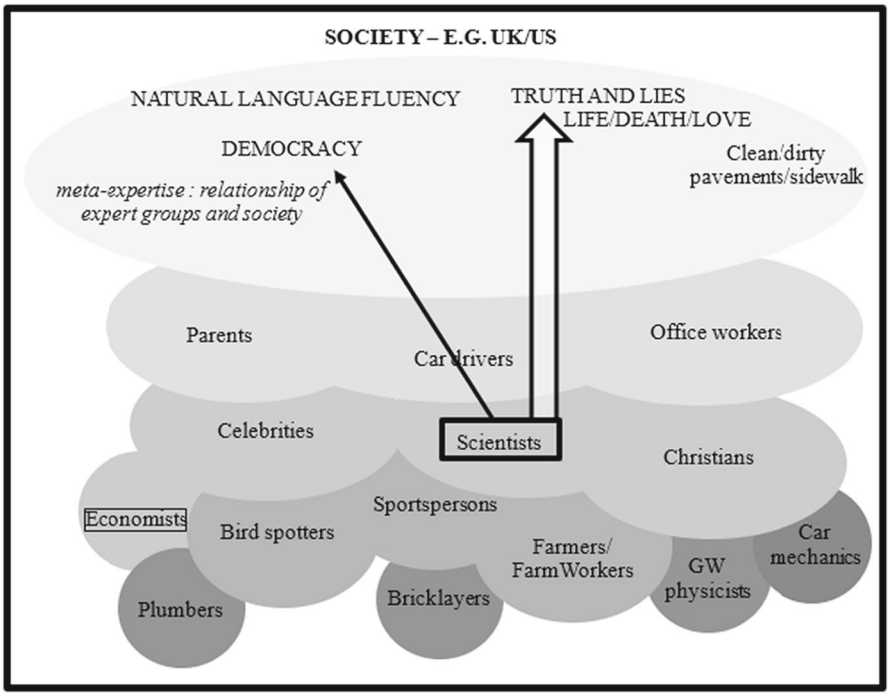


**Fig. 3** Influence of science on societal culture

### 3.1.1 The value-free ideal and epistemic values as actors' and analysts' categories

*SVA and 3W agree that science cannot proceed in the absence of an indefinite range of assumptions and epistemic values but SVA still wants to avoid biases—but endorsing values, even epistemic values, could weaken science's legitimacy; 3W squares this circle where epistemic values are concerned by distinguishing between actors' categories and analysts' categories—scientist actors maintain a value free ideal/aspiration even while analysts agree that maintaining it is impossible; the aspiration defines the institution.*

SVA, as represented for example in the treatment found in Elliot's, 2022, book, readily recognises the dangers to the credibility of science of declaring that OEP is influenced by values. If Elliot is representative of SVA then both perspectives recognise that academic science has little political power outside its claims to be able to produce honest and disinterested advice to governments. It is hard enough to speak truth to power without those preferring something other than the truth being advised that scientific advice is freighted with values. At least some practitioners of SVA are at pains to stress that the rejection of the value-free ideal does not imply that *bias* is to be invited into science but avoidance of bias surely implies an aspiration among actors to act in a value-free way where values are being thought of in this instance as anything that might affect ones scientific judgement in the domain of observational

and experimental procedures. On the other hand, the second wave established (e.g., first stage of EPOR) that the domain of OEP cannot operate without continual value-based judgements from trust in other's evidence and products through willingness to accept any number of assumptions without which no experimental program can move forward (see, once more, Collins, 1985/1992 and 2013, Chaps. 5 and 14). But the circle of value freedom in the domain of observational and experimental procedures with the dependence of those procedures on value freedom, can be squared. The crucial idea is the distinction between actors' and analysts' categories.

We can trace this distinction back to philosopher Winch's (1958) book, in which the interpretation of Wittgenstein was an important source for the sociology of scientific knowledge and wave two, certainly for this author. Winch, already mentioned in connection with the Wittgensteinian idea of form of life, argued that one can only explain social life in terms of 'actors' categories'—the way a society works and the way people will act in a society is determined by the taken-for-granted, mostly unexplicated 'rules' for action in that society. We have already talked of taking out a mortgage and divining a witch as examples of ways of going on that differentiate between societies. Each of these actions will be supported by an indefinite number of rules that support their application but all of which cannot be explicated. Analysts, according to Winch and to interpretative sociologists, can only understand a society (and this applies just as much to all the sub-groups in the fractal model), if they can come to understand the taken-for-granted rules that guide social life within it. Analysts, on the other hand, have their own societies with their own rules and their understanding of the society they are studying, though it must be based on the actors', in the groups they are studying, way of being, it will probably include 'technical categories', built on top of the actors' categories. Here what we are saying is that the way every scientific act depends on trust and other such values is an analyst's idea. The scientist actor's idea—the thing that creates the world they live in—is the idea that they are discovering features of the natural world in the only way such discoveries can be true to that world—by conducting their observational and experimental procedures in a value-free way. Even if they are reflexively astute enough to understand the limitations on value freedom, scientists' worlds are built on the aspiration to be as value-free as possible when they are working at the research front. In this case, the actors will be working according to the value free ideal even though we analysts tell a different story about how value free the research front of science really is. That there is a difference in actors' and analysts' accounts of the world is unremarkable: after all, if we were looking at the Azande we would be accepting that the actors' world was driven by the idea of witchcraft though the analysts' was not. That is how social life works and that is how the social life of the social analyst works—they do not have to be the same so long as the actions of the native members can fit into the analyst's account of them.

That is why the lower box includes the value-free ideal as line 8 even though both SVA and 3W agree that there can be no science without epistemic values. Lines 1 to 7 exhibit actor-scientists trying to live up to the value-free ideal by inventing experimental and social procedures to help their value-free aspirations be fulfilled. There is a value-free ideal *for the actors*. But, for the credibility of science it is the actors' view of the matter that is the most important because that is what guides their actions. It is what makes it that the scientists can be trusted to fulfil our need

for craftwork, crucially, craftwork with integrity, when we seek scientific advice for policy. And if our policy relates to the observable world, there is no better place to find that advice, even though it cannot be guaranteed to be right. Science, as an institution, rests on the idea that its heartlands—the observational and experimental procedures—are value-free, or as value-free as possible. At its heart the institution of science rests upon the value-free ideal.

Going back to the lower box of Table 1, lines 1–5 are all part of the effort to ensure value freedom, though it can be referred to as bias-freedom if preferred. Those involved in OEP and in the assessment of others work, cannot be just anyone, they must be skilled and practised at the task in hand (just as with witch-diviners) —small groups with carefully guarded boundaries. Science is defined by its 'locus of legitimate interpretation (LLI—line 4) being close to those who produce the findings in the first place (as opposed to the adventurous arts where the LLI is distant from the producers, including newspaper critics, gallery owners and the general public. What we might call 'the democratisers'—those who think that wave two has shown that science cannot be distinguished from ordinary life, would prefer to push science's LLI in the direction of the arts.[27] Lines 6 and 7 express actors' intentions to find universal features of the observable world even though analysts might argue that this has not been achieved.

### 3.2 The matter is less clear in the case of non-epistemic values; these have to be analysed on a case by case basis

Turning to line 9 in the lower box of Table 1, some SVA analysts are also clear that 'bad values' are not to be invited into science. Here SVA and 3W agree, though 3W is clear that this is not a problem specific to science. Though we argue that science is a foundation for many societal values, notably truth, there are other good values for the source of which we must look elsewhere.[28] In sum, for 3W and at least some SVA analysts, the demise of the non-epistemic value free ideal does not imply that all values, including all social values, are to be absorbed into science.[29] There are some social values the impact of which on science would not be endorsed. But in the case of non-epistemic values, the grounds for the demarcation between good values and bad values must be searched for in the wider reaches of moral and political philosophy and in so far as SVA looks to wider moral and political philosophy to identify bad values, it is similar to 3W.[30] Societal values can, then, be shown to improve science only on a case-by-case basis; this also seems perfectly reasonable from the 3W perspective. But it means that should one discover a domain of observational and experimental procedures within a science that is free of non-epistemic values—it might be the heartlands of

[27] For locus of legitimate interpretation see Collins and Evans (2007).

[28] The point is made with more care in Collins and Evan's (2017a), *Why Democracies Need Science*, p. 126ff.

[29] Here SVA analysts are clearer than some of those coming from science and technology studies who consider that the second wave of science studies implies that all kinds of scientific decisions, right into the heartlands of science, should involve public participation (thus was the parents' revolt against MMR vaccine endorsed).

[30] Anti-discriminatory values (though they are found in wider society), can be justified as epistemic values since they lead to improved science via the norms of universalism and disinterestedness.

gravitational wave detection physics for example—one should not assume that there is something lacking in the science or wrong with the analysis of the science: the opposite of the value-free ideal is not always a value-laden ideal. In sum, the opposite of the VFI is not the VLI. In the case of epistemic values, it is not the opposite because of the distinction between actors' and analysts' views of the world. In the case of non-epistemic values, the sciences differ and the values differ affecting where it applies and where it does not; a value laden *ideal* would have to be universal, at least in aspiration. In this case the opposite of the VFI is something like 'value tolerance'.

## 4 Part Three: is truth an epistemic or a non-epistemic value?

### 4.1 This short section asks about the nature of truth: has it become a non-epistemic as well as an epistemic value given the political role of the erosion of truth—the starting point of this paper

The pursuit of truth, both correspondence truth and moral truth, it has been argued, is a central epistemic value of science—it is a crucial part of the institution of science's formative aspirations. But it has been argued that we need it to filter up into society as a whole, if society is to preserve itself against populism collapsing into fascism. So, is truth a non-epistemic value—a social value—or an epistemic value? Perhaps the answer lies in the notion of form of life.

A form of life as the term is used here, is a culture: it is a set of practices and concepts that support each other.[31] But in the normal way, most of what we experience as membership of a form of life is invisible to us. Rules cannot contain all the rules of their own application and the larger body of supporting rules are invisible and simply 'taken-for-granted' by members of society; they are the tacit knowledge that is the substance of social life. Skilled philosophers are able to reflect on this substance and social scientists deploy certain techniques to bring it into the open; in both cases they are revealing actors' categories so as to make them a basis for analysts' categories. One classic technique for revealing the hidden substance of social life is the 'breaching experiment', which makes hidden social rules visible by breaking them and watching for the reaction.[32] So, instead of seeing the world as simply divided between hidden and explicit values we should be aware that there is a shifting boundary between what is obvious and what is not; most of the values we live and act by are hidden most of the time, but skillful research can bring some of them to the surface.

In what has been described in the opening paragraphs of this paper as the 'golden age' of Western societies, between the end of the Cold War and Brexit/Trump, respect

[31] A clear exposition of the Wittgenstein's (1953) term as it is used here is found in Winch's (1958) book where he describes the discovery of the germ theory of disease. The ritualistic gloving, gowning and scrubbing that surgeon's undertake makes no sense outside of the concept of germ—it creates the concept of germ—and the concept of germ would make no sense if surgeons still operated in bloody waistcoats.

[32] The idea was invented by Harold Garfinkel (1967). A more accessible source for breaching experiments and other such techniques is Collins (2019, Chap. 7). A nice breaching experiment invented by Peter Halfpenny is to ask a bus driver for two tickets, the second to reserve the adjacent seat. Courageous analysts might try taking items from shoppers' supermarket trolleys as they approach the checkout, pointing out that they have not paid for them yet so ownership has not been established.

for truth had been hidden in society's world of the taken-for-granted. In so far as members of Western societies were concerned with truth, it was as an epistemic value and a focus of science and a few other institutions: the role it played in everyday life was hidden. But the activities of people like Johnson and Trump (and Putin), like breaching experiments, brought truth back into the conscious realms of society. What had been merely an epistemic value metamorphosed into a debatable social value. Today, then, science is freighted with a social value right at the heart of its observational and experimental procedures. That is the social value on which we might be able to build a stable democracy. What we must hope is that, in the not-too-distant future, truth, once more, will be able to slip quietly into the background of society, the esoteric concern of philosophers, historians, and sociologists of science, assuming, once more, the status of a purely epistemic value.

## 5 Summary and conclusion

The third wave of science studies (3W) has been described and briefly compared with SVA in an attempt to help both escape from their academic silos and learn from each other. A major difference is that SVA is concerned with analysing and enhancing the influence of societal values on science whereas 3W is more concerned with the influence of scientific values on society and how this can act as a bulwark against the erosion of truth. The erosion of truth in public life could create the conditions for the revival of fascism in Western countries and that is why taking notice of the 'upward' influence of institutions on society is important: it is a value choice for philosophers and sociologists. Distinctions developed out of Wittgenstein's later work, which are familiar in interpretative sociology, show how the value-free ideal can be seen as a 'formative aspiration' in respect of the institution of science even though both SVA and 3W concur that a science free of epistemic values is impossible. SVA has shown that non-epistemic values can and should inform certain sciences but not necessarily all. Therefore, a better choice of term than 'value laden ideal' for the end of the value free ideal, would be 'value tolerance'.

### Declarations

**Conflict of interest** There are no conflicts of interest nor any financial interests bearing on this work.

**Informed consent** Not applicable.

**Research involving human participants and/or animals** None.

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