History and Philosophy of Technoscience

POST-TRUTH IMAGINATIONS

NEW STARTING POINTS FOR CRITIQUE OF POLITICS AND TECHNOSCIENCE

Edited by
Kjetil Rommetveit

"*Post-Truth Imaginations* offers the most comprehensive and sophisticated treatment of post-truth phenomena to date. The book adopts the standpoint of Science and Technology Studies, the field that has been at the heart of the matter from day one. The editors are to be congratulated for the range of voices heard in these pages and the subtlety of the considerations – conceptual, empirical and practical – that they bring in coming to terms with our 'post-truth condition'. The diagnoses and strategies proposed here are diverse, but there should be something here for anyone who has thought hard about post-truth, whether it be in the spirit of warm embrace or fear and loathing."

Steve Fuller, author of *Post-Truth: Knowledge as a Power Game* and *A Player's Guide to the Post-Truth Condition,* UK

"This book offers a comprehensive overview of the various aspects of post-truth and a deep and novel understanding of its epistemology and politics. It is wide-ranging and deeply insightful, empirically rich and theoretically innovating. *Post-Truth Imaginations* moves beyond the immediate concerns of fake news, false evidence and failing science communication as it centres on one of the biggest questions of our times. What are the roles of science in society, the politics of technoscience and the public imaginations of democratically governed, science-permeated societies? These are crucial questions if we want to address the global challenges of climate change, pandemics and international justice."

Wiebe E. Bijker, *Maastricht University and Norwegian University of Science and Technology, The Netherlands and Norway*

"The notion of 'post-truth' harbors a romantic view on a now gone era of truth and certainty. The contributions in *Post-Truth Imaginations* not simply criticize this view as a glorification of the past, but skillfully uncover post-truth's deep entanglements of Western ideas on knowledge and its publics. By so doing, they link the debate to fundamental cultural changes during the development of the political economy since the second half of the 20th century. The book is essential reading for scholars of technoscience, the history and philosophy of ideas, science studies as well as the many streams of social theory today."

Matthias Gross, *Helmholtz Centre for Environmental Research and the University of Jena, Germany*

"At a time when conspiracy theories are spreading like wildfire on social networks, when academies and governments are worried about the public's distrust of experts, it is more than ever appropriate to critically discuss the notion of a post-truth era. This collective volume provides a fine

description of the cultural context of emergence of the imaginary of a new knowledge order, or disorder, characterized by the collapse of truth value. More importantly, it provides indispensable clues for making sense of the epistemic unsettledness brought about by technosciences. It will be the reference book for a deeper understanding of controversies on climate and vaccinations and more broadly of the technoscientific regime of research and innovation."

***Bernadette Bensaude-Vincent**, Université Paris 1 Panthéon-Sorbonne and member of the French Academy of Technology*

Post-Truth Imaginations

This book engages with post-truth as a problem of societal order and for scholarly analysis. It claims that post-truth discourse is more deeply entangled with main Western imaginations of knowledge societies than commonly recognised. Scholarly responses to post-truth have not fully addressed these entanglements, treating them either as something to be morally condemned or as accusations against which scholars have to defend themselves (for having somehow contributed to it). Aiming for wider problematisations, the authors of this book use post-truth to open scholarly and societal assumptions to critical scrutiny. Contributions are both conceptual and empirical, dealing with topics such as: the role of truth in public; deep penetrations of ICTs into main societal institutions; the politics of time in neoliberalism; shifting boundaries between fact – value, politics – science, nature – culture; and the importance of critique for public truth-telling. Case studies range from the politics of nuclear power and election meddling in the UK, over smart technologies and techno-regulation in Europe, to renewables in Australia. The book ends where the Corona story begins: as intensifications of Modernity's complex dynamics, requiring new starting points for critique.

Kjetil Rommetveit is associate professor at the Centre for the Study of the Sciences and Humanities, University of Bergen.

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Introduction

Post-truth – another fork in modernity's path

Kjetil Rommetveit

> "When I use a word", Humpty Dumpty said, in rather a scornful tone, "it means just what I choose it to mean — neither more nor less". "The question is," said Alice, "whether you can make words mean so many different things". "The question is," said Humpty Dumpty, "which is to be master – that's all."
>
> (Lewis Carroll, *Through the Looking Glass*, 1871)

Since the concept of post-truth entered the public scene in 2016, it has proliferated and spread throughout a number of discussion and publication sites. Although the concept had been around for some time, it had mainly circulated in academic and journalistic circles. Quite suddenly it was propelled to fame by main media outlets in their commentary on the UK's Brexit referendum and the US election of Donald Trump. The implication was that the collective capacity for truthfulness and respect for fact had deteriorated, and mechanisms for checks and balances had failed, been corrupted and bypassed. Public institutions and functions had been left open to demagogues, populists and peddlers of fake news and false factual evidence. Since then, post-truth has rapidly spread beyond the western and Anglo-Saxon contexts in which it arose, and is used in Spanish (posverdad), mandarin (*houzhenxiang*, 后真相), German (post-faktisch) and in the English-writing parts of Indian media. Post-truth is a concept deeply invested in media discourse, in media technologies and unfolding information ecologies of the early 21st century. It has become a catchall phrase used to describe whole societies and ways of life, and referenced by Wikipedia as a distinct style of doing politics. It is frequently associated with populism, authoritarianism and even fascism. Yet, the subject around which such associations turn, is *science in public* and *the political role of science and technology*.

Post-truth was defined by the Oxford Dictionary (in 2016) as originating in "circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion or personal belief". This definition can be used to indicate historical and political *shifts* (the "era of post-truth"), but the concept also has strong rhetorical and performative uses:

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post-truth can be used to denigrate an interlocutor's capacity for (or even interest in) veracity and truthfulness, and to pre-empt any claim or argument, by stating that the other's argument is mere opinion, bias, expression of false consciousness, or self-interest. It simultaneously becomes a way for strengthening one's own position: staging it as beyond the fray of populist opinion, and as based in scientific Enlightenment and Reason. *Or*, just as likely, it can be used to turn the table on official truth-telling: situating one's own position as "straight talk", siding with "the people", and opposing expert discourse seen to no longer represent collective opinion and interest. Post-truth rhetoric can be used to align one's message with an in-group (*the People*, cf. Müller 2017), thereby creating an outgroup (*enemies* of *the People*), possibly a foreign enemy aiming to undermine the sovereignty of the in-group (the Nation, the People). It can be used to attack and defend traditional ways of truth-telling, such as scientific and legal evidence, and to mobilise alternative sources such as anti-vaccination movements. As is already clear, post-truth attributions are ultimately deeply normative and they are usually aimed at delegitimising an established form of authority.

Within this performative register, we observe the recurrence, in new forms, of old problems of philosophers and sociologists of knowledge (from Pareto onwards), known as the hermeneutics of suspicion (Ricoeur 1970) and critique of ideology (Mannheim 1936/1972). To demonstrate, in the foreword to the 1936 edition of Mannheim's *Ideology & Utopia*, Luis Wirth wrote:

> It seems to be characteristic of our period that norms and truths which were once believed to be absolute, universal and eternal, or which were accepted with blissful unawareness of their implications, are being questioned. … We are witnessing not only a general distrust of the validity of ideas but of the motives of those who assert them.

Propelled by rapid and intense circulation through digital networks and social media, in these days such critical repositories have gone viral: *who* has a privileged right to knowledge and reality, once it is recognised that any knowledge or piece of evidence is partial, perspectival, and always to some extent shaped and limited by human interest and perspective?

Scholarly responses have arguably adopted one of two strategies: (1) they have involved themselves in epistemic pearl-clutching, rushing to the defence of fact, truth, and rationality, and condemning constructivist, post-modern, attacks on these (see for instance, Shore 2017, McIntyre 2018, Wikforss 2018). Alternatively (2), members of scholarly communities studying science and society interrelations, have ended up in rather defensive positions,[1] feeling the need to defend their stances on the social (and political) roles and uses of knowledge, and of critique of knowledge (see section on Science, Technology and Society (STS) post-truth debate, and Durant, this volume).

For the collective contributing to this book, main motivation came from a feeling that there is more to the phenomenon, considered as a moment in the evolution of knowledge society. Historians, sociologists, and philosophers of science have long-since demonstrated how truth and fact-making depend not merely on correspondence between factual representations and the world, but crucially also on practices, institutions, public displays, and rituals. Stating this does not amount to relativism in a strong sense, but points to the broader meanings and imaginations that provide fact and evidence with meaning, context, and direction (cf. Polanyi 1958). We, the authors, have assumed that post-truth is not merely an outcome of vicious attacks on Reason and Enlightenment, but rather denotes gradual shifts of fairly well-known developments. Specifically, we argue that post-truth emerges as *intensifications* (see Pellizzoni, this volume) of processes, practices, and institutions of modernity, thus shifting their meanings and qualities, possibly reaching discontinuities like tipping points. Modernity's defining cardinal truths *never were* without (self-)contradiction or ambiguity. And, in the midst of the innovation economy, some very old and partially forgotten figures of thought are re-emerging, whereas others fall into the background.

One example is the capacity for critique itself: According to Habermas (1987), critique and suspicion (or scepticism) are legitimate and necessary mechanisms of modern western institutions and societies, as long as they are countered by rational communication embedded in institutions (Skirbekk 2019). From a hermeneutic point of view (Wynne, this volume), such institutions are underpinned and sustained through at least a working minimum of relations of trust, mutual understanding, and shared collective meaning. Ricoeur described the hermeneutics of suspicion as "reduction of the illusions and lies of consciousness…", where "'truth as lying' would be the negative heading under which one might place these (…) exercises of suspicion" (Ricoeur 1970, 32). Post-truth intensifies the hermeneutics of suspicion, and has been described as the proliferation of "bullshit" (Frankfurt 2005, cf. Durant, this volume) where truth no longer matters, even as a remote ideal, and the only goal is persuasion and obfuscation. Yet, as pointed to in all chapters and in this introduction: even if bullshit proliferates, persuasion and obfuscation are intelligible as practices in their own right, and can be turned into the foreground of analysis. Hence we may point to a more constructive role for critique, also implied by Ricoeur, namely for reconstruction of historically emergent asymmetries, and articulation of conditions that could enable communication, mutual understanding, and a common world (cf. Habermas 1982, all contributions to this volume). This comes closer to critique as an emancipatory project seeking to re-establish practices and institutions supportive of collective meaning and action, and limitations (checks and balances) on power. Here, we may also point to a Foucauldian concept of *problematisations* of the present, and Dewey's *problem of the public* as grounded in, and trying to articulate, a collective situation and collective predicament.

Post-truth therefore indicates shifts or intensifications in major public imaginations of science and politics, driving established categories, meanings and practices beyond their established boundaries, creating *new starting points* and a need for re-articulations on the side of analysts. What those intensifications and starting points are, is developed in each contribution to this volume, as described at the end of this Introduction. In preparing this volume, some main themes and their interrelations have been circulated amongst the contributors, based on the works of Wynne (1982/2011) and Pellizzoni (2011, 2015), and a merger of these lines of inquiry in a prior special issue (Pellizzoni 2017, Rommetveit and Wynne 2017). These identified themes, which may work in conjunction or as contradictory forces, are:

Firstly, a *weakening or thinning of public and collective meanings* (cf. Wynne, this volume), situated on the intersections of science, technology, and society and that would give meaning and context also to facts and to science. This is exemplified by recent works on imagination in science, technology, and politics, associated with notions of performativity and imaginaries of public meanings (Felt et al. 2007, Ezrahi 2012, Welsh and Wynne 2013, Jasanoff and Kim 2015).

Secondly, a *blurring of boundaries*, such as those between fact and value, science and politics, Nature and Culture, as intrinsic to most analyses of post-truth, and to economies of knowing and non-knowing. This theme has been elaborated in studies of ignorance as inadvertently (Beck 1992, Wynne 1992, Beck and Wehling 2012, Guimares Pereira and Funtowicz 2015), and as deliberately created (Oreskes and Conway 2010, Gross and McGoey 2015, cf. Nordmann 2020). It is found in studies of neoliberalism and technoscience (Sunder-Rajan 2006, Cooper 2008, Pellizzoni and Ylönen 2011), and in works on the social and cultural implications of cybernetics and digital technologies (Bowker 1993, Hayles 1999, Mirowski 2002, Turner 2006, Kline 2015, Bigo et al. 2019).

Thirdly, and closely related, *shifts in the politics of time*, as the negative value of time (the economic demand for speed, for example, in supply chains) is intensified, specifically, the strong futures-orientation of contemporary technoscience, the role of promise and expectation (Fortun 2008), and their intricate interrelations with a neoliberal economy (Cooper 2008, Pellizzoni and Ylönen 2011, Lave, Mirowski and Randalls 2010, Pellizzoni 2015).

In what follows here, I present one possible interpretation of these themes, focused on intensifying logics and imaginations of risk and technoscience, which is then applied to a genealogy of post-truth. Following this, I provide an account of discussions in philosophy of technoscience and STS, mainly centred on a debate in the journal *Social Studies of Science*. In the last section of this Introduction, I suggest that post-truth be conceived as performative, where the performance of truth extends on and encapsulates all of these (intensifying) dynamics or trends.

From risk to technoscience: whither the "knowledge society"?

Central to the post-truth diagnosis, including academic accounts of it (see section on the STS post-truth debate), is the blurring of categories separating facts from values, opinion and imagination, affect from reason, and science from politics. As argued throughout, such blurring must be understood as intensifications of what could be called quite ordinary and officially sanctioned mechanisms of industrialised knowledge societies. In this section I pursue these dynamics into two ways of projecting natural order and human control: risk and technoscience.

According to Ulrich Beck (1992), the public role ascribed to *risk* denoted increasing (implicit and explicit) recognition in industrialised societies that reliance on science and technology came with negative though unintended consequences, such as nuclear accidents and proliferations of chemicals throughout ecosystems. Efforts to deal with such consequences ran counter to prevailing institutional arrangements, based on separations of Nature from Culture, science from politics, since (ecological) disaster, indeed normal ecology, respects no such boundaries. The dynamics of risk played out beyond the reach of institutional mechanisms (i.e. parliaments), and threatened developments that would run out of control. This led to the inclusion of Early Warnings mechanisms, i.e. risk assessment and risk management (Harremoes et al. 2001) to deal with the risks *before* they could settle in society and in the ecosystems. As opposed to manifest disaster, risk operates on *as-if* assumptions, promoting logics of anticipation and precaution, and assuming future dangers as present calculable reality (Beck 2009). As a technology of (control with) public imaginations (cf. Wynne 1975, Ewald 1991), it fuses within a horizon of calculability, the absent and the present, the remote and the nearby, the real and the possible.

Scholars of STS pointed out the limits of the risk calculus, and how it could only be understood on a continuum invariably also including *uncertainty, complexity, ignorance* and *unknown unknowns* (Wynne 1992, Funtowicz and Ravetz 1993). They argued the need to attend to the irreducible social and natural worlds, the human relations and imaginations, in which material risks were embedded (Wynne, this volume). This seemed to require broader participation and inclusion in decision-making, and inclusions of precaution in the broadest possible terms (Jasanoff 2003). A further quintessentially constructivist STS point was made by Wynne (1992), which when one includes those further dimensions of risk analysis into the attempted risk-quantification, the question of trust is seen to be an *essential* component of questions of risk. Despite these authentic challenges, due to long-established ways of knowing and governing in for example insurance market mechanisms (Ewald 1991), risk as an organisational and managerial tool kept expanding and inserting itself across institutional and life-world boundaries. Big data and IT systems of all kinds

have been regulated in data protection and privacy terms, by importing risk assessment protocols and methods taken directly from material risk domains such as chemical pesticides, agrobiotechnologies, nuclear power, and GM crops. This expansion carried risks of its own, as risk would eventually engulf basic societal and institutional distinctions: "Risk functions like an acid bath in which venerable classical distinctions are dissolved… the 'binary coding' – permitted or forbidden, legal or illegal, right or wrong, us and them – does not exist" (Beck 2009, 187). The category of risk itself started to blur and, in spite of its pretensions towards precision and control, gradually merged with events that *cannot be controlled* (Pellizzoni, this volume). In his later works, Beck recognised how risk dynamics were re-politicised in spite of their technocratic framings, initially through state and private actors becoming more active in the security fields, with implications also for *risks to political* and *human freedom* (Beck 2013, cf. Rommetveit and van Dijk, this volume).

According to Baumann (2012, 51), the promise of control through risk needed to assume "a universe in which the probabilities of events are predetermined, could be scrutinised, made known, and assessed". The gradual realisation that such an environment cannot be assumed (cf. Lakoff 2017), combined with the increasing organisational complexities and costs of containing risk (Wynne 1992), has brought shifting imaginations, strategic priorities, and forms of legitimation. The impacts of today's most prominent global dangers, from climate change and species extinction, to nuclear annihilation, pandemics and terrorist attacks, cannot be meaningfully calculated, predicted, or contained. The dangers are "unnamed before striking, unpredictable, and incalculable" (Baumann (2012, 51), constitute both "known" and "unknown unknowns", that are largely non-intended and inadvertently produced.

Risk can be recast as enabling opportunity for entrepreneurial undertakings, rather than only limitations on action (precaution). Since its original launch in 2013, this view has been vigorously promoted in the EU-focused "Innovation Principle", which is intended as a counter to what is seen as the anti-innovation qualities of one of the EU's central policy and even constitutional pillars, the 2000 Precautionary Principle. Political strategising, agenda-building, and innovation take place against backdrops of increasingly disorderly ecological and political systems, and come inscribed with imaginations of disruptive innovation and creative destruction (Rommetveit and Wynne 2017). This does not entail an abandonment of risk, but a slide in meaning-making towards positive embrace of stochastic forces, indeterminacy, and complexity (Pellizzoni 2011). The underlying imaginations are more easily aligned with subjective (Bayesian) conceptions of risk, merging with promise and private wishfulness. Other modes of legitimation have also come to the fore: from *neutral representation to intervention* (cf. Hacking 1983), from *archetype to prototype* (Nordmann 2017), from *precaution* to *pro-action* (Fuller and Lipinska 2014) and *pre-emption* (Pellizzoni, this

volume). With increasing digitalisation, projections of universality also shift, from a view from nowhere (Nagel 1986) towards a strongly utopian and totalising *view from everywhere* (Bowker 1993, Turner 2006, Morozov 2013, Zuboff 2019, cf. Ballo and Vaage, this volume).

Insofar as the key claim in question is about knowing through big data, sensors in the environment, digital networks, and algorithms, such knowing has to combine seemingly incompatible perspectives and requirements: on the one hand, the strong universalistic pretentions of data and information, applicable anywhere, any time and to any process, from the nano-level to IBMs "smart planet". On the other hand, data science and machine learning seemingly dissolve any objective relation into a probabilistic universe that is also "intentionally artificial and limited" (Mackenzie 2017, 116). As noted before, and partly because of the background exaggerated presumptions of the epistemic power of such knowledge forms, this explicit intellectual delimitation also embodies and engenders inevitably normative political and social exclusions that remain implicit – until identified, and challenged. Such contradiction however is oftentimes not resolved, but pushed indefinitely into the future, and into forms of networked knowing and interacting to achieve those imagined futures. Hence, similar to risk, the future emerges as an object to be produced and controlled, this time through technological means. Technoscientific ways of knowing supervene on previous ways of knowing, also dissolving prior categories of calculation and ordering, into "emerging patterns" of big data and machine learning. These entities that are both "raw and curated, both real and highly artificial" (Cohen 2019, 66), and performatively involved in the (co-)shaping of politics (Bigo et al. 2019). The frame of reference shifts: whereas epistemology and risk is about that which in principle can be known, ontology and ontological politics pursue reality and experience itself: "The thing itself, and the real, is never encountered – it is a virtual, a generative force; it is metaphysical rather than physical" (Lash 2007, 71). Immanuel Kant termed these the *Noumenal* aspects of reality, denoting the *limits* beyond which rational pursuit of knowledge should not proceed. Yet this is what happens in major public agendas such as smart modernisation (Vaage and Ballo, this volume), Internet of Things and Fourth Industrial Revolution (Rommetveit and van Dijk, this volume), where the most powerful technologies in existence today are directed exclusively futurewards. Large-scale engineering merges the abstract and infinitely big, with the intimate and everyday (i.e. sensors on the body, smart phones, and gadgets), and overflowing promises (Durant, this volume) to remake reality across biological, physical, digital, and social boundaries. Such promise projects an underlying, non-dualist view on matter and data as vibrant (cf. Latour 2005, Bennett 2010), vitalist and productive sources of surplus value to be extracted (Pellizzoni 2015, Cohen 2019). As such, participation in value-creation may even appear as an attractive surrogate for actual democratic participation in processes of (digital) innovation.

Technoscience in its public functions is deeply invested in the imagined-possible, and comes to resemble charismatic *political* authority as described by Weber:

> Charismatic authority, represented by the prophet is the purest form of authority in that it claims the right to break through all normative structures … The prophet, so long as he retains his charisma, can destroy old norms and create new ones.
>
> (Spencer 1970, 125)

The high priests of post-truth are the high-tech and hedge-fund billionaires in control of financial and technological capital and vital infrastructure (cf. Rommetveit and van Dijk, this volume). The penultimate expression of this boundary-breaking, visionary form of authority can be seen in widespread pursuits amongst these elites: private wealth generation as a buffer against the vagaries of competitive, winner takes all social-Darwinist environments, dabbling in private enterprise space-travel ventures, and the active pursuit of immortality and life-prolongation to push death and suffering indefinitely into the future (Davies 2018).

This is not to state that science has now become politics, or that the authority of technoscience will expand unabated; indeed, what we are also starting to see, are initial institutional steps of questioning this authority, possibly reinstating new boundaries (Durant, this volume, van Dijk, this volume). Still, it indicates a novel situation, and a further weakening of purification rituals that were earlier central in political legitimation processes (Rommetveit and Wynne 2017, cf. Latour 1993). Corresponding to this weakening, the traditional roles of public institutions in countering and rectifying the disruptive effects of technoscience have also weakened over time and on several fronts at once. It is into these open yet deep spaces of possibility that alt-epistemic actors, themselves in fierce competition with the powers that be, are also forced to take more visibly political stances. Together, they create and perform a much more politicised and agonistic space where science and technology occupy main symbolic and strategic roles, and where the surrounding ecologies and political economies are increasingly projected as disorderly, complex, and largely beyond control. As noted in this section, this implies a reversal of a classical modern belief, namely, the idea that knowledge and truth is generally expanding, and becoming implemented in collective ways of knowing, what Jasanoff has termed civic epistemologies. With a shift towards ontology (towards that which *is* and *can be*), and towards innovation and engineering (that which can be technologically *created*), the routine production of ignorance (Nordmann 2020), which was always intrinsic to modernity (Beck 1992), is not a matter to be covered up, but also an investment resource to be actively mobilised for political purposes. Hence, post-truth denotes a redistribution within economies of knowing and unknowing.

The different courses taken by our knowledge societies may indeed unfold from the ways in which states, corporations, and civil society negotiate these increasingly tight relations between politics and technoscience. These relations are increasingly politically defined, as in the attachment of the post-truth label to different right-populist governments, in countries as diverse as India, the Phillipines, Brazil, Turkey, Poland, the US, and the UK (Bello 2019), and in efforts to counter them. Rather than try to describe all of these, here I shall focus on the settings and situation(s) in which post-truth emerged, that is, the US and the UK.

Post-truth: a brief genealogy

The initial coinage of the term post-truth is, according to Wikipedia, credited to the American playwright Steve Tesich, and his 1992 article "A government of lies" (in the US journal *The Nation*). His reference was to the exhaustion of the American public following the Watergate scandal (and, before that, the Vietnam invasion; and, following it, the Iran-Contras scandal). With the coming of the First Gulf War, Tesich argued, the US public no longer wanted to know the truth about war: *In a very fundamental way, we, as a free people, have freely decided that we want to live in some post-truth world* (Tesich 1992). In 2004, following the Iraq invasion, another journalist at *The Nation* published the book *When Presidents Lie: A History of Official Deception and its Consequences* (Altermann 2005). Although historically oriented, the book's concluding chapter was on the "Post-Truth Presidency of George W. Bush". A specific theme was the strategic use of falsified evidence in building the case for the invasion of Iraq, the main response to the attacks on the US on September 11, 2001. The Iraq invasion was carried out in the face of contrary evidence, and in the face of strong public opposition throughout the western world and beyond. *That* the invasion was based on erroneous and falsified evidence is beyond doubt, as demonstrated by the UK Chilcot commission of inquiry. It is also well-known how this falsified evidence was aggressively pushed by main media outlets, such as *The New York Times*, *The Washington Post*, and *The Guardian*. Still, the post-Iraq period has seen a continuation of "regime change" interventions throughout the Middle East and beyond, carried out in the name of freedom, human rights, and democracy. The Iraq invasion may thus be identified as the moment in which US public distrust in institutions, described by Tesich, were propelled onto the global, or at least the wider western stage.

Political scientist Colin Crouch (2004) identified this moment, at the beginning of the 21st century, as one of "post democracy". It designated a state where democracy had triumphed, and expanded rapidly beyond previously existing boundaries. At the same time, representative democracy and electoral politics were increasingly becoming "empty shells", disconnected from their electorates and publics. Within main systems of representative

democracy, "The People" no longer identified with their governments, nor with the main political parties that had driven the expansion of the welfare state and (for some) social democracy in the post-WWII period. This lack of identification between governing elites and the demos, was recognised in official governance documents (House of Lords 2000, EC 2001), and described by political scientists. According to Peter Mair, the representatives (party politicians) of representative democracy were increasingly staring into the "void", that replaced a well-functioning party – political system (Mair 2013) of the post-WWII order.

It was within this political and democratic void that post-truth was awarded "word of the year" by the Oxford Dictionary, and projected by main media outlets such as *The Washington Post*,[2] *The New York Times*, and *The Guardian*, following the Trump election and the Brexit referendum. The target of the media campaign (which after all appeared as coordinated) was clear. It was directed at certain agents of change, including campaign managers and publics, that enabled the election of Trump, and the Brexit referendum outcome. The usage of post-truth was pejorative and asymmetric, describing how the promoters of domestic regime change gathered support from "deplorables" and ignorants with little respect for science and evidence, and the national and international institutions within which they unfolded. It entailed, seemingly, a stubborn refusal to bow to the prescriptions of mainstream media and political institutions seen as, and seeing themselves as, the gatekeepers of the existing order.

The epistemic pearl-clutching of mainstream media voices denoted the realisation, by those suddenly identified as the "liberal elites" (Frank 2016) that *they* themselves had come under scrutiny, and attack. They suddenly saw their social standing and authority (through academia, politics, intelligence services, and the media), as up-for-grabs and in peril. As stated by Wolfgang Münchau of the *Financial Times* (2018):

> You hear it all the time: we need to defend our liberal, multilateral economic order. If you want to get a roomful of people in places like Davos to keep nodding their heads to exhaustion, this is what you say.

The emergence/y of alt-epistemologies: US style

Donald Trump's campaign aimed directly at this cosmopolitan, liberal political order, which he described as corrupted. He promised to "drain the swamp" of DC politics, and to reinsert the interests of real (predominantly white) Americans, many of whom were located in "Rust Belt" states hit by industrial decline and deteriorating living standards. He blamed, probably correctly, elite politicians (from both parties) for the outsourcing of work through international (Asian) markets and trade deals. He promised to end foreign wars, and to "bring the troops home". He effectively mobilised the in-group of "Real Americans", against the outgroup of Democrat

internationalists, identified as representatives of Wall Street, and against foreigners and immigrants. The strong racist elements were clearly captured by the promise to build a wall along the Mexican border.

It was presumably this direct identification with "We the People" (Müller 2017) that granted Trump the victory. The strategy, crafted by Steve Bannon and his co-ideologues (Green 2017), is quite consistent, whether one looks at Trump's public speeches and rallies, which usually took the form of spectacle and entertainment, or at the mobilisation of psychometric profiling to target swing voters through social media. Cadwalladr (2018) claimed that: "the idea they bought into was to bring big data and social media to an established military methodology – 'information operations' – then turn it on the US electorate". A main funder and facilitator of this operation was Robert Mercer, a hedge-fund billionaire and computer scientist, who set himself up as a spider in the web of connecting finance, politics, and technology (see van Dijk, this volume). Trump took directly to Twitter for communicating with the public (including other heads of state), sidestepping official protocol. His tweets were frequently ill-humoured responses to criticism, and used as evidence of his labile mental state. But the strategy was consistent with Trump's distrust of mainstream media, according to him the real peddlers of "fake news". Online and offline, therefore, the Trump campaign targeted long-established discontents, and the swing states that could tip the balance of the election (even as most polls proclaimed this to be unlikely).

The Clinton campaign, on the other hand, was widely recognised to circulate among the urban cosmopolitan elites, never venturing far beyond their interests and priorities. Their aim was not the swing voters, but to mobilise those already convinced (Allen and Parnes 2017). The campaign never really articulated a strong and clear message (like that of Trump, or of Bernie Sanders), but relied on well-known talking points from within the Democratic Party and focus groups (Allen 2017). This was expressed also in the use of big data: although much less reliant on social media, the Clinton campaign relied heavily on a super-algorithm called Ada. Ada ran 400,000 simulations per day based on polling and voter data collected by the campaign (Wagner 2016). Significantly, "Like much of the political establishment Ada appeared to underestimate the power of rural voters in Rust Belt states" (ibid.), thus reproducing the priorities of the campaign leadership. Jonathan Allen (2017) cites a scene from the campaign. In it, Bill Clinton was urging the campaign manager (Robert Mook) to change the strategy: "Listen, you need to campaign more in the Rust Belt and appeal to the concerns of working class voters," and Mook responds, "The data run counter to your anecdotes" (Allen 2017).

In what ways does this resonate with the distinctions laid out in the previous section?

First, the Clinton campaign remained reliant on the capacity for centralised top-down control as enabled through a well-established party

apparatus, which was already well-connected to main sources of official data generation and harvesting. It had a low presence on Facebook and social media compared with the Trump campaign. The campaign assumed and relied upon a surrounding environment remaining (more or less) stable, with the crucial task being to mobilise the party apparatus, and the voters already convinced. Trump, on the other hand, set out for the improbable task (according to pollsters) of de-stabilising the system, releasing its locked-up powers by tapping into public discontents with "the swamp" and a game that is rigged. These were, after all, well-known, if one only ventured outside of official circles of meaning-making (Frank 2016). Trump mobilised the forces of nationalism and populism, and the digital mercenaries of Cambridge Analytica, operating in legal grey zones created by the digital. The strategy, therefore, was one of *politics through disorder* (cf. Pellizzoni 2011).

The emergence/y of alt-epistemologies: UK style

The penetration of this alt-epistemic stance, and its intensification, can be more clearly observed in the case of Brexit, and specifically the construction of Brexit as a hybrid political and scientific object.

The 2019-elected government of Boris Johnson has been described as a "war cabinet" (cf. Shipman 2016, Davies 2018, Eaglestone 2018) engaged in the campaign to realise Brexit, "do or die", "whatever the circumstances". The cabinet includes many alt-right conservatives, identified with a resurgent radicalism within the conservative party, laid out in the book *Britannia Unchained* (Kwarteng et al. 2012). Johnson and his political advisor Dominic Cummings controlled the cabinet, which they ran like an organised political campaign. This campaign transitioned from the Brexit campaign and vote, into government, got involved in a conflictive and populist battle with Parliament and the High Court, and with an exposed civil service whose culture Cummings overtly despised (Diamond 2019). Johnson uses similar rhetoric to Trump, aimed at obfuscation and confusion. Imagining a situation where Trump negotiates with the EU, Johnson related how: "He'd go in bloody hard…there'd be all sorts of breakdowns, all sorts of chaos…. Everyone would think he'd gone mad. But actually, you might get somewhere" (cited from O'Toole 2019). This style has been paired with a much-remarked-on tendency to bend 'truth' to Johnson's own purposes. Describing the intractable problem of the Irish Border backstop mechanism, Johnson stated how:

> …any statistical estimates I give, whether that's expressed in odds of a million to one, or whatever, they all depend exclusively on the willingness of our friends and partners to compromise on that crucial point, and get rid of the backstop.
>
> (Ibid.)

Here, a no-deal Brexit was seen as almost impossible, thus evading responsibility and accountability, but that depended on the EU counterparty to do *as Johnson said*.

This highly subjective use of data seemingly issued as random "bullshit" (Frankfurt 2005). It was however coupled with the backstage-work by Cummings to tighten control over the UK state apparatus. Cummings became known as the leader of the Vote Leave campaign,[3] and was the main author of the strategy to steer towards a no-deal Brexit "whatever the circumstances". Johnson's frontstage work of politics through disorder can be correlated with Cummings' long-standing intellectual orientations. In his prior function as advisor at the education department (to Michael Gove), he wrote a treatise on education and political priorities. Its opening paragraph reads:

> Although we understand some systems well enough to make precise or statistical predictions, most interesting systems — whether physical, mental, cultural, or virtual — are complex, nonlinear, and have properties that emerge from feedback between many interactions. Exhaustive searches of all possibilities are impossible. Unfathomable and unintended consequences dominate. Problems cascade. Complex systems are hard to understand, predict and control.
>
> (Cummings 2013)

This style of thinking was compatible with the tactics of the Vote Leave campaign, and closely resembles the Trump strategy: the "interesting systems" would be the *swing voters* whose votes would tip the overall balance of the system in the direction of de-stabilisation, opening up new pathways for techno-political entrepreneurs. One way in which this was carried out was profiling and targeting of individualised messages through Facebook, distribution of made-up news stories through the newsfeed (van Dijk, this volume), including strongly xenophobic messages. This operation was only possible due to close collaborations with data analytics companies Cambridge Analytica and AggregateIQ, whose profiling and micro targeting algorithms were running on top of the normal Facebook applications, such as the "likes" function. This possibility had been foreshadowed in Cummings' 2013 treatise, then *as a warning* against the possibility to "manipulate the feelings and ideas of many people". Yet, he himself exploited exactly this option.

Cummings had broader ambitions than Brexit, concerned with the making of a radically hybridised techno-political object, and even the *re-making of politics itself. Britannia Unchained* is set against the backdrop of a dysfunctional educational, bureaucratic, and political system not fit for the challenges of the 21st century (Cummings 2013, 2019). It includes a long-standing strategy to transform or supplant the UK civil service, which Cummings portrayed as rotten and outdated (Cummings 2019). Brexit was not really the goal, but the means (and opportunity) to realise the vision of a radically reformed political system.

According to Cummings, markets, science, and technology have evolved capacities to incorporate institutional mechanisms for "error-correction and predictive accuracy" (2019), and are much better suited to deal with complex systems, feedbacks, and cascading consequences. Brexit emerged as the opportunity of the century to disrupt, "hack" and reboot the hard-drive of the political and administrative systems (cf. Cummings 2020). To "*take back control*" became a much more ambitious project than merely exiting the EU. Cummings envisioned forms of high-performance government that were much more capable of drawing upon and utilising "cognitive technologies", "dynamic tools to understand complex systems" "superforecasting" and "seeing rooms" for decision makers (Cummings 2019). Seeing rooms are operational centres designed to support decisions in complex environments through real-time big data and visualised means. Such rooms would make it "as easy to insert facts, data, and models in political discussion as it is to insert emoji" (ibid.). There was also due homage to the high priests of technoscience, as when Cummings envisaged to "phone up Jeff Bezos and partner with him on creating a base on the moon, which will in turn enable us to industrialise space" (White 2018). Such statements triggered concerns that "No. 10 be turned into a NASA control centre" (Spicer 2019), and the perception that the civil service had come under a mortal attack (Diamond 2019).

Although these may be idiosyncratic products of Cummings' imagination (Cummings 2020), their contents are familiar to students of STS. Literally connecting the dots here is a kind of cybernetic-political vision, reminiscent of prior experiments (i.e. Stafford Beer in Chile in the 1970s), and incorporating the "Californian ideology" of neoliberal technoscience (Barbrook and Cameron 1996, Turner 2006). It corresponds to the previously described shift in public meaning-making: from in principle controllable and calculable risk to the active strategic embrace of (very particular, self-serving interpretations of) uncertainty, complexity, and disorder, for many years noted by observers of biotechnology and environmental science (Sunder-Rajan 2006, Cooper 2008, Pellizzoni 2011, 2015). More than anything, the Johnson-Cummings war cabinet embodied politics as spectacle and performance, actively obfuscating the untransparent power relations thereby enabled. The War cabinet mobilised "the will of the people", yet actually enabled more centralised, more elite politics centred on technology and finance. Following Covid-19, this war cabinet is increasingly colliding with main public institutions, media, and parts of the public, as well as some more independent individuals or sectors of science, seen as *obstacles* standing in their way (Coppola 2020, cf. Rommetveit and Wynne 2017).

The STS post-truth debate: building defences against the merchants of ignorance?

An STS post-truth debate started by claims from philosopher and social epistemologist Steve Fuller (2016), about close connections between

post-truth and the methodological scepticism of STS towards scientific truth claims. This is known as the "principle of symmetry" according to which *for the purposes of explanation of what comes to be given the status of truth,* "untrue" claims are to be granted equal status as "true" ones (cf. Bloor 1976). The point of this methodological stance was that the (eventually designated) truth or untruth of any scientific knowledge-claim cannot be explained by reference to its eventual standing as true or untrue. In Fuller's view, post-truth would count as independent corroboration (Fuller 2018, 59) of strong STS commitments. This claim triggered heated responses, the first of which came from the editor of the journal *Social Studies of Science*, Sergio Sismondo (2017a), followed by reactions from Collins, Evans, and Weinel (2017), Jasanoff and Simmet (2017), and Lynch (2017). It was wrapped up by a final response from Sismondo (2017b). Whereas the debate certainly has continued well beyond the SSS discussion, it provided occasion for some fairly well-established positions to be played out in a new setting.

Sismondo and Lynch went to quite some lengths to distance STS from the post-truth debacle: there are marked differences between the kinds of debates (over conspiracies, etc.) played out in the media, and the elaborate methodological case studies displaying and analysing scientists at work. And, as highlighted by Lynch, whether one thinks that (a) principle(s) of symmetry is still relevant in contemporary STS research, it was intended and practised as a *methodological* stance, not as a philosophical or ontological one.[4] And, to some extent addressing the problem of ideology and reflexivity: the kinds of orders analysed by STS researchers point to the "construction of more-or-less stable socio-technical orders" (Sismondo 2017b, 589). This recounts the pragmatist criterion of truth as "working knowledge" (Baird 2004), and has also been mobilised in a post-truth context by philosopher of technoscience Alfred Nordmann (2020). Scientific practices and ways of knowing, once stabilised, are not easily susceptible to total relativisation where "anything goes".[5]

Such views of ideology had already been criticised by Karl Mannheim (1972/1936) as "totalising", and the argument was repeated by Collins et al. (2017, 581). According to them, this simplistic application of the principle of symmetry contributes to a totalising hermeneutics of suspicion. Collins et al. did not primarily associate this with the political economy of knowledge, but with choices made within the nascent field of STS in the 1970s. STS "cracked the pure crystal of science and showed that the social and political could have an impact anywhere" (581), and this, the authors claimed, led more or less directly to science wars and post-truth.

In this way, Collins and colleagues joined Fuller in arguing the responsibility of STS researchers for post-truth. Yet, their prescriptions were the opposite from Fuller's: the problem was not one of further opening Pandora's Box, but of how to close it. Collins and Evans (2002) had previously argued that STS arguments towards democratisation of expertise were going too

far, potentially dismantling the boundaries between science and politics. According to them, a "Third Wave" of science studies devoted to the study of expertise would have addressed this problem, but the STS community had not heeded their advice. As such, STS was at least partially to blame.

A more expansive view of the problem came from Jasanoff and Simmet (2017), where political and institutional dimensions were foregrounded. They recognised that post-truth is a problem for STS: "Certainly STS has work to do to explain why the Enlightenment project has taken a hit in recent years" (Jasanoff and Simmet 2017, 752). They laid out some main ways in which facts and norms are known to be related in action, and provided a historical diagnosis, mainly based on Jasanoff's prior analyses of the many and often obscured US science policy interfaces. In the case of *regulatory agencies*, this reflected the inability to deal with scientific uncertainty and contingency: they had reverted to a framing of risk as an exclusively scientific matter, thus falling back on an age-old strategy to purify facts to secure their legitimacy (Latour 1993). The result was that the option of dealing with controversial issues (relating to health, environment, etc.) as complex societal matters in need of careful negotiation and compromise, had foundered. Parallel developments were described in *the US courts*, where controversial issues had driven judges towards similar strategies of scientism and purification. Such de-politicisation through scientific risk management had opened up a politicised space that could be easily taken over by right-wing forces.

According to Sismondo (2017b), these responses demonstrated how STS positions could be defended against the arguments of Collins et al. and Fuller: across sites from research practices to regulatory institutions, STS research would point to "stable socio-technical orders", and these had weak or no relations at all with the cases under discussion in the post-truth debate. Sismondo could not therefore "…see much in common between any of these claims about the post-truth era and the kind of work I routinely see in STS" (588).

Steve Fuller (2018) was not content with the STS responses, which he described as "passive-aggressive agonizing" (p. 62). To see why, we must also consider Fuller's own account of post-truth. "Knowledge as a power game" is, according to him, played out mainly at a meta-level. It denotes a state of affairs in which the distinctions between meta-level rules and ordinary (scientific, political, everyday) norms of conduct have broken down. Drawing on concepts from analytical philosophy, he described how "Second-order thought is the default state of mind of someone in the post-truth condition" (p. 191). This comes quite close to a point that has already been introduced: it is not so much knowledge that is at stake as the capacity to *criticise* knowledge and the framing assumptions of one's interlocutor, paving the way for "alternative facts" to be introduced as such. The fundamental division for Fuller, therefore, goes between those who would protect established regimes of truth-telling ("Lions", following Pareto), and those who would upset them ("Foxes"), through constant questioning.

It is the mainstreaming of this state of mind that marks the post-truth era, says Fuller: an overflowing of the boundaries of official knowledge production, including STS's "stable socio-technical orders". This is done, not by anti-science, but by anti-establishment science, which is different. Fuller names this "protscience" (after the protestant reformation), the followers of which "share a desire to integrate science more directly into their own lives" (190). To Fuller, post-truth is marked by decisive risks and dangers, but these are, overall, worth taking: "…the post-truth condition marks a triumph of democracy over elitism, albeit one that potentially tilts the balance towards 'chaos' over 'order'" (Fuller 2018, 181). A good post-truther is not risk-averse but endorses risk and danger, and the greater goods thereby to be achieved. Fuller has previously promoted this as the "proactionary principle" (Fuller and Lipinska 2014), which resembles his (2018) concept of "Precipitatory governance", seeing "any major catastrophe as offering just such an opportunity for those who survive it". Risk-taking is thus for the greater good, and is closely aligned with the entrepreneurial ethos and "revolutionary science" as promoted by Popper (ibid., 189), seeing society as a laboratory.

Post-truth imaginations: new starting points?

We now see that it is not the case that "critique has run out of steam" (Latour 2004b), but rather that it has been re-directed, turned up several notches and widely dispersed. Critique, qua hermeneutics of suspicion, is performative (cf. Hilgartner 2000) and performance-like: it operates through, and targets, public affect and imagination. It may use fact and evidence, but this is not its primary target. Post-truth protagonists engage not merely with facts and pseudo-facts, but with the entire *conditions* for using science in public, redirecting them towards new ends and meanings. In this (limited though powerful) sense, critique has gone mainstream, informing and co-shaping powerful media stories, innovation agendas, political campaigns, and institutions. Reflected in post-truth performance, even if articulated in less than satisfactory ways (i.e. "Make America Great Again", "Take back control") is an underlying problematic situation, and problematisation. This goes beyond mere lying and points to a crisis of collective capacity to make sense and to work out collective problems. What seems to be needed, therefore, is a critique of critique, where strategic uses and configurations of ignorance and non-knowing are placed more firmly centre stage, not as simply opposed to the regular production of knowledge but as intrinsic to it (see Wynne, this volume). How could such a task be approached?

Firstly, we cannot simply presume the binaries between true and false, fact and fiction, science and values, to defend one and condemn the other: this position gives rise to epistemic pearl-clutching and is rejected by most participants in the debate as here described. Further, the STS and

associated philosophical debates were introduced (especially by Fuller) in terms of a (radicalised) principle of symmetry going mainstream, and for which (Fuller argued) STS should take responsibility. The STS response rejected this responsibility, arguing that it was not to blame for post-truth. An alternative position was articulated, similar to the pragmatist criterion of *working* knowledge, and stabilisation of socio-technical assemblages.

Yet, this strategy stopped short of explaining the ways in which knowledge production and uses of knowledge in public have themselves shifted. The possibility that academic analysts are somehow implicated in the same problem horizon and situation as post-truthers escaped discussion. In all descriptions in this volume, we use the lens of post-truth to observe how basic coordinates and sign-posts of science in public have shifted. Whereas this may happen in a number of ways, this introduction highlights the ways in which unknowns and uncertainties themselves have become investment resources: not merely to be managed and fended off, but actively and strategically manipulated and produced, in ways that are themselves obfuscated.[6] In the below table, I illustrate this dynamic, and the demands placed on critique, focusing on the concepts of certainty–risk–uncertainty and ignorance, which were central to this text, according to truth and post-truth regimes. Each entails a division of epistemic labour along shifting sign-posts, from certainty towards ignorance. Along with this shift, the place for critique has been displaced (Figure 0.1):

One should acknowledge Fuller's contribution in helping to make this distinction clear: two different epistemic regimes, truth and post-truth, were designated by him as main positions within the post-truth knowledge–power game. If critique and hermeneutics of suspicion have gone mainstream, and insofar as some principle of symmetry (since there are different versions at play) is one to be observed and used, one may agree with Fuller about its expansion and radicalisation. Yet, we now read it not simply as a flip of the coin in which the Foxes outfox the Lions; "critique of critique" entails neither celebration (*pace* Fuller), nor rejection, of those starting points that have fallen into disrepute. Rather, we revert to problematisations of various kinds, seeing them as arising within a certain historical and (geo-)political *situation*, and as processes of *intensification* at work, through which different constellations of knowledge and power play out. In this volume, we especially highlight three dimensions of intensification:

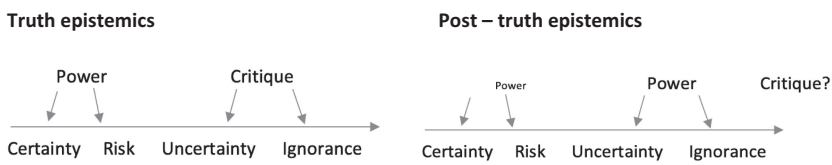

Figure 0.1 Relations of power and critique in truth and post-truth regimes.

further weakening of collective meanings, blurring of boundaries, and the politics of time. But there certainly are other ways of articulating the underlying intuition.

The question about symmetry,[7] says Lynch (2017) is mainly about a *methodological* trick, and not an ontological or epistemic one. Yet, a method rarely if ever comes without assumptions, and can be hard to disentangle from normative and epistemic commitments, even if the originator of the symmetry principle as explicitly and exclusively methodological, David Bloor, has always been clear about this (Briatte 2007). According to Söderberg (this volume) and Pellizzoni (this volume) a "method" of symmetry is easily associated with analytical operations where Nature is mutually constituted with Culture, semiotics with materiality, Science with Politics, Object with Subject, and so on. Such categories are also at work to explain the ways in which practices and socio-material assemblages stabilise (or not). And, they show their critical force, and intent, in the ways in which they are relied upon to demonstrate and argue that "things could be otherwise" (Sismondo 2017a). This then, points to a more expansive, perhaps more implicit, use of "symmetry" on the analysts' side. Here, symmetry slides towards becoming ontology or social epistemology, extrapolated onto the world as explanation, *and* relied upon as critical corrective to powerful imaginations.

Such strategies may not be all that different from the practices they aim to critique, and may even have been appropriated by them: Innovators routinely talking about co-production as simultaneous with co-creation; materiality and ontology becoming investment resources for neoliberal entrepreneurs; complexity and uncertainty as sources for political authority, or for manipulating attributions of responsibility for unpredicted harms, etc. The risk is of increasing conflation between (powerful) actors' categories and analysts' categories, a shared problem horizon or problematisation, and possible lack of critical capacity. This was displayed in the SSS discussion, and its lack of appetite to engage with Fuller's challenge.

Following this, "symmetry" as a methodological trick of the trade may be abandoned, *or* extended towards new starting points, and a critique of critique. This would entail neither celebration nor rejection of post-truth: As argued in several of the contributions, Fuller's position may end up as reactionary. The question then is not merely how to bracket out truth and knowledge while necessarily expressing (as a question, about whether original conditions apply in new circumstances of use) its always-conditional basis of validity; but also how to *identify*, *analyse*, and *critique* the production of ignorance and non-knowing, as parasitic on, possibly breaking free from, major existing regimes of truth. The relations described are, more often than not, highly asymmetrical, and can be described and critiqued as such, as arising within political economies of knowing and non-knowing, and referenced in some situation. As can be seen in several of the contributions, these are just as likely to start with politics and political institutions,

mobilising science and technology, as the other way around. Most contributions can be read as comments on Shapin and Schaeffer's (1985) claim, that *Hobbes was right* about the political: it must ultimately be imposed by sovereign force.[8] Yet, sovereignty itself is at stake, and its nature and mechanisms are shifting.

Insofar as non-knowing and ignorance are actively manipulated and mobilised (and Wynne for one (1992) has emphasised the importance in addition, of non-manipulatively, inadvertent, unknowing production, including collective forgetting, of scientific ignorance) including for political ends, one could apply a principle of symmetry to bracket out the effects of those manipulations as well, to open up towards their underlying dynamics, ways of knowing and power relations. Here, "symmetry", as a normative analytical principle, would also include the bracketing out of *rhetoric force* and frontstage work, to access and observe backstage relations, institutions, and practices. The operation of bracketing out is not on propositional knowledge only then, nor on the materiality of technology, but shifts towards *performance* and *performativity*, towards affect and imagination as collective battle-fields (Davies 2018), and towards political economy of knowing and non-knowing. This extends on the sociology of ignorance (Beck and Wehling 2012, Gross and McGoey 2015) or agnotology (Oreskes and Conway 2010, Söderberg, this volume); but (again) denotes processes of *intensification* from limited settings, to mainstream political arenas, often also incorporating digital technologies in major ways. Whatever the reader takes away from this volume, and in spite of the great heterogeneity of contributions, the chapters can be engaged with as grappling with this "expanded symmetry" approach, its exploration, articulation, and possible critical force.

Returning then to our theme of intensification, we may ask what kinds of functions, logics, or dynamics are revealed by such performativity? I do not pretend to offer a comprehensive answer here, and recognise that the volume could have been differently conceived and composed. We demonstrate that substantial resources from STS, social science, and philosophy of technoscience *can* be mobilised, yet cannot provide here an adequate account of the required new starting points. We articulate the need for them, and we make some exploratory suggestions, predominantly in terms of intensifications, tipping points, or "phase changes" in political, institutional, and cultural arrangements.

I have divided the book into two main sections, Foundations and Inquiries. Foundations deal with the origins of the debate, as social and historical phenomenon, and as part of academic and public development and discussion. Chapters placed in Descriptions do the same, but may be just as concerned with how to use post-truth as an analytical and empirical tool for opening up a field to discussion. Yet, all chapters contain some empirical analysis, and all make diagnostic efforts, so foundations and descriptions must be seen as related, as part of the same problematic and situation.

Foundations

In Chapter 1, *Brian Wynne* tells the story of his engagements with The Windscale Public Inquiry (WPI). WPI was set up against its will by the British government, to publicly work out issues relating to the mushrooming controversial THORP plant, a proposed spent nuclear fuels reprocessing plant for military and civil nuclear energy materials. Focusing on the inquiry as a ritual aimed to produce political truth, or "collectively authorised authority" through contested scientific expertise and legal discipline, Wynne argues that post-truth is not really novel, and that lying and untruth were always part of even the most rational institution or process. He shows how various elements of an environmental and scientific case against THORP and its intended succeeding developments were reframed and interpreted by the judicial rationality of the High Court Judge Inquiry Chair, into a Report and Recommendations that not only declared in favour of THORP, but promulgated the myth that an intensely controversial development threatening social disorder was decided by scientific–legal discovery, and not by political choice. While this authoritatively declared public narrative was full of falsehoods and self-contradictions, and in this sense a large-scale untruth, Wynne points out that *the falsehood worked*, in the key sense that it gave the authoritative view that, as a supposed expert discovery, implicitly from nature, human beings had no choice but to absorb and adapt to it. Wynne draws upon Ezrahi's (2012) historical idea of necessary (public) fictions as essential instruments of democratic political order, and poses the question: if such public fictions have been essential indefinitely, as with the particular example he both studied, acted in, and published on, then where was the pre–post-truth era, which a supposed post-truth era necessarily implies?

Yet, this is not to say that nothing has changed as, says Wynne, the evident contradictions between official narrative of objectively discovered deterministic decision – truth and the messy informal and backstage realities of reframing, were never exposed. In those days he suggests, unlike nowadays, there were buffering effects of important societal meanings and institutions, including legal–judicial impartiality, that have effectively silenced those contradictions. Yet, these functions have since become weakened, to the extent of no longer providing effective societal buffering between conflictive (including violent) groups, values, and interests, and their driving narratives. Wynne's notion of truth can be placed in a hermeneutic and interpretative (Sociology of Scientific Knowledge, SSK, and social science) tradition, focused on social meanings and relations rather than truth–falsity binaries. The history of such truth, and its public function, can be traced right back to the early days of modernity and a "Modern Framework", which is what renders this piece a search for foundations. Adding to this, Wynne's focus on nuclear technology provides another foundational entry-point: nuclear was *the* emblematic public technology of the post-war era, and second half

of the 20th century. Wynne points to how technosciences, from nuclear to ICTs, and risk as a modern scientised political culture, have moved further into the core of collective meaning-making. In this way, culturally and politically mediated institutions could even be seen to be collapsing into an all-encompassing naturalism fuelled by technoscientific innovation.

In Chapter 2, *Luigi Pellizzoni* describes post-truth as connected to deep changes occurring and intensifying in the political economy since the 1970s, most of which are related to the (pre-)dominance of neoliberalism and technoscience. Drawing on a Foucauldian concept of problematisation, he argues that both neoliberalism and technoscience intervene on basic levels of perceiving and projecting nature and reality. This reality has become increasingly constructivist and manipulative. Compared with other forms of truth-telling, or truth-production, post-truth denotes the intensification of such manipulation with reality at basic ontological levels, thriving on a logic of pre-emption or *pre-emptive truth*. The aim of such truth is not enlightenment, but is increasingly involved in a story of regeneration, as in re-surgent nationalist rhetoric of a mythical past. In this sense, Pellizzoni's account is different to, but also resonates with that of Wynne, as both point to the deep entanglements of myth, truth, and technoscience, especially when deployed for political purposes. In this vein, baldly put, Truth is what works. In a further resonance between these chapters, Wynne's anthropological sense of public "realist" discourse as putatively functional ordering and order-stabilising/repairing myth, is an ultimately constructivist interpretation that implies manipulation, though not exclusively deliberate on the part of any social agent(s), but also historical-cultural. In Pellizoni's view, the STS discussion of post-truth failed properly to grasp these interconnections, as they themselves were too strongly invested in the "new materialism" and an "ontological turn", shared across large segments of the social sciences and STS. The pre-occupation with notions of "symmetry" and its offsprings (such as co-production and assemblage theory) does nothing to counter these effects, and shares in the same problematisation, through the strong – and laudable – intention to overcome dualisms (between Nature and Culture, Subject and Object, etc.). Whereas we cannot go back to old dualisms, Pellizzoni argues the need to establish new starting points, in the social sciences and governing institutions alike, that could be used for renewed critique.

Chapter 3 is written by *Johan Söderberg* and recaptures some of the original sense of the word radical, as going to the foundations (possibly cutting them down). In this case, these are the founding assumptions of the field of science and technology studies (STS) in the 1970s. Some of these assumptions were built into a concept of symmetry that, says Söderberg, has become second nature to the field. These assumptions have now come into question by post-truth, rendering this "STS' moment of post-truth". Söderberg argues that the price of establishing the field was to let go of its roots in Marxist theory, and that a prior notion of critique of ideology was replaced by notions such as "symmetry" and "reflexivity" (especially in the sub-field

of Actor-Network-Theory (ANT) to lesser extents in the Sociology of Scientific Knowledge (SSK)).The claim is that post-truth demonstrates how the table has been turned on truth-telling, with science no longer occupying a hegemonic space, and even relegated to the position of the underdog. Hiding behind STS's critique of scientism and positivism is an unresolved relation to the critique of ideology. According to Söderberg, post-truth has created fear that critique of ideology will slip back in. Söderberg's chapter outlines two STS (and philosophy of technoscience) strategies for dealing with post-truth, and for fending off the claim that it is somehow to blame: first, the argument that post-truth is not really new, and is rather an outcome of the technification of the sciences, labelled "technoscience". Second, there is the argument, grounded in a constructivist criterion of demarcation, to distance the STS scholars' object of study from those of the post-truth debate. Finding both alternatives wanting, Söderberg introduces a third line of investigation, ignorance studies, in which asymmetric relations and knowledge forms are not denied, but critically articulated and contested. On this account, ignorance studies and a re-loaded critique of ideology, pose valuable alternatives and starting points for critique.

Inquiries

Darrin Durant's Chapter 4 is a reflection on, and critique of, important cultural and academic sources that inform thinking about post-truth. Durant sees post-truth not merely as a passing phenomenon, but as an ongoing intensification of long-term trends for which many sectors of society share responsibility. The contribution takes as its starting point the differences between the works of Huxley and Orwell, and argues that there is a propensity amongst post-truth academic and more cultural–political commentary to presuppose an Orwellian reading of externally imposed control, rather than an overflow of information, entertainment, and sensuality (Huxley). This reading is pursued through various tracks, demonstrating the Orwellian influences on STS scholarship, post-truth academic literature more broadly, and climate and energy policies in Australia. If the Orwellian reading is presupposed, the quite common strategy of opening up issues to make them public, and demonstrating how "it could be otherwise", can be criticised for feeding into, and in that sense contributing to, the post-truth condition. If a Huxleyan reading is pursued, then the question will not be how to counter Big Brother, but rather how to provide closure for controversial matters under conditions of constant overflows of information and "gaslighting". Invoking controversies from the Third Wave debate in STS, Durant argues that STS accounts of post-truth need to, firstly, recognise the value of aspiring to achieve truth, or truthfulness, for public and political life; and second, that there is a need to pay attention to those parts of democratic theory that could help us localise and articulate institutional sites, or starting points, for democratic closure (and not just opening up). One could also see a potential connection here with Wynne's analysis – albeit a critical

one – insofar as both ask about *what counts* as democratically legitimate "closure" in a world of political and value conflicts and where science is supposedly a resource for all.

In Chapter 5, *Ingrid Foss Ballo* and *Nora S. Vaage* analyse the interrelations between post-truth, public reasoning, and smart technologies and projects. They argue that we are presently passing through a "time of interregnum" (Gramsci), in which the traditional role of science in disciplining and guiding public reasoning has to large extents been taken over by technoscientific imaginaries aiming to generate futures seen as desirable by powerful actors. Yet, these futures imaginaries are not shared by everyone, in spite of their in-built propensity to speak to different worlds and different actors involved in innovation. In this sense, smart technologies and the futures imagined through them, can be said to intensify and prosper from an underlying post-truth condition of weak or lacking shared understandings. This argument is pursued through three analytical empirical sections, dealing with the making of futures, the modular characteristics of smart visions and technologies, and implications for broader public engagements. Whereas the main dynamic may be towards the closing down of collective futures, Ballo and Vaage also identify opportunities for opening up towards other forms of engagement. In this way, major interpretative concepts from social science, STS and philosophy, turning on the imaginary, are deployed to critique the post-truth – producing characteristics of normal, taken-for-granted innovation and development. The chapter thus comes close to the notion of truth and progress as social and public meaning, and the close entanglements, as described by Wynne in Chapter 1, of such "truth" with political authority.

In Chapter 6, *Niels van Dijk* reverts to an old descriptive trope of classical ANT, of "unscrewing the Leviathan". Whereas ANT gets a rough beating in some of the other chapters, it is actually hard to see how practices such as the digital manipulation of elections could be described without using the networking metaphor, indicating its continued usefulness. In this chapter, van Dijk takes up an unmet challenge from the STS post-truth debate, of "describing the infrastructures of post-truth". He expands on a notion of symmetry, in similar ways to this Introduction, shifting the focus from the production of knowledge, and from human–non-human relations, onto the production of ignorance and disinformation. The empirical sections deal with efforts of societal actors themselves, to unscrew the Leviathan of the existing political order, and especially the case of Cambridge Analytica, active in both the Trump election and in Brexit. Van Dijk relies on a variety of sources, revealed through controversy, all of which represent specific ways of opening up disinformation activities to closer inspection. These are, firstly, the works by digital journalists to track disinformation networks, second, regulatory efforts to pry open the workings of infrastructures of post-truth using the force and apparatus of (privacy, anti-trust, media) law and politics (in this case, mainly the UK Parliament). The chapter more than indicates the continued relevance of ANT, and demonstrates some

ways in which it could be re-imagined to tackle the techno-political quagmires of post-truth information wars. As a slight contrast to Latour's initial (1993) argument, (but agreeing with Humpty Dumpty!) in this chapter, the conclusion seems to be that, given post-truth conditions, Hobbes may have been right after all.

Chapter 7 is written by *Kjetil Rommetveit* and *Niels van Dijk*, and can be read as a continuation along similar lines as Chapter 6, but focusing more on legal-regulatory hybrids. Rommetveit and van Dijk make two interrelated claims: first, they pursue the claim (from all the chapters) that post-truth is not a mere surface phenomenon, but rather grounded in the general production of knowledge (and ignorance). Second, they connect post-truth conditions to the "hyper-truth" status of digital innovation agendas, and governance of digital technologies. The significant issue at stake is one much commented on in general STS (and related) scholarship, namely the intentional blurring and merger of boundaries (hybridisation) in technoscientific and digital innovation. The chapter makes a twist on this analytical approach, by pointing to two cases wherein such hybridisation becomes problematic: the design of privacy (a fundamental right) into ICT technologies, and a debate over personhood for robots. Both are "post-truth" insofar as they intentionally blur the normative with the factual and technological. Hence hybridisation itself has become part of mainstream legitimation, and therefore cannot be relied upon by scholars as a critical corrective to idealised and simplified accounts based on science or law. Stated differently: there is little sense in relying on non-human actors as critical corrective to "subject-based philosophies" when powerful industrial interests are planning to bestow rights on machines. And, a related notion of boundary work becomes equally inadequate, when legal rights become matters of engineering into insipient technological systems. The authors argue that digital technologies bring a shifting legitimatory strategies, and that, therefore, a concept of "boundary fusion", according to which sources of authority are merged together, is a pertinent extension on the idea of "boundary work", according to which authority is made by separation of sources, such as science and law.

This volume has been a long time in the making, and has been delayed by the Covid-19 pandemic. It has been followed by anti-racist manifestations, culture-wars, allegations of 'wokenness', the Covid-19 pandemic, anti-vaccine movements and conspiracy theories, on the political left and right, in the western world and beyond. A chapter on xenophobia and racist discourse was planned to be included in the book (but did not make it in the end due to Covid-19). And, references are made to the main event within this contemporary tumultuous public landscape, Covid-19, in various chapters. For all of these themes, however, we would claim that they should not be seen as distinct events. Rather, they constitute well-known traits of knowledge, society, and modernity, whose dynamics have intensified. In this sense, the book ends where the Covid-19 story begins.

Notes

1 The "Science Wars" were fought (in the 1980s) over the authority of science and constructivism. Practitioners of Actor Network Theory have spent considerable energy in distancing themselves from "Merchants of doubt" arguments and actors (cf. Oreskes and Conway 2010) in the area of climate science (see Latour 2004a, 2013), and from the kind of simplistic constructivism enacted and implemented by policy makers (cf. Law 2010).
2 Whose motto changed to 'Democracy Dies in Darkness' around the same time.
3 Cummings role was portrayed in the BBC drama *Brexit: the uncivil war*. The interrelations with Cambridge Analytica and AggeregateIQ are described in the documentary *The Great Hack*.
4 This is not obvious in the case of Latour and ANT who expanded it to human–non-human relations, hence ontology and ontological politics (Pellizzoni 2015).
5 As David Bloor, originator of this symmetry principle as part of his "Strong Programme in the Sociology of Scientific Knowledge (SSK)" was fond of pointing out, established scientific knowledge is an institution – and institutions are normally very solid, adaptable to many external forces, and extremely challenging to dismantle.
6 In Foucauldian terms, we may question whether it is sufficient to regard power and knowledge as intrinsically interwoven (as in the formula power = knowledge), see Pellizzoni, this volume, and Söderberg, this volume.
7 Philosophers are well accustomed to such tricks, as in Husserl's *Epoché*, Descartes' methodical doubt or Rawls' Veil of Ignorance. *Any* critique so understood needs some 'trick' to put powerful assumptions aside, for inquiry to get started.
8 Although Bruno Latour initially opposed this proposal, he later endorsed it as a characterisation of politics. And, as seen in the introductory quote: so did Humpty Dumpty.

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Part 1
Foundations

1 Truth as what kind of functional myth for modern politics? A historical case study

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> It is here that philosophy is seen in actual fact to be placed in a precarious position, which is supposed to be firm although neither in heaven nor on earth is there anything from which it depends or on which it is based. It is here that she has to show her purity as the authoress of her own laws – not as the mouthpiece of laws whispered to her by some implanted sense or by who knows what tutelary nature…
>
> (Immanuel Kant, Groundwork of the Metaphysic of Morals, 1785)[1]

Introduction

The Introduction to this volume has explained the various ways in which "post-Truth" has emerged in both academic and popular cultures, as a mainstream idiom to describe the destabilisations of democratic politics (and its supporting knowledge order), since around 2016. It has also identified the main currents of social and political theory, and of historical, sociological and philosophical research into scientific knowledge which help illuminate these unforeseen and unsettling contemporary developments.

Post-Truth language is unacceptable for many reasons, but a central one is its entirely false presumption – that the current era was preceded by an established era of "Truth" that guaranteed an acceptably civilised democratic social order, one now under threat – or liberation – because that presumed universal authority of "Truth" has been broken. Justified argument against the false claim for post-Truth as history only risks inadvertently reinforcing the whole misbegotten frame of meaning within which it sits. This is an inevitable implication of the "post-…" prefix. This bowdlerises the supposed history of how modern human social orders maintain their apparent orderliness (Burrow, 2020), and drastically limits what is imaginable as mutually respectful collective human knowledge-orders.

The separate factors that have brought about this syndrome may be worth proper study; but this chapter is more modestly tangential. I take a different starting point, digging beneath the claims, counter-claims, and accusations, to begin to explore the question begged by the post-Truth

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term. This historical question asks what kind of Truth was given authority in resolving major late-20th century political controversies over the most powerfully iconic technologies of the modern era, nuclear. In post-war decades, this combined military-civil nuclear networked series of technologies was barely seen as a question of political choice. Instead, nuclear development fell under the universal ideological spell of scientific-technological determinism (McDermott, 1969; Schwarz Cowan, 2010). Modern science was given the role of revealing necessity to politics from nature – far beyond "only" informing collective human responsibility and choice. "Necessity" incorporates meaning as well as fact.

Thus a nuclear choice – military and civil – was not seen as human choice but as natural necessity. Under the further pressures of Cold War nuclear arms-race competition, aspirant global superpowers like Britain and France curtailed society-wide democratic rights of freedom of information, critical debate, inclusive and continual negotiation of "the public interest", and open science under the greater perceived urgent military-nuclear need. Civil nuclear technology decisions were also presumptively private to the overwhelmingly powerful strategic expert cadre that controlled the very heart of a nuclear weapons-prioritised British "parliamentary-democratic" government.

From the late 1940s onwards, it was stated without demur in public that policy decisions were made by (scientific) Truth-determined advice, combined with overriding (nuclear) national security need. However, this façade of deterministic necessity concealed an extremely ambitious, indeterminate, and high risk, but far from democratically deliberated and chosen, military-nuclear state political vision for the future. Moreover, this basic form prevailed in British policy-making, scientific expertise and debate, not only across the crucial nuclear (civil power and military weapons) domain. It also took shape in the rapidly expanding broader economic, scientific, technological, and commercial innovation domain, across fields like chemicals, plastics, food, consumer goods of all kinds, energy, transport, pharmaceuticals, and telecommunications. This long-lasting flood of science-intensive new technologies required new regulatory processes and decisions, often subject to public controversy. This huge and novel economic-political agenda and its institutional forms developed over these same decades as nuclear technology, with many of the same institutional-cultural habits.

An important one of these routines that intensified and became taken as given over those decades, was the overextension of the authority given to science in policy decisions about new technologies. This was the gradual and unnoticed change in the role of science, from *informing* public debates and policy decisions, to default author of public concerns and meanings (Wynne, 2014).[2]

Science and Technology Studies developed from the early 1960s[3] study, initially of scientific knowledge-production in its own private communities

like laboratories, enlarging later to scientific expert knowledge in public arenas – the latter a mushrooming proliferation from roughly 1970 of frustratingly irresolvable controversies over "the Truth" as assumed public authority (Nelkin, 1979; Jasanoff et al., 1995). Long-established assumptions that scientific knowledge naturally led to consensus were left in question as attempted scientific methods and procedures failed time and again, over decades, to stem the flood.

Authority has always it seems been grounded in some form of Grand Truth, be this Divine, or natural – revealed from somewhere beyond negotiation, by actors (Priests: Judges: Monarchs: Scientists) whose authority comes from their supposedly unique, unmediated access to that suprahuman domain. As anthropologist Mary Douglas (1975) put it, social authority is always founded in nature, time, money, or God. Reference to some form of *extra*-human source of external law always seems necessary for what are humanly determined commitments to enjoy universal authority. Truth as *collectively authorised* authority is ambiguous because it is *founded* on a fiction over the determinative source of the law thus authorised. In pursuit of wider authority, it may be insistently communicated as *revealed* to be final, but it is never closed – the conventional binary between Truth and falsehood is simplistic and misleading. Truthfulness as a heuristic *process* seems better than Truth as a supposedly black-or-white condition.

References to such external non-human agencies as sources of human collective Truth and Law can thus be recognised as myths, in which multivalency and ambiguity are essential qualities. While projecting an unacknowledged *untruth* of some kind, they may also nevertheless be *functional* in other important respects for society. Socrates' Noble Lie is an example – that the unfalsifiable idea of God may be what maintains a peaceful, caring, and unified society, despite its difficulties of universal and direct demonstration. Truth is more than exclusively the reductionist version of validated knowledge that normal science provides. Therefore, following science's instrumentalist turn, "what works, is true", myths may be both false and true (if the myth as social authority helps maintain that crucial public good).

To explore these ambiguities, I use a now historical case-study (Wynne, 1982, 2011) of the 1977 UK Windscale Public Inquiry (WPI) into a globally controversial new international nuclear spent oxide-fuels reprocessing plant, THORP. This important formal process was keystone of an escalating three year conflictual political process to reach a democratic political decision, immediately concerning the THOR plant itself, but actually, as a big potential leap for military and civil nuclear technology, about the future of an integrated nuclear arms and energy complex itself and its then-ascendant imaginary and aspirations for human society. This whole period, from 1975 (when THORP was first made public, in a planning application to Cumbria County Council) to 1978, was marked by: fears of political breakdown and disorder; intense media debate; protest marches; peace

camps and attempted invasions of nuclear sites; lobbying of members of local and national government; an intensive five-month legal-scientific-public inquiry, headlined "The Inquiry Into the Future of the World" (UK Daily Express, 1977) with international public, media, and scientific participation; the High Court Judge Chair's formal report and recommendation to government; and a parliamentary debate and vote in favour of THORP. The latter three major official UK government processes were all initially presumed unnecessary by the government, but hurriedly initiated in succeeding U-turn responses to the unforeseen, intense public outcry against the presumption in favour of the nuclear plans.

THORP was an untried part of the globally networked nuclear fuels weapons materials cycle. Its imagined future development into fast-breeder reactors, global exchange of nuclear materials, including global industrial production and transport of weapons-grade plutonium and uranium isotopes, and radioactive wastes – "The Plutonium Economy" – was taken for granted by nuclear proponents and their political allies. THORP was then the key step into an elaborate, nuclear-utopian, technoscientifically ordained future. Yet at the same time, from the early 1970s, public protest against nuclear technology in Britain as elsewhere internationally was suddenly mushrooming, from a preceding "golden age" of the 1950s–1960s where apparently awestruck public approval prevailed. As the THORP plan emerged into public view with presumptive government support, the unprecedented confrontation between the aspirant superpower UK, and the anti-THORP US Carter government, further inflamed an escalating international inferno.

I examine how a particular form of Truth was established as effective political authority in this, the most important, yet intensely contested domain of modern big nuclear technology, at what was an especially sensitive historical moment. In the 1960s and 1970s, many democratic industrial societies beyond the few nuclear states were confronting unprecedented challenges over how to govern the post-war tsunami of scientifically intensive new technologies, both state-promoted and private together. Attempting to distance, even divorce, its civil power generation from its primary and continuing weapons role, in Britain nuclear arms was the foremost of these many other controversies involving scientific knowledge, and the first to be confronted with organised international opposition, including mass protest and violent modes of state response in Germany and France. This opposition combined such widespread popular direct action with more peaceful but equally influential and authority-disruptive critical science.

From my full participation in and detailed analysis of the 1977 WPI and of the whole three-year process (1975–1978) from local planning proposal to final democratic decision, I described as *myth*, the form of Truth constructed to give authority to the political decision approving THORP. I also described the widely acclaimed rationality of the process of inquiry as a *ritual* of rationality. This combined both legal and multiple scientific

cultures, which inscribed and delivered that mythical Truth, whose authority depended on denial of its ritual character. However, I disavowed the common view that my description of the inquiry conclusion as myth meant a claim that it was "fake". I declined that mistake because the decision to be made for or against THORP (and maybe the whole UK, even an international nuclear future) was a matter of political choice, not of revelation. The point of its ritual quality was to underpin this (functional) myth as revealed Truth.

The mythical – and false – dimension of the judicial conclusion was *not* his conclusion in favour of THORP. It was his *false account* of it as the *unpolitical revelation* of a pro-THORP, pro-nuclear, pro-trustworthiness of industry and government regulatory agencies, independently existing Truth.

My key point was that: yes, the judicially chaired inquiry process and consequent judicial report contained many detailed and some major falsehoods, misrepresentations, and deletions of specific counter-THORP arguments, but at a different level of analysis, this elaborate, composite lacework of untruth was highly effective – precisely because of its falsehoods. Its effectiveness came in making the THORP political choice seem as if it were *revealed*, by uniquely disciplined investigation, from a non-human realm. This narrative defused what was a human conflict close to widespread political disorder into a minority objectors' outrage, but a majority public quiescence (even if a silently ambivalent one).

This suggests a very different history of what came before the era of so-called post-Truth.

What "Truth" preceded "post-Truth"?

Many have acknowledged that in science, what is acceptable as true is whatever "*works*" (Medawar, 1967). Since the 1927 Instrumentalist epistemic shift in quantum physics, realist representation of nature as a scientific goal was (unevenly) abandoned, for the more feasible option of predict and control – if the prediction works, it is true. Whatever natural reality lies behind is irrelevant. However, it is typically overlooked that this is a conditional Truth. It depends upon the instrumentalist commitment to control, and not realism, as its normative framing. This is a human choice, not a natural necessity. As Davies (2019) has argued, too much of post-Truth culture is locked within rigid binary reductions, thus denying the forever conditional basis of whatever Truth enjoys authority. Related to this, a less recognised but profoundly damaging binary comes with the dominant technoscientific reduction which almost defines modern policy and neoliberal culture (e.g., Bonneuil and Fressoz, 2021).

"*Functional* myth" renders ambiguous the ostensible Truth-falsehood dichotomy – which is precisely why I introduced it. One question that can then be posed, as a public political question for debate, is *what societal*

function does the myth serve? And whose social purposes benefit, at the expense of which other, silenced social aims? Avoiding disintegration of social order is one such important social benefit if this can be reconciled with democracy.

In terms of functionality, while it was demonstrably false, in its performative self-accounting as the declaration of a revealed Truth from Nature (Wynne, 1982/2011) (thus concealing its collective political choice character), Mr Justice Parker's fiction from the full decision process around the WPI worked remarkably well, whether deliberately or more serendipitously. Its absolutist declarative-revelatory form – which committed no human violence, even if it bruised a few opponents' egos – effectively passivated broad non-specialist public opinion and agency, while describing the marginal if emergent *specialist* public opposition in effect as not just misinformed, but illegitimate. This judicially authorised myth of the Truth process effected strong political closure on the public controversy. It very effectively replaced normal democratic process, of *mediation*, collective deliberation, and compromise in collective political choice, with the judicial revelation authority, that parliamentary decision makers had no choice at all, because the scientists had assisted judicial authority in revealing the given Truth. Both the endlessly elaborating multiple scientific conflict over THORP and its escalating national and international public opposition were trumped and closed by an extremely demanding judicial-empiricist rationality, and its declaratory revelation of Truth-as-necessity. This was much more unequivocal and disciplined than normal institutionalised scientific processes of debate and "decision".[4]

For such a highly polarised political issue, this judicial "revealed necessity" style outraged the THORP opposition. However, far more strongly counter-effective was its powerful political closure of the issue for wider, less specialist publics, including elected parliamentary members representing them, and for the (naturally) pro-nuclear government. The judicial rationality was more rigidly closed, and much more forbidding to anyone wishing to reopen the issue. Parker's account of the inquiry's arguments in the legal-scientific exchanges was littered with falsehoods, only a few of which, on one issue only, are described below; yet it successfully deleted these falsehoods for all but a few specialist opponents. As singular authority, this successful myth of judicial revelation was more *functional in forcing closure* than a more pedantically truthful account including all the contingencies could have been.

This case is an extremely important one, but it typifies many other such political issues resolved by what was claimed as scientific, or combined scientific-judicial rationality. It raises the question – which post-Truth seems to answer only by presumptive fiat: was this long historical period, which we might call "pre-post-Truth", ever really one where revelatory Truth-seeking was the accepted order for resolving big political conflicts? Or was order maintained rather through ritualised mythical (mis)

representation, in which choice is made to seem for public consumption as if it were a non-negotiable necessity – Truth by revelation and thus "charismatic" declaration?

I also argue here that the myth that came to represent the exceptionally controversial and uniquely elaborate, scientifically intensive and judicially disciplined 1975–1978 THORP decision process was: not exceptional, but normal, historically speaking; and *deeply functional*, in effectively achieving public quiescence, and thus peaceful political closure.[5] Such avoidance of large-scale disorder through mass quiescence was I suggest only achieved through this kind of untruth.

I explore further this understanding of functional myth as a normal and necessary quality of peaceful democratic order-making. Post-Truth never had any prior political condition of which it could be "post-". The term is meaningless. Instead, in countless public controversies about new technologies over several decades across many modern democratic societies, scientific rationality has previously been a normal, institutionalised myth of revealed Truth for public authority, especially in domains where science was in serious question both as origin of some supposedly socially beneficial innovation, and as self-acclaimed arbiter of its (usually, lack of) risk.

More generally, authoritative judicial rationality has been an essential reinforcement in the most politically intractable cases, like THORP. A general implication is that in public contexts, scientific knowledge, or "expert discovery" narratives of political conflict-resolution, may need to be read in multiple registers, including not just propositional questions but also more ambiguous hermeneutical ones, where legitimately different public meanings and normative concerns would be acknowledged also to be in play.

This kind of unadmitted parochialism being performed in the public myth of cosmopolitan scientific modernity has been a central element of the post-war inability to recognise that public concerns over new uncertainty-laden technologies of all kinds have typically been questions, and not unfounded, unrealistic demands for zero risk; and crucially, they have been concerns about unacceptable relations with expert scientific and policy cultures that insist that public concerns are (or should be) only about risk – and risk as we the experts define it. Through the long history of those controversies, such expert cultures have failed to recognise that ordinary citizens may have *different meanings*, and different histories, to share with them and to negotiate together, and that those different histories may nevertheless include those same experts as alien, unresponsive, and patronising social agents on whom the same citizens have to depend for acceptable governance of innovation and its normal surprises (unpredicted effects – ignorance). Instead, given their cumulative historical experience, typical publics often cannot trust those expert bodies. The illusion of scientific institutional self-reflexivity is most starkly exposed here (Wynne, 1993).

Yet this institutional self-delusion – that science is intrinsically self-reflexive in its role as public authority – can also be seen as Truth in the

functional sense – it has helped to maintain the public and political authority of science, even while scientific demeanour in practice has been falsifying it. When, as often, publics decline to comply with expert reassurances that risks are negligible and well controlled, and instead remain sceptical, their mistrust is based in the double experience: of expert bodies not listening to them and unwilling to hear their concerns, including about expert parochialism; and of expert hubris, in being unable to recognise that maybe – as publics typically propose – those responsible for proper governance do not know as much as they think or say they do, about the future consequences of the technology in question. Indeed such scientific regulatory experts have shown themselves unable even to recognise that scientific ignorance – thus lack of (predictive) control – is a condition that besets risk assessment science (Wynne, 2006) – and which matters.

Thus democratic political order has in modern, pre-post-Truth times, let us say in the late 20th century, been maintained through untruths, or myths, of such richly variable kinds and number, it is impossible fully to describe. Scientific modernity in its various forms has been held in order, to the extent that it has, by myths about both science and modernity, and their legitimate claims to authority, over what reach (Toulmin, 1990). Had those untruths deleted by these myths been explicitly public, order would at best have been destabilised, perhaps fatally.

Ezrahi (2012) has raised questions similar to these using his term, "essential fictions" in "imagining democracy". Interestingly, this is almost identical to Cronon's (1991) concept, "necessary fictions", used in his almost 20 years' earlier seminal 19th-century environmental (and political-economic) history of "Nature's Metropolis", Chicago and the US Great West. Ezrahi recognises that modern post-Enlightenment thinking has marginalised imagination (or imaginaries) as interesting collective processes, because they were – mistakenly – seen only as fantasy, the binary opposite of fact, by cultures of Cartesian bipolar rationality (see also Toulmin, 1990). Like science and judicial rationality, this also denied the essential ambiguity that Ezrahi, like Vico, acknowledged in (grounded, but imaginative) public lifeworld common sense, and in collectively achieved political Truths. In his own words:

> political imaginaries constitute the fabric of political world-making, the core of the political order, and the clue to its formal architecture and informal dynamics. *In this context, social and political imaginaries are considered neither pure fantasies nor representations of a given external reality, although they may employ both modes of imagining* [my emphasis]. What renders such political imaginaries consequential is their capacity to generate performative scripts that orient political behaviour and the making and unmaking of political institutions. That is why it is appropriate to regard fictions that are selected and realized as hegemonic regulatory imaginaries as politically performative.
>
> (Ezrahi, 2012, pp. 37–38)

As with my analysis below of the *functional*-performative "Truth" of Parker's false account of his THORP inquiry verdict (and in Cronon's 1991 case, pp. 182–189, grain quality standards in Chicago's huge markets for prairie grains), Ezrahi's longer-term historical account of the essential fictions (performative imaginaries) sustaining modern democratic forms of political order emphasises their quintessential ambiguity as key to their (contingent) functional political agency.

Toulmin (1990) has documented the enormous ambiguity in modernity's mutually reinforcing myth that science has provided stable order and authority for post-Enlightenment society through absolutely pure exclusion of any (untrustworthy and threatening, as experienced at that time) human-cultural agency. Other historians like Fletcher (2020) and Porter (2003) have given support to Toulmin's proposal that the chronic threat of terror from "a complex and dismal history of alliances and betrayals, sacks, sieges, famines, assassinations, and gruesomely ingenious tortures" (Fletcher, 2020, p. 137) in bloodthirstiness and terror that blighted Europe over the 100-years war, engendered the "retreat" from the materially human and into mind, or into Nature as object of control. This epistemic retreat included the refusal to encompass anything threatening because not under control and order. This in turn encouraged a positivism that deemed the unknown, the uncontrollable, thus also scientific ignorance or contingency, to be unimaginable. The Windscale reprocessing plant's Safety Director (Donoghue, 1997) actually said to me, in WPI cross-examination over THORP's safety, that when something (i.e. nuclear risk) "becomes inconceivable, it is no longer possible" (Wynne, 1982/2011, p. 180).

This Modernist authority myth narrates that the developing "given" authority of scientific rationality has successfully entrenched the cultural faith that disciplined, objective discovery of Nature alone – inspired by the unfolding of the 17th-Century Scientific Enlightenment's experimental natural philosophy – holds legitimate authority over what would otherwise be a splintering and disorderly human world (Barnes and Shapin, 1979; Latour, 1993). Toulmin calls this myth "The Hidden Agenda" of modernity.

"Hidden" is ambiguous here, and worth further scrutiny. It is relevant because the idea of a myth's being functional in the way I propose in this chapter depends upon a form of public collective willingness to "hide" an informally widely known Truth from public acknowledgement, by rendering it taboo. This is I understand what Cohen (2001) meant in referring to public denial of uncomfortable, perhaps shameful truths, and "twilight knowing".

Questions about political functionality for public untruths are by definition for democratic collectives themselves to resolve (Skirbekk, 1958, 1998) – I finish with some tentative ideas about how such collectively lived falsehoods can nevertheless prevail as democratically public authority. I first describe how the WPI was established, in a political context where industry and government nuclear elites had just presumed it was unnecessary – they did not

see it as a public issue, but one private to government and the nuclear industry. I follow this with an analysis of the ways in which the High Court Judge chairing the inquiry defined a rational way of framing, and resolving the multiple technical and social-normative conflicts and questions expressed or emerging over THORP. A particular novel one of these was authored under pressure by myself *during* the WPI's proceedings. It involved hitherto undefined environmental risk questions, rationally embedded in which, I argued, were more difficult social-relational issues of public trust in expert nuclear authorities – which had a grim track record on trustworthiness. A brief case example given below from the WPI was focused on scientific understanding of Irish Sea radioactive discharges from Windscale-Sellafield, and their ensuing risks to local residents – the Ravenglass issue.

As a signature insight into STS and risk research (Wynne, 1979, 1993, 2014; Stirling, 1998; Felt et al., 2007), the risk *scientific* question, rigorously pursued, resolves scientifically into a social-relational question of trust in regulatory scientific bodies, and in the industry. I began to see this point only during the WPI, struggling day-and-night to work out what was the crux question to be put to both government and industry scientists about marine discharges from the site, given that THORP did not by then exist; it was an imaginary. This fundamental issue as I defined and explained at WPI was entirely blanked by the Judge chair, and translated instead into an immediately measurable empirical question for which he demanded a clear and rapid answer. He insisted on this even though the industry and government experts agreed off-the-record that it was meaningless, as well as impracticable. This is a particularly sharp example of the typical empiricist judicial mode of political Truth-making that governed the public issue.

Post-war technology controversies: scientific Truth fails as authority – law to the rescue?

This post-war period, for approximately the latter half of the 20th century, was a formative one for our recent fall into the so-called post-Truth era. After the 1945 use of nuclear fission weapons on Hiroshima and Nagasaki and the onset of the Cold War nuclear arms-race, the superpowers attempted to redirect the even more awesomely fearful successor to this technology, nuclear fusion or H-bomb technology, "from swords into ploughshares" in the 1956 UN Atoms for Peace programme (Weart, 1988). Nuclear states including Britain embarked on a huge race to build civil nuclear power stations, even though these were still informally known as "co-production" sites, since their spent fuel was reprocessed for both civil and weapons nuclear materials. The 1957 military pile fire at Windscale was kept secret and burnt out-of-control unannounced for days before being quenched through an unplanned and untested last-resort method. This was one of several accidents at the site that converted scattered local public concerns over the next decade or so into a national then international organised public opposition.

It is barely surprising that animating much of that opposition, from empirical experience over years of cover-ups and misinformation, was mistrust bordering on outright public anger.

The authorities' responses in Western democracies to these unexpected, and sustained eruptions, of (uneven, but increasing) scientifically literate public opposition to civil nuclear technology, was one of shock and dismissal, because, they asserted, it was based on public ignorance. Thus began the lengthy series, continuing today, of such provocatively arrogant and patronising expert expressions of the public deficit model (Wynne, 1993, 1995, 2006) explaining away public opposition and political difference, as vacuous, and founded only in misunderstanding of the risks as known to science. During this period of almost half a century, until the 1986 Chernobyl disaster coincided with the "accidental" late-1980s public exposure of its impossible economics, nuclear power was the iconic – indeed, *idolatrous* (Wynne, 2011, pp. 8–15) – big technology. It was deeply rooted into and shaped democratic politics, while glorifying itself in the false name of "Science".

Thus even by the early 1970s, nuclear power was encountering proliferating international public protest, paradoxically more overtly against civil nuclear power than its Siamese twin, nuclear weapons. Nuclear elites, as I can testify from many meetings with different varieties of them from about 1974 to the mid-1990s, were appalled and mystified by what they (mis)read as a sudden public U-turn, from apparently monovalent active previous support for nuclear technology during the 1950s and 1960s halcyon days. In this period, public quietude – not at all the same as *support* – reigned supreme, to the early–mid-1970s, when the THORP-Windscale case mushroomed into controversy. This case was a prime illustration of how political Truth is *constituted as authority*, in a vital and inflexibly polarised *political* controversy *involving* "science", but is falsely defined by the authorities as a "scientific controversy", thus according to their late-modernist mythology, *defined* – i.e. given its sole public meaning – by science. This seamlessly deleted from democratic view many other important and legitimate public concerns about the industry and its government support.

The case study showed how even an extremely polarised political conflict was resolved through a ritual process that pretended, not to choose, but to *discover* and demonstrate a greater Truth, about which, it was imagined, no conflicting parties could any longer disagree. This extended ritual underpinned and sustained a *myth* of such a Truth process that was constructed, gradually and perhaps fortuitously, over three or four years' duration, from about 1975 to 1978. "Revealing" the Truth of THORP as a Truth of Nature, a Necessity beyond choice, was its central point, amplified as it was by the institutional Truth authority of the judiciary and legal procedures (Smith and Wynne, 1990; Jasanoff, 2005).

Anthropologist Mary Douglas's (1975) four sources of extra-human "Law" for social authority described earlier seem diverse-enough, but two of them – time and money – could be seen as sub-categories of Nature (they

have been culturally naturalised, through routinised repetitive use), while in secular Western modernity, God's extra-human universal authority has given way, unevenly, since the 17th century to Science and the Voice of Nature. In the WPI case, the myth of revealed Truth, as assimilated into democratic parliamentary debate and media reproduction, finally won the day in achieving peaceful political closure. Had it been attempted, an authentically democratic political process, of debate, including of technical evidence and its precise relevance to the questions at issue, mutual listening, negotiation, compromise, might instead have failed, precisely because of its honestly democratic provisionality.

However, in the WPI case, this normal narrative of public authority through scientific natural revelation had to be elaborated by a further crucial intervention, for wider public, media, and parliamentary witnessing. Scientific exchange alone was failing to produce closure. This became something of a crisis for political institutions that were captive to the myth of natural consensus in science. As voluminous research on scientific controversies has since then shown (Nelkin, 1979; Pinch, 1994; Jasanoff et al., 1995), more interaction between adversary scientists typically only produces more elaborated technical conflict, not consensus. Such was the irresolvable force and technical differentiation of the THORP conflict, that an ad-hoc pragmatic move was made to try something more powerful. This was the political decision to have an experienced and famously strict High Court Judge, Mr Justice Parker to chair the inquiry.

Thus the supreme authority of legal due process would determine the Truth of the case, beyond only (obstinately still-plural) Natural Truth, through bringing mutually contradictory scientific claims under the discipline of legal adversarial evidence-presentation, with full documentary support; formal cross-examination; and judicial assessment, all (except judicial assessment, see later) under full public witness and on the public record. Parker would then produce a report and *recommendations* for the government on the THORP decision. Almost in parallel with the WPI in 1977, similar conflicts in neighbouring European countries, France and Germany, had already resulted in mass civic protests, armed riot police, and civilian deaths. In the UK, with equally intransigent conflicting forces, and with previously entrenched hegemonic nuclear scientific expertise promoting the full panoply of fantastic nuclear imaginaries with what they still presumed as unquestioned public authority, legal process was introduced as an extra, *emergency* layer for attempting to create a credible public Truth by revelation.

Thus for THORP, what was a then-crumbling previous form of public Truth-revelation, through science, was buttressed just in time to avoid civic disorder and perhaps violence, by adding the further discipline (with ritual) of legal process and judicial authority, including over the scientific interactions. After several weeks of his inquiry, Parker himself expressed his indignation with the scientists on opposed sides over THORP, that even under

his transparent judicial discipline, they still could not reach an agreement from the available evidence, over what were supposed as "scientific-only", even empirical-only, questions. These ranged over for example: safe levels of radioactive discharges; environmental risks for different radioactive isotopes in different specific environmental pathways and multiple plausible exposure scenarios; accident safety; safe water-storage duration for both oxide fuels (zirconium-clad) and advanced gas-cooled (stainless steel-clad) spent reactor fuels; delayed risks to radiation workers in the reprocessing plant; long-term disposal and storage risks from radioactive wastes released (as liquid) from (solid) spent fuels by reprocessing; economic viability of THORP; and nuclear proliferation risk.

Parker's imagined legalist solution was forthright – legal discipline of the kind he could impose, is what the scientists need to extract the (supposedly singular) Truth from them, when their own culture is too lax for them to do this themselves. The fact that this was still failing, late in the inquiry's one hundred days, was evidently (from my daily witnessing of his demeanour) scandalous to him. This indicated the depth of this common conviction of natural consensus in science. This judicial framing of what was originally defined as a purely (if multiple) scientific-technical conflict over the acceptability of THORP, as if it had a scientific answer "out-there", awaiting revelation to government ministers and the public, added a crucial double elaboration, to this scientistic mechanism. One was the legal ideology of empiricism, which allowed more substantial questions than only scientific ones to be reduced to solely empirical questions and thus resolved, even when these judicial translations were wholly *different* from the opponents' expressed arguments. One such example from several (Wynne, 1982/2011: chapters 6 and 8) is given in the next section.

From his simplistic belief that scientists put under legal discipline would naturally reach singular consensus, Parker was evidently shocked and angered by the weeks upon unexpected weeks of persistently divergent scientific evidence and cross-examination, rationalisation, further evidence, etc. Normal scientific debate is quite informal, with flexible sometimes inconsistent procedural rules. Evidence is rarely if ever adequate to rule unequivocally between competing inference options and beliefs, and contingencies become more evident and problematic the more different scientific schools of thought investigate a competing position at close quarters. Even without any political interests in a scientific dispute, closure is an achievement, not a preordained outcome.

Parker did not seem to understand any of this when he began the inquiry process; nor did he learn it as his experience of the exchanges grew. He expressed anger and impatience once he found that even his strict legal discipline was failing to drive the conflicting expert sides towards his expected natural consensus. His pragmatic solution, evident only after his report became available, was to judge which side had been more credible to his mind, and then construct a rational justification for this by judicious

selection from the extremely detailed inquiry record.[6] Many experienced judges and legal scholars have acknowledged this more complex way of having to "reach the truth", then communicate it (Stone, 1964; Chayes, 1976). Ultimately, his way of dealing with it was twofold:

First, he did his level best to impose his more legalistic and empiricist procedural rule on the multiple expert exchanges; but second, when this had failed by the end of the inquiry, he simply retreated and awaited his own time, which was the later, private and confidential process of drafting his report, then publishing it with full government publicity support. As such, this was completely free from the procedural and public transparency discipline of his inquiry itself. This was the deeply important difference between the five months of the uniquely open, *procedurally* fair, and sharply conflictual inquiry itself, and his own private period of deliberation with the documents himself, his two veteran expert assessors/advisers, and whomever else he chose to consult while drafting his report. This was submitted confidentially to the government in late January 1978, and only hurriedly published in mid-March 1978, to inform the parliamentary debate and vote – which had never been envisaged until many MPs demanded it.

One political consequence of this practical dislocation was that Parker ran the inquiry itself very strictly, but fairly. This fairness was procedural, but not intellectual. As was only apparent later to those few specialists who read his report, this institutionalised due process and immediate practical fairness contrasted starkly with his intellectual inability or unwillingness to understand the more indirect and complex substantive arguments of objectors, including about the mistrust that objectors and wider members of the public had developed over years, towards the arrogant and secretive institutional culture of the government-industry nuclear establishment. However, the full reductionism and rigidity of Parker's intellectual framing was only demonstrated after the inquiry report was published. It was exonerated from the due process of the inquiry itself. In his report Parker angrily dismissed as illegitimate that objectors had (as he mistook it) questioned the personal integrity of the senior scientific experts of British government and international expert institutions. His precise but simple judicial empiricism blinded him to the distinction between what was a *structural* analysis of pro-industry bias in regulatory scientific bodies and what he saw as outrageous ad-hominem attacks on the personal integrity of such personnel. The automatic judicial requirement to compartmentalise issues into atomistic and precise, as far as possible direct empirical questions, blinded him also to any cultural-historical processes which may accumulate particular assumptions and framings into establishment as taken-for-granted givens, such as the trustworthiness of particular institutions, or particular (exclusive) ways of framing the question at issue. This erased any room for legitimate interpretative differences which would expose indeterminacy, and for political negotiation for such a human-relational issue.

The trust issue as I defined it in WPI was impossible to slice in this judicial way. Thus Parker translated it *a priori* into individualised questions of

personal honesty, but only more than six months after he heard – and could have clarified – these arguments, when dialogue was no longer possible.

The dislocations between the inquiry itself, and the later report of it, were several. Given that over half the registered objectors included environmental risks (and mistrust) in their cases, Parker allowed such arguments and evidence in the inquiry itself, on many specific environmental questions. However, the report when published, several months later, showed a completely different and unequivocally convinced – indeed provocative approach to the overall THORP decision problem, even though some of these inherent intellectual qualities had been evident earlier to daily inquiry participants like myself. Over its intense, demanding, and expensive five months, the full inquiry itself, though "public", had been almost a private, distant (it was conducted in Whitehaven Town Hall, near Sellafield-Windscale but seven or eight hours from London), esoteric, intense, and insulated occasion. Its specific questions and arguments were, even at the time, already effectively obscured from wider public scrutiny.[7] The eventual report, with its strong judicial filtering, reframing, and analysis of those translated questions, buried the original concerns t by reframing them into his own terms very decisively. Only dedicated WPI participants could scrutinise all this with the intensity needed to be able to identify these wholly unstated contradictions and untruths.

In that late 20th-century period overall, the scientistic political and scientific presumption that public issues *involving* science are only *scientific issues*, was enacted increasingly insistently. Thus as noted before, public controversies involving science were rarely if ever resolved in the expected manner by intensifying the science, because such controversies embodied differences over much more than just scientific questions and concerns. Those usually legitimate social and political differences were obscured behind the science, and when exposed, dismissed by established powers as illegitimate "hidden agendas". If public groups continued to disagree, this was normally not on the scientific questions, but on the social and political grounds which had been deleted and denied by the authorities, Yet when scientific methods or processes failed inevitably to close those conflicts, instead of recognising this further set of drivers of conflict, political and scientific authorities dismissed public refusal to agree by dismissing them as ignorant or even worse, anti-science; and turned to the law as supreme procedural authority based in the myth of "finding the facts" and "revealing the Truth".

Judicial reason deletes ambiguity: environmental risks and burying mistrust in the Windscale Ravenglass Issue

The nearly 300 Ha Windscale-Sellafield nuclear complex consists of many different operational and abandoned nuclear plants from the early 1950s (military, civilian, and combined, some post-accident), along with radioactive dumps, waste-silos and water-storage ponds for spent fuel originally awaiting reprocessing, but with an unknown future after reprocessing was

finally discontinued in 2015. The whole combination of military and civil facilities, materials, dumps, and processes, was officially declared a decommissioning (clean-up) site, no longer a "production" site, in 2007.

Over this 70 years history, government-authorised environmental discharges of different radioisotopes continue to be emitted, both to the Irish Sea floor along a 1 km sub-surface pipeline, and to the atmosphere. They were controversial well before the WPI, when it was found that the authorised marine discharges to the Irish Sea, for example, for Plutonium 239 and Americium 241, both ultra-long-term half-life alpha-emitters, were 100–1,000 times greater than those for the equivalent plant, Cap de la Hague, France (Wynne, 1978). Public concerns about discharges were exacerbated when objectors found a 1958 publication by the then-director of health and safety at Windscale (Dunster, 1958), stating that radioactive discharges had been set deliberately high from the outset so as to more easily monitor their variable – and scientifically unknown – environmental pathways back to human "critical groups".

The relatively shallow and contained Irish Sea is home to various and shifting autonomous human activities such as: sea, land, and estuary-fishing, including wading in contaminated silt; seaweed-harvesting for human consumption; walking; swimming; and in various coastal villages and towns, simply living and breathing. Dunster was therefore acknowledging the deliberate conduct of an undisclosed and unauthorised experiment on society (confidentially authorised by government, but not by its involuntary local participants). The autonomous government of The Isle of Man, 50 km across the shallow Irish Sea from Sellafield-Windscale and an official objector to THORP at the 1977 WPI, was pursuing the particular concerns of its own vital fishing and tourism industries, which were also continuing subjects of this unauthorised experiment.

Many of the WPI THORP objectors, including my own group Network for Nuclear Concern, were making their case on environmental grounds. Yet at this time, environmental issues were only just emerging as public issues for which government agencies were given responsibility. These environmental risk concerns were animated by long-accumulated intense mistrust of the institutions responsible for controlling the plant, its discharges, and environmental and public health risks. Dunster's admission, five or more years after it had commenced, is an example. In part, this mistrust was founded in the seamless continuity between industry scientific and management staff, and government regulatory body counterparts, as well as the shared culture of autocratic and patronising military secrecy that protected both from public or independent scientific questions. Thanks to that almost total secrecy since 1945 (apart from limited monitoring reports), no environmental case, arguments or evidence against THORP, indeed against the whole nuclear site, even existed before 1976. The THORP planning case was the first which the site operators had had to submit, in 1976, after many different nuclear facilities over 30 years had been

installed. The 1957 Windscale military-nuclear pile fire (Arnold, 1992), out of control but covered up for several days before it was controlled, and discharging atmospheric radioactivity over Britain and Europe, had occurred in almost a different age, politically speaking – but it certainly provoked much unexpressed, long-lasting, local public anger and mistrust (Waterton et al., 1993; McKechnie, 1996).

Our THORP environmental case for WPI had to be constructed, and as far as possible tested, before submitting for distribution, then cross-examination by the judge and the richly funded and infinitely more insider-informed industry representatives. Typical of modern policy, risk and (thus) scientific definitions of the public issues were automatically taken to be the only imaginable framing of issues like THORP. As representative of the regional-local network of objectors, NNC, I was exposed daily to the exchanges of the contending parties, as well as interacting with them including nuclear and government actors informally every day before, between and after the six hours of formal legal sittings. I soon saw that the immediate environmental case against THORP – that existing evidence proves that its environmental risks are too high – was naïve and vacuous. How could there possibly be such evidence, I reasoned, when the plant in question, THORP, had never existed? In the intimidatingly hostile inquiry arena, it would fail badly. With such an issue, I began to see that our case was more abstract and indirect, though based in clear and unquestionable empirical evidence about past and current practices, promises, and observed environmental outcomes. This formed several different but mutually reinforcing parts.

Our first point, composed from scratch, was as follows: Although by definition there was no THORP that could be tested directly for its environmental harms, there already existed specific design-stage predictions of THORP radioactive discharge levels, isotope-by-isotope, if approved. There was also a similar existing reprocessing plant, the Magnox spent-fuel plant, which began operation in 1964, and for which we found 1962 industry planning design documents, stating the radioactive discharges for this plant once operational, and for its full 30-year envisaged lifetime. By 1977, there were also data for the discharges that the Magnox plant has actually achieved each year since 1964. We realised we could test THORP promises by comparing with the empirical outcomes of their magnox promises. For example, the 1962 *promised* magnox discharges for 1971 were 22,000 Curies total (mixed isotopes). The *actual* 1971 total radioactive discharge was 220,000 Curies – ten times higher than promised. This comparison was already clear evidence for mistrust of the industry's promises for the untried, untested, and unbuilt THORP; furthermore, THORP would be reprocessing spent fuel 10–20 times more intensely radioactive than the magnox plant.

Our entirely novel case was unimpeachably empirical, even if partly indirect. These figures were not disputed. However, they were empirical evidence not about public or environmental safety itself (in fact in the 1970s, *environmental* safety itself was ignored, except as derivative of *human*

safety norms). They were evidence for the question that we generated and posed on several related fronts to the inquiry – what is the evidence on which we can judge the credibility of the industry's promises about a future THORP's environmental discharges and harms? Could these be trusted? What is the existing track record of whoever claims public trust? By 1977, this empirical evidence existed; and it was dramatically conclusive, against THORP. But the key point, as I put it to the inquiry (Wynne, 2011, pp. 165–172), is that we had, in the heat of the moment as it were, invented the anti-THORP environmental risk case, as a (mis)*trust* case. It was not a direct claim – as some environmental objectors continued to submit – that the existing environmental risks are demonstrably unsafe. We did not exclude that, but left it as unknown.

A more complex second part of our argument was more general, and more directly founded in specialist sociology of scientific knowledge. Again however, it included questions of trust(worthiness) in those of risk. It concerns the tacit but inherently relational essence of risk. This also extended, as it was happening, into the Ravenglass issue, as explained below.

The trust question is logically unavoidable when – as is usual – *future* technologies and their (future) risks are investigated. This inherent connection in the magnox case outlined above between risk as a scientific question and trust as a social-political question, is even deeper when we recognise: (i) that scientific knowledge of environmental risk processes always embodies scientific ignorance (Wynne, 1992). Future surprises – unpredicted effects due to ignorance – are therefore likely;[8] and (ii) the rational question then to ask is: who will be in charge of the societal responses to those surprises? And can they be trusted? (Wynne, 1980; Stirling, 1998).[9] I return to this later.

As a more general problem for risk scientists, regulators, and risk-producing technology promoters, this logical question sequence has existed – and remained unrecognised – since that period.

At WPI, I had developed – and posed – a range of questions about this general question of the trustworthiness of the regulatory scientific authorities, UK and global, along with documented evidence, which was both scientific and institutional. Impartiality and rigour of British regulatory expert bodies and their relations with the industry-government-science nuclear cadre were central here. This was a delicate part of our overall case, since one of the inquiry tribunal's technical assessors, Sir Edward Pochin, an eminent radiobiologist, was a senior figure of the global regulatory scientific authority, the International Commission on Radiological Protection (ICRP). It demanded some nerve to suggest to this very tribunal, with Pochin next to Parker (and Warner), that there was evidence to justify public and scientific mistrust of this global scientific authority together with the several UK ones of which Pochin was also a senior patrician. I received an extremely frosty reception when I included it, on several occasions, during WPI.

However, this chill real-time response was nothing compared with its pointed dismissal as illegitimate, by Mr Justice Parker's later inquiry report.

Apparently unable to recognise the emphatically structural basis of our arguments about regulatory bodies' untrustworthiness, instead he deleted any such question by misrepresenting them as *ad-hominem*:

> I have no doubt as to the integrity of those concerned in all of [the regulatory authorities] and I regard the attacks made on them as being without foundation. Such attacks did nothing to further the cases of those who made them.
>
> (WPI, 1978a, paras 10.130–10.132; Wynne, 2011)

These criticisms were of a social and structural kind, for example documenting the long-standing "revolving door" circulation of scientists between the nuclear industry and UK and international regulatory bodies (Wynne, 2011, p. 163). They were explicitly nothing to do with the personal attacks into which Parker translated them. In a wider vein, reflecting his judicial rationality, he refused to acknowledge that factual evidence required both framing and interpretive judgement, which allows legitimate differences of inference and assessment. As he had stated at the inquiry preliminary meeting, he saw himself as having no judgements or choices to make – he just had to find the facts (Wynne, 2011, p. 147). Yet in practice, inevitably, his report was replete with such interpretive judgements and normative choices.

The further interconnected element of our anti-THORP case – the Ravenglass issue – also developed logically into a fundamental question of trustworthiness, from the historical evidence we uncovered during that time about both scientific knowledge (i.e., ignorance) of salient environmental processes, and about regulatory practices and claims. Again, judicial rationality was unable to recognise this, bowdlerising the basic social-political issue, while artificially discrediting the environmentalist case. That we had presented documented empirical evidence to demonstrate the basis for further questions about public trust, was thus also silently deleted. Public trust and compliance was normatively presumed. Parker transformed our more extensively multifactored point into an irrelevant empiricist question.

Only a few weeks before the inquiry, NNC scientists found an article by US radioecologists (Bowen et al., 1975) concluding that since alpha-emitters strongly adsorb chemically onto silt particles, unduly high concentrations could return onshore from emission at the Windscale discharge-pipe 1 km offshore. Observed seabed currents carried suspended seawater-silt towards a nearby coastal village, Ravenglass. Three rivers converged in this complex estuary, forming very large silt banks, close to the village's single residential street, whose end also issued onto surrounding silt and sand. These large silt banks often dried in prevailing winds, the fine silt particles resuspending into the air, producing hitherto unknown radioactive atmospheric inhalation risks to nearby residents.

Coincidentally, we had also found a recent paper from a UK government Fisheries Radiological Laboratory, FRL, scientist (Hetherington, 1975),

which reviewed prevailing scientific knowledge about Irish Sea discharges, particularly of the ultra-long half-life alpha emitters. This recognised "an appalling lack of knowledge" about local movement and concentration of alpha emitters in potential exposure pathways, and a lack of any foundation for calculating potential risk. This we might note, was *thirty years after* the high discharges experiment described by Dunster (1958) as a deliberate attempt to develop adequate knowledge about environmental pathways to critical groups in local populations. From this I noted to the inquiry that, despite the situation described by Hetherington, UK authorised discharges from the site remained two orders of magnitude higher than for the similar French Cap de la Hague plant, and even more stringent, as close to zero as feasible, US EPA discharge standards.

At the time of WPI, we did not know of Dunster's (1958) earlier explanation, to a nuclear audience, of the extremely high Irish Sea discharges for experimental reasons.[10] We asked for Hetherington to be summoned to the inquiry for formal cross-examination on his abnormally forthright assessment of the quality of the scientific knowledge so developed over 30 years or more. In response to my request, Mr Justice Parker – was seemingly unable (or unwilling, which he never clarified) to fulfil his own quasi-legal procedural requirements, nor those claimed for science. Unknown authorities had swiftly and silently removed Hetherington from his post and he never appeared, nor despite our own efforts was he ever contactable. His erstwhile FRL director did appear as a witness, and facing my amateur but well-researched cross-examination was embarrassingly inconsistent, and simply blocked or diverted challenging questions. In addition, the responsibility for aerial radioactivity resuspended from marine discharges into an atmospheric risk pathway (Ravenglass) was confused between FRL, responsible for marine discharges and fisheries, and the Department of Environment, responsible for atmospheric and land exposures. This began as a marine discharge, but unknown to the authorities as we had exposed, became an atmospheric and land exposure. Resuspension, which the Environment Department had dismissed in 1976 as insignificant, was suddenly by 1977 in the FRL director's own words, a pathway "of major significance".

One can surmise that this complacency, ignorance, and confusion resulted from the simple observation of incessant long-term silt deposition in the shallow and sandy Irish Sea, and with the strong adsorption of alpha emitters. With their apparent ignorance of the onshore seabed currents, this would have encouraged the conviction that all these discharges were being continually buried, deeper into the seabed, effectively forever. This was one reason why FRL, supposedly the regulator of the nuclear operators, had authorised as much as 6,000 Curies p.a. marine alpha-emitter discharges, when the operator was discharging 4,000 in the early 1970s, and was even ready to authorise up to 100 times more (Wynne, 1982/2011: chapter 8, pp. 155–182).

None of this was presented as evidence for alarm about existing environmental risks. Considering the powerful wall of secrecy that had protected the industry for decades until that moment, the evidence we had hurriedly

brought together showed the long history of combined pro-nuclear complacency, arrogant disregard for democratic human rights, incompetence, negligence, dishonesty, under-resourcing, and confusion between the multiple scientific authorities including the industry itself. As I also pointed out, independent public-funded university research on such questions was virtually non-existent when public funds for nuclear developments were almost limitless. As it developed rapidly on several fronts during the WPI itself, we believed this to be a considerable case of sustained untrustworthiness against THORP's proponents (including government military elites) and their supposedly independent public interest government regulators.

I continued with this case by asking the FRL director whether they had monitored household dusts (standard scientific practice after global weapons-testing radioactive fall-out during the 1950s), residents, and roadside dusts, for alpha-emitter contamination at Ravenglass, very close to the contaminated silt banks. By then knowing some of the expert arts of legal cross-examination, I already knew the (negative) answer to my question. It was intended to further demonstrate the same basic risk trust point that had become the central argument of our anti-THORP environmental case – the institutions supposedly regulating the industry, and the industry as operators, had consistently shown themselves unworthy of such trust; so how could we believe in their promises of future safe operations, for an untried and untested technology? Moreover, an appalling dearth of relevant research to underpin specific risk assessments for regulatory decisions, had left those authorities to languish in – unacknowledged, indeed denied – scientific ignorance, for example about the seabed currents and resuspension. Again, it was an empirically founded argument, albeit an abstract and multiply interwoven one. I had asked my question of the FRL director to demonstrate the – actively cultivated – lack of necessary monitoring and research, and thus of knowledge, for trustworthy operation even of existing reprocessing, let alone a more challenging future proposed THORP.

Instead of attempting to understand and test this complex point about (un)trustworthiness, the judge immediately adjourned my cross-examination and instructed all parties' representatives, including myself, to attend an immediate private meeting to decide a plan to conduct the absent Ravenglass monitoring that my question had revealed. Even industry scientists and their QC, and all the other experts, agreed that this immediate question about present safety was beside the point of my own question. It was also impracticable. Even choosing meaningful sampling sites would take some weeks, and then a single quantitative air-concentration measurement would take a full day once properly calibrated, when an as-yet unknown number and distribution of sites were needed. Reliable overall measurement of aerial and household contamination from Sellafield-Windscale alpha-emitter resuspension would take an estimated several months to over a year. Our question remained: "why had this standard scientific monitoring practice not been done years ago?" Parker had already begun to delete it.

The unanimous scientific advice to Parker on opening the next day's proceedings was that his demand for immediate monitoring results was infeasible (not to mention also, as was generously noted by Cumbria County Council's QC, an unwarranted deletion of the very different point which I was making). Visibly angry at this rebuff he persisted, demanding that a short timetable be agreed for enough direct sampling and monitoring, of house-dust and ambient aerial atmospheres, for a definite rapid empirical conclusion to be drawn as to whether "the public" was safe or not from existing site activities. His insistent judicial authority was such that over the intervening weekend, the UK government National Radiological Protection Board, NRPB, also an original critic of the idea, was persuaded to offer to measure aerial contamination just outside Ravenglass village – not household or main-street dust contamination. Parker accepted this, with preliminary findings due in two weeks. When these were provided to the inquiry (WPI, 1977), the original all-round scientific scepticism about meaningful measurements requiring at least a year was forgotten (it was never put in the record, as the key meeting between all parties' experts had been informal). Parker made a public announcement using the inquiry secretariat's full government media machinery, that the NRPB findings revealed no cause for public concern. Nuclear chiefs congratulated Parker in national media headlines (Wynne, 1982/2011, p. 174) for having exposed and dispatched THORP opponents' fantasies with real facts. In his later inquiry report, he reinforced this falsehood with two further untruths: first, that "NNC submitted [in its Ravenglass case] that there was cause for alarm" (WPI, 1978b, para 10.83, p. 54); and again that the Ravenglass issue "was one of a number of suggestions made by objectors as to the existence of alarming situations already present". In final submissions to the inquiry, I again reminded Parker, the attendant media and everyone else of our already made but apparently unintelligible point about the interwoven rational unity of: risk (and unacknowledged scientific ignorance); the trustworthiness question about those delivering and supposedly controlling future risk and consequences; and the voluminous historical evidence of their past – and present – untrustworthiness.

Parker's account of the process was loudly celebrated as a scientific victory for the industry, over "emotive" and groundless factual allegations by objectors. Mr Justice Parker "had found facts", apparently with no intervening framing choices or interpretive judgements about my own questions and evidence, and no hint of the completely different explicit point we were making. In its place, Parker asserted that "NNC submitted through Professor Radford, Dr Wynne and Mr Laxen that there was cause for alarm [about Ravenglass]" (WPI Report, 1978b) and extensively detailed the – de-facto, irrelevant, yet "reassuring" – monitoring results that NRPB had provided, at Parker's insistence. My own attempts during the WPI itself to register my complaint to Parker about this severe misrepresentation at the inquiry had been utterly erased, along with our case itself. This included our corresponding relational environmental risk point about (un)trustworthiness.

Discussion: institutional and cultural buffers keeping modernity's contradictions at bay?

Post-Truth's binary vacuity has been well-aired and dismissed by many accomplished thinkers (Jasanoff and Simmet, 2017; Sim, 2019; Davies, 2019) and needs little further help from me. However some important dimensions of my nuclear case study's review of late 20th-century democratic politics of technology repay further discussion. I hope this includes some new starting points for superceding post-Truth.

Both the idea of functional myths, and Ezrahi's (2012) "essential fictions" (see also, Cronon, 1991, pp. 182–187) for democratic modernity, combine public falsehood of the kinds constructed by Parker, with Truth through their larger social ordering role. The untruths were arguably essential in upholding the larger Truth. I further argued from my own earlier work (Wynne, 1993, 1995) that ordinary publics as the "floating signifier" collective subject of democratic order (Barber, 1995; Laclau, 2005) are more reflexive than conventional wisdom allows (Wynne, 2006), and may absorb the intolerable, including public falsehoods and contradictions, without overt protest.[11] Mr Justice Parker's WPI and its later report was a falsehood woven with specific untruths, but it was *functional* for society in that its untrue account of his final verdict as revealed necessity, not chosen "destiny",[12] worked to help avoid social disorder and maybe violence (Wynne, 1982/2011).

The institutional, political, and scientific controversies that have defined the half-century or so since nuclear "necessity" began overtly to be challenged by organised civil society networks in the early 1970s, have been much more than contrary propositional scientific claims about risks or harms. A large and multidisciplinary body of international research into such public concerns (e.g., Marris et al., 2001; Leach and Fairhead, 2007; Kearnes and Chilvers, 2019) has shown how publics have various further concerns in addition to risk alone, including questions about: promised benefits; unexplored alternatives; unpredicted effects and their expert denial; and (un)trustworthiness of those supposedly in control. None of these are "risk issues". Yet they inform public refusal and contestation when these occur. The issues also mean rational public concerns about their relations with the unknown thus unaccountable experts in charge of the technology or industry and its consequences. These are also a defining part of their relations with the technology itself. How can those publics trust such experts and their claims about safety, when they feel patronised by them, and their further concerns ignored? As I explained it (Wynne, 1980, 1995), public ambivalence about such regulatory expert institutions is not (the conventional social science and policy wisdom) their recognition of conflicting costs and benefits. Instead, it is a *relational* matter (Noer Lie, 2016): that they know their unavoidable dependence upon institutions that they do not even know, which are unaccountable, and so whom they feel they cannot

trust. Elites in science, commercial innovation, and government have failed to see that ordinary citizens, autonomously and collectively organised, are authors of their own meanings, in continual negotiation with and learning from others and their knowledges, including scientists. The nuclear "democracy" of the late 20th century with its presumptive imposition of both epistemic and hermeneutic impotence on its imagined publics, seems to have come close to Hegel's account of the master–slave dialectic, elaborated distinctively by Nietzsche (Williams, 2012).

The issue of democracy and "post-Truth" now quite properly departs from epistemic dimensions alone, especially from their simplistic binary framing, and involves normative questions and how society accommodates differences in normative commitments and choices – that is, also, differences of culture, meanings, and concerns. As Barber has put this:

> …it is the character of politics in general, and of democratic politics in particular, that it is precisely *not* a cognitive system concerned with what we know and how we know it, but a system of conduct concerned with what we *will* together and *do* together and how we agree on what we will to do. It is practical not speculative, about action rather than about truth…The question is not which politics is legitimated by a certain epistemology, but which epistemology is legitimated by a certain democratic politics.
>
> (Barber, 1996, pp. 349–350)

Scholars such as Arendt (2007), Dewey (1927), and Laclau (2005) have explained that if publics are usurped by other actors in the role of collectively authoring democratic public meanings, then democracy is lost. This is I suggest, what contemporary society had come close to achieving, without noticing, and without conspiratorial intent. These are some of the defining historical conditions into which post-Truth was launched.

Comparison of that maybe complacent late 20th-century period with current times where licence for any tribally preferred belief or normative stance seems not just permitted but required, suggests that typical publics have greater than recognised capacity to absorb and accommodate, rather than directly contradict, institutional falsehoods including misrepresentations of themselves, their concerns or values. My earlier thesis about what nuclear elites mistook as proactive public acceptance, when they should have recognised it as silent ambivalence combined with vigilant scepticism, is another example of the same qualities. They are both instances of this public capacity to absorb powerful expert falsehoods and impositions and buffer possible confrontational responses. From a different context, similar complex public capacities are analysed by Cohen (2001), as "twilight knowing". I also explained (Wynne 1980, 2019) how typical publics provide false assurance to authorities anxious for their trust, when they appear to trust such authorities and accept their favoured innovations. As I noted,

much of this acceptance and trust is passive quiescence, not active acceptance; and so-called trust is simply an absence of motivation to articulate what is a deeper, often historically accumulated, alienation. These are all important forms of public falsehood, for whatever good pragmatic reasons they may prevail.

I suggest that a central part of the so-called post-Truth era is that those erstwhile buffering qualities, which may also bring resilience, have been eroding over recent decades. This would also correspond to the observation (Rommetveit and Wynne, 2017) about Latour's (1993) critical analysis of the functional myth of modernity, that Nature and Culture are categorically and historically separate and pure domains. Writing in the early 1990s, Latour argued persuasively that their relentless discursive purification articulated the functional legitimation myth for modern institutions, especially governance ones, that Nature and Culture are purified as they are (or were), even though contemporary political economy was (and continues to be) frantically doing the opposite – increasing human and natural entanglements, in every way.

Rommetveit and Wynne's (2017) question as to why the purification processes that Latour identified seemed to be waning some 20 years later, for example where discourses promoting innovation freely hybridise ad-hoc both human and natural promises, often in idioms of control and security, as other chapters in this volume discuss. This now looks something of a rephrasing of what I here call the erosion of buffering processes of the kind that indirectly functioned in the 1970s to lend public authority to Parker's myth of revealed Necessity. Perhaps purification is or was itself one form of buffering; and it is arguable that Parker's sustained action through WPI and his report, was itself such a discursive purification.

The public absorption and accommodation of external impositions and falsehoods, and ambivalence about dependency on untrustworthy expert bodies mentioned above reflects both the intrinsic relationality of human beings, and a "passive" mode of rationality which Kekes (1977; Wynne, 1982/2011: chapter 9) identified as a neglected dimension of public life. Lack of control; flexibility to the surprises it implies; acceptance of ignorance (the epistemic dimension of difference and of non-control); ambiguity as normal life conditions; and relationality in terms of negotiated (and always renegotiable) collective meanings; are all consistent elements of the kind of public that Kekes was emphasising, to enlarge the inadequate dominant goal-seeking "decisionist" model. It is not clear that post-Truth, whatever it is, even recognises any of these important societal qualities.

Although deleted as such, Parker's was a form of political choice, in that, as I described he chose to dismiss, indeed to deny the existence of, the environmentalists' argument that the THORP environmental risks issue was actually an issue of whether the authorities (industry and government-scientific bodies) could be trusted to regulate THORP and its industrial operators in ways that upheld public and environmental health.

In deleting this trustworthiness question even from consideration, Parker chose a normative position consistent with support for THORP. He did likewise for opponents' arguments on every issue. Unacknowledged political choice pervaded his recorded judgement. However, these consistent normative choices in each specific WPI issue were translated very effectively into the public myth of revealed necessity, in the move from inquiry to report, to media and nuclear-government discourse, then into parliamentary discourse. This was a considerable achievement, though it was far from unique in the prevailing institutional culture, and was at that time reinforced by similar habitual practice in related domains of authority.

Even our most respected and authoritative institutions like science itself live by such myths – as with the false histories of scientific knowledge development whose teleological narrative functions for the greater goal of engendering dogmatic authority for prevailing scientific orthodoxy with new scientific recruits (Kuhn, 1963; Brush, 1974). The strict untruthfulness of such myths is barely noticeable as they are routinely repeated and reinforced as public Truth.

From a major international nuclear political conflict in 1970s Britain, to many other less dramatic but ubiquitous and varied social situations, stabilisation of such ambiguous and tension-laden human orders seems to be provided in part by a surprise actor. This is ordinary human citizens, observing such "official" ambiguities and contradictions, and judging tacitly whether it is worth making an explicit *public* issue of them. They do not need to protest overtly about an alleged discrepancy between the official narrative of an issue like the WPI, and the known reality (if they even know it). Instead it may be more practicable to participate in the collective fiction, and enact its untruth as collective solidarity. Thus, part of the tacit buffering processes I suggest, may be what is a surprising degree of *notice* being taken by ordinary citizens of such failures of Truth, but with a decided withdrawal from "going public" about it, which can also be costly. This seems akin to the point made earlier (Wynne, 1980, 1995) about tacit public ambivalence or "*as-if*" trust in authorities. It also offers part explanation of the lamentable capacity of elites to misunderstand typical publics.

This is also buffering, which might defend the more-or-less universal belief in the myth, against its *public* contradictions. Post-Truth may well be, *inter alia*, a marker of lesser general tolerance of such "untruths", but if this only brings a greater tribalist chaos of competing fundamentalist truths, then how is a return to maybe violent disorder to be avoided? The more society becomes yet further fragmented into the intolerant parochialism associated with social media, identity politics, and related narcissistic cultural developments, the more urgently does ambiguity, with its immanent invitation to modesty and recognition of the other, need rehabilitation.

The kind of scientism that Parker amplified with his judicial rationality's social authority continues unabated to frame many important policy domains involving scientific advice, like risk assessment for new technology

products. As political theorists and anthropologists have explained, however (Douglas, 1975; Habermas, 1975; Scott, 1985, 1998; Werbner, 2008; Ezrahi, 2012), having become cumulatively naturalised and habitually repeated in society, then they prevail as "natural". The thinning of buffering seems to have coincided with the growth of post-Truth, though analysis of this has to wait.

Returning to Parker's avowed faith that legal rationality is the ultimate discipline of public Truth-finding, more searching even than science, it is worth referring to legal scholarship like that of Fuller (1968). In his book on legal fictions, he explained a judicial decision in a US paternity case, where a sailor husband was abroad at sea for 15 months, yet his wife bore a child 13 months after he had gone. The judge ruled that the child was indeed the true biological son of the sailor husband, thus authorising a scientific fiction that the human prenatal period can be greater than 13 months. Fuller explained this fiction-based legal reasoning as a reflection of the law's institutional responsibility to decide and disseminate justice in society. This judge made the tacit judgement that social justice necessarily includes maintenance of key institutions of social order, such as the family. Thus maintaining the integrity of the family by "bending" a biological Truth was presumed essential to the judiciary's social function. This too can be seen as a functional myth. As ever, the validity of the social function(s) thus served may deserve debate, but notice that this would already imply the failure of the myth. Its whole point, as with Parker's functional myth over the THORP inquiry and decision, was that it should *not be identified* as untrue.

Conclusions

Companion authors in this volume suggest what could be an apocalyptic human imaginary implied in post-Truth. As discussed in the Introduction and most chapters in this book we face more and more pervasive and ambitious promissory technoscientific innovations – in the making. These promissory discourses claim to be outstripping any need for "external" public investigation. Their justification is what they imagine as their own self-endowed power to foresee what will need regulatory intervention, which supposedly then allows them to design the imagined (technical) solution(s) into the prior technoscience itself. This cannot avoid the hubristic cul-de-sac of assuming that technoscientific innovators and regulators exhaustively knows all of its future consequences, and also, which of these will create what public concerns. I argued earlier that this has gradually become a normal, largely implicit condition over recent decades, as scientific non-knowledge (ignorance) has become increasingly difficult for scientists to recognise (not to identify what their ignorance constitutes, which is by definition impossible; but to recognise what history shows – that the condition itself affects them and their knowledge, not as a failing, but as a predicament). This

would also, we might assume, compromise their public authority, which could be one reason why it rarely occurs, except as a post-hoc self-exoneration for surprises and mistakes which do happen.

Perhaps also the essential reference to natural reality that legitimation myths of the kind that Latour (1993) first noted embody, has given way to the more instrumental myth of *control*, as alternative means of legitimating power, intervention, and authority. This broad modern culture of science and policy and its imagined (presumed upon) publics, including its constitutive false dogmas, unquestioned assumptions, and increasingly dysfunctional myths of control and universal knowledge, also marks a different issue seen more directly from a political-economic viewpoint. This is our entry, willing or not, into an essentially unbounded, runaway neoliberal commercial technology society (including its extravagant self-empowering imaginaries), and with its instrumental dogma of commodification of everything, even of intimate human relations, anxieties, and imaginaries. Here "prediction-preemption" (Pellizzoni, this volume) as a promise and yet another anxiously repeated collective self-delusion, is made a self-justifying key driver.

Unlike with the "Rationally discovered Truth" myth of the Windscale Inquiry, this "control" myth is seriously and relentlessly dysfunctional, and potentially materially harmful, when finite technoscientific knowledge runs into the train wreck of its own (denied) ignorance. In this kind of culture, apart from other harms too, informed and timely democratic social debate about human needs, priorities, alternatives, and limits (both material and intellectual predictive), becomes unimaginable. So too do justice and sustainability. Furthermore, if our governing culture of democratic "representative" power and scientific knowledge cannot bring itself to speak, in public, about the inevitable and normal condition of scientific ignorance, which as its alter-ego, surprise, can be respected as the epistemic equivalent of the human "other", then how can we expect modern society – claiming to be democratic, cosmopolitan, inclusive and just – to identify and respect *human* otherness – ethnic, political, cultural, sexual, whatever. The one deep and unrecognised disablement seems symptomatic of the other; and they are both human-cultural failings. Perhaps engaging in the struggle to overcome the dearth of essential modesty in the one domain would help with the same struggle in the other?

Some philosophers of technology, in discussing technoscientific innovation and its relations with publics in the Hegelian terms of master–slave relations, have recognised that the conventional elite belief in technoscientific determinism (Winner, 1977), that society can and must adapt to whatever need for innovation is bestowed on society, has itself been overrun (Dupuy, 2009). This now afflicts even highly skilled workers such as surgeons and lawyers. There is no longer any standpoint from outside the commitment itself, from which to exercise any independent norms, whether of social utility, ethical propriety, or control of societal or environmental harm. As van

Dijk and Rommetveit also suggest in this volume, under these conditions – in my own words, not theirs – society has been lured by (a few of) its own social actors, into a nihilistic nightmare that would have finally attenuated human agency – and thus also, human life.

In this event I would suggest, everything has become nature, and the idea of any kind of *human* social-cultural order has become, literally, meaningless.

Notes

1 With thanks to Gunnar Skirbekk (1998).
2 This historical practice has its deeply wounding contemporary legacy. During the 2020 Coronavirus pandemic, it was manifest in UK government media conferences with scientific advisers and ministers together, that neither kind of authority knew how even to speak about the scientific ignorance that beset everyone. When culturally, beyond a specific issue like pandemic, science has been inadvertently given the different and more fundamentally powerful authority of providing public meaning, epistemic questions like "do we know enough?" are irrelevant to that authority, and its capacity to speak them must inevitably shrivel. This was evident almost daily in UK government practice over months, between February and August 2020. See Scoones and Stirling (2020) and (Comment) Wynne (2020).
3 A different kind of Marxist STS, which identified the ideological influences of capitalism in western scientific knowledge, was developed in the 1930s in the Soviet Union. In its systematic interest in the social, political construction of scientific knowledge, this presaged a similar key dimension of key formative dimensions of what became STS.
4 As I suggested at the time (Wynne, 1982/2011, p. 188), mediation, inclusive deliberation over the proper questions as well as their answers, and compromise, as a more overtly democratic, open-ended style of governance, may be just incompatible with big technologies especially nuclear, with their structural inflexibility, and more rigidly irreversible forward commitment.
5 This was only temporary, as it turned out, mainly because of THORP's delays and its nuclear industry operator British Nuclear Fuels inability to manage the whole Windscale-Sellafield site without regular scandals and failures, including legal penalties for negligence over radioactive discharges. It only began operation 12 years late, and for much shorter operation until closure, than planned.
6 STS found this same normal process for science, in the 1970s. See, e.g., Mulkay (1979).
7 There was an admirably full presence of senior correspondents from *The Times* and *Guardian* national newspapers, and selective presence of others, but even full media reports could not remotely cover distinctions such as these.
8 They may of course be harmless, but the point is, no one can say. There are copious examples where the opposite has occurred (eg, Wynne, 1992; Harremoes et al., 2003; Gee et al., 2014).
9 Noer Lie's (2016) important argument on relationality as ontological is salient here.
10 More is given on this in Wynne (2011, p. 4 *et seq*).
11 This is no argument that typical publics are unreservedly reflexive. It is that conventional wisdom of power-elites grants them absolutely none at all.
12 It is interesting here that 'destiny' itself carries ambiguous meaning, when, as distinct from a destination, 'Destiny', even if chosen, is usually read as something close to a future that is (thought to be) historically determined, thus 'necessity'.

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2 Post-truth or pre-emptive truth?

STS and the genealogy of the present

Luigi Pellizzoni

Introduction

With the election of Donald Trump and the *Oxford English Dictionary*'s proclamation as the word of the year for 2016, post-truth has come to the forefront engendering heated debates, mostly building on the pejorative sense of the definition of the *Dictionary* ("relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief"). STS has found itself at the centre of the storm, witnessing a revitalisation of discussions concerning the legitimacy and implications of social inquiry into the production of scientific knowledge. Though debates over post-truth address a number of topics, including the impact of traditional and new media on public opinion and the health of contemporary democracies, post-truth seems to consist primarily in an undermining of the role long given to science in public affairs: from the privileged relationship, or elective affinities, between science and democracy theorised by Dewey and Popper to the crucial function assigned to scientific expertise in the policy process, thanks to its ability to "speak truth to power" (Wildavsky, 1979). And if the questioning of the privileged status of scientific knowledge is at the centre of the post-truth debate, the calling into question of STS is hardly surprising.

By enunciating the symmetry principle, whereby "true" and "false", successful and unsuccessful, knowledge claims should be treated the same way with regard to analysing the processes leading to their emergence, the sociology of scientific knowledge (SSK) had questioned the epistemic exceptionalism of science, raising for this very reason the problem of its own epistemic status. With the development of lab studies and related methodological perspectives, such debate had seemingly settled. Yet, in fact, the topic never went out of sight; it rather changed in focus: from a discussion over the epistemic status of science studies to a debate over the effects of deconstructive approaches on science as an institution and the ensuing social and political consequences. Taking initially the character of an external attack (the "science wars" of the 1990s) and subsequently of a self-critique (Latour, 2004), criticisms built to a significant extent on the claim that,

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more than supporting weaker social groups by exposing the hidden links between scientific authority, economic interests and political powers, science deconstruction may undermine the very possibility of contesting such interests and powers in the name of indisputable factual evidence.

To a significant extent, the STS/post-truth debate may look like a continuation of such line of critique. However, we are not faced with a mere reiteration of older discussions, for at least two reasons. One is context. Post-truth emerges after, and as an overturning of, decades of growing emphasis on "evidence-based" decision-making (Marres, 2018); an emphasis that critical scholarship has identified, under the label of "post-politics", as an evermore distinctive trait of neoliberalism (e.g. Mouffe, 2005; Swyngedouw, 2010).[1] Then, as neoliberalism is hardly over, one should ask what lies behind what appears a complete reversal of its governmental strategy. A second reason is the focus of discussions. Commentators typically frame post-truth as an epistemic issue, seeing in the symmetry principle the basic point of contention. Hence the feeling of déjà vu sparked by the debate. Yet, as I will argue, a more fitting perspective for addressing post-truth is ontological. Post-truth concerns the statute of reality, rather than, or before, what can be said about it. In this sense, Trump Advisor Kellyanne Conway's (in)famous claim about "alternative facts"[2] should not be scoffed, but taken as an indicator that something has happened to the relationship between knowledge and things that is deeper and fraught with greater political implications than discussions of post-truth seem generally ready to acknowledge.

To make my case, I start with reviewing some takes on post-truth, from outside and from within STS. I proceed with reflecting how pointing to the symmetry principle as the *trait d'union* between post-truth and STS – as such takes do – fails to acknowledge that a gulf separates SSK, still heavily indebted to postmodernism, and generalised symmetry, with which Actor-Network Theory (ANT) expresses and contributes to promoting a vast intellectual change, whose basic trait is an attack on the dualisms foundational of western modern ontology, beginning with the language/matter one, and which a genealogical reconstruction allows to connect with post-Fordist capitalism and neoliberal rule, with special reference to military and security issues and the government of technosciences. Building on, or, more precisely, *intensifying* (a term whose meaning and significance will be accounted for later) a trend emerged in the 1970s, a novel political rationale took shape, I argue, since the 1990s gaining momentum in the aftermath of 9/11. Accordingly, rather than post-truth as an issue pertaining to the epistemic level, one should arguably talk of pre-emptive truth. The latter consists in the adjustment of words and things, knowledge and reality – beginning with the past – according to reactionary purposes. The challenge ahead for STS, I conclude, is to keep open the possibility of critique by working out a form of perspectivism that steers clear on one side from traditional naturalism and on the other from the full contingency of the encounter of matter and cognition.

Post-truth, STS, and the symmetry principle

Let's consider first what can be regarded as an example of the attacks on STS from the outside. Similarly to the *Oxford Dictionary*, the philosopher of science Lee McIntyre defines post-truth as an "eclipse of truth", in the sense of the growing irrelevance of truth in shaping public opinion and decision – making: a "careless indifference toward what is true"; the replacement of factual evidence with "truthiness" (i.e. truth – feeling); its subordination to political points of view up to denying basic facts, hence challenging "the existence of reality itself" (McIntyre, 2018: 9–10). This, for McIntyre, is happening because of the delegitimation of the authority of science occurred in the last decades and the consequent growing possibility of casting doubts over factual evidence, from the health effects of smoke to climate change. And such delegitimation, he contends, is an offspring of science studies, namely the "strong programme" of SSK, with its claim that "all theories – whether true or false – should be thought of as the product of ideology" (McIntyre, 2018: 129). In its turn, SSK is an offspring of postmodernism, with its claim that everything can be treated as a text, open to interpretation. Postmodernists, notes McIntyre, regarded their move as "emancipatory" from cultural and social hierarchies. What they did not foresee was the rise of a "right-wing postmodernism", that is reactionary forces who learned from postmodernists how to undermine unwelcome scientific evidence. Post-truth is an effective application of this lesson.

This account, in my view, is a good example of the confusion surrounding much of the debate over post-truth. On the one hand, different positions about truth are conflated, namely: *disbelief* in truth, which corresponds to anti-realism, either methodological (one cannot describe things "as they are") or metaphysical (what we define as real depends on our minds or conceptual schemata); *disregard* for truth, which is compatible with straightforward realism, as with Max Weber's "value rationality", whereby one sticks to a certain principle against all odds; and the *undermining of unwelcome evidence*, which does not necessarily mean devaluating science – indeed, as the smoke and climate change cases precisely show, manufacturing uncertainty entails emphasising its relevance, stressing that rival positions lack conclusive evidence (Michaels, 2006; Oreskes and Conway, 2011). On the other hand, postmodernism is claimed to rule out the possibility of truth claims. Yet, taking for example, Foucault (one of the champions of postmodernism, according to McIntyre), his idea of critique is based on a deflated account of truth claims, seen as building on socially and historically positioned perspectives (Foucault, 2007), which does not mean they consist in mere "assertions of authority" (McIntyre, 2018: 126). I'll come back later to this account of critique. Thirdly, targeting postmodernism, that is an intellectual wave whose decline began decades ago, as responsible for the rise of post-truth means leading the discussion back to the science wars of the 1990s, neglecting what has happened since, in particular how

postmodernism's simultaneous attack on Cartesian objectivism *and* confirmation of the latter's dualist ontology by simply inverting the dominant polarity (in the access to reality language has pre-eminence over materiality, rather than the vice versa) has been superseded by a different account of the relationship between words and things. I'll elaborate later also on this.

As for debates internal to STS, prominent scholars took different positions (Rommetveit, this volume). Collins, Evans, and Weinel basically concur with McIntyre, blaming STS for having, if not exactly caused, at least eased the rise of post-truth. For them, "the logic of symmetry, and the democratising of science it spawned, invites exactly the scepticism about experts and other elites that now dominates political debate in the US and elsewhere"; hence, "we have to admit that for much of the time, the views STS was espousing were consistent with post-truth irrespective of their authors' intentions or their causal impact" (Collins, Evans and Weinel, 2017: 581).

Sergio Sismondo rejects such accusation, claiming that STS has never supported an "anything goes" approach, showing instead the hard work whereby scientific facts take shape; that the very definition of post-truth – as a disconnect between facts and values, opinions, beliefs, and emotions and the predominance of the latter, or as plain bullshit, casual dishonesty, or demagoguery – has hardly anything to do with the type of work carried out in STS, beginning with how STS questions the obviousness of the very distinction between facts and beliefs or emotions; and that, if anything, through its own work, STS helps to account for why "the emergence of a post-truth era might be more possible than most people would imagine" (Sismondo, 2017: 3).

Similarly to Sismondo, Michael Lynch defends STS, yet building on different arguments: on one side, he stresses, the symmetry principle is "not a metaphysical position but a procedural maxim" (a "style of explanation"), concerning how to approach science as a social field where the "truth, success, or rationality of a given 'belief' [are irrelevant] in order to set up a social explanation of how it became ascendant and why adherents continue to hold to it" (Lynch, 2017: 595); on the other, SSK's symmetry principle has been long superseded by ANT's "generalised symmetry"; hence, it cannot be indicated as the connecting point between STS and post-truth.

Sheila Jasanoff and Hilton Simmet see in the emergence of post-truth the expression of "moral panics about the status of knowledge in the public sphere" (Jasanoff and Simmet, 2017: 755), in itself not a novelty but in its present configuration the result of fundamental flaws in how truth has been used in policy-making: namely, failure in recognising that "debates about public facts have always also been debates about social meanings" (Jasanoff and Simmet, 2017: 752), and that judgements of truth are always premised on judgements of worthiness. That knowledge and social order are co-produced is for them a key finding of STS. Their recipe against post-truth is consequently not "to get more science and truth back into the public's uneducated, misled or distracted minds" (Jasanoff and Simmet, 2017:

760), but to expand accountability for and inclusion in the selection of relevant concerns and generation of related public facts. Noortje Marres (2018) makes a similar – not exactly novel – plea for a more inclusive validation of experimental statements, against attempts at restoration of traditional expert authority.[3]

Steve Fuller introduces a dissonant voice in this choir by both considering STS as largely responsible for the emergence of post-truth *and* celebrating the latter as a valuable achievement of society – a sign of its health and dynamism, rather than disease. STS is blamed, instead, for "talking the talk without walking the walk", that is for recoiling from the post-truth tropes (with special reference to the contingent, manufactured, negotiated status of consensus over interpretations, or what counts as relevant expertise), it actually "routinised in its own research practice, and set loose on the general public, […] whenever such politically undesirable elements as climate change deniers or creationists appropriate them effectively for their own purposes" (Fuller, 2018: 59). Rather than an expression of anti-scientism, Fuller claims, post-truth indicates people's acknowledgement of the crucial role science plays in their life; hence, how it cannot be left entirely to expert elites, becoming a matter of personal responsibility – taking for whatever one decides to believe, living accordingly, "or d[ying], as the case may be" (Fuller, 2018: 107).

Generalised symmetry, new materialism, and the government of technosciences

Johan Söderberg (this volume) stresses that the positions above are all committed to defending the symmetry principle, seen as a foundational STS tenet. Such defence is either explicit, as with Collins, Evans, and Weinel, Sismondo and Lynch, or implicit, as with Jasanoff and Simmet's reaffirmation of the inseparability of science and politics or Fuller's attack on how investigations of manufactured uncertainty, such as Naomi Oreskes's, reinstate an asymmetry between "the *natural* emergence of a scientific consensus and the *artificial* attempts to create scientific controversy" (Fuller, 2017). For Söderberg, behind the defence of the symmetry principle lies the fear of a return of ideology critique, which for STS is anathema as much as it was for the poststructuralist scholarship that provided STS with its main theoretical underpinnings. STS, he notes, gained academic legitimacy by combining the value neutrality of the method, which allowed taking distance from Marxist critique of capitalist science, with the normative commitment implied in the assumption of a direct correspondence between epistemic authority and political power. This assumption entails that unmasking the groundlessness of the former would correspond to supporting socially marginalised actors. Yet, post-truth shows how the opposite is increasingly the case. Hence, Söderberg concludes, in accord with a host of critics of the depoliticising implications

of ANT (e.g. Hornborg, 2017; Mills, 2018) – tackling post-truth entails reintroducing some form of asymmetry.

That the symmetry principle plays a major role in the post-truth/STS debate is hardly doubtful. However, it is interesting that, in the accounts above, the distinction between SSK's (restricted) symmetry and ANT's generalised symmetry is either missing or not followed up, as if the latter was a mere extension of the former. Yet, the entry of nonhuman actants onto the scene signals a major shift in the understanding of reality, by no means limited to ANT, but of which ANT represents an indicator and, given its influence within and outside STS, an important trigger.

To grasp the relevance of this shift, one has to adopt a genealogical outlook, moving from a classic history of ideas, focused on how SSK developed out of a critique of the weaknesses of the Mertonian sociology of science, and ANT out of a critique of the weaknesses of SSK (see e.g. Mills, 2018), to a concern for what Foucault (2001) calls *problematisations*: the social, cultural, economic, and political conditions that make it possible, in a given historical period, for certain types of questions to arise and certain types of answers to become conceivable. In a Foucaultian perspective, moreover, "the emergence of new modes of power happens through the lightening, saturation, becoming – more – efficient, and transversal linkage of existing practices […] [up to] tipping points […] where the object or subject mutates into another form" (Nealon, 2008: 38–39). In other words, more than a revolutionary upheaval, the shift to a new problematisation, a new governmental rationale, is to be conceived as the intensification of elements pertaining to the ruling order, up to the point in which they become something different.[4]

This outlook offers a valuable clue to how to perform an analysis that, without drawing the former to the latter in a simplistic base/superstructure manner, traces parallelisms between the evolution of ideas and intellectual movements on one side, and social and political change on the other.[5] This type of analysis has been notably applied to account for how post-Fordist capitalism has been able to resolve to its own advantage the socio-ecological crisis of the 1970s, integrating on one side the "artistic critique" raised by intellectuals and social movements against the rigidity and verticality of the Fordist mode of production (Boltanski and Chiapello, 2005), and on the other, the theories of complexity and disequilibrium that had been emerging in a variety of fields, from ecology to chemistry, physics, biology, cybernetics[6]. These theories also contained a libertarian critique of the post-war social order, but were used in support of the neoliberal attack on welfare and socio-economic planning (Walker and Cooper, 2011; Nelson, 2015).

As regards the shift from (restricted) symmetry to generalised symmetry, one has to look within poststructuralism to trace indications, roughly contemporaneous to the above, of a progressive detachment from the predominance structuralism had assigned to language over materiality towards more fine-grained accounts of the interconnection between words

and things. A first step in this process is readable, for example, in Foucault's shift from an archaeological to a genealogical perspective. If Söderberg is correct in describing SSK's normative assumption as the "knowledge = power formula", this in my view hardly applies to ANT. The Foucaultian resonances of the latter are explicitly acknowledged by its main instigators (Latour, 2005; Law, 2008), and at least in Foucault's writings of the 1970s and early 1980s, the formula is not knowledge = power, but power–knowledge or power/knowledge, the dash or slash indicating that knowledge and power are to be conceived as reciprocally constitutive, enabling, and constraining, knowledge being an exercise of power but also power a function of knowledge.

But it is a further step, or intensification, in the process of detachment from the pre-eminence of language that is especially interesting here. At the end of the 1990s, various authors were detecting a tendency in cutting-edge scholarship to move away from the idealist end of the idealism–materialism axis, and towards the materialist one, yet not in terms of a return to traditional realisms but of conceiving human actors "as mutual constructed/constructing the other actors, including texts, graphs, buildings, money and machines" (Dean, 1998: 191); an approach whereby "not only must society be studied as constitutive of nature and vice versa, but nature must be understood as an actor with a conjoined materiality with society" (Goldman and Schurman, 2000: 565). STS has been constantly at the leading edge of this movement, which gained momentum in subsequent years in philosophy, social sciences, and the humanities, to be christened at some point the "ontological turn" (Woolgar and Lezaun, 2013) or "new materialism" (Coole and Frost, 2010; Dolphijn and van der Tuin, 2012). Apart from ANT, one may recall for example Andrew Pickering's (1995) and Isabelle Stengers' (1997) elaborations on the contingent, assembled character of experimental evidence; Sheila Jasanoff's (2004) introduction of the notion of "co-production" of science and the social order; Annemarie Mol and John Law's case for knowing as enacting a version of, rather than describing the state of, the world, hence for the multiple character of reality (Mol, 1999; Mol and Law, 2006).

The main characteristic of this intellectual strand is the attack on the dualisms characterising western modern ontology – mind/body, subject/object, natural/artificial, sensuous/ideal, living/non-living, masculine/feminine, active/passive, and so on – as theoretically untenable and normatively blameworthy for their dominative implications, any binary entailing the pre-eminence of one pole over the other (Pellizzoni, 2016). Target of criticism is especially the language/matter duality, which, as noted, postmodernism had not questioned but simply inverted in its dominant polarity. The claim that language has been granted an "excessive power […] to determine what is real" (Barad, 2003: 802) is common in new materialist literature, in explicit contrast with the culturalist leaning of postmodernism. Attention, thus, focuses on Foucauldian insights into the materiality of power

dispositifs, the phenomenology of bodily experience of Merleau–Ponty, theories of immanence like the late Deleuze's, long neglected philosophies of nature like Whitehead's, and ANT, which attracts interest well beyond STS. Source of inspiration is also the anti-naturalism found in non-modern or non-western ontologies (Viveiros de Castro, 2014; Descola, 2014). Yet, it is notable how the material turn is often perceived to be instigated by changes in scientific accounts of reality (Barad, 2007; Coole and Frost, 2010; Kirby, 2011).[7] The deconstruction of the language/reality binary, it is stressed, is "in line with contemporary science and with contemporary turns to life and living systems" (Colebrook, 2011: 3). The reference is to how, in a variety of fields, phenomena are being increasingly conceptualised in terms of porous boundaries and blurring distinctions: from epigenetics' challenge to the gene/environment and brain/body dichotomies (Papadopoulos, 2011) to how the inorganic realm is increasingly depicted as having vital connotations, life being simultaneously infused with dematerialised characterisations – textuality, information, codification (Keller, 2011); from the way mining and processing of huge amounts of data generate unforeseen insights where knowledge and production of reality can hardly be distinguished (Calvert, 2012) to how the penetration of computational processes "into the construction of reality itself" (Hayles, 2006: 161) brings into question the divide between machine and organism. Given all that, it is stressed, it is "impossible to understand matter any longer in ways that were inspired by classical science" (Coole and Frost, 2010: 5). Matter is hardly inert, stable, resistant to socio-historical change. It instead exhibits agency, inventive capacities, generative powers; a "viral life" that "problematize[s] the assumed distinctions between the physical and biological sciences" (Grosz, 1999: 8). It is a doing, an incessant becoming (Barad, 2007; Grosz, 2011).

In sum, poststructuralism distinguished itself from structuralism by increasingly complicating the relationship between words and things, up to a moment where the very distinction between language and matter was brought into question and the ontological turn took off. As we have seen, this is how Foucault describes the shift from a power arrangement to another, the intensification of some traits of the former engendering at some point a qualitative shift, which usually keeps them while giving them a new meaning and function. What is crucial to the present discussion, and makes it possible to talk of a common problematisation, is that these intellectual developments have occurred in concert with the evolution in the government of technosciences. Biotechnology arguably played a central role here. Its fundamental feature is the combination of biology and information science. As a result, life has come to be conceived as simultaneously matter and information, presence and pattern, "wet" and "dry", real and virtual; something capable of moving fluidly from living cells to test tube, to digital databases (Thacker, 2007). On the regulatory side, biotech patenting has come to designate, and legally protect, ontologically ambiguous entities, oscillating between materiality and virtuality, thingness and cognition, rights

over information and rights over the organisms incorporating such information (Calvert, 2007). Moreover, the claim that patented artefacts are indistinguishable from nature for any practical purpose has entailed that artefacts can be simultaneously described as identical and different (more usable, more valuable) to natural entities, while corporate storytelling has conveyed the message that biotech is just a more accurate continuation of what humans did for thousands of years, or nature always did, "the 'technology' in these practices [being] nothing more than biology itself, or 'life itself'" (Thacker, 2007: xix) – hence, nature is technology, and technology is nature, through and through.

A similar ontological blurring can be found in other policy fields. Carbon trading, for example, builds on the establishment of a conversion rate between the "global warming potential" (GWP) of CO_2 and other greenhouse gases, so that reducing one of these gases here can be regarded as equivalent to reducing CO_2 there (MacKenzie, 2009). In this scheme, GWP is simultaneously symbol and matter, means of exchange and physical phenomenon, cognitive construction, and feature of reality. In turn, so-called "payments for ecosystem services" (PES)[8] break the distinction between commodity and non-commodity. Commodification traditionally entailed human extractive and transformative intervention (the separation of valuable "pieces" of nature from their milieu, and their reworking and combination). Now commodities are created without even touching things (indeed, precisely because of this), by means of just renaming, classifying, and measuring them as services that can be sold and bought (Robertson, 2012; Büscher, 2013) – hence, they were commodities *since the beginning*, only as yet unrecognised (Pellizzoni, 2021).[9] Consider also climate engineering, and in particular "solar radiation management" (SRM). The idea, as well-known, is that, if emissions cannot be reduced at the rate and magnitude needed to produce significant effects, then, at least to buy time, a solution that promises to be cheap and quickly productive is to reflect solar radiation, through rather mundane technologies, such as launching giant mirrors into space, spraying sulphates into the stratosphere, making clouds brighter by spraying seawater into the air, and so on (Keith, 2013). The point is that, given the chaotic character of the atmosphere, it is impossible to predict with any degree of reliability the actual effect, either local or global, of such applications (Macnaghten and Szerszynski, 2013). SRM, therefore, is a strange type of technical fix; something which fixes by non-fixing, indeed by letting loose(r), a system, as it points on reacting and adjusting on the spot to the elicited swerves of the latter. The distinction between control and lack thereof blurs. SRM intensifies, bringing it literally to a planetary scale, the neoliberal argument about the limits of prediction and planning faced with social complexity, the empowering character of uncertainty and the social value of the brave entrepreneur, capable of riding (hence adding to) it, thanks to "nose", quickness in reacting, resilience, ability to apply practised judgement, and rules of thumb.[10]

The rise of pre-emption

Following scholarship that argues how the bio/ICT-based third industrial revolution, which allowed capitalism to relaunch accumulation after the 1970s crisis, has begun to lose momentum rather soon, making it incomparable with the second revolution, also because energy is becoming evermore costly to obtain (e.g. Bonaiuti, 2018),[11] it is not unreasonable to see in the burgeoning celebration of the virtues of uncertainty, entrepreneurial bravery and path-breaking innovation a repressed fear of secular stagnation, which financial speculation is increasingly unable to hide (cf. Rommetveit and van Djik, this volume). Be it as it may, if individual and social insecurity represent for neoliberalism a core governmental means (Dardot and Laval, 2014), its role has intensified since the beginning of the new millennium, engendering a qualitative shift in the governmental approach. Catalyser of the shift was 9/11 and the subsequent acceleration in a trend that global politics had followed since the previous decade, and more precisely since the Gulf War of 1990–1991. During this war, factual truth had shown early signs of sufferance (it was the first modern conflict where the press had no access to the theatre of operations, having to rely on the reports given by the US Army). Yet, it is in the aftermath of 9/11 that post-truth – or what, for reasons I am going to explain, I prefer to call pre-emptive truth – takes full shape. A passage of a speech delivered in 2002 by President G.W. Bush at West Point Academy is revelatory:

> If we wait for threats to fully materialise, we will have waited too long. We must take the battle to the enemy, disrupt his plans, and *confront the worst threats before they emerge* […]. Our security will require […] to be ready for pre-emptive action when necessary (Bush, 2002, emphasis added).

Consider also the following statement, attributed to Bush's aide Karl Rove:

> We're an empire now, and when we act, *we create our own reality*. And while you're studying that reality — judiciously, as you will — we'll act again, creating other new realities (quoted in Suskind, 2004, emphasis added).

What is outlined here is a type of action that entertains a peculiar relationship with the world – the aim is to "counter the unknowable before it is even realized" (Cooper, 2006: 120), creating an "own" reality – which Bush calls "pre-emptive".

Yet, what is pre-emption as a governmental rationale? A genealogical account has to start with considering that anticipation plays an important role in modernity. As effectively argued by Niklas Luhmann, modernity's orientation to the "new", that is a futurity conceived as open and actionable entails that one needs to anticipate it, identifying and selecting among

a surplus of possibilities. The development of probability, statistics, insurance, and social security responded to such need. Statistics "defuturizes the future without identifying it with only one chain of events" (Luhmann, 1976: 141), keeping uncertainty within a known threshold, deemed acceptable. Since the early nineteenth century, this becomes the dominant governmental way of relating with the future – from public health to retirement pensions, to industrial accidents (Hacking, 1990; Ewald, 1991). As an application of probabilistic prediction to undesirable events, prevention enters environmental regulation in the 1970s, being depicted as a preferable alternative to damage reparation.

The limits to risk calculation, however, had begun to be acknowledged already in the 1920s. For John Maynard Keynes and Frank Knight, economic decisions may escape probabilistic estimates, requiring subjective judgements and individual heuristics. Yet, they still consider incalculable uncertainty as the exception, rather than the rule. The rise of precaution in the 1980s, then, corresponds to a widespread acknowledgement that there are situations, engendered by the application of evermore powerful technologies, where threats are apprehended yet no proper risk assessment is possible, while postponing action might entail irreversible consequences. Note that both prevention and precaution conceive of a linear temporality: action in the present affects the future state of the world. And both build on a naturalist ontology (Anderson, 2010). The world is assumed to proceed "on its own", should action not take place, or to "react" to such action.

Pre-emption, in turn, gains momentum beginning in the late 1990s, in the field of the military and security (Cooper, 2006; Kaiser, 2015). Its rationale is that, to confront merely guessed threats, lacking even the inconclusive but robust evidence required for precautionary measures, one has to "incite" them, help them emerge, acting to create the reality that demonstrates such very action was sound since the beginning. Said differently, the process produces its own cause. "Some may agree with my decision to remove Saddam Hussein from power – claimed in 2005 G.W. Bush – but all of us can agree that the world's terrorists have now made Iraq a central front in the war on terror" (quoted in Massumi, 2007). In other words, removing Saddam Hussein was the right thing to do, since in this way Iraq has become what justified such action. The shaky, wrong, or plainly fraudulent grounds of the decision become irrelevant. Truth becomes retroactive, not in the sense of re*interpreting* the past in the light of the present (which would be nothing new), but in the sense of retro*acting* on it, making it become a place where different things have happened. The threat is generated by action, but its elicitation paradoxically demonstrates it was already present (Pellizzoni, 2020).

Thus, pre-emptive truth does not operate at the epistemic but at the ontological level. Better, it blurs the two – new materialists couldn't but approve of this, if perhaps grudgingly. The arrow of time is replaced by a more complex temporal structure; a sort of secular eschatology. The look forward, towards a future envisaged with various degrees of confidence, is replaced by a look backwards, from the certainty of the future to the action capable

of postponing or modulating its actualisation.[12] Pre-emption, therefore, shares with precaution the idea that the course of the events has to be significantly altered. Yet, while precaution conceives of such intervention as "separate from the processes it acts on" (Anderson, 2010: 789), pre-emption conceives of knowledge and reality as adjusting to each other, moving back and forth through time.

Precaution has been criticised for its conservative outcomes, as in the attempt to reduce the possibility of harm one gives up precious opportunities (Fuller and Lipinska, 2014). Pre-emption is positively *reactionary*. Everything can be transformed (including, and indeed beginning with, the past), yet within a threshold that cannot be crossed, since action aims precisely to push forward the eschatological event. Anything is permitted, provided that it does not threaten the status quo. Note, moreover, that pre-emption is not restricted to military and security issues, nor does it evoke only dystopian futures. Of particular interest for STS is how the same governmental machinery works in regard to the regenerative eschatology associated with technological change. Consider, for example, the dramatic leaps in productivity bringing about the end of hunger, or the optimisation of energy and chemicals leading to clean industrial agriculture, that biotech storytelling painstakingly repeats; or how the alleged convergence between bio-info-cogno-technosciences is claimed to disclose limitless opportunities of "human enhancement" (Roco and Bainbridge, 2002), for example, in terms of a blurring of the organic and the inorganic – something already happening with new prosthetics and brain–computer interfaces (Rao, 2013) – as bound to improve resistance to adverse environmental conditions. In similar cases, where, according to the narrative at play, technology is deemed capable of either (re)adjusting the environment to human life or of adjusting human life to a changing environment, the strategy is to lay on someone (environmentalists, religious traditionalists, opponents of the market forces, lack of far-sighted public and private investors, etc.) the blame for why the allegedly impending "disruptive" technological revolution has not occurred yet, the actual goal being rather to infinitely extend and modulate the present. Indeed, a revolution – if actually such – would by definition disrupt the ruling social order, which is precisely what pre-emptive anticipation aims to ward off (Pellizzoni, 2020).

Conclusion

If the argument developed here holds, we should look at post-truth as a manifestation of a process that began much earlier and can in turn be regarded as the intensification and qualitative change of a governmental rationality whose first steps date back to the 1970s. If such shift is today more recognisable, this is probably because expressed in an astonishingly crass way and in a context where media power has increased proportionately to the concerns over the destiny of democracy.

Neither of the STS takes on post-truth discussed above, whether disapproving or approving, seem to acknowledge, let alone tackle, it, in the terms suggested in this work. This is hardly surprising. Partaking in the same problematisation, it is difficult for STS (and more broadly for scholarship involved in the new materialist movement) or for those who linger with nostalgic portrayals of the scientific enterprise, to take the necessary critical distance, as this would require a profound reconsideration of the ontological presuppositions on which one builds. From this perspective, McIntyre's and Collins, Evans and Weinel's claims – that STS's views are objectively consistent with post-truth and that conservative and reactionary forces have learned how to use them effectively – are well-grounded, yet they miss the actual origin and character of the problem. Also well-grounded are the preoccupations of many, though the solutions some suggest seem again hardly adequate. Jasanoff and Simmet, like Marres and post-normal science scholarship, make a plea for an extension of public deliberation over technoscience. Yet, if the good old days of the unquestioned public authority of science (if they ever existed) are over, plenty of research testifies to how "participation" is the target of ever more skilled actors, who use it to promote their own agendas and hollow out opposition (see e.g. Wynne, 2008; Felt and Fochler, 2010; Irwin, Jensen and Jones, 2013; Ward et al., 2019). Moreover, that hopes be pinned on precaution, as "a first-order attempt to distinguish between worthy and unworthy objectives through politics, when facts are not available to resolve a dispute to everyone's satisfaction" (Jasanoff and Simmet, 2017: 760), is perhaps understandable in the American context, traditionally hostile to the precautionary principle; hardly so in Europe, where the ineffectiveness of precaution in bringing the animal spirits of global capitalism under control is in the public eye, the very notion of precaution having indeed virtually disappeared from the political lexicon to the benefit of (responsible!) innovation, competition, security, and green economy.

Fuller fails as well to see that the question of post-truth is not just located at an epistemic level. As for his belief that post-truth inaugurates a season of customisation of science, its refashioning as a relationship between sellers and buyers free from expert domination, Fuller neglects in my view how laypeople's growing capacity of "going meta", challenging the rules established by the elites to their own advantage, does not guarantee at all that the "game of truth" will be played on an equal footing. More likely, power differentials will reproduce themselves at the meta level. Customers are regularly given the impression of purchasing something they really want and choose; and, the more skilled they become in deconstructing communication, the more the persuaders work on such very capacity, in a race to going "more meta" than their target. Moreover, Fuller's case for risk taking as the only road to "progress" fails to take stock of how the success-oriented notion of truth, arguably embraced since the beginning by modern science *qua* empirical science, has been intensifying to the point that Cartesian or

Popperian accounts look evermore archaeological relics, while Giambattista Vico's claim that true is just what is made (*verum esse ipsum factum*) is increasingly high on the agenda. As Alfred Nordmann (2017) notes, the guiding image of techno-scientific truth is of a reality that lies not beneath but beyond detectable phenomena. Truth is no longer a matter of archetypes to be theoretically represented, tested, corrected, and elaborated further, but of prototypes to be made, produced, and introduced in the world.

What deserves investigation, then, is the link between Nordmann's prototypical truth, post-truth *à la Oxford Dictionary*, and pre-emptive truth as discussed in this chapter, as they together outline the contours of the problematisation in which we live (and possibly we'll die, as Fuller says). In conducting such investigation, one has to bear in mind that things move on and pre-emption is taking novel routes. Observing cutting-edge social theory is again indicative. The burgeoning call is now for acknowledging the implications of the "intrusion of Gaia" (Stengers, 2018), the need to turn towards the "terrestrial attractor" (Latour, 2018), to inaugurate a "geological politics" (Clark and Yusoff, 2017) that recognises "geopower" (Grosz, 2011), the supreme indifference of geophysical processes and biological manifestations of "inhuman" nature such as viruses and bacteria, as fraught with major political consequences. Which? Is anything new in sight? Not a bit, it seems to me. Reading this literature one is faced – in a perfectly pre-emptive fashion – with the usual (neoliberal) call for preparedness and resilience; for relying on trial and error, flexibility, and "ongoing creative experimentation" (Clark and Yusoff, 2017: 18).

The anticipatory logic of preparedness is as well increasingly indicated as suited to addressing threats, like insurgent or resurgent pandemics, which, given their "emergent" (concealed, accumulative, eruptive) character, require constant alertness and vigilance (WHO, 2009; Lakoff, 2017). This character brings preparedness close to pre-emption, yet a difference seems to be that pandemic threats are not elicited but just expected. However, thinking of the debate over the Covid-19 crisis, on one side zoonoses are portrayed as inevitable and only manageable, as if no shift to a less exploitative and destructive attitude towards ecosystems was conceivable, let alone practicable. On the other, controversy over the origin of Sars-CoV-2 is fuelled by the development of "gain of function" research, that is, research focused on modifying viruses to explore their potential virulence or transmissibility, indicating that, the deeper and the more refined the intervention in the biosphere becomes, the more contentious ends up the distinction between the "natural" and the "artefactual". Yet, the more the controversy over the anthropic or non-anthropic origin of an entity proves to be irresolvable, the more, precisely for this, it appears irrelevant - which is basically what ag-biotech corporate storytelling claims. In short, also pandemic preparedness seems to be framed, or underpinned, by the governmental logic of pre-emption. Anything on the planet, from seeds to viruses, is drawn to the techno-capitalist ontology, pre-empting any meaning, before than any possibility, of change.

To conclude, post-truth might be regarded as a fashionable topic of passing relevance, yet in light of the discussion above, it draws attention to an emergent political and methodological challenge for STS. On one side, the task is to acknowledge that non-dualism is per se hardly conducive to emancipatory outcomes, and to deal with a world where neither a further "democratisation" of science nor a (re)turn to well-guarded cognitive fortresses is likely to guarantee progressive research and political agendas. On the other, the task is to rethink "asymmetry" without falling back to old forms of naturalism, and to develop a critical capacity that does not presuppose a view from nowhere. "New starting points" (Rommetveit and van Dijk, this volume) need not be invented entirely from scratch. Foucault, for example, made a case for an immanent critique, that is one which does not refer to a transcendental vantage point, yet builds on the minimal normativity provided by the lived unbearableness of being "governed *like that*, by that, in the name of those principles, with such and such an objective in mind and by means of such procedures" (Foucault, 2007: 44, emphasis original). And, within science studies, feminist standpoint theory has long sought to combine a realist approach with a stress on the situated character of knowledge (Harding, 2008). Said differently, perspectivism is neither equivalent to relativism nor with the impossibility of critique, though the task ahead is to work out a version of the latter that steers clear both from traditional naturalism and from the full contingency of the encounter of knowledge and things, or their mutual adjustment under the oversight of a dominative will.

Notes

1 Accounts of neoliberalism are notoriously controversial. A good working definition is the one proposed by David Hess: "public policies and economic thought that have guided a transition in many of the world's economies toward the liberalization of financial and other markets, the privatization of public enterprises, and the retrenchment of government commitments to social programs" (Hess, 2013: 178). Regarding science, this has entailed "a regime of organization quite distinct from the Cold War science management regime" (Lave, Mirowski and Randalls, 2010: 667), including a rollback of government support to public research universities, replaced by increased corporate funding, an aggressive promotion and protection of intellectual property, and the reframing of universities' mission as providers of human capital and competitive global service industries rather than educational institutions, with consequent expansion of non-tenured and post-doctoral positions.

2 Conway was referring to Press Secretary Sean Spicer's grossly inflated estimates about the size of the crowd attending Trump's Inauguration. See: "Conway: Press Secretary Gave 'Alternative Facts'", *Meet the Press*, 22 January 2017. Available at: www.nbcnews.com/meet-the-press/video/conway-press-secretary-gave-alternative-facts-860142147643 [Accessed 16 August 2019].

3 Faced with controversy over the origins and features of the Covid-19 pandemic, this plea has been renewed by appealing to the "post-normal science" case for a new, inclusive, social contract for science against the elitism of traditional "puzzle-solving" approaches to scientific inquiry (Waltner-Toews et al., 2020;

see Funtowicz and Ravetz, 1993). However, emergent changes in the approach to uncertainty, on which I dwell later, call into question a straightforward reiteration of the post-normal science argument.

4 In this sense, neoliberal governmentality does not withdraw but rather intensifies the distinctive elements of the liberal problematic of government (Foucault, 2008). So, for example, the liberal view of exchange as a natural tendency of humans which one is to leave free becomes the need to stimulate their latent competitiveness (Dardot and Laval, 2014). And the liberal view of the need to handle the dynamics of population and the environment becomes, as noted below, a plea for riding uncertainty and unpredictability.

5 The Foucaultian is not the only possible framework for such an endeavour. For example one may turn, as David Hess (2013) suggests, to Bourdieu's field theory; or to Ludwik Fleck's notions of thought collective and thought style. Of particular interest for understanding how a certain problematisation becomes established is the study of specific moments and loci where different scientific communities interact among themselves and with economic and political actors. In this vein, for example, Phil Mirowski (Mirowski and Plehwe, 2009) has addressed the role of the Mont Pelerin Society in the spread of neoliberal ideas outside academic circles, and Melinda Cooper (2008) has found in the Santa Fe Institute a site of exchange between economists, biologists, complexity and evolutionary theorists crucial to laying the foundations of bio-cognitive capitalism.

6 In ecology, the idea of equilibrium as the spontaneous tendency of ecosystems was replaced by competition, patchiness, fragmentation (Holling, 1973). In chemistry and physics, attention focused on "dissipative structures", that is, thermodynamically open systems characterised by the spontaneous formation of dissymmetry and bifurcations (Prigogine and Stengers, 1979). In cybernetics, notions of homeostasis and selective openness/closure were supplanted by the idea of emergence (Hayles, 1999). Contemporaneously, the notion of "trans-science" (Weinberg, 1972) was elaborated, with reference to issues escaping contained experimental settings; something later described as "post-normal science" (Funtowicz and Ravetz, 1993).

7 However, by no means should one think of a one-way conceptual migration. From evolutionary biology (Keller, 2002) to cybernetics (Hayles, 1999); from nanosciences (Dupuy and Grinbaum, 2004) to chemistry (Lehn, 2004) and immunology (Tauber, 1997), there is plenty of evidence of cross-fertilisation of the social and the biophysical sciences. Such process often begins with a metaphorical use of a concept, which, travelling across disciplines and problem-fields, comes step by step to gain a literal truth-content, around which theories are built that bear no memory of their origin (Stengers, 1987; Pellizzoni, 2014).

8 Ecosystem services are defined as the benefits biophysical systems give to humans, from resource provision to regulative and supporting functions like carbon sequestration, waste decomposition, soil formation, crop pollination, and also cultural ones, such as aesthetic, spiritual, recreational, educational, therapeutic (see Millennium Ecosystem Assessment, 2005). PES are defined as voluntary transactions by which owners are compensated by users for ensuring a service – say potable water – by maintaining the associated resource – say a catchment basin.

9 Of course this is not entirely new: tourist attractions work this way since the dawn of tourism. Yet, the idea of PES, as virtually applicable to everything, gives this ontological reframing an intensified, pervasive character.

10 This argument gained momentum from the 1990s. Studies have detected in influential managerial literature a growing celebration of uncertainty, danger, insecurity, volatility, disorder and non-predictive decision-making, seen "at the

heart of what is positive and constructive" (O'Malley, 2010: 502; for a typical example of such literature see Taleb, 2012).

11 This is testified by EROEI ("energy return on energy investment") calculations. Oil and gas EROEI declined from a ratio of 100:1 in the 1940s to the present 15:1. For shale oil estimates talk of a 3:2 ratio; for solar panels of 4:1 at best (Kelly, 2016). To put this in context, estimates for the US economy indicate that its growth is possible only if the primary energy system has a minimum EROEI of 11:1 (Fizaine and Court, 2016).

12 This non-linear temporal structure makes pre-emption cognate with a type of anticipation emerged with the Cold War, namely deterrence. Also deterrence crafts the world according to what action needs to be effective (Massumi, 2007), and makes the future at once impending and postponed, rather than averted (as with prevention and precaution). Yet, while deterrence builds on the knowledge and evidence of the threat, pre-emption builds on the indeterminate, latent character of the latter. This provides this type of anticipatory governance with an unprecedented generativity, which encompasses unintended consequences, deemed unavoidable and actually part of the effect (Anderson, 2010; Pellizzoni, 2020).

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3 The moment of post-truth for Science and Technology Studies

Johan Söderberg

Introduction

Science has gone from being the bully to being the underdog. In this one-line statement, the core idea of post-truth can be summarised. Speaking of such a before – and – after – moment is to invite the objection that: "[…] moral panics about the status of knowledge in the public sphere are as old as knowledge itself" (Jasanoff and Simmet, 2017, p. 755). The objector is right, of course. Starting with the birth of philosophy 400 BC, and then again with the inception of the social sciences in the 19th century, time and time again have the production of knowledge been shown to be conditioned by, among other things, prejudices, customs, interests, etc. And yet, this observation about the timelessness of scepticism only begs the question, why are we having this conversation now, and not, say, 20 years ago.

The surge of anti-rationalistic, authoritarian, and populist movements in recent years, carrying candidates to public office who are openly contemptuous about making their statements even to seem accurate and coherent, is a noteworthy event in itself. The background condition, against which this event looks like a novelty, is the past few decade's hegemony for a liberal consensus politics. As Kregg Hethertington has compellingly argued, liberalism has reigned with such self-confidence that its political contenders have come across as imbeciles raging against empirical reason (Hetherington, 2017). Exemplifying with fact-checking algorithms and the surge of big data, Hethertington stresses the continued relevance of subjecting the post-political, end-of-ideology imaginary of liberalism to scholarly critique. I agree with him on this point, but I disagree with the underlying, business-as-usual message of his: Social scientists should continue questioning scientific expertise just like they did before post-truth.

It is a moot point to debate the novelty of this phenomenon. There is a historical precedent for the present-day surge of authoritarian politics. Under authoritarianism, power is unhindered by the constraint to pass decisions off as just, true, and rational. Steve Hoffman reads the political needs of the present time accurately when making the following plea to fellow academics: "Yet let's also not get too bogged down criticizing fact-checking

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and related practices that are aimed at holding those in power accountable for their words and deeds" (Hoffman, 2018, p. 444).

The plea was made in a debate with a well-known scholar in the field of Science and Technology Studies (STS), Nortje Marres. Just as Hethertington, she rejects the proposition that the scholarly critique of scientific expertise needs to be reassessed in light of recent, political developments. Hethertington and Marres represent a common position in the ongoing metadebate on post-truth that I elect to call "the moment of post-truth for STS". With this phrase, I play with the proverbial sense of the expression. The proverb conveys the idea of a background assumption that has passed unnoticed for a long time because of its foundational importance to one's belief system and self-image. A sudden crisis brings the background assumption to the fore, triggering an existential choice of either affirming or suppressing the revelation with its disrupting consequences for one's cherished beliefs and one's sense of self.

The STS moment of post-truth was triggered by the recognition that the relativist tenets widely endorsed in the STS community are echoed by anti-vaccinationists, climate change-sceptics, anti-evolutionists, and their ilk. The social scientists and the right-wing populists are on the opposite ends of the political spectrum – as regards, for instance, the merits of cosmopolitanism and representative democracy. What the two camps have in common is a deep-felt reluctance towards privileging scientific knowledge claims over other kinds of knowledge claims. In the STS literature, the imperative of not discriminating between true and false beliefs among the actors goes by the name "symmetry principle". Most STS scholars find the moral-political consequences of the symmetry principle unacceptable when it is mobilised by right-wing science deniers and corporate doubt-mongers. Put next to the alternative, however, a restoration of the epistemological authority of scientific experts over other claimants on knowledge, the symmetry principle appears to be the lesser evil. Framed like this, as a choice between two, equally unattractive, moral-political positions, the metadebate on post-truth ends in an impasse. My contention is that the old standoff between relativism – versus – realism is a red herring. I will suggest a different entry point to the metadebate by recalling an almost forgotten episode in the disciplinary history of STS.

The symmetry principle played a key role in the boundary work whereby the nascent STS field liberated itself from its Marxist roots and became academically respectable (Werskey, 2007). The symmetry principle was expedient for this purpose in two ways. First, it banned the signatory mark of ideology critique, an asymmetrical approach towards actors' self-understanding (what in the old parlour was known as "false class consciousness"). Second, by treating all knowledge claims symmetrically, the symmetry principle was understood to secretly prop up the weakest actor in a scientific controversy. This way of combining neutrality in methods with partiality in outcomes allowed the nascent STS discipline to match the

normative and critical investments of the Marxist rival, while all the same conforming to the expectations of value neutrality and objectivity within the academic setting. A requirement for this intellectual operation to work, however, is that the symmetry principle is coupled to an additional assumption, namely that science is reducible to politics, or, knowledge is reducible to power. In homage to its Nietzschean–Foucauldian origins, I call this reduction "pouvoir = savoir formula". The identity between the two must be assumed to be perfect, leaving no reminder behind. Otherwise, a residual core of knowledge would remain after science has been deconstructed. Allowing for such a residue would amount to the same thing as having a failure-of-nerves, to refer back to the accusation that David Bloor once levelled against Karl Mannheim's sociology of knowledge (for a critique of Bloor's assessment, see Pels, 1996a).

From this digression into the disciplinary history of STS, I derive the following proposition: Behind the many warnings issued by senior STS scholars today that the moral panic over post-truth will reinvigorate scientism, another and possibly even more alarming prospect lurks: That post-truth will put ideology critique-approaches back on the agenda of the STS community. This is exactly the kind of response to post-truth that I will advocate in the chapter.

The three camps in the metadebate over STS and post-truth

At least since the Science Wars in the 1990s, commentators have blamed the right-wing turn in politics on postmodernism, a charge that, unsurprisingly, has been renewed with the surge of "post-truth" (Macintyre, 2018). Here I will leave the external critics of the social sciences and STS without further comment. My focus is on the metadebate internal to the scholarly community, a debate engaging some of the most centrally placed and well-recognised names within the STS community. Roughly speaking, three camps can be discerned in the metadebate. Harry Collins, who played the role of chief villain of postmodernism in the Science Wars, nowadays represents a minority position in the STS community. He accepts a partial responsibility for the current wave of right-wing science denialism. Consequently, he and his followers urge their colleagues to take a U-turn in respect to their previous (second-wave) standpoints on the status of scientific expertise, factual statements, and validity claims (Collins and Evans, 2017). Steve Fuller agrees with them on the complicity of STS scholarship in the surge of post-truth, but draws the opposite conclusion. He welcomes the independent corroboration of orthodox STS tenets by the populist, right-wing science deniers. He is alone in expressing this opinion, but the liminality of his intellectual position in the scholarly community makes him an important point of reference. I will refer to Collins' and Fuller's positions from time to time, but it is the third camp, to which most STS scholars adhere, that I am chiefly concerned with. This camp disputes the

proposition that STS can be linked to the post-truth phenomenon in any meaningful way. They chose different strategies for doing so. Some dispute the legitimacy of the very notion of "post-truth" as nothing more than "old wine in new bottles" (Jasanof and Simmet, 2017; Marres, 2018). Others concur that something has happened that merits a discussion, but disagrees that STS, and the social sciences more broadly, is to blame for having furnished the populists with science-debunking arguments (Sismondo, 2017). I will respond to each of these objections in turn.

First line of defence: nothing new under the post-truth sun

In disputing the novelty of the phenomenon of post-truth, STS scholars try to defend a business-as-usual approach to the critique of science. In the Introduction, I quoted Jasanoff and Simmet as a case in point. They are right in observing that scepticism about knowledge claims has a very long history. However, their hasty dismissal of the public's so-called "moral panic over post-truth" misrepresents what it is that the public is worked up about. By attributing this panic to the fragile status of knowledge, Jasanoff and Simmet imply that it is an age-old longing for foundational truths that has been hurt. They would be more on the mark, if they acknowledged that the growing unease about post-truth owes to the crumbling possibility of holding corporations and elected leaders accountable. Their charge against the lack of novelty of post-truth is due to them having confined their argument to the ontology of truth making, while being impervious to how the political context has changed in recent years by the rise of authoritarian populism.

However, even if we confine the argument to the level of ontology, the rise of post-truth as a novel phenomenon can be inferred from a widely accepted narrative in the STS community about the "coming of the techno-sciences". This notion describes a historical tendency towards a technification of the sciences. Alfred Nordmann has argued at length that the rapprochement between the natural sciences and the engineering sciences implies a transformation in the kind of problems that are being resolved, in the criteria of success being used, etc. Whereas the former pose questions in a representational idiom, the latter tests effectual parameters. As the two converge in the techno-sciences, the epistemic value of truth-as-correspondence loses ground to the value of utility. Although the problem-solving activities characteristic of the techno-sciences often advance the state of technical knowledge, this is not preconditioned on, nor does it contribute to, a deepened, conceptual understanding or theoretical reconstruction of the systematic whole of the problematic at hand. Another way Nordmann puts this is by contrasting the aspirations of the old natural sciences, to minimise ignorance by reducing complexity, with those of the techno-sciences, to accomodate ignorance and generate complexity from which innovations can be procured (Nordmann, 2020).

This discourse about the techno-sciences resonates with Jean-Francois Lyotard's observations in his iconic text about the coming of post-modernity.

In both cases, the argument takes foothold in the evolution of society's productive base, as exemplified in the growth of new communication and computer sciences, biotechnologies, cognitive sciences, etc. (Lyotard, 1974). Extrapolating from this tendency, Lyotard famously predicted an end to two grand narratives about what knowledge is all about. The narrative about the subject gaining insights into the Self through speculative reason, and the narrative about universal emancipation from superstition and serfdom. These aspirations were, since the days of the Enlightenment, intimately associated with the growth of the natural sciences, and, beginning with Humboldt's educational reforms, embodied in the institutions of the university. The disintegration of these two narratives about knowledge foretold transformations in how science and education were organised and conducted. Scientific rationality and technical control would continue to grow, Lyotard asserted, but without a corresponding growth in society's rational self-understanding and critical-emancipatory capacities. All the better, in Lyotard's opinion.

Nordmann confirms this prognosis by laconically acknowledging that progress in the techno-sciences, in contrast to the natural sciences, does not furnish society with a baseline for public deliberation, regulatory safeguards, or accountability for impacts on the environment, human health, etc. Having abandoned the aspiration to establish a state of certainty from which to pass judgements, take regulatory action, or hold juridical entities accountable for its misdeeds, the techno-sciences progress by way of a data-intensive "muddling through" in real time. Steve Fuller approvingly names the same trend as a transition from the precaution principle to the proactionary imperative. Whereas the former theoretically reconstructs systematic wholes and anticipates outcomes, the latter mandates a state of permanent vigilance and adaptability (Fuller and Lipinska, 2014).

To get an idea of what is implied by this diagnosis, Melinda Cooper's account of the inductive model of drug discovery in the pharmaceutical industry is informative. In the old, science-like and linear model of innovation, a team of white-coated scientists deduced the medical properties and therapeutic uses of a chemical substance for which the regulatory agency allocated a narrow regulatory space in the market. In contrast, the new, inductive model combines early releases of novel substances with post-market surveillance. The market is closely monitored, not only to detect adversarial events and minimise biochemical risks, but more importantly, to discover unexpected uses (and markets) for the chemical compound, be it for therapeutic or for optimisation purposes. The mining of data from the user-patients' risky self-experimentations can now be reframed as "democratic" involvement (Cooper, 2012).

Cooper's study demonstrates that the public may have valid concerns about the fallouts from the techno-sciences, above and beyond clinging to an obsolete "fundationalism." What is at stake – to refer back to Lyotard again – is the effacement of the two grand narratives, which, since the days

of *Les Encyclopédistes*, have accompanied the advancement of the sciences: Self-understanding and emancipation. Alternatively, putting the same thing in Habermasian terms, the culmination of the techno-sciences in post-truth signals the succumbing of the "emancipatory knowledge interests" of science under the "instrumental reason" of the techno-sciences. For the record, I must add that I am rather more hesitant about using the techno-sciences terminology than I have been letting on so far. The technification of the sciences is just a too good match to the neoliberalisation of the university (Mirowski, 2011; Ylonen and Pellizzoni, 2012), for it to be comfortably attributed to an innate trend in the forces of production. In a different chapter in this book, Luigi Pellizzoni refers to my arguments as a retake on the old complaint levelled many times before by activist-minded scholars against the "high church" Paris school of STS for its lack of normativity. I plead guilty as charged, but with an additional remark. Rendering history as *Fundamentalontologie* is the school book example of ideology production (Adorno, 2019). This is where the Heideggerian-derived, post-structuralist branch of STS goes astray. Jasanoff and Simmet, as representatives of this branch of STS, are single-mindedly focused on uprooting metaphysical notions about foundational truth and determinism. Hence, in spite of all the talk about everyday practices and political interventions, they remain oblivious to a political reading of our current, historical predicament.

Second line of defence: a constructivist demarcation criterion of science

Sergio Sismondo acknowledges the gravity of the post-truth phenomenon, its political implications, and the need for the STS community to formulate a response to it. For instance, he recognises the value of scholarly inquiries into cases of corporate doubt-mongering, and welcomes the subfield of ignorance studies to the STS family. Inquiries of the sort are preconditioned on the distinction between, on the one hand, scientifically validated correlations (for instance, between CO_2-emissions and global warming), and, on the other hand, corporate-sponsored phony science (such as the "global cooling" hypothesis) (Farrell et al., 2019). The thorny issue is if such a distinction, together with the underlying assessment of validity claims, is compliant with the imperative in STS of treating actors' knowledge claims symmetrically. Sismondo is confident that the two perspectives are compatible. He asserts that the amount of effort and infrastructure that goes into the construction of stable, scientific facts, as opposed to the dissemination of wilful lies, provides a sufficient condition for telling real science apart from non-science. Constructivist science studies scholars have always taught that the construction of epistemically unassailable positions takes hard work. Whereas the word "work", when invoked in a context of science-in-the-making, tends to be positively associated with an idea of "getting one's hands dirty", analytically speaking, it is indistinguishable

from saying: "capital investment". Sismondo's argument is, in other words, fully consistent with how Lyotard defines post-modernity: The truth of a propositional statement is indistinguishable from the relative size of capital that is mobilised to make something true. This spells trouble for Sismondo's attempt to offer the amount of work/capital as a criterion, by which we can tell apart instrumental politics from the discursive rules of making propositional truth claims.

Without saying so, what Sismondo is proposing is nothing short of a "constructivist demarcation criterion of science". In their reply, Harry Collins, Robert Evans, and Martin Weinel challenge the robustness of this demarcation. They fault Sismondo for underestimating the amount of work/capital that it takes to fabricate "alternative facts" and phony science (Collins et al., 2017). Hence, quantity alone cannot provide the sought-for benchmark of science. One must acknowledge a qualitative difference between work that is proper to scientific-rational discourse and the work of rhetoric and politics. By refusing to do so, Sismondo rehearses the conventional STS gesture of equating science with power. This equation is the reason why post-truth caused such a disarray in the first place. Harry Collins et al. are right on target in raising this objection against Sismondo. Given the explicatory weight that the "amount of work" (or capital investment) is supposed to carry, the argument is severely underdeveloped in Sismondo's article. In comparison, Karl Popper spent a lifetime explicating and defending his demarcation criterion of science (with limited success). For the argument to be plausible, it is in need of a sustained discussion of "how much work" is enough, and if "work of any kind" will do, for bullshitting to be consecrated into a scientific endeavour. In the absence of clarification on these matters, the constructivist demarcation criterion of science amounts to the same thing as the STS scholar saying: "I recognise science when I see it".

In an opinion piece published in the same special issue, Michael Lynch tries out another argumentative strategy to absolve STS from responsibility for the post-truth debacle (Lynch, 2017). Unlike Sismondo, he concedes to Harry Collins that the symmetry principle is problematic, but disavows its centrality for present-day STS research. He links the symmetry principle to one school of thought, Sociological Knowledge of Science (SSK), which he then assigns to the pre-history of the STS discipline. It was sublated already with the ironic twist that Bruno Latour put on SSK when he generalised symmetry to human and non-human actors. This is more of a gibe at Harry Collins, the nestor of SSK, than a solidly argued case. The intervention by Actor Network Theory (ANT) scholars did not change the basic point of the restricted symmetry principle: The suspension of the analyst's convictions about the relative merits of the factual or evidential support for the contending "beliefs" under examination.

Lynch moves on to argue that the STS community has abandoned the symmetrical approach in yet another way. After the "normative turn", the strictures of symmetry were abandoned in favour of engaged and

particularistic positions. Hence, STS scholars are now free to take a stand against the populist "basket of deplorables" on purely normative grounds. Though the point is not further elaborated by the author, what he here is endorsing is a replacement of factual, referential claims with value-based, emphatic standpoints. The pitfalls of an epistemological position that elevates the heart into the sole criterion of truth is well-known since the days of Hegel. It is particularly surprising to see Lynch advocating normativity as a solution to the post-truth quagmire. Throughout his career, Lynch has stood the furthest to the right among right-wing Wittgensteinians. He has come down against even the faintest traces of "interventionism" among fellow ethnomethodologists as a betrayal of the descriptivist and politically agnostic approach (which, as it happens, colludes perfectly with the symmetry principle).[1] These remarks aside, the normative turn in STS offers no solution to the post-truth challenge because, as I will argue at length in the paragraph below, the engaged position did not signal such a decisive break with the past as Lynch suggests. From the outset, the symmetry principle combined descriptivism with crypto-normativity.

Lynch marshals yet another proof that the STS community has moved on from the symmetry principle: Hardly anyone is referring to it anymore in the literature. This is correct, but his observation could easily be given the opposite interpretation. The foundational status of the symmetry principle in the STS field is indicated by that the tenet is accepted without any questions asked. Another indication of the foundational status of the symmetry principle in the STS community is the concerted efforts to exclude those scholars and theories that treat actors' truth claims asymmetrically. This brings me back to the first remark by Sismondo, as concerns the alleged compatibility of the symmetrical approach in STS with the study of corporate doubt-mongering and wilfully produced ignorance. The contested membership status of the subfield of "ignorance studies" in the STS family gives a clue as to what is foundational to the community. I will come back to this observation shortly.

In a position paper published three years later, Lynch again pledges the innocence of STS, but the line of defence is drawn in a completely different place (Lynch, 2020). Now he commends the circumscribed interpretation of the symmetry principle as it was practiced in the SSK branch of controversy studies. He suggests that symmetry only started to cause STS a headache when it was overgeneralised and politicised. This allows Lynch to develop a defensive strategy more in keeping with the nominalist and agnostic inclinations of his own intellectual career. Post-truth looks problematic only because the classification of "science" and "anti-science" are erroneously taken to be coherent and neatly delimitated categories. Thus he can propose as a solution to post-truth the tried-and-tested STS recipe of bringing more "nuance" to the debate about science. By "nuance" he means a return to "descriptivism". Lynch's solution is to rewind the normative turn. He assures that detailed research in particular cases

suffices to reach pragmatic judgements on which sciences and scientific claims are real and fake, even though the symmetry principle, by his own admission, has erased the normative criteria upon which such judgements are based. Lynch fails to comment the displacement of his argument from the first to the second article. In both articles, he concludes that the STS community is innocent of post-truth, but he reaches this conclusion with diametrically opposed arguments. In a way, this is consistent with the Latourian saying that he pays homage to in the title of the second article: "We have never been anti-science". The argument that "we have never been x", where "x" refers to whatever the moment requires, is a textbook example of post-truth *1984*-style thinking. "We have always been at peace with Eastasia".

Ignorance studies: the return of ideology critique-approaches

The gravitational centre in the metadebate about how the STS community should respond to post-truth is the subfield of ignorance studies. Scholars in the subfield documents how corporations and other vested interests are producing doubt about scientific findings, to prevent litigations and/or the regulation of markets (Proctor and Schiebinger, 2008; Oreskes and Conway, 2011). The scientific vocation, to whatever extent it provides the argumentative baseline whereby powerful actors can be held accountable for their deeds, is itself becoming a target of repression. Furthermore, evidence from the subfield suggests that corporate doubt-mongering is not limited to single, one-off cases of "product defence". The individual corporations lean on a supportive infrastructure, consisting of think tanks, PR-bureaus, astroturfed grassroots movements, evangelical churches, etc., whereby the individual tactics acquire a systematic importance. A signatory mark of neoliberalism, to borrow Luigi Pellizzoni's expression, is that it "governs through disorder" (Pellizzoni, 2011). The term puts emphasis on how the production of ignorance is being operationalised on a strategic and pre-emptive time horizon. By keeping the public in the dark about the correlation between, for instance, a pollutant and increased cancer prevalence in a district, or, CO_2 emissions and rising sea levels, corporations maximise their room for manoeuvre in an uncertain future space (Nerlich, 2010; Proctor, 2011).

Corporate doubt-mongering has a long history. In recent years, the elevation to public office of politicians who are openly hostile towards the environmental sciences, have brought public attention to the issue. Thus, the wilful production of ignorance has climbed higher on the agenda of the STS community as well. It was in this context that Sergio Sismondo endorsed ignorance studies in an editorial in the STS flagship journal *Social Studies of Science*, which set off the ongoing metadebate on post-truth.

For this endorsement, Steve Fuller took him to task, on charges of intellectual inconsistency:

> I find it strange that in his editorial on post-truth, Sismondo extols the virtues of someone who seems completely at odds with the STS sensibility, namely, Naomi Oreskes [...]. A signature trope of her work is the pronounced asymmetry between the *natural* emergence of a scientific consensus and the *artificial* attempts to create scientific controversy [...].
>
> (Fuller, 2017)

By reintroducing asymmetrical judgements between truth and falsehood, Naomi Oreskes and likeminded scholars in the subfield of ignorance studies were found guilty of smuggling the old, correspondence theory of truth through the back door of STS.[2] Fuller is himself a controversial figure within STS, but more centrally placed scholars in the field echo his misgivings. In her reflection on post-truth, for example, Shelia Jasanoff reiterated the same accusation against Oreske's scientism, be it *sotto voce* (Jasanoff and Simmet, 2017). The fact that Fuller and Jasanoff, two scholars of very different temperaments and inclinations, have found a common enemy in ignorance studies, underwrites my previous claim about the foundational status of the symmetry principle in the scholarly community to which they belong. Proponents of the co-production camp and the social epistemology camp protest as with one voice when this principle is being violated against (Lynch, 2018). Jasanoff politely abstains from teasing out the implications of her argument for Sergio Sismondo's conciliatory editorial. Fuller, quite to the contrary, directs his wrath against what he sees as intellectual inconsistency bordering on opportunism. In his opinion, Sismondo's position amounts to saying that the STS scholar should adopt the symmetry principle whenever he/she sympathises with the values of marginalised actors, while reserving the right for him/herself to judge validity claims asymmetrically, whenever he/she is in disagreement with the actors' values.

Pace Fuller and Jasanoff, I suspect that their charge against "scientism" only tells us half the story. There is something even more unnerving about the study of ignorance, than what they are letting on with this charge. Inquiries that foregrounds ignorance, or, with a more philosophically loaded term, "negativity" (Rappert and Bauchspies, 2014), is reminiscent of the tradition from which STS originates, namely the Marxist–Hegelian tradition of ideology critique.

It is noteworthy that, in the metadebate about STS and post-truth, which is centred on how vested interests feed the public with misinformation for private gain, there has not been a single reference to scholarship on ideology. The word "ideology" is barely uttered even in the Ignorance Studies-literature. In a 400-page *Handbook of Ignorance Studies*, the word

"ideology" is mentioned three times in passing, without any literary references being given or any sustained discussion of the term. The word is not indexed in Naomi Oreskes' and Erik Conway's seminal book, *Merchants of Doubt*. This lacuna could be interpreted in the same way as I previously argued that the absence of references to the "symmetry principle" in current STS literature indicates its foundational status to the scholarly community. It takes only a superficial acquaintance with the history of the field to write that possibility off. Marxism and intellectually related (if not always politically close) approaches in the "sociology of knowledge" – tradition (i.e. Karl Mannheim) was ousted from the STS canon in the intellectual skirmishes of the 1980s and 1990s, Bruno Latour leading the charge.

Latour's celebrated article on "critique having run out of steam", although stylised as a moment of self-doubt, is just a retake on his old rant against "critical critics", consistently upheld since *We have never been modern*. Written on the eve of the fall of the Berlin wall, he started the book with a congratulatory remark about the "old mole" having had its burrows collapsing in on himself (Latour, 1993; for a critique, see: Noys, 2014). Latour alluded to Karl Marx's metaphoric description of the subterranean class struggle that occasionally bursts out into the open, in the form of strikes, revolutions, and civil war. By whacking the mole and taking it for dead, Latour seconded Francis Fukujama's ill-fated prognosis of an end-to-history, which was announced at the same moment of triumphant liberalism. Alas, with the surge of post-truth and its corollary, right-wing authoritarianism, the mole is back.

What I want to add to the disciplinary history already existing about the "academisation of STS" (Martin, 1993) and the marginalisation of Marxist perspectives (Werskey, 2007) is the role that the symmetry principle played in facilitating this transition. It is old news that the symmetry principle and ideology critique mixes like oil and water. Ideology critique presupposes the possibility of distinguishing between states of consciousness that are more or less impregnated with ideology, and strives to go from the first state to the second (Eagleton, 1991). Theodor Adorno, in a reflection on his showdown with Karl Popper in the *positivismusstreit*, conceded to his opponent that critical theory too relied on the possibility of making factual, referential claims: "The study of ideology, of false consciousness, of socially necessary illusion would be nonsense without the concept of true consciousness and objective truth" (Adorno, 1976, p. 21).

Hence, the incessant critique against "correspondence theory of truth" and "scientism", double as so many attacks on ideology critique. An advantage with this roundabout way of attacking ideology critique is that when the target is supposed to be Science, the attacker can pass him/herself off as striking out from below against a more powerful foe. The arrogance and know-it-all-attitude of the scientific expert is destabilised by a symmetrical treatment of actors' knowledge claims. It is true that in the history of science studies, there have been attempts to combine symmetry with ideology

critique. Barry Barnes is a case in point. His attempt foundered on the internal inconsistencies of the synthesis, underwriting the incompatibility between the two approaches (Lynch, 1994). To most adherents of the symmetry principle, Latour, Lynch et al., it is an advantage that the dictum to be symmetrical rules out ideology critique-approaches. That being said, when the race was on to outcompete ideology critique-approaches, the nascent academic discipline of STS needed to match the normative claims of its non-academic rivals. As I will now show, the symmetry principle could be made to fit the bill.

Combining the symmetry principle with the pouvoir = savoir formula

It might now seem as if I am lining up behind the activist (but epistemologically naïve) low church branch of STS in a charge against the apolitical (but supposedly more sophisticated in terms of epistemology) high church branch of STS (Fuller, 1993a). If so, my argument could be waved off as outdated, since the word is out that the cleavage between the two churches has been closed (Sismondo, 2007). The "normative turn" introduced a more engaged approach to science studies. From that day on, Michael Lynch suggests, the STS community overcame the symmetry principle with its built-in liability to right-wing science denialism. This happened long before post-truth arose on the horizon. My take on it is that the normative turn was not such a decisive rupture with the past as Lynch and others would like to have us believe. Normative and descriptive stances joined hands in the symmetrical approach from the outset, although without being fully accounted for. As a first step in laying out my arguments, I will follow the perceptive critique of the "value-neutral relativism" of the symmetry principle that was put forward by Dick Pels a long time ago:

> In a field of unequally distributed symbolic power or symbolic capital, a symmetrical approach invariably subverts the dominant view, and strengthens the side of the weak and the marginal. Symmetry is often a 'cool' and detached way of siding with the oppressed. In this fashion, it still conspires with the established authority of value-free science, even while moving to attack it.
>
> (Pels, 1996c)

The symmetry principle combines neutrality in methods with partiality in outcomes. By treating the conflicting truth claims in a scientific controversy in a symmetric manner, the scholar leans in behind the epistemically disadvantaged actors (i.e. the non-scientist, laymen, patients, etc.). (Ashmore, 1996). Differently put, partiality is a secondary, incidental effect of the scholar's strict adherence to the descriptive approach. This double-sidedness of the symmetry principle allows the scholar to meet two incompatible expectations

on the social sciences: It must conform to value neutrality and objectivity, concurrently; it must lay claim to a normative-critical edge, which vouches for its societal and policy relevance. So far the arguments of Pels.

A piece in the puzzle is still missing. What the symmetry principle cannot provide on its own is a guarantee that the epistemologically disadvantaged actors are also the ones who deserve, morally and politically speaking, the help that they receive from the scholar's symmetrical intervention. The wider, normative significance of the symmetrical approach hinges on a supplementary assumption: The actors who lack epistemological authority are also the politically marginalised actors. This does not guarantee that the opinions of marginalised actors are sound and just, but their marginality suffices to warrant an "epistemological preferential treatment". By giving such actors more airtime, the total number of perspectives are increased. The pluralism of perspectives, not the content of any single opinion, vouches for the normative worth of the symmetrical intervention in scientific controversies. In this roundabout way, epistemic and cognitive values are linked to political and moral values. Pluralism in one sphere is supposed to engender pluralism in the other sphere too, and pluralism is taken to be a moral good (Mol, 2003; Marres, 2013, Tsing, 2017). In conjunction with this supplementary assumption, the symmetrical approach to scientific controversies automatically places the STS scholar on the morally righteous side of the divide, shoulder to shoulder with the weak and needy actors.

I elect to call this supplementary assumption the pouvoir = savoir formula, with a nod to its origin in Foucault's reading of Nietzsche in the aftermath of May 1968. Although there are other traditions within STS as well, it would be hard to overestimate the influence of this formula on the community, especially on the many derivatives of post-ANT thinking.[3] Its influence is detectable in the tendency, bemoaned by Collins, Weinel, and Evens in their critique of Sismondo and "second-wave STS" at large, to collapse the analytical distinction between discourses and practices specific to the scientific-cognitive sphere, and discourses and practices stemming from power politics. This is just an application of the formula's reduction of knowledge to power, or, which is the same thing, the reduction of epistemic authority to political influence. Such a reduction, effectively amounting to stipulating a necessary linkage between the two, is hard to square with the empirical sensibilities of much STS work. It would seem more fitting to adopt an agnostic stance in regards to when epistemological marginality translates into or is derived from political marginalisation. The identity between the two must be presupposed, however, before the empirical study commences. This is a prerequisite if the descriptive-neutral approach is to result in normativity as an unintended, automatic by-product. Without that assumption, the scholar would be required to do further articulation work on behalf of the marginal actors, in addition to adopting a symmetrical approach to contesting truth claims. A choice would have to be made by the scholar between an explicit normative stance or value neutrality.

Whereas the symmetry principle has been programmatically stated in bullet-point format and discussed at great length in the STS literature, its supplementary thesis, the pouvoir = savoir formula, has not been much elaborated on. Nor has the relationship between the two been elucidated. I deduce the pouvoir = savoir formula from what must be assumed, for the symmetrical intervention to *automatically* result in a normatively charged position. My claim is that the two in combination make up a widely shared, backdrop assumption for many case studies conducted in the STS field. The formula is not so much argued for as made to look self-evident. This is achieved by the narrowness in the selection of the empirical case studies. In studies where medical or scientific authority clashes with, for instance, the perspectives of marginalised groups, such as, indigenous people, ethnic minorities, the mentally impaired, etc., all the privileges line up on one side, and all the disadvantages fall on the opposite side. That is to say, one party in the scientific controversy is simultaneously disadvantaged in terms of epistemological authority *and* in terms of political influence.[4] In the face of such examples, it appears self-evident that actors assert their dominance over less powerful ones through the exercise of "epistemic authority". By piling such cases on top of one another, the impression is reinforced that knowledge is reducible to power and nothing but power, leaving no residual of truth behind.

This rhetorical strategy backfires at the moment of post-truth. The media attention given to climate change deniers, advocates of Intelligent Design, opponents of vaccination programs, etc., has as if in a flash of lightning exposed the narrowness in the selection of cases that have been studied. The "basket of deplorables" are uniquely placed in the metadebate on STS and post-truth because they personify the divergence between, on the one hand, a weak, epistemic authority in their chosen, scientific dispute, and, on the other hand, having political influence, in the form of allies, economic resources, ethnic privileges, and organisational capacities.

This can most clearly be seen from the phenomenon of "astroturfing". The word stems from a commercial brand of plastic grass, but it has acquired the secondary meaning of describing how grassroots protests and social movements are manufactured by vested interests to serve as public fronts (Cho et al., 2011). In the case of astroturfing, epistemologically weak actors are not politically strong in themselves, but they are in the service of some of the most influential and resourceful actors in the world. This observation overturns the pouvoir = savoir formula. Lack of epistemic authority is no guarantee of the moral righteousness bestowed upon the politically weak. Quite to the contrary, weakness in epistemological and cognitive capacities is precisely what make these actors susceptible to being enrolled in political agendas not of their own making. The stipulated identity between epistemic authority and political influence, between knowledge and power, turns into a trap. If the STS scholar suspends his/her own judgement in favour of following the epistemologically weakest actors in a scientific

controversy around, under the auspice that their marginality will suffice as a moral warrant for the scholarly intervention, then the scholar runs the risk of becoming astroturfed along with them.

Astroturfing points to the more general problem of "heteronomy". It was the main preoccupation of political-philosophical thinking in the enlightenment tradition, from Kantianism to Marxism and everything in-between. Heteronomy designates a generalised lack of self-determination or *mündigkeit*, following from the incapacity of an individual or a group to rely on one's own faculties of judgement. The anti-thesis of heteronomy is autonomy. In the (neo-)Kantian tradition, emphasis is put on the individual's cognitive and moral autonomy stemming from his/her capacity to reason through argumentative propositions and factual claims. In Marxism as well as in various schools of sociology of knowledge, autonomy refers to a collective subject achieving self- and class consciousness through labour, reflection, and/or struggle. These important differences aside, Kantians and Marxists and everyone in-between share a positive evaluation of autonomy, and a corresponding wariness about heteronomy. This directs the analyst's attention to the framing conditions of the subjects' worldviews and self-understanding. From which follows that in the enlightenment tradition, relations of domination and bondage are typically associated with the "gaslighting" of the public's capacity to reason and debate issues (through censorship, religious superstitions, illiteracy, fascist myth-making, etc.).

The pouvoir = savoir formula inverts the positive valuation of the linkage between knowledge and power into a negative judgement. Expanding the knowledge base equals amassing power, here understood in the pejorative sense, as domination, subjugation, self-disciplining…etc. This was a direct affront against the political and philosophical outlook of the old left. Nevertheless, the French interpreters of Nietzsche could portray their newfound stance on critique as being in keeping with the older, Republican-leftist tradition of denouncing the powers-that-be. The twist was that the powers here being denounced resided in the communist party and the (party) intellectual.[5] The aspiration of the intellectual-turned-critic to know the actors-workers better than they knew themselves was the textbook example of how knowledge claims disguised a will-to-power.

This is where the symmetry principle was called in. In levelling all truth claims to the same, equal plane, a symmetrical approach first and foremost denied the analyst a privileged access to the world, whether that be through speculative or a priori synthetic concepts, classificatory categories, statistical methods, or modelling. This remains the cleavage running right through the different schools within the STS community, as well as in many other disciplines within the social sciences: on the one side, schools of thought whose normative thrust presupposes the explicatory power of concepts and categories, and, on the other side, those schools of thought whose critical edge consists in renouncing such an analytical procedure. The turn towards normativity did little to close this divide. By renouncing concepts,

the analyst deprives him/herself of the right to appoint whom among the actors are the knowledgeable ones, and who are the beguiled ones. The symmetry principle and the pouvoir = savoir formula fit together like two pieces of a jigsaw puzzle. In combination, they ban ideology critique-approaches, while all the same placing a competing bid on the critical and normative high-ground.

French structuralism and Nietzschean perspectivism against Ideology critique: the pre-history of STS

In the following section, I will elaborate on the claim above that the coupling of the symmetry principle with the pouvoir = savoir formula originates in the intellectual milieu from which the nascent STS field emerged, i.e. Marxism. As I have shown elsewhere, ANT was an offshoot of a branch of French epistemology, most notably, Althusser's Structuralist Marxism (Söderberg, 2017; Massimiliano, 2018). It might come as a surprise to hear that scholars working in the post-ANT-tradition, who typically only mention "Marxism" to debunk it (Whatmore, 1999), would be the intellectual heirs of the author of *The Ideology and Ideological State Apparatuses*. In fact, back in the days, the Althusserians were as hostile towards ideology critique-approaches among their fellow Marxists as the Latourians are nowadays. What they understood with this term was "subject philosophy", "idealism", or, "humanism", so many names for the same, metaphysical fallacy (Descombes, 2004). The appeal of structuralism consisted precisely in that it rendered superfluous all references to the anthropocentric notion of (human) consciousness. It was thus the Althusserians convinced themselves that they were in the business of doing science, as opposed to producing ideology.

The political upheavals of May 1968 left structuralism answerless, as it had no vocabulary for sudden, historical transformations. To overcome the impasse, the French scholars (formerly structuralists) took cues from Nietzsche and Heidegger, and reinvented themselves as post-structuralists (Ferry and Renaut, 1988). Some of the key, structuralist tenets were overturned in the process. Structuralism stipulated a permanence of structure behind the kaleidoscopic surface phenomena, accessible to the theorist through a structural (scientific) analysis. In contradistinction, post-structuralism asserted the omnipresence of contingency, from which it followed that the analyst could not support his/her claims in any foundation. Under the guidance of Nietzsche's genealogy, the post-structuralists rendered the permanence of the structure contingent, and, drawing on Nietzsche's perspectivism, they replaced the single structure with a multiplicity of unresolvable, warring viewpoints. What remained constant throughout this metamorphosis, however, was the hostility towards subject philosophy. The ex-students of Althusser, most notably among them, Michel Foucault and Michel Serres, were as strident on this point as their old teacher had been (Kelly, 2014).

Under the increasingly influential discourse of anti-totalitarianism in the late 1970s, the denouncement of the subject became a philosophically coded language for denouncing (Hegelian) Marxism and the associated, "old left" political strategy, to seize state power through mass party mobilisation (Christofferson, 2004).

The common denominator of structuralism and post-structuralism, i.e. anti-humanism, circulates under a different name in ANT. It is known as "generalised symmetry". It prescribes a generalisation of the symmetry principle to humans and non-humans. Just as the analyst must not explain the outcome of a scientific controversy with reference to the correctness or falsity of one or another hypothesis, the differentiation between who is a human being and who isn't must not be allowed to influence the analyst's explanation of social phenomena. This is a cleaver reformulation of the time-honoured dogma in mechanic-materialist philosophy (as well as in behaviourism, cybernetics, etc.) of denying any explanatory, causal force to consciousness, the hallmark of human beings. According to the Althusserians, the epiphenomenon of human consciousness was "interpelled" into existence by (oppressive) state structures. Althusser had famously illustrated this with the police hailing a passer-by in the street. In the language of ANT, it is the emergent effects of the network that are being mistaken for intentionally acting, human beings. This provides the right context for making sense of the trenchant opposition of Latour and his followers to the use of overarching concepts, social facts, categorisations, etc. (Mills, 2018). Concepts are the mirror projections of the cogito. Both stem from the same metaphysical notion of the subject, the sworn enemy of anti-humanists of all colours, whether Marxists or not.

I grant that the ANT scholars did not address this philosophical foe when they called for a generalisation of the symmetry principle. The sharp end of their argument pointed at sociologically inclined, fellow STS scholars. The key debate, which became known as the "Chicken-debate", centred on the explanatory power of theoretical concepts of the sort made use of in sociology, such as "class", "society", etc. It was with those concepts that the proponents of the Strong Programme and Sociology of Scientific Knowledge (SSK) sought to relativise the validity claims of the natural sciences. The restricted application of the symmetry principle to scientific validity claims unfolded within the interpretative framework that the sociological concepts had made available to the analyst. The way SSK approaches the sciences is reminiscent of how structuralist anthropology interpreted the religious belief system of pre-modern tribes as an interrelated, systemic whole, without passing any judgement on the correctness or falsity of the individual, propositional statements (the question whether or not the totem animal actually has the causal powers that the tribal members ascribe to it is never discussed in the anthropological study). A recurrent problem with structuralism is that it lacks the theoretical means to account for the place of the analyst within the interpretive framework. Just as post-structuralism had

done in relation to structuralism before, the proponents of ANT seized on this omission in SSK by playing up the lack of reflexivity. They demanded that the validity claims of sociology were relativised in the same manner as the validity claims of the natural sciences had been before. The generalisation of the symmetry principle to include the cogito of the analyst, i.e. his/her interpretative framework, served to destabilise the explicatory force of sociological concepts. The call for reflexivity served to pull the rug from under the analyst's feet. The call for a "generalised symmetry" between humans and non-humans was an innovative reformulation of post-structuralism's trademark sign, anti-foundationalism, of which we have innumerable more examples in neighbouring disciplines (for an account of implications of cybernetic generalised symmetry in the field of legal rights, see Rommetveit and Van Dijk, this volume).

The political ramification of the anti-humanist challenge to the explanatory force of concepts becomes evident from a spin-off debate over the contested legitimacy of "interests". The concept of "interest", and, more to the point, "class interest", was mobilised in the Marxist-inspired Edinburgh school of STS to explain the different standpoints taken by actors in scientific controversies (Shapin, 1975). Steve Woolgar protested that such an analytical procedure relied on a stable backcloth of identities and interests (Woolgar, 1981). Marc Berg applied the same critique to the subfield of workplace studies, thus bringing the challenge to the home turf of the Marxists. By questioning the stability of the class interests of the employee, and, by implication, of the employer, Berg suggested that the antagonistic relation between the two was contingent. Factory automation must not be taken to be contrary to the interests of employees, he argued, because those interests are remade together with the identity "worker" in an ever-shifting, socio-technical configuration. In passing, it can be noted that this is just a cleaver reformulation of the argument that generations of engineers have had on their lips when introducing new, cost- and labour-saving, factory machinery (Berg, 1998). The rhetorical strategy of ANT scholars takes the anti-humanist argument wholesale but supplements the word "subject" with "interest". Many other names, "purpose", "intentionality", "a priori reasoning", "scheming", etc. can be inserted in the same place, ready to be debunked for its anthropocentric fallacy, that is, the fallacy of assigning explicatory and causal force to human consciousness. When the analyst has barred him/herself from doing so, he/she concurrently expels from the analysis any reference to *adverse* interests, which is to say, to class antagonism and class struggle.

This is of outmost importance to the metadebate on how STS should respond to post-truth. The key point of ignorance studies, namely that vested interests are deliberately keeping the public in the dark about scientifically proven correlations (between tobacco and cancer, CO_2 and global warming, etc.) sounds to the present-day anti-humanist as a relapse into metaphysical error. Having banned references to intentionality, what remains to

be studied is "generalised ignorance", now encountered as a meaningless, random complexity, or, if Althusser's terminology is preferred, as "aleatory materialism". Another word for the same thing is "multiplicity."

The word "multiplicity", much beloved in present-day STS lingua, puts a positive spin on what was formerly known as "heteronomy", or unfreedom. The attempt to bring the multiplicity of chaotic sense data under a single concept, whereby the subject can start to make sense of itself and its place in the world, is denounced by the anti-humanist scholars as a vain, paranoid striving for control and domination. The Althusserians made this argument in a highly convoluted and abstract, theoretical prose. Present-day STS scholars prefer to advance their arguments with "thick description", but the argumentative core remains the same. To illustrate my claim with a recent classic in the STS canon, consider Anna Tsing's book *The Mushroom at the End of the World*. The following statement by her is representative of the genre: "Twentieth-century scholarship, advancing the modern human conceit, conspired against our ability to notice the divergent, layered, and conjoined projects that make up worlds" (Tsing, 2015, p. 22; for an older classic, see: Mol, 2003).

It was by dissolving the binary distinction between truth and falsehood into a multiplicity of viewpoints that Foucault, following Nietzsche, took up arms against the tradition of ideology critique.[6] The asymmetrical treatment of actors' validity claims in the ideology critique tradition is inseparable from the notion of "false class consciousness". Furnished with a privileged, theoretical perspective on capitalism, the Marxist scholar claimed to be able to know the "objective class interests" of the workers better than they knew themselves. It was the epistemological authority of the vanguard party intellectual that Foucault had in mind, when he demanded that all knowledge claims should be flattened to the same (symmetrical) surface plane.

Although the vanguard party intellectual is forgotten about today, he was a towering figure in the intellectual milieu from which the "Paris school of STS" emerged. The run-of-the-mill polemic in STS literature against scientific and medical expertise, typically portrayed as paternalistic and arrogant towards laymen, patients, etc., is a secularised version of the New Left's affront against the vanguard party intellectual. By letting the scientist and the medical doctor take the place of the Marxist-Leninist party intellectual, a critique against positivism is grafted onto the argumentative line of attack whereby anti-humanism sought to disband subject philosophy and humanism. This is to underline the claim that I made initially: the rehearsal of the old standoff between relativism and realism has led the metadebate on STS and post-truth astray. Hence, the warning issued by many senior and recognised STS scholars that fact-checking initiatives and studies of ignorance heralds the return of scientism, is doubled by another anxiety: post-truth is stirring up a repressed memory from the childhood of STS: the return of ideology critique.

Conclusions

Steve Fuller challenges fellow STS researchers to "walk the talk" by declaring their support for the right-wing, populist science deniers who are echoing the relativist tenets of the academic discipline. Without reservation, Steve Fuller endorses what he calls "credential libertarianism", a free-for-all-land where individuals have to learn to navigate the biochemical hazards of living under post-truth conditions (Fuller, 2018).[7] In the bewildering multiplicity of knowledge claims unleashed by the "democratisation" of scientific expertise, vitamin cures for cancer, global cooling, Pizzagate, etc., the reactionary and anti-egalitarian politics of Nietzsche come home to roost (Ferry and Renaut, 1997). It should give pause for thought that although Fuller's epistemological proclivities are widely shared in the STS community, no one is willing to follow in his footsteps. The right conclusion to draw from this reluctance is that the talk should be adjusted to the walk.

A first step towards such a normative reorientation of the STS community is to recognise that behind the charges leveraged against the subdiscipline of ignorance studies for having smuggled "scientism" and a "correspondence theory of truth" through the back door of STS, another and a very deep-seated worry lurks, namely, that ignorance studies will put ideology critique-approaches back on the agenda of the STS community.

There is a historical precedent for conflating scientism with ideology critique-approaches. In the process of making STS academically respectable, the legacy of Maoist populism, still upheld by Foucault and his comrades in *Le Groupe d'information sur les prisons* (Hoffman, 2012), was secularised as a critique of scientific expertise. Instead of denouncing the vanguard party intellectual of the French communist party (PCF), the same critique was thrown at the scientist, the medical doctor, the sociologist, etc. Instead of extolling the worker or the prisoner, it was the knowledge of the lay expert that was celebrated in paper after paper on citizen science, dialogue panels, patient activism, user innovation, etc. The shortcomings of this stance had been identified *avant-la-lettre* in 1937 by Max Horkheimer. He made the following remark in a paper where he drew up the demarcation line between traditional theory and critical theory:

> The intellectual is satisfied to proclaim with reverent admiration the creative strength of the proletariat and finds satisfaction in adapting himself to it and in canonising it. He fails to see that such an evasion of theoretical effort (which the passivity of his own thinking spares him) and of temporary opposition to the masses (which active theoretical effort on his part might force upon him) only makes the masses blinder and weaker than they need be (Horkheimer, 2002, p. 214).

The words of Horkheimer speaks directly to our present situation and the steady stream of news reports on corporate doubt-mongering, post-truth

politics, the gaslighting of the public, etc. What passes under the name of "post-truth" is an intensification of the class struggle linked to steadily deteriorating ecological and geopolitical conditions. The right response to the current deterioration of democratic politics is to go back to STS half-forgotten roots in ideology critique. In this intellectual tradition we can find the theoretical resources for steering a middle path between the Scylla of scientism and Charybdis of science denialism. This obliges us, however, to give up on the symmetry principle and the pouvoir = savoir formula. Ideology critique-approaches hinges on the possibility, indeed, the inevitability, of passing asymmetrical judgements on knowledge claims. Concepts such as "heteronomy", "false class consciousness" and "objective class interests" needs to be salvaged and updated to relevant contexts. From which follows a partial restoration of the epistemological authority of the vanguard party intellectual, whatever that can mean in the absence of a workers' party. I willingly concede that those concepts and roles are problematic. That being said, the attempts to give up on explicatory concepts and to submit to the generalised symmetry principle has not meant that the STS scholar has relinquished his/her prerogatives as a critic and scholar. The right course of action is to acknowledge the epistemic authority invested in this position by society and assume the responsibilities towards the public that comes with it. When facing up to its "moment of post-truth", the STS community can take a cue from Simone de Beauvoir: "Truth is one, only error is multiple. It is no accident that the right professes pluralism" (de Beauvoir, 1956).[8]

Notes

1 For one such example where Lynch reprimands a rather modest proposal to use description in the service of social critique, see: (Bogen et al., 1990). For a reply to Lynch, see: (Pels, 1996b). For a more general critique of Lynch's stance, see: (Lynch and Fuhrman, 1992).

2 For a debate between Steve Fuller and Naomi Oreskes on this issue, see: (Oreskes and Baker, 2017). On the reception of Naomi Oreskes and Erik Conway within the STS community, see: (Radin, 2019).

3 John Law, for instance, writes: "[…] 'actor - networks' can be seen as scaled - down versions of Michel Foucault's discourses or epistemes" (Law, 2008). The Clausewitzean dictum in science studies of treating science as if it was nothing but politics is commonly traced back to the Nietzschean-Foucauldian genealogy of power/knowledge. (Pels, 1995).

4 This argument harks back to Alvin Gouldner's perceptive critique of the "underdog metaphysics" of the Chicago school sociologist Howard Becker (Gouldner, 1968). The applicability of his critique to large sways of the STS field has been noticed before (Fuller, 1993). That being said, underdog metaphysics has spread far and wide in the social sciences.

5 The polemic by Foucault against the (Soviet-loyal) party intellectual, was spurred on by a tide of Maoist populism (Khilnani, 1993). Accordingly, the Maoist method of doing factory worker – and prison inmate – inquiries can arguably be described as an *avant-la-lettre* follow-the-actor-approach.

6 A very long list of quotations could be marshalled to back this statement up. One will have to suffice: "The notion of ideology appears to me to be difficult

to make use of […] Now I believe that the problem does not consist in drawing the line between that in a discourse which falls under the category of scientificity or truth, and that which comes under some other category, but in seeing historically how effects of truth are produced within discourses which in themselves are neither true nor false. […] I think that this is a notion that cannot be used without circumspection" (Foucualt, 1980, p. 118).

7 To get an idea of what kind of "risks" that Steve Fuller is alluding to, as he, prudently enough, refrain from spelling them out directly, we may refer to Arlie Hochschild's ethnographic study of how life is coped with in the "cancer belt" of the US (Hochschild, 2016).

8 Quoted in: Luc Ferry and Alan Renaut (1990) "Preface to English Edition" *French Philosophy of the Sixties: An Essay on Anti-humanism*. Amherst: University of Massachusetts Press, p. xiii.

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Part 2
Inquiries

4 Post-truth dystopia

Huxleyan distraction or Orwellian control?

Darrin Durant

Introduction

What is "Post-Truth"? I argue that post-truth is a Huxleyan moment in the intensification of alt-fact discourses, in which vaudeville entertainment, propped up by partisan thought-bubbles and framed by allegiance superceding evidence, morphs into gaslighting. This picture of post-truth stems from a sociological bet, building upon Neil Postman's *Amusing Ourselves to Death* (1985), that we live in a society more like the dystopia of Aldous Huxley's *Brave New World* (1932) than the dystopia of George Orwell's *Nineteen Eighty Four* (1949). Contemporary right-wing authoritarians certainly make Orwell's warnings deeply relevant, but I suggest we live in a world of Huxleyan distraction more than Orwellian indoctrination. Moreover, Huxley explained distraction as a cultural product not just a capitalist product, granting Huxley's warnings more scope than stories describing capitalism's instruments for distracting and pacifying the masses (like Guy Debord's *Society of the Spectacle* (1967)). Crucially, the Orwell/Huxley contrast allows us to see how control relations can differ in dystopias. For Orwell, control is achieved through externally imposed oppression, information deprivation, and the concealing of truth. For Huxley, control is achieved through coming to love one's oppression, information overload, and flooding discussion with irrelevancies and trivialities. Although both Orwell's and Huxley's dystopic visions foretold salient elements of modern political culture, Huxley's concerns are more informative about the character of our post-truth age. Huxley's focus on politicians as entertainers reveals more than Orwell's focus on politicians as deceivers, and Huxley's focus on trivialisation reveals more than Orwell's focus on repression. I also elucidate two specific mechanisms of post-truth dynamics that stem from thinking we live in Huxley's dystopia not Orwell's. The first mechanism is the way fragmentation obscures incoherence (illustrated by Australia's 2016–2019 deliberations about whether to build nuclear reactors to address climate change). The second mechanism is the way culture becomes burlesque, draining the seriousness and spirit out of the elements and factors that feed into political discussion (illustrated by political

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responses to South Australia's electrical blackout in 2016 and subsequent carbon carry-over credits debates).

Two features of post-truth help explain its diverse implications. One, post-truth discourses are intimately tied up with fears about relations of control. The types of control relations and their targets vary per discussant, resulting in high normative variance in understandings about post-truth dynamics. Two, post-truth overlaps with political populism. Some treat populism as a benign process of re-politicising issues and thus ameliorating political exclusion (Laclau 2005; Mouffe 2018). By contrast, I treat populism critically as an anti-elitist, anti-pluralist adulation of the common people (Muller 2017; Mudde and Kaltwasser 2017; Durant 2018, 2019a; and see the book-length discussion in Collins, Evans, Durant & Weinel, *Experts and the Will of the People* (2020)). More generally, assessments of the social utility of post-truth will mirror different ideas about collective goods and what might challenge them, and our response to post-truth will reflect assessments about the distribution of responsibility for post-truth. Some thus emphasise an evenly spread complicity – both the alt-right and progressives are equally to blame – in fostering post-truth (Gray 2017; Jasanoff and Simmet 2017). The absurd political naivety of such self-admonishments is the lesser sin here. Worse still, progressives end up playing the same unwarranted social levelling card as the alt-right - an example being the then-President Trump saying there were good people on both sides of the August 2017 Charlottesville neo-Nazi demonstration (Blake 2019) - only in inverse fashion (we are all bad). Comedians provide a better guide, as they confront live on stage the fact that responding to life-worlds powered by filter bubbles requires "messy, stranger, more unmoderated conversations" (Safran, interviewed in Koslowski 2019). Taking my cue from the comedian, I intend to engage post-truth via a messy and unmoderated conversation, splattered across four sections.

In section two, I show that Orwell's *1984* and Huxley's *Brave New World* constituted overlapping warnings about futures-to-be-avoided and thus help illuminate the social dynamics within which contemporary post-truth discourse dwells. In section three, I discuss a tendency within general audience books on post-truth and within my own field of Science and Technology Studies (STS) to view post-truth through the lens of Orwell's threatened dystopia. I nevertheless use and build upon Postman's *Amusing Ourselves to Death* (1985) to frame an answer as to why Huxley is the better guide if we wish to grasp post-truth politics. In section four, I introduce empirical vignettes to illustrate two features of political culture that are Huxleyan in tone: the dangers of a fragmented, and a burlesque, political culture. In my concluding fifth section, I speculate on resources useful for guarding against post-truth as information overflow (Huxley) not information diminishment (Orwell). I suggest we attend to processes of intensification (see Pellizzoni 2016), to the side of democracy that closes down not just opens up issues, and to the possibilities for reimagining authority relations as supportive not undermining of democracy (see Moore 2017).

Reading Orwell and Huxley

I first recount the stories told by Orwell and Huxley. Next, I analyse their different control mechanisms, namely Orwell's grim constriction and Huxley's entertaining proliferation, and the enduring applicability of both dystopic visions.

Orwell versus Huxley

Orwell's *1984* is set in Airstrip One (a province of Oceania) and dominated by the ideology Ingsoc (English socialism). Winston Smith works for the Ministry of Truth, rewriting history, but secretly hates the Party. If you fall foul of the Party, you become an "unperson". Winston rebels by getting involved with fellow employee Julia, whom he suspects is an informant. They start an affair after Julia hands Winston a simple note reading "I love you". Winston's superior is O'Brien and Winston suspects O'Brien to be a secret agent for the resistance movement (The Brotherhood). O'Brien offers Winston a chance to join The Brotherhood and Winston and Julia do so. Unfortunately, O'Brien is part of a sting operation "thoughtcriminals". Over several months, O'Brien tortures Winston to cure Winston's insanity and coerce him to believe the Party line, even if it means believing 2 + 2 = 5. Although O'Brien informs Winston that after re-programming, he will be released, only to be executed a little later, Winston says at least he has not betrayed Julia. But soon after O'Brien takes Winston to the final stage, Room 101, where you confront your worst fears. For Winston, that is rats. A cage of rats is lowered onto Winston's head, but he yells "do it to Julia". Julia later reveals she also betrayed Winston. Winston thus realises the Party has even managed to take away their love. Winston eventually "realises" that he loves Big Brother, because he can celebrate Oceania's victory over Eurasia in Africa.

Two features of *1984* are worth highlighting. First, some characters are constituted by the acts of referring to them rather than their actual manifestation. We never meet Big Brother (the leader) nor the resistance leader (Emmanuel Goldstein). Nor do we meet the enemy of the people railed against during the televised Two Minutes of Hate (where subconscious feelings of angst are re-directed away from Oceania and towards external enemies). Second, everything fits: deceptions are temporary, so discordance is minimal; the plot quickly settles around clear and consistent roles; and outcomes are frightening but go to plan.

By contrast, in Huxley's *Brave New World*, no character is shadowy, and nothing fits perfectly. The story is set in a future World State where advances in reproductive technologies, psychological manipulation, and classical conditioning have created a pre-defined social hierarchy. The World State is built on the principles of Fordist production: homogeneity, mass production, and consumption of disposable goods. Citizens are engineered in vitro, and, from birth, classes are indoctrinated by recorded voices

reading slogans saying their own class is superior but other classes perform needed functions. Residual unhappiness is treated by soma (an antidepressant). The novel opens in London 632 AF (After Ford; or AD 2540). The story turns on the alpha-plus Bernard Marx, who has an inferiority complex because he is shorter than average after an alcohol accident with his blood-surrogate pre-decantation. Bernard has incomplete conditioning. He is cowardly, hypocritical, and does not enjoy communal sports, solidarity services, or promiscuous sex. Bernard even dislikes soma. Bernard's love-interest is Lenina Crowne, a beautiful foetus technician who is part of the 30% of the population not infertile. Lenina is typical in enjoying promiscuous sex and soma. Bernard and Lenina holiday outside the World State in the unrefined New Mexico Reservation. There they encounter Linda, a former beta-Minus, who had been on holiday there and fell pregnant to the Director of Hatcheries and Conditioning. The offspring of that union, the abandoned-by-his-father John the Savage, and the promiscuous Linda, are both outsiders on the Reservation. Bernard and Lenina relocate Linda and John to the World State. The novel is the fallout from this decision.

John the Savage becomes a celebrity in the conformist World State, by virtue of not fitting in. Initially optimistic and excited to relocate to the World State, John then misses the disease, dirt, and free will of the Reservation. John is soon confronted by one of the World Controllers, Mustapha Mond, who tries to convince John that people will believe what they are conditioned to believe, and that soma is the appropriate treatment for unpleasant things. Yet John rejects a perfumed world where nothing costs enough and there is no value placed on hard work and sacrifice. Mustapha presents a worldview where traditions are the enemy of innovation, and only newness is valued. Mustapha explains to John that beautiful things, including great works of art, literature, and science, tend to last. But a consumerist society demands new things and, if newness is to trump intrinsic value, achievements beyond local consumptive moments need to be suppressed. Importantly for understanding modern post-truth, Mustapha considered science "subversive" and in need of corralling (Huxley 1932, 231), indicating Huxley saw anti-science as an instrument in the pacification not enlightenment of citizens.

Although Huxley's citizens thus lived and consumed in a context of open information about their personal relations and social roles, such information proliferation is treated by Huxley as designed to overwhelm citizens and intensify their emotional conflicts. Consider the uncomplicated (if ultimately unsuccessful) love Orwell depicted between Winston and Julia, and the ultimately accommodating outcomes as Party wins over Resisters. By contrast, the relations of love, friendship, and citizen–state central to Huxley's story are relations of frayed edges and partial accommodations. For instance, John the Savage is physically attracted to Lenina but finds her promiscuity socially repulsive, because he was educated by reading Shakespeare's romances. Bernard is John's custodian but becomes jealous of John and Lenina's mutual attraction, and of John's friendship with Bernard's friend Helmholtz Watson. While Linda starts taking soma to build a wall between herself and the angst

caused by relocation, John and Lenina completely fail to understand each other's social and sexual norms despite almost complete information about each other. When Linda dies, John attacks onlookers who refused to mourn, their emotional connection to tragic outcomes desensitised by soma. Is this like our current `living with Covid' mantra, the drug of an open economy desensitizing many to the death that follows the contours of existing inequalities? The resident controller ultimately expels Bernard and Helmholtz to islands for their antisocial activity, for they aided John's rebellion and let their own dispositions to the manners of their society become maladjusted. Helmholtz is happy to finally face some physical discomfort, but Bernard the misfit protests his exile because he had come to enjoy the popularity of being the custodian of a celebrity. The resident controller refuses John's request for exile, so John retreats to a hilltop. Crowds gather to watch John's bizarrely reclusive lifestyle, including whipping himself. Lenina arrives to watch and, while John had previously assaulted Lenina for wanting sex without love, now he launches a fresh, frenzied attack on her with the whip, fueled by the soma-induced voyeurism of the crowd. The novel ends when we learn that John had hung himself the following morning.

But the ending of Huxley's story was really the depiction of the audience in the final few pages. The audience had soaked up John's madness as a form of entertainment. Is that like contemporary post-truth social dynamics, participating in the frenzy of factual contestation as a form of entertainment? When we make civic engagement entertaining, does that ameliorate the stress of democratic contestation in the short-term, but in the long-term trivialise and disempower citizen engagement? Democratic engagement can be much tougher and more difficult than fuzzy utopian invocations of universal participation typically allow. Mark Warren (1996a) thus argues that the "complexity, size, and scale … [and the] … differentiated, pluralized, and extensively politicized" (242) nature of industrial-capitalist democracies creates the conditions for the "social groundlessness of political space" (243). That social groundlessness consists of all the inter-personal discomforts occasioned by civic debate. Yet as our factual debates become fragmented by the modern proliferation of epistemic viewpoints, with their easy travel across digital networks and entrenchment in echo chambers, it seems like everyone is watching gleefully as factual testimony becomes a combat sport. Huxley himself was certainly concerned about the relaxation rather than enforcement of standards, and the way audience engagement can hype such loosened standards into trivialisation not seriousness. Or, as Huxley wrote to Orwell when reviewing Orwell's book:

> Whether in actual fact the policy of the boot-on-the-face can go on indefinitely seems doubtful. My own belief is that the ruling oligarchy will find less arduous and wasteful ways of governing and of satisfying its lust for power, and these ways will resemble those which I described in *Brave New World*.
>
> (Huxley 1949)

Orwell and Huxley

An important caveat here is that the two dystopic visions ultimately comprise overlapping warnings. The two sets of warnings do differ systematically, but both warnings remain applicable to the modern condition.

Orwell's warnings can be conceptualised as three forms of grim constriction. One, Newspeak, involving deliberately contradictory speech-terms that are used to narrow and obfuscate the *range* of thought. Two, information deprivation; to narrow and obfuscate the *subjects* of thought and dominate their meanings, whether that be through conscious deception, deliberate lies, the blunt reversal of facts, or blatant acts of selection to privilege one interpretation. Three, the repression of individuality, sexual intimacy, and emotion, to push the passivity of citizens to their limit. By contrast, Huxley's warnings can be conceptualised as three forms of entertaining proliferation. One, the immediacy of the moment becomes the entire field of experience, symbolised by art and science being considered dangerous unless tied directly to immediate problems. Two, information overload, often via entertaining distractions, lulls citizens into egotism and passivity. Three, overindulgence, with sexual promiscuity and varied personal experiences hyper-extended to render citizens infantile (and anxiety about contradictory experiences and knowledge is narcotised by the citizen consuming soma).

Orwell's warnings of course remain salient. Orwell wrote of Big Brother as a leader that never appears but through a cult of personality and strict control over bureaucratic agencies exerts dictatorial control over Oceania. Contemporary focus is on Trump in America since 2016–2020, gutting federal agencies and using personality politics to undermine democracy (Johnston 2018). Yet the drift towards autocratic rule has been underway for quite some time. Dictators have ruled over most of the African continent since the mid-1800s (Kenyon 2018). Egypt had overthrown authoritarian rulers in the Arab Spring of January 2011, only to return to authoritarianism by 2013 (Fahmy and Faruqi 2017). Political populists with the hallmarks of would-be autocrats have been assuming power in democracies, such as Victor Orban in Hungary, Recep Tayyip Erdogan in Turkey, Rodrigo Duterte in the Philippines, Hun Sen in Cambodia, Nicolas Maduro in Venezuela, and Jair Bolsonaro in Brazil (Mounk 2018). Meanwhile the openly authoritarian China, under Xi Jinping, exports autocratic management in the form of its "one belt, one road" infrastructure loans programme. The other Communists (the Soviet Union) had collapsed in the late 1980s and flirted with democracy yet, when Vladimir Putin came to power in 2000, he re-established authoritarianism (Gessen 2017). Putin's Russia set about attempting to destabilise Western democracies through digital warfare, including fake news cyberwar during the UK Brexit vote of 2016 and Trump's presidential election run of 2016 (Snyder 2018).

The way such online disinformation and misinformation are mobilised seems eerily reminiscent of Orwell's depiction of Oceania, Eurasia, and Eastasia engaged in perpetual war; sometimes attacking "the other", and

sometimes launching domestic attacks and blaming "the other". Of course, Orwell famously described how Winston became convinced that 2 + 2 = 5, so that domestic war included the policing of thought itself and especially politically unorthodox "thought-crimes". Tellingly, the debate over political correctness tells us that – aside from the fact that right-wing conservatives successfully captured and inverted the left-wing progressives' concerns about speech and social problems – everyone wants to prosecute someone else's thought-crime (Sparrow 2018). Moreover, a foretelling of modern internet trolling and viral outrage (Reagle 2016) is Orwell's televised "two minutes of hate", when citizens would vent their rage and it was impossible for anyone not to join in. Trump, as we know, replicated the move, inciting his supporters to chant "lock her up" during the 2016 primaries run-off against Hillary Clinton, "send her back" in 2019 references to four non-White democratic Congresswomen, and of course "stop the steal" as his supporters stormed the US Capitol building in 2021 after losing the 2020 election. Like Orwell's two minutes of hate, the point of the chants is to incite hatred against an abstract other than needs to be eradicated (Hesse 2019). Orwell's worries thus find resonance in our political times, but also our cognitive times. Orwell worried about an assault on the idea of truth, to the point where the very possibility of a distinction between truth and lie is erased. Some concur, arguing we are witnessing an attack on the very idea of established knowledge (Nichols 2017).

But as befits my purpose in this chapter, Huxley is as salient as ever. Huxley depicted promiscuous hedonism as reflecting a strategy within broader power relations to enact painless consensus. The contemporary sexualisation of everything is often treated as indicative of (misogynistic) power relations (Bridges et al. 2015). Huxley depicted citizens consuming soma (a drug) to dull any sense of inconsistency in life. Today anti-depressants and other means of diagnosing or medicating away our human variances appears to be reaching epidemic proportions (Schwarz 2016). Huxley suggested if you want passive citizens you distract them, heightening their experiential life and overloading them with information. Today we heighten experiential life by commodifying it; witness the popularity of reality TV from *The Bachelor* to *Survivor* and, ironically, *Big Brother*. Huxley worried that a trivial culture would trivialise both entertainment and injustice. Those who worry democracy is under siege indeed conclude that "the struggle for freedom and dignity has become a reality TV show" (Temelkuran 2019, 264). We also roll that experiential life into general information overload, pushed by the hyper partisanship of commercial and online media outlets (Ball 2017), and deepened by the way the likes of Facebook and Google foster a digital life characterised by over-sharing (Agger 2012) and datafied citizens (Sumpter 2018). Huxley worried that information overload would render citizens passive egotists. Some suggest our digital-information age indeed produces an inordinate number of passive copycats following egotistical leaders (Baddeley 2018) and disenfranchised citizens (Moore 2018).

In general terms, Huxley suggested a distracted world can be a dangerously passive world. Huxley (1932, 230) modelled the political organisation of his World State after an iceberg – one-ninth above the water (the World Controllers) and eight-ninths below (the Class-Stratified Citizens) – and depicted his citizens as too busy entertaining themselves to care. If democracy were to end, some suggest, one clear route would be for democracies negative powers (their institutionalised means to challenge authority relations) to wither due to citizen inattention (Runciman 2018). Huxley anticipated such concerns, realising that confusion and experiential gluts are just as much of a weapon for achieving political docility as doctrinaire thought-control. To the extent that what makes our post-truth age distinct from previous eras of lies, bullshit, and propaganda is the deep penetration into the modern social fabric of information technology based social patterns (Keane 2018), the contemporary over-investment in the digital age is grist to the mill of Huxley's thesis that entertaining proliferation breeds passivity. Indeed our modern digital war, as Dyer-Witherford and Matviyenko (2019) show in their analysis of digital subterfuge, "is a veritable fog machine, because operations are usually conducted covertly and are often intended to confuse; hacks are hidden from view and, when discovered, are laden with misdirection; signals intelligence implodes into infloglut" (7). While Orwell's villain O'Brien was personally overbearing, cyberwar is more "ahuman" (Dyer-Witherford and Matviyenko 2019, 18), because it is carried out largely by chat bots, malware, and algorithmic filter bubbles. Yet as we come to love our digital inter-connections, we face the problem, as Huxley (1949) realised, that "the lust for power can be just as completely satisfied by suggesting people into loving their servitude as by flogging and kicking them into obedience."

Post-truth as If the problem Is Orwellian control

To see why we should adopt Huxley as our guide to post-truth, and not Orwell, we need to calibrate the moral compass of the reader by following the trail of the control relations in discussions of post-truth. Orwellian images of control involve a tightly ordered surveillance State. Huxleyan images of control involve a loosely organised promiscuous State (note the constitution of the populace into tightly ordered Castes is the outcome of previous social experimentation and not available for political reimagining). In Orwell's dystopia, if the possibility of veracity is steadily undermined, one can dominate social relations by stifling free thinking. In Huxley's dystopia, if veracity can be trivialised, one can encourage social passivity. For Orwell, manipulative leaders deprive us of information. For Huxley, manipulative leaders flood us with information. To the reader: at first blush, in what dystopia might you live, one more Orwellian or one more Huxleyan?

It turns out that most social commentary fixates on Orwell and thinks we live in or are heading towards Orwell's dystopia. Below I thus show

why general audience books view post-truth through an Orwellian lens, and then show why my own field of STS follows suit. Finally, I build upon Postman (1985) to frame a defence of Huxley's dystopic vision as the more informative one about our modern condition.

Books titled "post-truth"

Turning to four books titled *Post-Truth*, written for general audiences, typically by startled philosophers and other disaffected culture critics and journalists, Orwellian images of information deprivation and the thought-police are prominent organising tropes. Note there are several versions of Orwell. James Ball's *Post-Truth* (2017) is Orwellian-lite, because autocrats lurk behind confusion not imposition. Ball depicts post-truth social orders as an "infosmog" – a general atmosphere of uncertainty – of mass-produced bullshit and confusion. Ball's post-truth social order is explained as resulting from an ongoing vacuum of trust in modern democracies. Dwindling trust, fueled by the proliferation of media sources, and the economics of the media landscape, undercuts traditional investigative journalism. For Orwell, the imposition of control is the tool of the autocrat, but Ball writes that "confusion is the tool of the autocrat", and that the infosmog is what "serves the agenda of the strongman and the autocrat" (2017, 277). Ball lands between the dystopias of Orwell and Huxley, fearing the exclusionary practices of the autocrat but thinking the autocrat exercises power by information overload and distraction techniques.

Evan Davis' *Post-Truth* (2017) is an instance of Orwellian-hope, because complex language is thought capable of saving the day. Davis argues that lies display a relation to truth by attempting to hide the truth. Bullshit is the absence of any regard for truth. A critic may object that the bullshitter has regard for the audience's regard for truth and manipulates audience norms. Regardless, for Davis, post-truth points to a social order that operates with an extreme version of overstating the case. Our social order is said to be shaped by both the way bullshit helps achieve manipulative psychological and advertising goals and can be socially rewarding, and the impacts of extreme divisions and tribalism. Yet Davis deflates the novelty of post-truth bullshit, emphasising our continuity with the past. The relation of control we ought to fear, in Davis' story, is the one where allegiance to a position (regardless of evidence) is used as a tool to enforce loyalty. Greater attention to communicative self-awareness, and to general linguistic and journalistic practice, is the suggested solution.

Why is Davis an instance of Orwellian-hope? Because Orwell left open the possibility that hope could reside in the redeeming features of nuanced language. Big Brother did not get the last word in *1984*. Yes, Winston Smith, with gin scented tears flowing down his cheeks, arrived at a point where he could think that "he loved Big Brother" (Orwell 1949, 245). Yet those words were not actually the last words of the story. Orwell included an

Appendix, "The Principles of Newspeak". Newspeak was an effort by Oceania to convert complex ideas to stark terms, reducing the vocabulary and narrowing the range of thought. Dissent and unorthodox opinions would become impossible because there would be no words to express them. The Appendix is written at some unspecified point in the future, narrated by an unspecified historian, meaning Orwell writes the history of Newspeak in the past tense. The Appendix documents that Newspeak failed, yet what function does the Appendix play in Orwell's morality tale? Orwell scholars debate the question as "the Appendix theory". Some argue – pessimistically – that Orwell meant to recreate in the reader the experience of living in a world where the authenticity of all documents was in doubt (Sanderson 1988, 593). Others argue – optimistically – that the Appendix points to a future world in which Winston's story (*as* a surviving record) implies a language with nuance enough to convey dissent and freedom (Rooney 2002, 80; Lynskey 2019). Either way, the fate of language is tied to the fate of social order. The optimistic reading gains support from the final page of *1984*, which mentions the US Declaration of Independence: governments depend on the consent of the governed and citizens can challenge any government that fails to honour that contract. Such ideas could only be translated into Newspeak ideologically, via the stark term "crimethink" (Orwell 1949, 256). The very idea of independence was unable to be captured and controlled by the severely diminished Newspeak term for it. Here Orwell was in good company with later political studies of totalitarian regimes, which have documented the limits to their manipulative use of language (Eidlen 1988).

Our final two books are full-blown Orwellian in fearing practices of grim constriction. Matthew D'Ancona's *Post-Truth* (2017) depicts a social order plagued by "the declining value of truth as society's reserve currency" (2). Post-Truth itself "is the direct ancestor of … 'doublethink' … [Orwell's term for] the power of holding two contradictory beliefs in one's mind and accepting both of them" (102). D'Ancona claims "digital technology has been the principal infrastructure of Post-Truth" (113), along with public acceptance of lying as the political norm, the Relativism of postmodern philosophers, and the economics of information. D'Ancona worries the deflation of truth risks "a drift towards autocracy" (8), meaning "Orwell provides a text for our times" (3). It is thus encouraging to see citizens turning to Orwell's novel (103), D'Ancona writes, because Orwell alerted us to the dangers inherent in the quest for truth itself being abandoned. For D'Ancona, Orwell offers a solution. Orwell's "hard-won realism" (148) from a life dedicated to truth teaches us that "it is only the vigilant citizen that stands watch over a free society and its fundamental values" (148–149).

Lee McIntyre's *Post-Truth* (2018a) is similarly full-blown Orwellian in fearing practices of grim constriction. McIntyre's post-truth social order is described as the latest product on the assembly line of misinformation produced by those who sowed doubt about smoking, vaccines, evolution, and

climate change. The post-truth social order also contains a new way to seek ideological supremacy. McIntyre (2018b) defined the post-truth social order as about the vapid lying of contemporary politicians and a transformation in ways of asserting power. Self-contradictions matter little, suggested McIntyre, when the aim is to trumpet the ability to be powerful enough to speak utter bullshit with impunity. Compelling belief in the shameless absence of evidence amounted to "a recipe for domination" if not resisted (2018a, 13). For McIntyre, Orwell's warnings were prophetic: McIntyre (2018a) sprinkled his book with quotes from Orwell (cf. xiii, 1, 35, 63), as well as allusions to politicians appealing to public feelings being a chilling reimagining of Orwell's Ministry of Love (4).

STS meets Orwell

My own field of STS tends to double-down on the Orwellian images of control, even among those who differ in their characterisations and evaluations of post-truth. For instance, Steve Fuller (2016a, 2016b, 2018) *celebrates* post-truth as a condition of modern democracy whereby the protection racket of expertise is being rightly upended. By contrast, both Sheila Jasanoff and Hilton Simmet (2017), and Noortje Marres (2018), *deflate* the idea of post-truth; they critique the idea of post-truth and refer to it as a label applied by those in a moral panic that Fuller is right. Yet all share a disdain for any conception of knowledge generation, dissemination, and discussion in which monopoly, concealment, deception, control, and domination prevails. They fear an Orwellian dystopia. Yet where Fuller argues post-truth is like a vaccine against Big Brother, Jasanoff and Simmet, and Marres, worry that post-truth is an ill-informed pining for expertise likely to accidentally create Big Brother.

Jasanoff and Simmet (2017) deflate post-truth because the "very idea of a 'post' implies a past where things were radically different … where politics was governed by pure *veritas*" (752). Jasanoff and Simmet suggest that to be anxious about post-truth amounts to ignoring the fact that "moral panics about the status of knowledge in the public sphere are as old as knowledge itself" (755). Both claims are warranted only because they are so narrowly and legalistically cast. The broader meaning of Jasanoff and Simmet's deflation of post-truth is revealed by noting that Orwell's concerns form the normative background of their argument. Just as Orwell worried that freedom is curtailed when citizens experience their political order as an exogenous imposition of judgement, Jasanoff and Simmet treat public truth claims as inherently problematic *because* "truth claims in the public sphere are normative because they reduce the space for democratic engagement by appealing to exogenous standards of rightness" (753). Just as Orwell suggested Newspeak was an attempt to sweep under single terms very diverse ideas, reducing the expression and even possibility of difference, Jasanoff and Simmet worry about an "unthinking reduction of lived

realities to technical facts" (762) and that collective disagreements will be "swept under a carpet of 'facts'" (754).

Marres (2018) similarly worries about processes of constriction, noting that "facts are too important to be reduced to vehicles of the restoration of authority" (441). Authority relations loom large in Marres's normative horizon and, like Jasanoff and Simmet, Marres' targets are mostly the *critics* of post-truth. "There is," sneers Marres, "an element of nostalgia afloat. To want your facts back is to evoke a time when experts still seemed to have unquestionable authority and felt secure in this authority" (423). Just as Orwell sounded the alarm about centralised authority figures coercing respect, Marres worries that "[there is a]…risk of re-instating an outdated strategy for securing the role of facts in public debate, one in which public respect for knowledge is based on authority" (424).

Such deflationary arguments are animated by Orwellian concerns about truth claims recused from contestation. Jasanoff and Simmet's "serviceable truths" (2017, 756, 759) captures the Orwellian idea that truth claims need to be both instrumentally and socially sensitive. But Orwell's commitment to truth orientation as a remedy was far less permissive about truth standards than we see in deflationary accounts of post-truth. Orwell's sociology of knowledge, which emphasised the idea of facts amenable to testing, is somewhat innocent of the idea that what counts as a fact is produced through a socially contested process of interpreting data (rather than being algorithmically determined by experiment alone). But Orwell's testability notion was embedded in a normative commitment to public discourse requiring the truth/falsity binary if enslavement is to be avoided (cf. Lynskey 2019). Hence it is reasonable for Jasanoff and Simmet (2017) to recommend we "rethink and complicate the stark binaries of … true/false" (762), but tone deaf when they use '2 + 2 = 4' as the kind of singular reality from which progressives should run (763). Orwell warned that when your truth standards are permissive enough that 2 + 2 = 5 is possible, you are on the road to slavery.

Marres (2018) is similarly reasonable when correctly observing that the "genre of 'fact' is undergoing transformation" (440) and thus we should expect that "epistemic authority will also have to be earned the hard way, through an exchange between epistemically diverse viewpoints" (441). But Marres is also tone deaf when treating the solution to the problems of the diversity of truth-making as more diversity of truth-making. Deflationary accounts end up committed to the very same epistemic promiscuity that post-truth dynamics exploit, possibly because deflationary accounts of post-truth are over-committed to seeing post-truth as a species of epistemics. Can we say instead that what Marres calls fact-making can also be called political demagoguery, asked Steve Hoffman (2018)? Hoffman correctly identified the challenge being shirked by deflationary accounts of post-truth: "scepticism toward scientific authority and expertise" weakens their ability to defend "scientific institutions and evidence-based reasoning

from the attacks of reactionary plutocrats and authoritarians" (2018, 446). Marres' claim to still believe in "hierarchies of epistemic value" (2018, 440) rings hollow when her entire article attacked fact-checking, like an astronaut defending space-walks while attacking safety checks. When critics of post-truth are attacked, on the grounds their defence of truth risks reinstating uncontested facts and ushering in Big Brother authoritarianism, the great deflators conflate achieved truth with truth orientation. Orwell knew to avoid that conflation. Orwell might not have accepted a friend-request from latter-day Orwell-informed deflationary accounts of post-truth.

Steve Fuller represents another side of STS, which takes post-truth seriously, though there are two sub-camps: one that worries about the trend (Collins, Evans and Weinel 2017; Hoffman 2018; Durant 2019a) and the other that celebrates the trend. Fuller is the latter. Fuller (2016a) writes of social order as produced by the interplay between two elites, the lions (where legitimacy is derived from tradition and expert authority) and the foxes (the maverick outsider and dissenter). The threat of an Orwellian dystopia looms large for Fuller, who associates scientific authority with "totalitarian 1984 … Truth is just one more … resource in a power game without end" (2016a). Post-truth is thus a fox's paradise, fortuitously disrupting the authoritarian hegemony of scientific authority. Fuller is so vexed by the spectre of Orwellian authoritarianism that even post-truth is an ally, which unfortunately leads Fuller to obfuscate any critical evaluation of the politics of post-truth.

Fuller's obfuscation begins with the mother of all academic diversions, creating a genetics dispute around whether STS spawned post-truth: the "post-truth world is the inevitable outcome of greater epistemic democracy … [and we should not] repress STS's foxy roots" (Fuller 2016b). True to form, Fuller (2017) owns the "undesirables", embracing climate change deniers and creationists as independent corroborators of the tropes of STS. Regrettably, Fuller confuses political evasion with methodological sophistication, playing the (modern; ironic) free speech card by (only …) allowing STS scholars the space to contest the undesirables "on political, not methodological grounds" (2017). This kind of slick demarcation between politics and method can have the effect of setting up a form of normative individualism, where politics is just random and isolated individual choices (Durant 2010). Thus, when Fuller (2017) uses Naomi Oreskes as his cardboard sparring partner, chiding her for being "asymmetrical" in treating consensus as based in nature and controversy as based in the artificial, the political thinness of the celebration of post-truth is laid bare. For Oreskes, a "manufactured" controversy is one where inauthenticity and gaslighting is evident. But Fuller disarms political critique by reducing "manufactured" to the methodological point that consensus is never self-evident.

Like deflationary accounts of post-truth, celebratory accounts are thus vexed by the threat of Orwell's authoritarian dystopia. But both Orwell-inspired accounts are ultimately and unwisely too relaxed about Orwell's

political warnings about the loosening of the public, democratic commitment to a truth orientation. Indeed where both deflationary and celebratory accounts of post-truth tend to lambast appeals to authority relations as nostalgic, outdated strategies pining for some idyllic past, they unwittingly replicate the error Huxley had Mustapha articulate: "we don't want people to be attracted to old things. We want them to like the new ones" (Huxley 1932, 225). John the Savage had replied to Mustapha that "the new ones are so stupid and horrible" (225) but, not too far from the political evasions of deflationary and celebratory accounts of post-truth, Mustapha replied that "they mean a lot of agreeable sensations to the audience" (227). Our Orwell-inspired discussants of post-truth thus appear innocent of Huxley's warning about how you build a passive society. Mustapha outlined that respect for science was anathema to passive stability: "every discovery in pure science is potentially subversive; even science must sometimes be treated as a possible enemy. Yes, even science" (231). Huxley thus provided a vision of the perils of treating science as the enemy. Despite impressive arrays of information and experiences provided to citizens, treating science as the enemy is part of a politics of disconnection, where nothing fits, and nothing truly coheres.

Huxley: are we amusing ourselves to political passivity?

So why is Huxley ultimately more informative about our post-truth age than Orwell? Postman's *Amusing Ourselves to Death* (1985) provides important clues, *because* that book is pre-Trump. We are not in the midst of a cultural change initiated by one particularly racially, economically, and politically divided nation electing a financially and morally corrupt television personality. We are instead living through an *intensification* of long-running cultural and political trends. To see what happens when the gaze is restricted to the very recent past or to one political context, consider Michiko Kakutani's *The Death of Truth* (2018). Kakutani discusses the way Postman had compared Orwell and Huxley's dystopias, and that Postman had concluded that Orwell told us more about totalitarian states (the Soviet Union for Postman; China for us?) but Huxley told us more about Liberal democracies. Fixated on Trump, Kakutani (2018, 165–168) dissented, thinking Orwell's dystopia was more relevant simply because Orwell's focus on controlling the narrative appeared to match Trump's quest to dominate the US political-cultural narrative. But Postman's thesis has more depth than Kakutani realised.

Postman (1985) sought to show that "the decline of a print-based epistemology and the accompanying rise of a television-based epistemology has had grave consequences for public life" (24). Treating TV as a paradigm of public information, Postman argued that ideas of truth move with a culture's shift from oral, written, to printed and on to televised media of communication. For Postman, TV packages news as vaudeville and, given

the influence of TV, "the total information environment begins to mirror television" (111). The images and fragments of TV challenge our ability to assemble isolated bits of information into coherent wholes, rendering us "unfit to remember" (137), as "the public has adjusted to incoherence and been amused into indifference" (110–111). To extend Postman into modern times is simply to ask whether digitised social media platforms are the latest cultural shift, with the total information ecosystem mirroring it?

Postman framed his book – as I have framed this chapter – as "about the possibility that Huxley, not Orwell, was right" (1985, vii). Where Orwell feared "externally imposed oppression", Huxley speculated that "people will come to love their oppression, to adore the technologies that undo their capacities to think" (vii). For Orwell "people are controlled by inflicting pain" but for Huxley people are "controlled by inflicting pleasure" (vii). Or as Postman said:

> Orwell feared those who would deprive us of information. Huxley feared those who would give us so much that we would be reduced to passivity and egoism. Orwell feared that the truth would be concealed from us. Huxley feared the truth would be drowned in a sea of irrelevance. Orwell feared we would become a captive culture. Huxley feared we would become a trivial culture.
>
> (1985, vii)

Akin to Postman, I think Huxley's dystopic vision has more relevance for capturing the modern post-truth condition than Orwell's. Several observations can help establish the point.

Postman (1985) suggested that "what Orwell feared were those who would ban books. What Huxley feared was that there would be no reason to ban a book, for there would be no one who wanted to read one" (vii). Does that resonate with the parochial echo chamber of shamelessly partisan books that do nothing but preach to the converted, in which there is little point to reading a book when the most that is required is that one signals political allegiance by flagging the book's existence? See, for instance, Rogers' (2018) discussion of Trump promoting books that promote him. Consistent with Huxley, the issue here is the trivialisation and capitalisation of political divergences.

Postman (1985) noted that Orwell "feared the politician as deceiver, not as entertainer" (129). In the last generation we appear to have seen politicians become consummate entertainers, typically in a quest to use widely televised reassurance to elicit acquiescence. (In)famous examples include the UK Agriculture Minister, John Gummer, feeding his four-year-old daughter beef during the BSE crisis (on May 16, 1990). Or US President Barack Obama swimming with his daughter in the Gulf of Mexico after the BP Oil Spill (on August 15, 2010). As a father I do not find it all that entertaining to think of using my daughter as a political prop but Google

the images and you will see smiles all around. Then there is the Japanese Parliamentary Secretary in the Cabinet Office, Yasuhiro Sonada, drinking treated water from the basements of Fukushima's Reactors 5 and 6 (on October 31, 2011). And closer to home, then Australian Treasurer (and now Prime Minister) Scott Morrison passed a lump of coal around Parliament House as a way of rationally debating energy policy (on February 9, 2017). Such televised and social-media-boosted political stunts show politicians as entertaining gaslighters more than bland deceivers, consistent with a reading of the post-truth phenomenon as one of confusion, gaslighting, distraction, diversionary reframing, and strategic irrelevance. Recall Huxley's quip that citizens will fall in love with the very technologies that contribute towards the undoing of their critical sensibilities. Trained as spectators, citizens stop critically watching. Or, as Hanna Pitkin – the major theorist of the concept of political representation – observed:

> Deception, propaganda, and indoctrination have always played a role in the rough and tumble of actual political life, but they take on new, disturbing dimensions in our age of electronic media and satellite surveillance, of 'hype', 'spin', and the 'infomercial', of 'image', 'credibility', and 'virtual reality'. Watching television from infancy, people not only acquire misinformation; they become habituated to the role of spectator. The line between fantasy and reality blurs (indeed, the line between television image and one's own fantasy blurs). As for those who set policy and shape the images, insulated from any reality check, they soon become captive to their own fictions. All this does not bode well for democracy.
>
> (Pitkin 2004, 231)

Climate Shenanigans in Australia

We can also draw upon Postman's discussion of Huxley's dystopia to identify two clear mechanisms by which post-truth operates. In this section, I will illustrate those two mechanisms with examples drawn from climate and energy policy debates in Australia.

All fragment, no coherence

Postman noted that "Huxley grasped, as Orwell did not, that it is not necessary to conceal anything from a public insensible to contradiction and narcotised by technological diversions" (1985, 111). The Huxleyan implication is that, in a "world of fragments, where events stand alone, stripped of any connection to the past, or to the future, or to other events" the perception of incoherence can vanish (110). Fragmented discussions, and not just centrally controlled messages, can evaporate all hope of pointing out incoherence.

An example capturing the dynamics of post-truth fragmentation is the oft-quoted "portfolio" idea in energy policy discussions. In Stewart Brand's (2009) influential book on environmental planning, he writes that "portfolio" captures

> the idea that climate change is so serious a matter that *we have to do everything simultaneously* to head it off as much as we can … [Socolow and Pacala's 'Stabilization Wedges' (2004) argued that] a set of 'stabilization wedges', made up of already proven technologies and practices, could reduce greenhouse gases to a tolerable level, *but only if all the wedges are pursued extremely aggressively at the same time*, starting yesterday. [There are] seven wedges to level off emissions: energy efficiency, renewables, clean coal, forests and soils … fuel switch … and nuclear.
>
> (87; emphasis added)

This framing of energy policy as about pursuing all options simultaneously became a default energy policy in itself when the then Prime Minister, Malcolm Turnbull, announced in March 2017 that an "all-of-the-above approach, including hydro, solar, coal, and gas, was critical to future energy supplies" (Grattan 2017).

This same framing later drove the August 2019 formation of a Parliamentary Inquiry into the pre-requisites for nuclear power in Australia, called by the right-wing conservatives in office. The fragmentation effect here is multiple in nature. First, the left-wing opposition correctly derided the inquiry as a technological diversion, in part because Australian conservatives have lacked an energy policy for more than a decade. Throwing up reactors further kicks real choice-making down the political road (Macmillan 2019). Second, the South Australian Royal Commission into the nuclear fuel cycle had already concluded in May 2016 that there was no commercial case for nuclear power in Australia. Political memory can be made short when it is pretended that no contrary and contextually relevant evidence exists. Third, the framing itself, the idea of all-of-the-above, trades on de-contextualised comparative assessment that omits crucial data and promises incoherent forecasting (Durant 2019b). Fourth, contrary to Brand's popularisation, the stabilisation wedges idea does not license all-of-the-above. A stabilisation wedge "represents an activity that reduces emissions to the atmosphere that starts at zero today and increases linearly until it accounts for 1 GtC/year [one billion metric tonnes] of reduced carbon emissions in 50 years" (Pacala and Socolow 2004, 968). Crucially, Pacala and Socolow specified that "although no element is a credible candidate for doing the entire job (or even half the job) by itself, *the portfolio as a whole is large enough that not every element has to be used*" (968; emphasis added). Note the issue here is the faulty, partial, and deceptive interpretation of Pacala and Socolow. Post-truth dynamics gain speed when information is so fragmented across cultural and historical space that incoherence can escape unnoticed.

Culture becomes a burlesque

Postman (1985) also noted that "there are two ways by which the spirit of a culture may be shrivelled. In the first – the Orwellian – culture becomes a prison. In the second – the Huxleyan – culture becomes a burlesque" (155). The Wikipedia entry for "burlesque" adequately captures the intent of the descriptive term:

> a burlesque is a literary, dramatic or musical work intended to cause laughter by caricaturing the manner or spirit of serious works, or by ludicrous treatment of their subjects. The word derives from the Italian *burlesco*, which, in turn, is derived from the Italian *burla* – a joke, ridicule or mockery.

An example capturing the dynamics of post-truth burlesque is the political response to the South Australia blackout of September 28, 2016 (Durant 2018, 2019a; Warren 2019, 81–84). A very large storm hit the State and the electrical grid crashed. On the night of the storm, the Australian Electricity Market Operator informed the Liberal government (conservatives) that the blackout was due to the severity of the storm and downed transmission lines. Regardless, the conservatives blanketed TV and radio with claims that wind power was to blame for the blackout (South Australia has over 50% wind power penetration in their electrical grid). Technical advice, internal to the government, was wilfully ignored. Or as Huxley had depicted, science was dangerous, negatively impacting the political discretion needed to completely invent what was convenient.

But another point here is the mockery made of serious discussion. Some government ministers boisterously joked that wind turbines do not work well when the wind is blowing too hard. In fact, wind power was furiously cranking out 70% of South Australia's electricity at the time. Yet after transmission lines were felled, the wind turbine generators in the north of the State were cut off from the grid entirely. Other government ministers blamed climate change and renewable energy policies of the (left-wing) Labour Party, both State (South Australian) and Federal (Labour was in opposition). Despite otherwise denying any link between extreme weather and climate change, now when it suited, the conservatives invoked that previously denied factual claim to chide Labour for having tried to address carbon emissions. The caricature of authentic argument was ludicrous political obfuscation at its best. Post-truth burlesque, while involving a mocking and ludicrous approach, will also caricature and demean the spirit of something.

An apt example is the Australian conservative government's approach to carbon carry-over credits as the nation moves from the Kyoto protocols to the Paris accord. Carbon credits are emissions that Australia could have released but did not, converted into certificates and equated with tonnes.

Can and should Australia use credits from the first and second Kyoto periods (2008–2012 and 2013–2020) to satisfy obligations under the third (2021–2030)? Australia managed to "over-achieve" by conducting less deforestation, and the conservative government announced plans to use that credit from over-achievement as a short-cut to meet Australia's Paris accord targets. The problem is that it is not in the spirit of either the Kyoto or Paris rules, as UN rules ban the carrying over of credits from Kyoto to Paris. More broadly, Australia's commitment to Kyoto was originally an internationally weak 8% increase in emissions when others committed to a 5% decrease in emissions, and Paris was explicitly framed as a "reset". Other nations have declared they will not artificially lower their Paris commitments by using carry-over credits (Hannam 2019; Pears and Baxter 2019).

Huxley's dystopia had no need for the theatrics of Orwell's concern that the State would literally destroy the records of the past, for Huxley instead predicted that "a politics of image, instancy and therapy may disappear history as effectively, perhaps more permanently, and without objection" (Postman 1985, 138). Post-truth burlesque is not dependent upon the crudely destructive behaviour lambasted by Orwell, but instead can achieve its aims via the vaudeville process of multiple unrelated acts all slyly draining the spirit out of its target.

Conclusion

To state that we live in a post-truth world that is Huxleyan, not Orwellian, is to claim that we live in a world that cultivates information proliferation and experiential gluts, that is promiscuous about standards, that gives oxygen to the idea that science and indeed any lasting achievement is dangerous, that trivialises learned opinion, tolerates irrelevance, lets politicians be entertainers, fails to guard against the incoherence that results from fragmented discourse, permits a burlesque political culture, and remains blind to the threat of social passivity in the midst of citizen engagement. Responding to these Huxleyan post-truth dynamics is another paper entirely but can be outlined here as three moves. One, resist the temptation to idolise novelty and instead focus on processes of intensification. Two, resist reducing democracy to opening up issues and admit democracy includes closing down issues. Three, resist reducing authority relations to an Orwellian process of coercing the surrender of judgement and theorise the scope for authority relations to coexist with democratic autonomy.

First, there is a tendency for some to use a kind of Jedi mind trick: "these aren't the post-truth dynamics you're looking for" (after Obi Wan Kenobi's "these aren't the droids you're looking for" from *Star Wars* (1977)). Novelty becomes the criterion; a quest for the completely new, original, and unusual. Concerns about a post-truth age are then dismissed on the grounds that historical precedents exist for modern lying, bullshit, misinformation, and deception. Sometimes novelty is buttressed by legalese, for instance

treating post-truth as "alleged" (Jasanoff and Simmet 2017, 754, 761). But the general form of the novelty argument is to point out that politics has always involved the bending of truth and facts have always been complicated assemblages, even if the lack of shame for being untrustworthy is somewhat new (Blackburn 2017). But shame is a moral quality. If truth has always been tied up with the moral problem of whom to trust, then changes in the political economy of the moral environment will involve an intensification of established dynamics.

Some pick up on this intensification, suggesting that post-truth is the weakening of norms of vigilance about the fallibility, biases, and politicisation of human reasoning (Enfield 2017), or that post-truth pushes vaudeville into gaslighting (deliberate sowing of confusion while toying with identities) (Keane 2018). The concept we all need here is – as Luigi Pellizzoni (2016) discussed (in relation to technoscientific governance) – Foucault's notion of intensification. Rather than sudden changes, we see "the lightening, saturation … and transversal linkage of existing practices [up to a] tipping point … where the object or subject mutates into another form" (Pellizzoni 2016, 212; citing J. Nealon). Reminiscent of Postman's thesis that shifts in the media of communication are tied to gradual but transformative shifts in sense-making, Pellizzoni argues that intensification is where "gradual sliding in sense-making and practices engenders eventual qualitative shifts, the terms of which are, however, difficult to grasp for precisely this reason – things look similar, yet also different to what they used to be" (212).

Second, we can easily miss the Huxleyan dynamics of our post-truth age because we are wearing blinkers when it comes to democracy: is it about opening up or closing down political issues? Andy Stirling (2008) once argued democracy is both, but closure is too often the tool of the privileged. Yet if appraisal processes can help establish plural and conditional policy advice and help map out and make visible and influential diverse perspectives, Stirling suggested, then any subsequent "necessary, inevitable, and desirable" (284) closure would have a hope of being just and accountable. Unfortunately, the nuances of Stirling's position are often lost in panics about Orwellian thought-control. Too many responses to post-truth calculate democracy in a one-sided way – open up = good, close down = bad – via banal pandering to the proliferation of voices: Jasanoff and Simmet citing the Catholic Church, that bastion of inclusive tolerance, to recommend a "culture of encounter" (2017, 766); Marres's "epistemic diversity and dynamism" (2018, 441); Fuller's (2017) foxes all the way down. Scared by the spectre of Orwellian processes of closing down political thought, too many social analysts settle on a conception of democracy as forever *and only* opening up issues. Huxley warned of such dynamics. As Mustapha Mond chided John the Savage, if you want passive citizens you do not let them settle, but instead encourage them to always reach for and open up that next trinket, that next experience, that next claim.

Third, where might authority relations fit in closing down post-truth shenanigans? An obstacle to answering that question is that authority relations are often taken to imply that acts of deference cannot be anything other than acts of completely surrendering one's judgement. Political theorists and STS scholars have now begun the process of undermining such accounts. Mark Warren (1996b), for instance, showed that authority relations are democratic when accompanied by the constant potential for scrutiny, contestation, and revision. Warren used a matrix of positions to pose questions about what kinds of movements we think are the normatively appropriate movements to focus upon when characterising democracy. Is the enemy a Big Brother scenario where unaccountable elites make decisions that are not open to participatory regulation, and so we must move our political action towards opening up and greater inclusion? Or do we think the movement to aim for in democracy is to have constant but provisional, contestable, temporally specific zones of deference relations, leaving citizens to devote their energies not to everything all the time but to some issues some of the time as per their resources and inclinations? More broadly, Richard Sennett (2002) asks if our culture's feeling of shame attached to dependency relations undermines our collective capacity for mutual respect. I suggest a culture ashamed of dependency is a culture with an unhealthy relation to divisions of epistemic labour.

Alfred Moore (2017) extends Warren and Sennett by attacking the "surrender of judgement" model directly. Moore shows that the concept of authority implies a moment of surrender of judgement, without precluding judgements over time that are conditioned by judgements of the parties to the deference relation over time. Where deference to authority is constructed in terms of belief, it is difficult to avoid the perception of unthinking docility. But Moore develops an "acceptance" model of authority that addresses such concerns. Moore shows that where deference to authority is constructed as acceptance, the process is clearly more reflective. The objects of judgement of the deferential party might be of a substantive claim itself, of the source of the claim, or of the authority relation itself. Overall, accepting the claim of an epistemic authority involves a decision of what to consider relevant in a context of adopting a policy of taking the authority's claim as a premise in one's own deliberations. I suggest that any sensible response to post-truth dynamics – and to the role of experts (Durant 2019a) – needs to come armed with a model of authority relations informed by works like those of Warren, Sennett and Moore, lest the spectre of Orwellian control send the analyst in the brave new world direction of thinking scientific authority is inherently dangerous.

A final word is just a reminder that modern forms of governance utilise complexity, uncertainty, contingency, and the unknown to stabilise vested interests (Durant 2009; Pellizzoni 2011). If we can appreciate today's Huxleyan modes of control, authority relations framed by Orwellian fears remain salient but more limited than most suppose. In an age of post-truth,

while it remains true that "truth does not, and never has, come unadorned … some ways of truth- telling are better than others, and therefore have a healthier influence on cultures that adopt them" (Postman 1985, 24). Where Orwell warned of an oppressive regime of truth shoved in your face, Huxley comes closer to the modern age, in which we appear to be entertained by one "good soma vaporisation" after another (Huxley 1932, 232–233).

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5 Public reasoning in "post-truth" times

Technoscientific imaginaries of "smart" futures

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Introduction: public knowledge-making during "post-truth" interregnum

There is currently an abundance of descriptions of our time as one of "post-truth", a state in which previously firm ideas about the status of (scientific) facts, public truth, and authority are contested, often associated with the Trump presidency and the Brexit vote in 2016. This gives cause for reflection upon the ways in which societies arrive at publicly accepted truths, as well as how previously well-established public fact-making processes are currently being reconfigured. In this chapter, we look at how previously unifying "social imaginaries" (Castoriadis 1975; Taylor 2004) of progress and modernity are weakened and even dissolved in contemporary "post-truth" times, with alternative compelling logics competing to fill spaces that are now open for transformation. We examine this fragmentation and ongoing transformation of public reason through the case of technoscientific imaginaries of "smart", a label that has become increasingly prominent in areas as diverse as energy management, urban development, and healthcare in the past decade. We explore the type of shared social order that modernity's legitimate truths provided, including who benefits from such order and, conversely, from disorder. As implicated by the argument of Wynne (this volume), if public acceptance of rational scientific truths as formative elements of social order is based in quietude, rather than support, this authoritative truth can be as great a threat to a healthy democracy as can post-truth scepticism. Can this critical moment of "post-truth" provide an opportunity to debunk, or perhaps replace, some of the previously shared imaginaries of modernity? And if so, what are we left with? We discuss the ways in which emerging logics and justifications based on technical and economic rationality, such as those developed around "smart" technologies, might normatively reduce the space for democratic engagement, for instance through specific framings of publics (Welsh & Wynne 2013; Wynne, this volume). However, the argument could also be made that "smart" technological developments might entail increased democratisation, for instance, due to a proliferation of open data platforms and programmes enabling new

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spaces for mediation and collective deliberation (Townsend 2013; Barns 2016). We discuss whether current "post-truth" reconfigurations could tip the scales towards an opening up of decision-making processes, or if such transformation are just resulting in new ways of "closing down".

In modern times, the openness to critique that characterises democratic societies has entailed, at least in principle, that truth claims can continually be subject to contestation, engagement, and negotiations by various publics and institutions. This has enabled a social order embedded in processes of public reasoning and fact-making, oftentimes informed by science, arriving at truths that are considered legitimate and thus accepted by citizens (Jasanoff 2012). In this view, public truths are collective achievements, presupposing the existence of a public space that allows for processes of deliberation about multiple and sometimes contradictory views, values, and interests. Certain critical moments, however, may be characterised as "times of interregnum" (Bauman 2012); a term that Gramsci (1971), in his Prison Notebooks written in the early 1930s, used for extraordinary situations in which the extant legal frame or social order loses its grip, while a new frame that fits the newly emerged conditions has not yet been assembled or is not strong enough to be put in its place. When "the old is dying and the new cannot be born" (Gramsci 1971 p. 276), previously established hegemonic discourses of science and public truths in society may be challenged and potentially reconfigured. Arguably, the contemporary "post-truth" times can be considered such a critical moment.

The current "post-truth" interregnum includes ongoing discussions about the reliability of public knowledge and scientific "facts". Importantly, however, this is not our first "post-truth" rodeo: Public debates questioning the reliability, value, or epistemic authority of science seem to be a recurring phenomenon. Robert Merton (1938), for instance, described a situation with striking similarities to some of our contemporary anxieties:

> Forty-three years ago, Max Weber observed that 'the belief in the value of scientific truth is not derived from nature but is a product of definite cultures.' We may now add: and this belief is readily transmuted into doubt or disbelief.
>
> (p. 321)

Insights from history, sociology, philosophy, and science and technology studies (STS) may guide us in making sense of the ways in which claims become accepted as settled "truths" (see also Latour 1999). Examples include Fleck's (1979) reflections on how facts are not facts until they have gained acceptance in a community of belief, and Haraway's (1991) observation that claims of truth always come from situated positions, from *somewhere*. Following this, any claim of "absolute" or "objective" truth that appears seemingly "from nowhere" is always contestable, and such a claim achieves relevance only when someone harnesses it efficiently. Based on

such insights, the relevant question in governance contexts is thus perhaps not so much *what is true*, but rather *which truths*, or *whose reality gets to guide political and normative action?*

During times of interregnum, various compelling logics compete to fill the spaces that are open for transformation, and in this process, what Gramsci described as "morbid symptoms" might appear (1971, p. 276). Contemporary "morbid symptoms" seem to include, for instance, the ways in which current populist political rhetoric seem to contribute to the legitimation of authoritarian ideas, as well as the normalisation of anti-immigrant or white nationalist discourses.[1] This shows that there might be good reason to pay attention to reconfigurations taking place during times of interregnum, as history has also taught us. Discussions of mass deception under totalitarian regimes, for instance in Hannah Arendt's well-known essay "Truth and Politics" (1968), serve as a reminder that during interregnums such as our "post-truth" time, we should not just be concerned about truth and falsehood, or about the creation of worlds of "alternative facts" (as famously stated by U.S. Counselor Kellyanne Conway in 2017 regarding the attendance numbers of Trump's inauguration); we should also pay attention to the ways in which such mass manipulation of facts by political leaders might potentially change entire political systems and "the sense by which we take our bearings in the real world" (Arendt 1968, p. 568). As illustrated in Huxley's *Brave New World* (1932; see Durant, this volume), an overflow of information and "alternative facts'" can become boundless and meet little resistance from increasingly passive publics, and as such, may be an efficient tool for suppression and influence.

Yet, although "post-truth" seems to be a recurring phenomenon, certain aspects of our current interregnum are arguably new, or have at least *intensified*. Following Pellizzoni (2017), we apply the Foucauldian concept of *intensification* to capture "shifts which are difficult to grasp, because things look similar, yet also different to what they used to be" (p. 212). The shift away from widely shared ideas about legitimate knowledge or "truth" has happened gradually, arguably in relation to a technological explosion and new media of communication. Post-truth is often associated with social media platforms, which on the one hand could potentially support citizen empowerment and democratisation, for instance, by enabling easier organisation of social movements or civil protests. However, on the other hand such platforms might also be seen as "truthless" public spheres (Marres 2018), constituting highly efficient tools for manipulating opinion through targeting and persuading specific publics. The development towards tailored news feeds, and the increased mobility and circulation of user-generated truth claims based on social media algorithms, could potentially lead to a weakening of shared public spaces for deliberation, including a reduction of possibilities for public "fact-making". These contemporary technology-intensive developments might thus entail "grave consequences for public life" (Postman 1985, p. 24; see Durant, this volume), beyond what classic accounts such as Anderson's (1991)

theorisation of "print capitalism" or Postman's (1985) descriptions of the rise of a television-based epistemology may account for.

The acknowledgement that broad social imaginaries are no longer (and perhaps never were) "collective" or shared by everyone (Massey 1991; Appadurai 1996) potentially brings opportunities for increased understanding of situated realities. However, the present fragmented situation seems to be accompanied by the emergence of new forms of decontextualised and almost universalist logics. Across complex and fragmented contexts, diverse actors are mobilised and enrolled in networks through unsituated circulating "truths" that efficiently close down alternative future imaginations. In this chapter, we examine the example of promissory futures of "smart" technologies, underpinned by logics of neoliberal technoscience, which at present are gaining traction through post-truth conditions of disorder. We argue that such imaginaries achieve legitimacy through a ubiquitous presence an emphasis on technological development, where the lack of situated perspectives constitutes a type of strategic fuzziness, allowing for seemingly "post-political" urban governance (Mouffe 2005; Swyngedouw 2007).

In what follows, we outline some relevant theoretical concepts for understanding this move from the presumed shared imaginaries of modernity to our present situation of competing realities and the intensification of technoscientific logics. We present a critique of "smart" imaginaries in the domains of energy and urban development, through an analysis of *logics of "smart"*[2], examining how technoscientific imaginaries may serve to mutually order different worlds in contemporary society. They thus become "key providers of public meanings and policies" (Rommetveit & Wynne 2017, p. 133), enticing a wide variety of actors into innovation and collaboration aimed at large-scale infrastructural and technological developments. Lastly, we discuss the ways in which such logics normatively reduce the space for democratic engagement through the construction of "imagined publics" (Welsh & Wynne 2013), but also point to some ways in which these trends might be turned, to potentially open up new spaces for public reasoning and deliberation.

Competing realities within public reasoning

From shared imaginaries to competing realities

With the modern emphasis on grand narratives, shared imaginaries were acknowledged as key to progress. The idea of a shared social imaginary goes back to Castoriadis (1975), and was further developed through Taylor's (2004) analysis of how collective imaginations relate to the development of modernity. Emphasising the role of the social imaginary in the hermeneutics of everyday life, Taylor describes this as "that common understanding that makes possible common practices and a widely shared sense of legitimacy" (p. 23). A shared social imaginary enables us to have a sense of what

to expect of each other, to carry out collective practices that make up social life and feel that we belong to certain "imagined communities" (Anderson 1991). In short, it is "the way our contemporaries imagine the societies they inhabit and sustain" (Taylor 2004, p. 6). Such understandings are both factual and normative, and hence closely linked to what Taylor sees as an underlying moral order: Our sense of how things usually function (related to our collective social practices) is interwoven with our background understanding of how things *ought* to be, and of what missteps would invalidate the practice. Our social imaginary can change, according to Taylor (2004), as a new moral order slowly penetrates and transforms the social imaginary through a change in our social practices.[3] This shift can be seen as a process of intensification (Pellizzoni 2017), with gradual, rather than abrupt changes. However, Taylor also emphasises that people need to be able to connect the transformed practices to new principles and form a new, viable social imaginary. If people are expelled from their old forms before they can find their feet in the new structures, for instance, due to war, revolution, or rapid economic change; breakdown or, in Gramsci's terms, "interregnum" may occur.

Contemporary society seems to have lost the binding force these collective social imaginaries provided. Bauman (2000) calls this *liquid modernity*: times characterised by temporality, constant movement, accelerating flexibility and change; in social relations, identities, and institutions. In short, a situation in which "change is the only permanence and uncertainty the only certainty" (p. 9). In other words, modernity has failed to rationalise the world, and we face times in which facts seem dependent on context, problems are often too complex to have scientific solutions, and the anxiety this uncertainty causes is exacerbated through politics of fear (Furedi 2005; Bauman 2006). The technological explosion of the past century leading up to our current information society facilitated a new intensity in the sharing of opinions and ideas across vast geographical distances. Thus, people today may live in deeply perspectival "imagined worlds" (Appadurai 1996), and not just imagined communities (Anderson 1991), as part of groups, networks, or movements that in our digital age can be deterritorialised, even having a global range, yet have little contact with other socio-political constellations. This is another way of describing the post-truth society: truth is no longer considered universal (or at least, universal truths are not considered available to us, in an argument that abounds with Nietzsche's nihilist early thought). Truths, in the plural, become fluidly resistant to objections from outside an imagined world, as the preconditions for the truths are internal to that world.

An intensification of technoscientific logics

Jasanoff and Kim (2009) link Taylor's notion of social imaginaries to modernity's grand aspirations with science and technology. They argue that science and technology can be seen as key sites for the constitution of

modern social imaginaries, coining the concept "sociotechnical imaginaries". Jasanoff describes this as: "collectively held, institutionally stabilised, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology" (Jasanoff 2015, p. 4). Future imaginaries of technoscience are seemingly concerned with the realisation of technical wishes, potential, or possibilities; with what could exist and how to make it exist. Yet, they also carry implicit ideas about what kind of society is needed to allow for the imagined-possible future of a specific technological potential to become realised. The concept of sociotechnical imaginaries thus helps us elicit the underlying values and normative understandings within such imaginaries, for instance regarding what is considered to be "desirable", what constitutes "public good", or what it means to be a "good citizen". This brings a sensitivity to power structures, less present in Taylor's account, which is useful for understanding why some imagined futures become dominant at the expense of others or the extent to which such imagined futures are performative.

Importantly, technoscientific logics are not dedicated to a traditional Enlightenment ideal of "truth-seeking", but rather to "the acquisition of basic capabilities of visualisation, manipulation, modelling and control" (Nordmann 2010, pp. 7–8). The technosciences engage in engineering practices of creating prototypes and devices that do not call for truth questions, but for questions about *whether an artefact works*. Theoretical representation of the world "out there" is no longer distinguished from technical intervention into the world. Rather, representing and intervening is considered to be inextricably interwoven (Hacking 1983; Nordmann 2010). As our discussion of logics of "smart" will illustrate, this blurring of boundaries, with promissory futures of technoscientific developments emphasising *what might work* (rather than *what or whose reality is true*), is part of what enables technoscientific logics to operate across complex fragmented realities.

"Smart" technoscientific futures in a moment of competing realities

Among the authoritative imaginaries of technological progress and economic growth manifesting themselves in contemporary society, those of "smart" abound. In 2010, the chairman and CEO of IBM, Sam Palmisano, declared the 2010s "the Decade of Smart". The ensuing years have proved him right, in terms of the increasing amount of funding (H2020 2018), journals (IJSmartTL 2020; Technol Econ Smart Grids Sustain Energy 2020), and conferences (IEEE 2017; SES 2019; UDMS 2017) dedicated to various "smart" technologies. In the same year as Palmisano's lecture, the European Commission released a strategy for smart, sustainable, and inclusive growth. Following this, major research, innovation, and policy programmes on the European level have included the notion of "smart", such as the European

Innovation Partnership on Smart Cities and Communities (EIP-SCC 2020) and the Smart Energy European Technology Platform (ETIP-SNET 2020). In general, the ubiquitous references to "smart healthcare", "smart grids", or "smart cities" tend to have rather technologically studded meanings. Multiple lists have been produced (e.g. van Doorn 2014) of "smart" as an inventory of certain characteristics (digital, interactive, user-centred, etc.) and as pertaining to certain technologies (phones, tablets, energy systems, home management, transportation, etc.). Increasingly, "smart" refers to the *interconnection* of and *communication between* various technologies and devices, to various forms of infrastructure both digital and physical. A central development here is the emergence of the *Internet of Things (IoT)*, based in the use of RFIDs and increasing digital networks. This has later expanded through a number of additional artefacts, i.e. radical expansions of sensors in everything from household appliances to roads, Big Data applications, cloud computing, and algorithmic decision-making systems. As such, "smart" devices and the data gathering they enable can be interconnected and combined with other digital devices and innovations (see e.g. Silvast et al. 2018). Increasing institutional endorsement and steps towards the realisation of "smart" visions at the level of local and national politics illustrate the increasing dominance of such logics. But what is actually implicated, as well as explicated, by the concept of "smart"?

Logics of "smart": the "only" way forward – colonising the future

Buzzword concepts such as "smart", "sustainable", or "low-carbon", and the technoscientific imaginaries linked to such concepts, get much of their attractiveness from their formulation as problem-solving visions that no one really opposes (see e.g. Haarstad 2016; Rommetveit & van Djik, this volume). As noted by Susan Brenner in her book *Law in an Era of "Smart" Technology*, the "general desire to make all of our lives easier and more rewarding is the global driver for the development and incorporation of 'smart', embedded technologies into our environment" (2007, p. 131). Oftentimes, such buzzwords also implicitly point to some pre-existing state that needs to be superseded (Vincent 2014); it is hard to argue for not wanting to move past a "dumb", "unsustainable" or "high-carbon" scenario. As such, "smart" imaginations are a way of "creating fantastic worlds" (cf. Ezrahi 2012) in which boundless technological development and digitalisation provide solutions to some of the major societal challenges we are currently facing. For instance, "smart" developments is portrayed as a possible way out of our current "double-blind scenario" related to climate change, where "we can't keep growing indefinitely in the way we have done so far, but if we don't keep growing, we jeopardise the economic stability, not only of future generations, but also – more decisively – of present ones" (Benessia & Guimarães Pereira 2015, p. 82).

Importantly, however, the act of extracting any single reality or potential future from the welter of possibilities can be seen in effect as a moment of co-production (Jasanoff 2004), in which a desire to see the world in a particular way (how things *are*) gets coupled to particular norms and values (how things *ought* to be). Following this, public reason is not just an epistemic, but also a normative commitment (see also Jasanoff & Simmet 2017). Technoscientific imaginaries of the future, in this case of "smart" developments, provide justification and legitimation for political decision-making in the present, by pointing towards desirable and seemingly almost inevitable future outcomes of technological progress. They are also often correlated, tacitly or explicitly, with the obverse: shared fears of harms or dystopias that might be incurred from the failure to innovate (Jasanoff 2015). What might happen if we were to "fall behind", not able to keep up with "inevitable" and necessary technological progress?

As certain imagined futures increasingly circulate, become widely shared and occupy new spaces, they close down possibilities for public decision-making based on alternative views or imaginations and previously available spaces for democratic intervention. In this way, "smart" technoscientific imaginaries "circumscribe the horizon of possibilities" (Leszczynski 2016, p. 1692), increasingly hijacking, or colonising (Rommetveit, this volume) the future. Furthermore, some actors have more power than others to project their imaginations, and thus more possibilities for making their imaginations widely shared and accepted, through drawing on recognised expertise or other resources that contribute to authority and legitimacy. Nation states have a long history of establishing the dominance of the ruling class through making their worldview hegemonic as broadly accepted norms (Gramsci 1971) and disciplining citizens (Scott 1998; Foucault 2000). In our time, such mechanisms are weakening in the face of post-truth value clashes, and other, less visible and networks are emerging to vie for hegemony.

As STS scholars have shown, for instance, artefacts and infrastructures emerge in and are deeply intertwined with social contexts, practices, and modes of organisation, norms, and discourses (Winner 1980; Jasanoff & Kim 2009). They come with built-in functional properties and intentionalities and as such, "smart" or sensing energy technologies typically reflect the values, knowledge, and expertise of energy experts and tech developers (Strengers 2013, p. 32), although this is rarely made explicit. Although smart technologies might be technically and socially disruptive when introduced in households, for instance, typically requiring time-consuming familiarisation and adaptation (Hargreaves et al. 2017) or interrupting well-established domestic routines that sustain comfort, cleanliness, or convenience (Shove 2003), these concerns are considered these concerns are considered short-sighted and are often pushed aside in the face of the drive towards implementing positive technological change. As such, imagined-possible technological futures of "smart" technological innovations enables a framing of

potentially controversial political issues or value conflicts as simply technical issues. Thus discussions of significant changes in people's everyday life, energy practices, or routines due to the introduction of strong market signals and incentives, gets reduced to discussions of "grid optimisation", and issues of privacy and security become framed as minor problems that can be easily solved through programming, design, or other "technical fixes" (e.g. Ballo 2015). In other words, social consequences of technoscientific innovation, as well as discussions of *which truths* that get to guide political and normative action, can effectively be side-lined. Both the natural and human world can be controlled, automated, and optimised to remove bothersome contradictions or complexity. Alternative, and potentially dissenting, imaginations, are hence deemed undesirable, excluded, or neglected.

In a post-truth situation, where many issues might entail strong value clashes, such technoscientific "engineering" logic becomes an extension of the modern convictions of scientific objectivity. The possibilities for challenging such a de-politicised technology-oriented "neutrality" is further reduced with current fragmented realities. In this "post-truth" interregnum, technology-intensive "ideologically drenched policy frames and strategies circulate not only with increased velocity but also with intensified purpose" (Peck 2010, p. 139). With this intensified and accelerating mobility, the legitimacy of "smart" futures, as well as their implicit understandings of "public good" or of what is considered to be desirable", is strengthened (Peck 2005; Prince 2012). Arguably, we are witnessing an historically unprecedented *intensification* of technoscientific innovation processes. The logics of technoscience are gaining ground within public reasoning, to such an extent that imagined-possible futures of technological innovation are increasingly included in political agendas, and "the entangled, 'impure' hybrid quality of today's forms of technoscientific and social order seems to be an explicitly accepted state-of-being in day-to-day political discourse" (Rommetveit & Wynne 2017, p. 134).

Logics of "smart": creating collectives through malleable modules

The envisioned future "smart" electricity grid is articulated, mainly from within the discourses of energy experts and political elites, as a kind of "shared roadmap" for the planning of future energy developments and investments (e.g. EC 2009; Berker & Throndsen 2016). Smart grid visions are often visualised in images or diagrams, such as the one below (Figure 5.1), showing the different areas or domains in which one could imagine potential "*smartness*".

Arguably, the imagined future smart grid could be divided into different parts or technological "modules" that are enabled by the introduction of "smart" electricity meters. In this particular visualisation, the parts imagined are electric vehicles (EVs), smart homes, consumers/prosumers, and

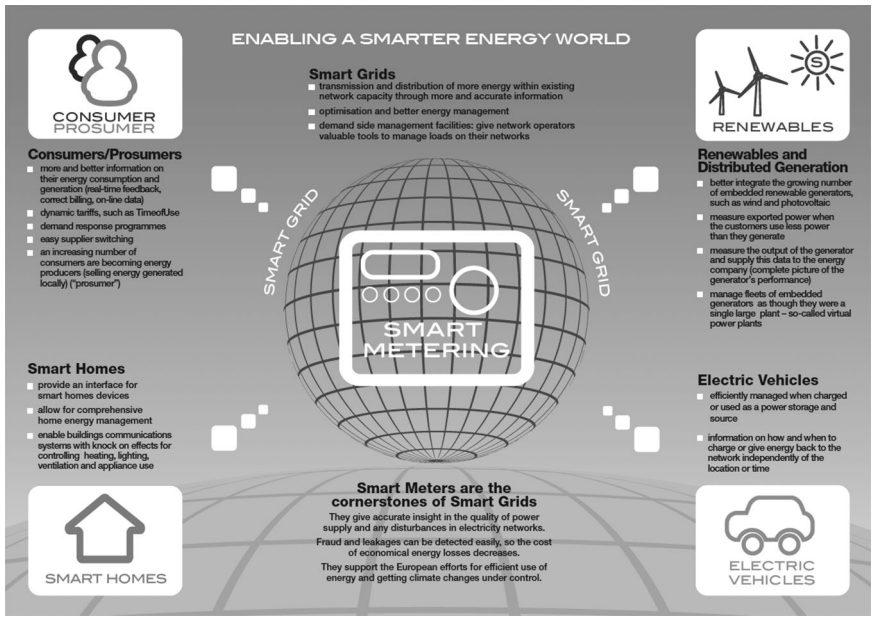

Figure 5.1 Visualisation of the future smart grid. Reprinted with permission from ESMIG images.

renewables. Like Latour's (1990) *immutable mobiles*, these kinds of visual illustrations or graphisms make the smart grid into "flat" parts that are mobile, readable, reproducible, of varying scales, and can be reshuffled and recombined. The kinds of illustrations exemplified by Figure 5.1 presents the smart grid agenda as an assemblage of a diverse set of activities and actors, efficiently washing away controversies and inconsistencies. The smart grid is presented with an impression of "optical consistency"; as a bright energy future that is coherent and controllable. When taking a closer look at the illustration, however, it becomes clear that these "modules" are constructed to work in different worlds. They can be modified depending on context, scale, or audience, which also changes the actors who would need to be involved in realising the vision. The EV "module", for instance, could be applied for mobilising many different actors and publics, such as citizens/consumers, car production companies, grid transmission operators or national or regional policies, schemes, or incentives for EVs. As this illustrates, "smart" technoscientific imaginaries tend to lack context and particularity (Viitanen & Kingston 2014), often being malleable, or *weakly structured*, with standardised subjects and a bracketing of contingency.

Yet, this indeterminacy and ambiguity of "smart" futures are in many ways "well-understood misunderstandings" (Vincent 2014, cf. Wynne

1992), embraced and utilised to create shared spaces for actors with a broad variety of values, interests, and agendas. The characteristic "fuzziness" of "smart" imaginaries thus *creates collectives*, by contributing to enrolling, connecting, and integrating expertise from different domains such as law, politics, science, or industry. This enables collaboration, translation and serving to guide action (Borup et al. 2006) across the fragmented realities of various actors involved in the making, distribution, and use of such imaginaries. The ambiguity characterising "smart" imaginaries allows the actors in these networks to strategically mobilise and operationalise them, for instance, by emphasising certain parts or "modules" in the overall vision while excluding others, in line with their specific agendas. While still recognisable as the loosely structured vision, this allows for situated translations or interpretations of "smart" developments at various times, in different sites and according to different political or social aims. In this sense, "smart" imaginaries are a kind of professional achievement, which entails the emergence of "techno-epistemic networks" (Rommetveit et al. 2019)[4] of various innovation contexts.

The *sense of urgency* that is implicit in such imaginaries (Benessia & Guimarães Pereira 2015), as well as the distribution and mobility of "flat" visual illustrations or graphism of imagined-possible "smart" futures (illustrated in Figure 5.1), intensify this process of *drawing actors together* (cf. Latour 1990) from different domains. As alternative views or imaginations are side-lined, the implicit goals and agendas of the assembled collectives producing "smart" imaginaries become increasingly hard to dispute. In the domain of energy, for instance, dominant smart grid imaginaries can provide solutions that reflect current institutional, economic, and political structures, and which would keep these structures relatively intact, thereby closing spaces for potential reconfiguration or contestation (see e.g. Ballo 2015; Inderberg 2015). In a fragmented post-truth moment, this characteristic malleability makes "smart" imaginaries resilient and robust in the face of any kind of objection to their implementation.

Logics of "smart": "smart" modes of citizen engagement and participation

As we have seen, "smart" technoscientific imaginaries carry implicit assumptions and truth claims, such as what kind of society or which "imagined publics" (Wynne 2006; Welsh & Wynne 2013) would be necessary to allow for the realisation of these imagined-possible futures. Such tacit views or "deficit models" (Irwin & Wynne 1996) of citizens, includes assumptions about what citizens are capable of in terms of knowing, doing, or learning, which might consequently narrow down what seems to be possible and meaningful in terms of democratic engagement, intervention, and deliberation. The ways in which publics are constructed within expert discourses are often essential for the framing of lay-expert interactions and public engagement mechanisms (Irwin & Wynne 1996; Barnett et al. 2012), and

affect the conditions under which publics may assert themselves as meaning-makers (Silvast et al. 2018).

For instance, specific "imagined publics" can be given agency in processes of sociotechnical change and be present at key decision-making points in evolving trajectories of technology development. As part of sociotechnical imaginaries of a future "smart" grid, the imagined consumer is idealised and de-contextualised, often constructed as some form of rational "Resource Man" (Strengers 2013) or "smart user" (Throndsen 2017; Silvast et al. 2018), intended to both help realise and significantly benefit from the sociotechnical change. Hence, while such conceptualisations may foreground "smart" consumers as having a key role as active contributors in order to realise the technoscientific vision, they often build upon instrumental behaviourist assumptions (see e.g. Hansen & Borup 2018). Sociological empirical findings about the complexities of social practices, energy consumption, and everyday life (see e.g. Shove & Walker 2014) are not taken into account, and the critical capacities and competencies of citizens are rarely recognised (Ballo & Rommetveit, forthcoming). This raises important questions about what kind of agency, citizenship (Ryghaug et al. 2018), or modes of engagement and participation might be available for so-called "smart" citizens, for instance as inhabitants of "smart cities":

Similar to the weakly structured "smart" energy futures, imaginaries of desirable futures of "smart" in urban contexts are characterised by indeterminacy, with somewhat "fuzzy" competitive goals and a lack of references to local contexts or "actually existing" urban politics (Shelton et al. 2015; Wiig 2015). Often framed as a *modernisation and development strategy* (cf. Scott 1998) in response to challenges of urban sustainability, such as climate change adaptations, of providing clean and energy-efficient solutions to increasing populations (Luque-Ayala & Marvin 2015), these imaginaries entice city governments and other urban actors into innovation and collaboration aimed at large-scale "smart urbanism". In short, "smart" seems to be almost co-extensive with "digitalisation of the city", which might entail a reconfiguration and transformation of urban governance and political practices (Braun 2014; Rutherford & Coutard 2014).

As illustrated by Figure 5.2, visualisations of the "smart" city include ICT sensing devices and new digital networks being built into the fabric of urban environments. City flows and processes such as traffic, shopping, and energy consumption are increasingly being monitored, registered, and regulated, but seemingly by ubiquitous, helpful technology rather than by human actors with clear agendas. In this sense, "smart" urban governance moves towards becoming "evidence-based" or *data-driven* (Townsend 2013; Barns 2016), in many ways a continuation of the Cartesian ideals of control and prediction. In line with the deterministic tendencies often characterising "smart" technoscientific futures, data is seemingly disentangled from values or stakes, appearing frictionless and non-ideological, as

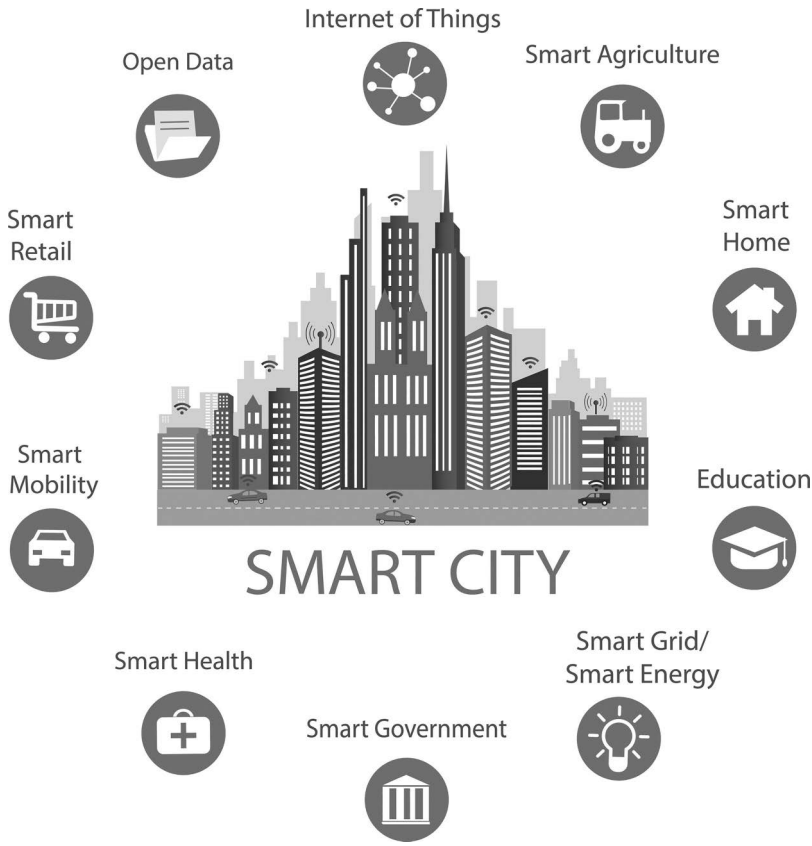

Figure 5.2 Visualisation of the future smart city. Reprinted with permission from PIXTA.

a streamlined and a straightforward way to improve or optimise what some have called the "post-political" city (Mouffe 2005; Swyngedouw 2007).

However, narrowing complex urban dynamics into that which can be coded is of course far from "post-political". Rather, *knowing and governing through data* entails strong universalist logics, dissolving prior categories of understanding and ordering (Rommetveit & Wynne, this volume). This also has extensive social implications (see e.g. Kitchin 2014; Thrift 2014). For instance, gathering, storing, and utilising such massive amounts of data may threaten the privacy, identity, autonomy, and legal rights (Hildebrandt 2015) of "smart" city inhabitants, and might make critical urban and national infrastructures more vulnerable to digital threats (van Dijk, this volume). As such, "smart" urban developments seem, to some extent, to contribute to a "black box society" (Pasquale 2015), in which an increasing number of decisions become automated in processes that are opaque, coached in highly

technical language and to some extent performed by codes and algorithms. This efficiently excludes or blocks publics from taking part in discussions about significant social, legal, and ethical issues related to such technological developments (e.g. Ballo 2015). Arguably, this constitutes an intensification; from normatively reducing citizens' space for democratic engagement through various "deficit models" and conceptualisations of an "imagined public", to seeing the emergence of an "obstacle model" (Rommetveit & Wynne 2017), where publics are viewed as potential threats to the imagined necessary progress and thus need to be removed or circumvented. A countertrend to such black-boxing, however, is the proliferation of open data platforms and programmes as part of "smart city" developments, which some suggest might have the potential to open up for more citizen-centric approaches to ICT urban innovation (Barns 2016).

As this shows, "smart" approaches to urban development (Viitanen & Kingston 2014; Luque-Ayala & Marvin 2015), with their technocentric and neoliberal logics, as well as "smart" modes of citizen engagement and participation are far from unproblematic. For instance, urban and national governments are framed as entrepreneurial facilitators of economic growth through new markets of "smart" products and services (Hollands 2015), with corresponding narrow conceptions of "publics" and of public participation. "Smart city" imaginaries seem to conceptualise publics as either passive recipients of economic development strategies from urban governmental or business elites (Bulkeley et al. 2016). In many ways, "smart" urban governance becomes a form of "corporate storytelling" (Söderström et al. 2014) where the aim to create "greener" cities or energy systems takes on the role of an irrefutable argument. Although some scholars argue for such challenging "corporate dominance" (Sadowski & Bendor 2018), and the implicit premise of "smart growth" (Pollard 2000), pointing out the need for developing alternative desired futures and a critical understanding of "smart urbanism" (Luque-Ayala & Marvin 2015), this is arguably becoming increasingly difficult to achieve.

Future imaginaries of "smart" urbanism are also strengthened through various forms of smart "urban experiments" of technological innovation, which has become part of contemporary urban governance, promising to couple de-carbonisation with economic growth by fostering innovative knowledge production (e.g. Silver & Marvin 2016). This kind of "government by experiment" (Bulkeley & Castán Broto 2013) entails carefully selected modes of participation, much in line with technoscientific logics, with demonstrations and testing of new technologies and policies, to see *what works* in "real world" conditions. Such intensification of technoscientific logics, in Pellizzoni's (2017) words, makes publics increasingly "appear as 'lookouts', marginal accomplices involved in someone else's plot" (p. 216). Such increasingly passive publics would not be well-equipped for dealing with the overflow of information and "alternative facts" characterising our "post-truth" times, which means we would be at risk of coming close to Huxley's (1932) dystopian descriptions.

Opening up or closing down? Democratic engagement in a time of "post-truth" and technoscience

As emerges from our discussion, our current "post-truth" interregnum, evolving in parallel and in conjunction with an "age of technoscience", seems marked as a moment of competing realities with a lack of shared future imaginations. This moment of "post-truth" can be named as such because the authoritative arguments of modernity, often scientifically founded, are now seen to be less persuasive, as increasing acknowledgement of complexity and uncertainty destabilises previously broadly accepted public truths or facts, leading to a void of authority. Our contemporary "post-truth" panics and the debunking of some of the previously unifying imaginaries of modernity, might, at least in principle, provide the necessary conditions and opportunities for increased understanding of situated realities and an opening up of processes of public reasoning and fact-making (see e.g. Stirling 2008). However, the spaces open for reconfiguration are already getting hijacked by the rationalist imperative of technology, for instance through widespread future imaginaries of "smartness". Such imaginaries are becoming increasingly dominant within the epistemic competition of contemporary public reasoning, drawing upon the modernist arguments of technological progress as more or less equal to societal progress. They also imply that the fantastic futures they describe are almost inevitable, in a move that mirrors the cultural hegemonisations of modernity.

Post-truth times entails a weakening of shared public space, which makes it increasingly hard to challenge or dispute the circulating technoscientific imaginaries which are currently establishing themselves as new forms of truth regimes. "Smart" imaginaries are charged with positive values, yet in a way that is ambiguous, fuzzy, and lacking in context, enabling them to translate to different social worlds across fragmented realities. Although claims of "truth" always come from situated positions (Haraway 1991), these weakly structured visions, emphasising technological artefacts and what might *work*, appear ubiquitous, and thus their source is hard to locate and, consequently, to engage with. The ambiguity of these imaginaries contributes to enrolling, connecting, and integrating expertise from different domains, and makes possible a "colonisation of the future" by appearing to be inevitable, "consensus-based", or even "post-political". The mobilisation of smart truth claims and logics, as well as their entanglement with emerging political agendas and discourses, seems to be intensifying, and over time, widespread "optically consistent" technoscientific imaginaries might desensitise the public to contradiction, allowing incoherencies to escape unnoticed.

This suggests that the transformations in public reasoning and fact-making that we are witnessing essentially represent new ways of "closing down", resulting in harsher conditions for alternative or dissenting views or imaginations. The intensification of technoscientific logic as part of public reasoning and policies normatively reduces the space for democratic

engagement, intervention, and deliberation for citizens, through the construction of "smart imagined publics" that are increasingly rendered passive, and which might, with the emergence of an "obstacle model" (Rommetveit & Wynne 2017), eventually even be removed or circumvented. However, as stated by Hannah Arendt (1968, pp. ix–x): "Even in the darkest of times we have the right to expect some illumination." Although our critical analysis points to significant challenges for contemporary public reason, this time of reconfiguration of hegemonic assessments of what "gets to count" as relevant knowledge also provides opportunities for applying insights from STS, philosophy and other humanities and social science disciplines to address important questions on the role of science and technology in society, how "facts" are made and prevail, or what makes certain realities or futures become hegemonic. This opens up for deliberations about which imaginaries might serve the needs of our democracies during our contemporary liquid and fragmented times, although the emergence and proliferation of encouraging alternative imaginaries across fragmented realities is no simple task. An emphasis on sustainable ways of acting and knowing might in such a situation be spurred through a reaction against the intensification of technoscientific logics and a mobilisation of what Gramsci[5] called "pessimism of the intellect, optimism of the will".

Critiques, such as this analysis, of dominant technoscientific logics (see also Schick & Winthereik 2013; Strengers 2013; Throndsen & Ryghaug 2015), might contribute to a gradual expansion of the narrow framings of imagined ("smart") publics, and thus might foster more complex and reflexive configurations of citizens. Such nuanced views of citizens might also contribute to shifts in public deliberation mechanisms; opening up new decentred spaces for dialogue between government and citizens, for instance, emphasizing place-based knowledge (Kohler 2002), of what it might mean to live in a "smart" city characterised by "big data" urban governance, or how to make use of new and emerging open data platforms and programmes as a "non-corporate" part of "smart city" policies to enable more "citizen-centric" approaches to urban innovation (Barns 2016).

As when Gramsci wrote about the interregnum in the early 1930s, many ways forward might yet materialise, and not all of them are equally visible from our present perspectives. The post-truth interregnum might, in this positive scenario, resolve into a situation where publics are not required to be quiescent and supportive to facilitate social order, but through their engagement, from various value perspectives, bring technology into use for the good of people, rather than people serving disembodied technoscientific ends as the new social order. As Hannah Arendt suggests (1968, pp. ix–x):

> …such illumination may well come less from theories and concepts than from the uncertain, flickering, and often weak light that some men and women, in their lives and their works, will kindle under almost all circumstances and shed over the time span that was given them on earth.

Notes

1 As we witnessed, for instance, when Donald Trump was unwilling to explicitly condemn white nationalist groups, famously blaming "both sides", after the white nationalist demonstrations and counter-protests in 2017 in Charlottesville, Virginia.
2 The analysis builds on a taxonomy of "smart" developed as part of the research project Checking Assumptions aND promoting responsibility In smart Development projects (CANDID), a European Union's Horizon 2020 project with grant agreement No. 732561. It was based on project members' expertise and a snowballing literature review.
3 Taylor's argument is that our modern order has been transformed by an underlying moral order of disembedded individualism.
4 This is co-extensive with a notion of epistemic networks (see Rommetveit 2013) (as well as with Stengers' (2005) ecologies of practice), since in every case, it is a matter of observing how each professional community has to rely on a given professional knowledge base, in relating to other epistemic actors/networks/communities.
5 After the motto created by Romain Rolland, see Antonini (2019).

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6 Tracing networked infrastructures for post-truth

Public dissections of and by techno-political Leviathans

Niels van Dijk

Introduction: enemies of truth

> The FAKE NEWS media (failing @Nytimes, @CNN, @NBCNews and many more) is not my enemy, it is the enemy of the American people. SICK!
>
> —Donald J. Trump (@realDonaldTrump), Twitter, 17 February 2017, 4:32 PM

> I just cannot state strongly enough how totally dishonest much of the Media is. Truth doesn't matter to them, they only have their hatred & agenda. This includes fake books, which come out about me all the time, always anonymous sources, and are pure fiction. Enemy of the People!
>
> —Donald J. Trump (@realDonaldTrump), Twitter, 30 August 2018, 4:11 AM

A good place to start this inquiry into post-truth, both qua content and form, is provided by these short utterances posted on the online social network Twitter in 2017 and 2018 by Donald Trump, President of the United States. It is remarkable how many elements come together: truth, fakeness, fiction, news, traditional media, social media, the people, (head of) state, public enemies, and political health. Within the space of the second tweet, we are led from the epistemically elevated concept of "truth" to the politically charged notion of "enemy of the people". This term goes back to the old times of the Roman Republic in which the Senate could declare a subject of the state a "public enemy" (*hostis publicum*). This was an exceptional sanction not just passed for breaking the law, which would merely make one a criminal or a bandit. Instead, it constituted a formal declaration against a subject that would put him or her in state of war with the Republic. This sanction turned a Roman citizen, often a political opponent, into a foreigner (*hostis*) by placing him outside of the scope of the law. This declaration was a political exteriorisation device for turning an internal

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political opponent into an external enemy of the public body of the state.[1] In the case of the tweet, the term is levelled not at a certain individual, but against established institutions of the press such as CNN, NBC, and the New York Times. Truth (as opposed to fiction) is here directly mobilised as a criterion for deciding whom to externalise from the body politic as its enemy.

Not only the media has faced these attacks. Other established social institutions have not only seen their (epistemic) authority diminish within society, but have also been targeted as enemies of the state. Another example of this occurred in the debate around Brexit with the British High Court. The court had to decide on the constitutional question whether the UK Government could by itself start the formal process by which the UK would withdraw from the EU, or whether approval of the Parliament was first required. Recurring to constitutional moments predating the Glorious Revolution, the court reinstated the fundamental principle of parliamentary sovereignty and decided that the Parliament has the final say on Brexit.[2] In a press response next day, the right-wing newspaper, the *Daily Mail* printed large pictures of the three judges on its front cover accompanied by the headline ENEMIES OF THE PEOPLE, as if passing the act of judgement a second time.[3] Several Brexit politicians considered the court to have "declared war on democracy" in pitting itself and "Parliament against the will of the people".[4] In this extraordinary recalibration of political forces, even the reassertion of the fundamental principle of parliamentary sovereignty by the country's supreme court is called a "constitutional crisis".

Science is also not exempt from attacks on its epistemic authority, as had for instance become clear in the climate change controversy in 2009, when e-mail correspondences of climate researchers were hacked and published online, a few weeks before the Conference on Climate Change in Copenhagen. These correspondences were mobilised by critics who claimed that the scientists were manipulating data on climate change and the controversy became framed as "ClimateGate".[5] The American radio talk show host Rush Limbaugh joined the "hoax" choir in a blogpost in his inimitable style, by sketching the broader epistemic implications beyond science alone:

> what the uncovering of this hoax, exposes, is the corruption that exists between government and academia and science and the media. Science has been corrupted. We know the media has been corrupted for a long time. Academia has been corrupted. None of what they do is real. It's all lies![6]

The institutions of government, academia, science, and the media are qualified as the "four corners of deceit" and taken together as the "universe of lies" controlled by the left, far removed from the universe of the right where reality reigns supreme and that does not overlap with the former. David Roberts, the journalist who also popularised the term "post-truth politics",

has called this separation and insulation of political spheres "tribal epistemology" (Roberts, 2017).[7] The truth value of information is here no longer determined based on criteria and evidence that would be shared by all sides, but rather based on the extent to which it is in line with the values and goals of the tribe that becomes increasingly insulated in its own political echo chamber. With Trump as president, this attitude and the attack on existing institutions entered mainstream politics.

Contestations of standards of truth have more broadly coincided with a decline of, or direct attacks on the (epistemic) authority of several established societal institutions such as science, government, courts, and the media. Such events have given rise to a self-reflective debate by science and technology studies (STS) scholars, which has been central to this book, on the role and position of their field.[8] The debate has centred on whether their detailed "symmetrical" descriptions of the infrastructures and networks within the techno-sciences that allow for the (de-)construction of facts and truths, have contributed to this post-truth situation.[9] This chapter will explore this debate and pose a counter-question that seems indicated by some of its authors, but is not followed through. It will push the argument of symmetry to the opposite side of the truth spectrum by asking: *What are the infrastructures for post-truth? How is fake news produced and distributed?*

These questions will be addressed by engaging empirical investigations of the Cambridge Analytica scandal around Brexit and the 2016 US presidential election, where disinformation phenomena touched upon the heart of democratic political institutions. Here there is a need to focus on the different sites, actors, networks, and technologies involved in the production and distribution of information, and the types of knowledge and some of the notions of fact and truth that underpin them. At the same time, it also requires a focus on the actors engaged in exposing these networked infrastructures by tracking disinformation campaigns. This brings us to new alliances of citizen and investigative journalism, media studies, data scientists, NGOs, but also to traditional regulatory institutions trying to reassert and reinvent themselves as sites for public dissections of these infrastructures, e.g. through public committees and bodies. This controversy reveals a struggle for control of the median ICT infrastructures in the networked society. It gives some insights in the attempts and counter-attempts of how actors are trying to unscrew the old state Leviathan, whereas simultaneously re-assembling techno-political new ones.

Unscrewing Leviathans: historical co-productions of ICTs, disinformation, and political order

To gain some historical distance and perspective, I will first start by considering some historical examples from the "pamphlet wars" in which analogous issues of disinformation campaigns and the role of ICTs were at

stake, and how these were linked to theories of state formation and political power. The link between information and communication technologies and political events is not unprecedented. History has shown that the emergence of important new information and communication technologies have often gone hand in hand with periods of instability and conflict. The prime example is the invention of the printing press in the 15th century, which enabled the publication and distribution of texts on a massive scale. The "revolutionary" influence on the Protestant Reformation has been well studied (Eisenstein, 2005), with the translation of the Bible from Latin in vernacular languages, printing and dissemination throughout Europe. In Luther we still have two models of public address juxtaposed. The Reformation allegedly began with Luther nailing his 95 theses on the indulgences to the large north door of the *Schlosskirche* in Wittenberg in 1517. This was an act of public disputation to provoke theological debate, tailored to the site of display to achieve great visual and dramatic effect, as it was performed on All Saints when large audiences were usually present. The effect of this act was however modest, or was even considered a failure (McGrath, 2011, pp. 22–26). On all accounts, it was incomparable to the effect made when the theses were, even without Luther's knowledge or consent, translated, put to print, and rapidly spread over a vastly larger territory of Germany, and eventually other European countries. Together with his translated Bible, this catalysed the printing and dissemination of books and pamphlets, starting a "pamphlet war".

It has been argued that the pamphlet culture in 16th- and 17th-century England provides an apt analogy for the current fake news debate. Public debate was also undergoing transformations due to ICT technologies and the political atmosphere was loaded with conspiracy and the threat of breakdown (Marche, 2018). Whereas printing books was still relatively expensive and thus reserved for the intellectual elite, pamphlets could be printed cheaply and easily distributed and were thus available for a larger pool of writers. They dealt with a range of social, political, and religious matters. To garner the attention of a larger reading audience, different writing strategies were developed that favoured conspiracy, exaggeration, and defamation of people, but also saw experimentation with new writing styles that challenged print conventions and mixed in oral speech elements, by directly addressing the audience and challenging figures of authority.[10] Not unlike online social media in our times.

Pamphlets quickly gained a reputation of unreliability, leading to complaints in 1590 that "many fabulous pamphlets are published, which give little light and less proof" (Joad, 2003, p. 8). They also influenced the political events of the time, for instance, before and during the British civil war (1641–1644) in which there was a huge spike in the number of pamphlets published (Greenberg, 1988). Pamphlets played an important role in political polarisation, but these events simultaneously co-shaped the concept of the pamphlet, its format, and its possibilities. They provided a way to

disseminate and discuss new political theories on representative government and parliamentary sovereignty (Skinner, 2005), an instrument to wage propaganda war by reporting and framing important political events (e.g. battle victories), or historiographical documentation of controversial events (Greenberg, 1988).

For political philosophers like Thomas Hobbes, these events of great societal and political turmoil around the civil wars had shown that the dissemination of disputed knowledge in matters of religion and politics could lead to civil strife. He thus struck an explicit and direct relation between knowledge and power and between truth and political order.[11] As has become well-known in STS circles, this broader power conception later also included the link between the status of scientific facts produced through the experimental method in the nascent laboratory and the stability of political order within society (Shapin and Schaffer, 1985). Hobbes (1998) wrote his famous Leviathan theory of the state and political power against the backdrop of these events. He built his state theory on the image of an "artificial man" or political automaton. The public body of Leviathan is assembled out of many elements, including government, courts, but also of print media distributing news and knowledge, each assigned its role and place in a specific sovereign power ordering. Hobbes for instance called magistrates the "limbs" and "joints" of the political body and judges its "voice".[12] Interestingly, Hobbes called seditious texts, such as the ones on religion and politics mentioned above, the "illnesses" that could befall the political body of the state.[13]

Here we can return to Trump's quoted tweets: the detrimental role of the circulation of fake news or disinformation on the vitality of the unified multitude of people, and the implied need for intervention in its "sick" body politic to disjoin these elements and cast them out. The crucial manoeuvring here is to pit the culprit against "the people". We could say that this enemisation from within, give us a glance into the dynamics of the current political struggles in the body politic, the institutions that have come to formally and informally constitute this body, and some of the new networks that are trying to re-compose it.

This metaphor of the Leviathan can be taken further. To borrow the image from Callon and Latour (1981), we are witnessing processes of reassembling Leviathan, by externalising and disjoining certain instituted actors and simultaneously enrolling new ones in socio-technical networks. In Callon and Latour's account, macro-actors like Leviathan become constructed by successfully translating the wills of many different smaller actors into a single will in whose name they become authorised to speak. Such macro-actors do not merely consist of relations between united humans as in Hobbes's famous frontispiece. If a macro-actor is to be durable, many of these networks of relations must be delegated to all kinds of materials and technologies (black-boxing) so they do not have to be renegotiated each time. Therefore, we can call them techno-political Leviathans. Contrary to

Hobbes, this does not happen once for all times in the social contract, but many times when macro-actors become constructed everywhere, such as large companies.[14] The task of the social sciences here becomes to unscrew these networks and scrutinise the various elements that compose such macro-actors and allow them to act as a powerful force. These insights have also been applied to unscrew macro-actors that explicitly structure themselves as social networks underpinned by digital networking technologies such as Facebook (Birkbak, 2017).[15]

The post-truth debate in STS. Facts, infrastructure, and digital wizards

The disinformation and fake news events, some of which have been described before, have given rise to a self-reflective debate within STS in society on the role and position of their field regarding the post-truth situation. Several STS scholars in the 1970s and 80s challenged the image of science as a human endeavour solely focused on finding facts about the world out there through the proper experimental method, and as gradually progressing closer and closer towards the truth. Instead, they provided detailed empirical descriptions of the variety of other actors, objects, and networks involved in the construction of facts within the sciences. These sketches showed close links between the scientific work of conducting experiments and the political work of establishing order within society, as we have for instance just seen with the Hobbesian example.[16] Part of the STS debate has centred on whether these "symmetrical" descriptions have contributed to this post-truth situation and to the loss of trust in, or direct attack on the epistemic authority of institutions such as science and the knowledge it produces.[17] I wish to highlight one aspect of this debate here, starting from Sismondo's overture:

> STS's detailed accounts of the construction of knowledge show that it requires infrastructure, effort, ingenuity and validation structures …. That doesn't look at all like post-truth. A Twitter account alone does not make what we have been calling knowledge.
>
> (Sismondo, 2017a, p. 3)

Sismondo points at the infrastructure and work needed to produce knowledge and contrasts this with the way post-truths become produced through the simple tweets we started this chapter with. Perhaps both STS and "Twitter may be part of the dissolution of the modern fact" (p. 4), but they have done so in very different ways. His argument triggered a reply by three STS scholars arguing against his opposition between sophisticated STS analysis and the simplicity of post-truth.

> post-truth is hard work: look at the work Trump and his supporters are putting into it beyond simply working a Twitter account; […] What we

> should be asking is "what kinds of work are required to sustain post-truth and how does this differ from the kind of work needed to sustain the scientific form of life?"
>
> (Collins, Evans and Weinel, 2017, p. 581)

This is an interesting point.[18] I argue it could be seen as an extension of the principle of symmetry from the production of information and knowledge by scientists, to the production of fake news and disinformation by the so-called post-truth actors.[19] Taking Sismondo's example, one would expect this to lead to an inquiry into the work and ingenuity involved in building the infrastructures for post-truth and the dissemination of fake news. Unfortunately, this is not what we are getting. Collins and his co-authors rather fall back on classical STS debates on the production of scientific knowledge and its public use and abuse as expertise in policymaking.

Similarly, in another contribution to the post-truth debate, Jasanoff and Simmet (2017) problematise the term post-truth, since it presupposes a time in which truth actually governed politics. STS has shown that facts intended to persuade publics have historically always been co-produced with prevalent forms of politics and relations between people and public institutions, and this is also the case in the current political setting. They point at a generational shift amongst millennials having grown up with online social networks (OSNs), which allow ways of seeking information and expose a variety of "alternative" truths different from those perpetuated by mass media or political institutions. As media theorists however know, each medium has different affordances and enables or limits different types of behaviour. These technologies can also push particular information through extensive digital networks to inform public opinion. Jasanoff and Simmet here make a promising reference to Steven Bannon's use of new media during the US election and Brexit:

> to disrupt our complacent politics… the chief architect of Breitbart used digital wizardry and the ideology of the alt-fact, alt-right to promote his own desired unravelling and restructuring of society.
>
> (Jasanoff and Simmet, 2017, p. 762)

Nevertheless, there is also no follow-up providing insight into Bannon's disruptively innovative enrolment of digital affordances for his ideological re-assemblage of society and the techno-political Leviathan. These remain shrouded behind the rather mystifying term "digital wizardry".

So, could we have some more symmetry please?

This chapter will try to take up the challenge that these authors have hinted at, but have not followed up on, by engaging with "the kinds of work required to sustain post-truth". It will do so by exploring a counter-question to the STS debate, asking instead: *What are the infrastructures*

for post-truth?[20] *How is fake news produced and distributed? Can the principle of symmetry be extended to study infrastructures for post-truth and the production and dissemination of fake news?*[21,22] We will take a main contemporary controversy regarding disinformation campaigns as a case in point, namely the Cambridge Analytica scandal around Brexit and the 2016 US presidential election. Here disinformation phenomena touched upon the heart of democratic political institutions. How could these (dis) information infrastructures be studied and where would we begin?[23]

An obvious (STS-related) starting point for studying information infrastructure is in moments of technical breakdown when normally invisible background processes become suddenly visible (Star, 1999). In the Cambridge Analytica case, however, there was no clear technical failure (to the contrary, the technology might have worked too well!).[24] The breakdown occurred on a different level: the technologies were dissected based on the controversial political events they had contributed to (Brexit and US presidential elections) and the way they had done so. This brings us closer to the intersection of controversy-based approaches in tracing socio-technical networks and the study of invisible public infrastructures (Latour, 2005a; Latour and Hermant 1998).[25] Controversies constitute events of tension in which infrastructural dimensions both come to light for political engagement, but can also channel the propagation of, or even enable some of these controversies. In the Cambridge Analytica case, we can observe various kinds (legal, technical, political, scientific) of "infrastructural inversions" (Bowker et al., 2010), but different from how they have been addressed in STS. First, they do not articulate material conditions for the emergence of a new (computer) science and its conception of truth, but rather for studying the infrastructural underpinnings of a (anti-scientific) discourse of post-truth. Second, these inversions are not performed by the (ethnographical) analyst, but by other actors who thereby themselves become involved in the controversy.

Another way to unravel some of the digital wizardry is through research done by scholars at the intersection of STS and digital methods, especially on fake news and disinformation (Birkbak, 2017; Bounegru et al., 2017; Marres, 2018; Venturini, 2018). In the spirit of McLuhan's old mantra that the *what* of the message is unimportant, but that we need to look at *how* the medium operates and affects, attention is shifted from the binary truth or false quality of concrete news messages, towards how these messages spread through the affordances of digital networks and attracted many followers. Its "spreadability" or "virality" became its crucial defining characteristic, not its deceptiveness or fakeness (Bounegru et al., 2017; Venturini, 2018). Here the emphasis is on the mediating role of online platforms and digital infrastructures in creating, facilitating, channelling, relating, sharing, aggregating, tracking, framing, filtering, using, or blocking certain types and "flows" of information online. These studies both track

ICT networked technologies and trace the human and non-human actors involved in controversies and digital infrastructure building.[26]

Disinformation and election manipulation. The Cambridge Analytica controversy

When turning to the controversy around election manipulation around the 2016 Brexit referendum and the US presidential elections, this implies we need to focus on the different sites (mainly digital), actors (ICT start-ups, political campaign teams, data brokers), technologies (hyperlinks, trackers, scraping, data-mining), knowledge types (psychometrics, social physics), concepts of fact and truth, and networks (online social, political) involved in the production and distribution of (dis-)information. At the same time, it also requires a focus on the actors engaged in exposing these networked infrastructures, through disinformation campaign tracking, hoax-detection, and bot-net dissections. This brings to light new alliances of citizen and investigative journalism, media studies, data scientists, NGOs, but also the role of traditional legal and political institutions trying to reassert or reinvent themselves as sites for public dissections of these infrastructures, e.g. through court cases and public committees and bodies.

This chapter is hardly the place to provide an account of a full-scale investigation of this issue. It is meant to indicate the directions, problems, approaches, and ingredients that follow from an overview of such a controversy. Where to even start an account of these controversies that are very wide-spanning and often still ongoing?[27] This case is a quagmire. I will commence by studying how the unfolding of this controversy has gone hand in hand with the activities of tracing and uncovering the social and technical networks through which (dis)information became produced and disseminated, including at the infrastructural level.[28] We will not perform an (ethnographic) study of information infrastructures or infrastructural inversions ourselves. These mapping activities are performed by other actors "in the field", who engaged with this controversy and were instrumental in its articulation and making it public more widely. These are far from "neutral", unobtrusive, fly-on-the-wall types of activities.[29] Each infrastructural inversion is rather an intervention according to specific interests and purposes (e.g. making public, protecting rights, re-establishing data sovereignty) depending on the actors involved, and each articulated through their own tools, concepts, and sometimes mandates. Each intervention brings a situatedness and orientation to the work of tracing infrastructures and is performative of the way an actor becomes drawn into the controversy.

This will first bring us to data journalists tracing the digital networked infrastructures through which disinformation circulates online and for tracking the people travelling those pathways by following the links, and

second to investigative journalists tracing the social network of suspects engaged in information warfare within the controversy. After this, we will turn to a series of dissections in the big data ecosystem by regulatory bodies. The first one, by a privacy regulator, performs a public dissection of the flows of personal information in the controversy through the lenses of data protection law. The second one is a broader parliamentary inquiry into the regulation of the circulation of disinformation to manipulate elections, digging into a wide range of issues including the business models, economic positioning, legal compliance strategies, privacy design architectures for users and app developers of online platforms. These two investigations themselves become platforms for these public bodies to increase their powers, resources, networks, and for upscaling their activities. As such, eventually these infrastructural tracing activities and inversions become part of larger efforts to re-establish control and sovereignty over data flows and to re-assemble a techno-political Leviathan.

Crawling through disinformation networks. Digital methods journalism

Investigations into the fake news or disinformation phenomenon in the aftermath of the US presidential elections on November 6, 2016 led to efforts at tracking the enabling socio-technical networks. The issue of fake news, hoaxes, and disinformation was already well-known at the time. After the elections, questions arose about the different factors contributing to Trump's success. Gradually attention also shifted to technological conditions, especially the role of Facebook. In the run-up to the elections, a large number of fake political stories about both Trump and Clinton circulated on the platform, and the filtering algorithms for Facebook's Newsfeed were thought to have created ideological filter bubbles.[30] Apart for the methodological problem that Facebook algorithms were notoriously impenetrable by outsiders due to well-guarded secrecy, for some researchers at the intersection of data journalism and digital media studies, the narrow focus on Facebook obscured the larger picture. Facebook's Newsfeed and Google AdSense programs might have amplified the spread of disinformation, but what were the sources producing this content and how was this traffic driven online (Albright, 2016, blogposts 1, 2, 3; see also: Bounegru et al., 2017; Faris et al., 2017)? "We need serious insights to get past fake news, and this area involves a better understanding of the infrastructure (i.e., the internet) we've built that has helped to enable it" (Albright, 2016, p. 4). This led to attempts at tracing through a range of digital methods (searches, crawling, scraping, indexing, timelining, visualisation), the broader media "ecosystems" or "micro-propaganda machine" involved in spreading disinformation at various levels. We will start with the work of data journalist Jonathan Albright, which is important in the timeline of the controversy.

The starting point of research is important since it implies a preconception of what is meant by the terms "fake news" or "disinformation". Albright commenced from lists of websites identified as "fake news" or as "disinformation" by fact-checking sites,[31] and extracted the network of hyperlinks on these sites connecting to other websites or webpages. This provided a basic structure of the larger linking network that could be rendered observable through visualisation tools (see Figure 6.1). The "map" allows to see to which other sites the fake news pages link (outbound links), and which sites link into them (inbound links). It shows the central sites that drive the flow of (dis)information in this network, and how this network is positioned in relation to other actors such as mainstream media or OSNs. The visualisation shows that a large part of this disinformation traffic is driven into mainstream media, social networks (e.g. Twitter and Facebook), search engines (e.g. Google), content creation, and sharing sites (e.g. YouTube, WordPress). Facebook indeed plays an important role here, but rather as a kind of amplification device for these networks. Knowledge editing wiki-type sites (e.g. Conservapedia, Rense) heavily function as (dis)information repository and as "strategic hubs" for linking out to other sites. There are several small "peripherical" sites (depicted at the margins of the graph) with large amount of links going out to other sites, and clusters of interrelated pages that coordinate linking behaviour. Furthermore, there are coordinated strategies for "gaming" the criteria of the algorithms that main search engines such as Google's PageRank use to order and prioritise their displayed search results, to push oneself up in the ranking. Through this overall alternative information machine, it became possible to frame and appropriate the discourse around a range of important political topics.

Albright compared this, what he calls the right-wing "hyperpartisan media ecosystem", to a mapping of the other side of the political spectrum (Albright, 2016, p. 5). Whereas in the left-wing news ecosystem, online media networks around the election period were more centred on traditional media and institutions, this right-wing ecosystem formed a highly coordinated, internally coherent and relatively insulated online sphere, which lacked bridging nodes to mainstream sources. The information flowing within these channels reinforced the views from its readers and shielded them from journalistic sources that contradicted this information. The "linking assault" on mainstream media from this sphere was used to both attack mainstream media and to push them out of the centre of relevance.[32] This also provides some insight into the machinations and machinery behind the tribal epistemology discussed earlier.

This first research was used to draw a map of these digital networks that allow the observer to trace how (dis)information circulates online (Figure 6.1). In a follow-up step, Albright's investigation turns towards mapping the infrastructure of tracking technologies constructed on top of the first network (Albright, 2016, p. 3; 2017, p. 9). The "deeper" layer of coordinated ad tracking networks follows around the people moving along

Figure 6.1 Network graph of the "micro-propaganda machine". Source: Albright, 2016, p. 2.

the laid out disinformational pathways, to construct profiles of their behaviour. This required a study of all the cookies, tracking scripts, APIs, identifiers and display ads leading to a host of "third parties", which were also visualised in a second network (see Figure 6.2).[33] Within this network, flows of personal data were enabled through channels with low digital security and semi-legal data-sharing agreements. Albright speculates this was built to weaponise behavioural ad tracking technologies, a kind of networked privacy infringement by design.[34] At the core of these networks are main ad networks such as Facebook's Custom Audience and Google's AdSense Networks. They further included e-mail newsletters, Facebook Likes and a range of both common and more specific cookies and trackers. On this basis, all kinds of personal data could be gathered about users travelling the disinformation pathways mapped above, relating to their

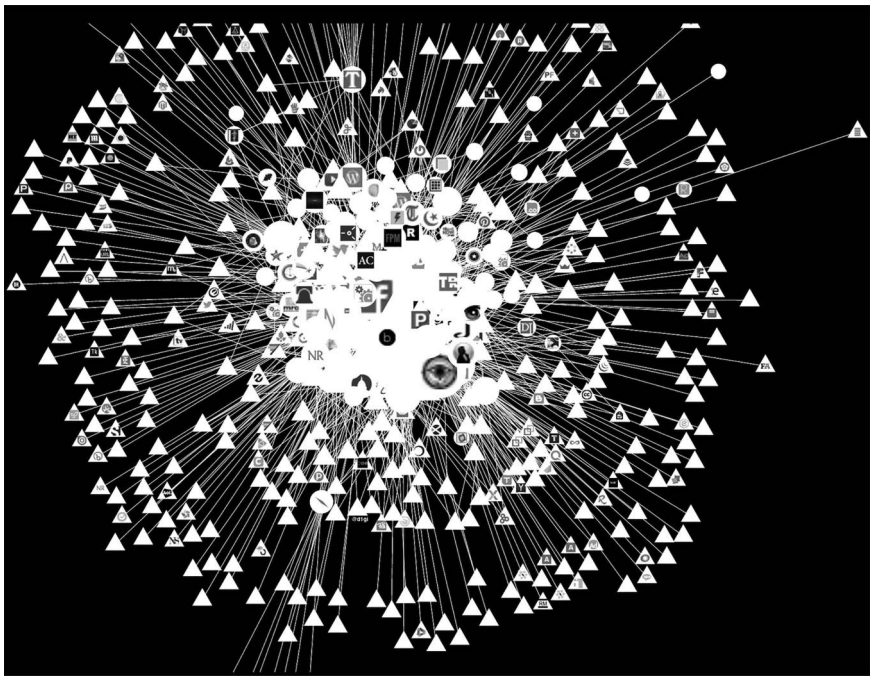

Figure 6.2 Ad tracking networks in the disinformation ecosystem. Source: Albright, 2016.

online (purchase and clicking) behaviour, social network relations, location and travels, personal characteristics, and cultural interests. These types of data profiling in AdTech networks had previously allowed tech companies, advertisers, and online retailers to estimate user preferences to deliver personalised *commercial* advertisements. In this case, such AdTech techniques were however used by different actors like political strategists and psy-ops consultancies.[35] The purpose here was to construct "propaganda-lytic" tracking networks to try and influence user's future behaviour by delivering, often emotionally charged, personalised *political* advertisements.

Pinning up on the social linking board on information warfare. Investigative journalism

> They have created a web that is bleeding through on to our web. This isn't a conspiracy. There isn't one person who's created this. It's a vast system of hundreds of different sites that are using all the same tricks that all websites use. They're sending out thousands of links to other sites and together this has created a vast satellite system of right-wing news and propaganda that has completely surrounded the mainstream

> media system. […] I scraped the trackers on these sites and I was absolutely dumbfounded. Every time someone likes one of these posts on Facebook or visits one of these websites, the scripts are then following you around the web. And this enables data-mining and influencing companies like Cambridge Analytica to precisely target individuals, to follow them around the web, and to send them highly personalised political messages. This is a propaganda machine…. It's a level of social engineering that I've never seen before. They're capturing people and then keeping them on an emotional leash and never letting them go.
>
> (Albright quoted in Cadwalladr, 2016)

In the same period after the US presidential elections, feature-writing journalist Caroline Cadwalladr of *The Observer* had started to look into the role of Google in spreading fake news. In performing searches with Google's autocomplete function, which predicts the phrase one is typing in the search bar, she found that one of the main suggestions to questions such as "*Are mainstream media……?*" was whether they were "dead" (Cadwalladr, 2017). The top ten ranked results provided the kind of list of "hyperpartisan" websites attacking mainstream media, which we have seen above. These findings triggered a further exploration that led her to interview Albright (see quote above), who pointed her to the role of Cambridge Analytica in the US elections and the Brexit referendum. This in turn led to a broader investigation of the network of actors involved in this techno-political controversy, simultaneously transforming her into an investigative reporter.[36]

These websites turned out to be funded by Robert Mercer, the A.I. and computer scientist-turned-billionaire and CEO of a financial hedge fund. Mercer was one of the main financial donors of the Republican campaign of Donald Trump and one of the spiders in the web of connections in this controversy. His funding trails linked to several "tactical" projects functioning as a range of offensive experiments (or an "arsenal of information weapons") at the intersection of (digital) media and politics.[37] A main one was Breitbart, a conservative media outlet that managed to attain a central position in the alternative (dis)information ecosystem constructed around the mainstream media with extensive ad tracking networks.[38] It also included Cambridge Analytica, the consultancy that helped target voters based on their psychometric profiles.

The investigations continued through interviews with Cambridge Analytica employees, eventually leading to contacts with Chris Wylie who became a whistle-blower and reported on the internal socio-technical mechanics of the companies involved (Cadwalladr, 2018). This led to a more elaborate mapping of the social network of the controversy's "Who is Who?", evoking images from a scene from a detective movie where photos of the main suspects are tagged to a "link board" connected by crisscrossing strings.[39]

The interviews paint a story that is heavily coloured with words from warfare vocabulary, which we have also seen in Trump's tweets.[40] This already applied to the Breitbart outlet, which was based on the ideas that

politics follows culture and to change politics, one has to start by changing culture. In the words of its chairman Steve Bannon, this has to be done by a "cultural and political war" through information. This happened through "weaponizing" digital media, political documentaries, and fake stories as tools against political and media "enemies". In the case of Cambridge Analytica, this element came to the fore even more literally.[41] The company and its parent SCL had a history of deploying military tactics stemming from both information warfare and psychological operations (psyops) and applied these to the democratic processes of elections. Classical tactics from the information warfare handbook here involved, include spreading of propaganda, rumours, disinformation, or fake news to manipulate the public and undermining the quality of the information by others (Conyers and Kiyuna, 2015).[42] Psychological operations pertain to the use of such information to influence the emotions, reasoning, and motives of people.

> [Bannon] believes in the whole Andrew Breitbart doctrine that politics is downstream from culture, so to change politics you need to change culture. And fashion trends are a useful proxy for that. Trump is like a pair of Uggs, or Crocs, basically. So how do you get from people thinking 'Ugh. Totally ugly' to the moment when everyone is wearing them?
>
> (Wylie in Cadwalladr, 2018)

Through Wylie, the link is made to psychometrics. Merging insights from Wylie's research into fashion forecasting and Bannon's Breitbart doctrine on politics following from culture, insights into fashion preferences became a proxy for politics that could eventually be used for targeted advertisements. Two types of science connected the dots here: (1) OCEAN psychology applied to political behaviour and (2) Big Data psychometrics research on Facebook. Hereafter, we will more specifically dig into this work, to understand some of the techno-*scientific* machinations behind this controversy and the different *notion of fact* behind the disinformation and fake news, which are so emblematic for the post-truth condition.

Psychometric facts and the online book of social data (interlude)

> [C]haracter ought to be measured by carefully recorded acts, representative of conduct. […] We want *lists of facts*, every one of which may be separately verified, valued and revalued, and the whole accurately summed. It is the statistics of each man's conduct in small, everyday affairs, that will probably be found to give the simplest and most precise *measure of his character.*
>
> (Galton, 1884, p. 154, my accents)

In this quote from an 1884 article by the statistician Francis Galton called *Measurement of Character*, we find the relation between a different notion of fact with this kind of personalised statistics, applied to the measurement of small everyday behaviour to estimate one's character and in which "class of persons" he can be grouped.[43] Galton also introduces a method for character measurement that came to be known as the lexical hypothesis, according to which certain singular words in the world's languages are expressive of character traits, transforming dictionaries into research source material (Galton, 1884). This research was over time refined and factored into five core replicable personality traits of people: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (Goldberg, 1993), also called "The Big Five". OCEAN psychology is premised on the idea that core personality traits exist and are measurable, that they vary across individuals and that they can be used to explain people's behaviour. The theory has been applied to different domains, amongst which the understanding of differences in people's political attitudes and affiliations (Gerber et al., 2011). Publications about the application of OCEAN to politics were a conceptual trigger for the Cambridge Analytica research. This however raised questions on how to do this in digital practice, and where to get all the data.

This second scientific building block was provided through publications from the Psychometrics Centre at Cambridge University. The research is part of the growing field of data-driven computational social science in which the analysis of human behaviour is fuelled by the increasing capacity

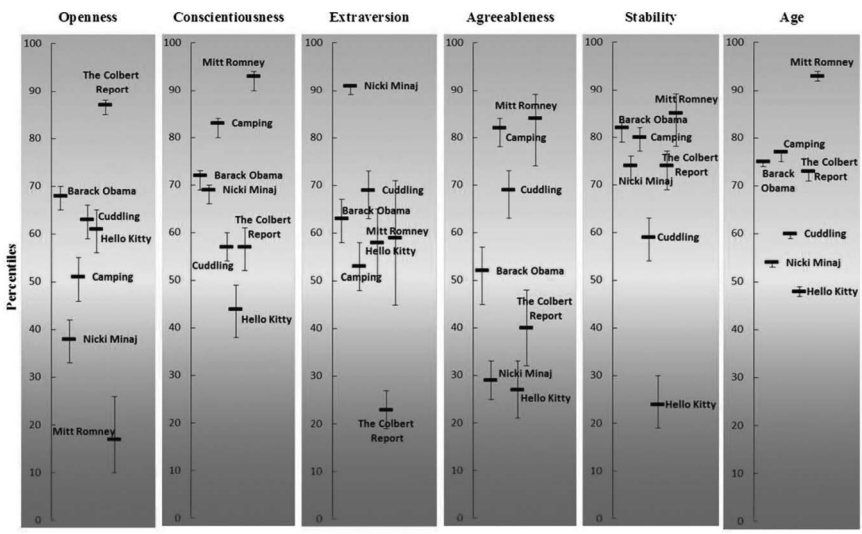

Figure 6.3 Sample sets of associated "Likes" for different personal traits.
Source: Kosinski, Stillwell and Graepel (2013).

to record and analyse online data (Lazer et al., 2009). The psychometric team approached the online social networking site Facebook as a tool for conducting social science research. They claimed that beyond the normal limitations of biased self-reports, surveys and artificial laboratory studies in social science methodology, these sites unlock troves of data about "actual behaviour expressed in a natural environment" (Kosinski et al., 2015, p. 543). Following the lexical hypothesis, this turned Facebook into the digital equivalent of the dictionary for mining social words. The research started in 2007 through an online personality quiz application amongst Facebook users called "myPersonality" (Stillwell and Kosinski, 2012). Many Facebook users granted the application access to their data in exchange for being scored on the Big Five OCEAN traits. Through a "snowball" sampling approach, friends of the users were invited to participate as well.

This approach made it possible to build a large database of psychometric data that became the starting point for a range of other research and publications, amongst which a 2012 famous paper of how *Private traits and attributes are predictable from digital records of human behaviour* (Kosinski, Stillwell and Graepel, 2013). The psychometric data and Facebook profile information was here correlated with user's seemingly trivial behavioural preferences expressed on Facebook through their Likes. On this basis, a range of very sensitive personal traits were "predicted", including sexual orientation, ethnicity, religion, intelligence, happiness, age, gender, substance use, relationship status, and, indeed political views. Figure 6.3 shows a sample of highly predictive Likes for each of these traits, *e.g.* liking "Hello Kitty" pages being correlated with political affinity with the Democrats.

> People use personality judgments to make day-to-day decisions and long-term plans in their personal and professional lives, such as whom to befriend, marry, trust, hire, or elect as president.
>
> (Youyou, Kosinski and Stillwell, 2015, p. 1036)

In a second well-known paper these Like-based predictions of personal traits were subsequently compared with the personality judgements made by people close to the user. The authors claimed that *Computer-based personality judgments are more accurate than those made by humans* (Youyou, Kosinski and Stillwell, 2015) given that enough behavioural information (number of Likes) was available. The researchers already pointed to the link between personality judgements and the election of a president, and (unrelatedly) they flagged the risk that detailed knowledge about people's personality could lead to manipulation.

These calls did not come out of the blue. Since 2012, researchers, including those working for Facebook, had already been studying the mass-scale effects of OSNs and the way online behaviour propagated (Bond et al., 2012). They experimented with the dissemination of political mobilisation

messages and the way they changed political self-expression, information seeking, and voting behaviour throughout the network. Follow-up experiments into mass-scale "emotional contagion" through Facebook by manipulating the Newsfeed of users (Kramer, Guillory and Hancock, 2014) had led to public outcry over breaching ethical norms (Jouhki et al., 2016).[44]

These papers showed how new ways of mining peoples' political preferences were possible and, through digital ad-delivery systems (Facebook and Google), they could be targeted with personalised political messages. These provided the building blocks for crafting the Cambridge Analytica approach.[45] As has become known, there was one crucial problem: no deal could be made with the psychometrics team for the use of the database. This is where fellow-psychologist Aleksandr Kogan came into the picture. He replicated the psychometric research by devising his own personality quiz called thisismydigitallife that provided access to user's Facebook profiles. The legal catch was that this Facebook application operated under Facebook's terms of service from before 2014. Under these terms, app developers that evoked the exception of scientific development, could access and pull not only the data of those who installed the app, but also of his or her friends without their consent. Kogan thus harvested a large amount of data that he sold to Cambridge Analytica and that enabled the personalised targeting of political advertisements.[46]

This provides a peek under the hood of some of the science fuelling disinformation data-mining operations. There is a certain asymmetry at work here. Such digital technologies have been used to undermine the epistemic authority of media, politicians, and of science and the facts they produce and present to the public. At the same time, the computer science behind these technologies embeds other conceptions of what constitutes a *fact* and a *truth*,[47] which have become black-boxed within these digital infrastructures and hidden from view.[48]

In this context, where Simondo (2017a) asserted that "Twitter may be part of the dissolution of the modern fact", Marres responds that where this may be true for how facts are attacked in online public discourses, there are other types of facts that play a crucial role in these digital ecosystems and that drive the ICT analysis within these platforms:

> Facts continue to reign but they do so outside the public realm: we are observing not the wholesale dismantling of the authority of facts – experts continue to exert considerable authority in institutional and commercial settings – but the far more specific dismantling of public facts.
>
> (Marres, 2018, p. 437)

These other facts of computer science and its subdisciplines apply computation to social online behaviour as in computational social science (Lazer et al., 2009). This can be done to assess the linkability of people within

OSNs (Backstrom et al., 2012),[49] or in our case, for assessing one's psychological character through psychometrics.

Public dissection through the lenses of data protection law. Privacy regulators

In this section, we will turn to investigations by public bodies in response to the scandal, such as regulators and parliamentary committees, most significantly the investigations by the Information Commissioner's Office (ICO, 2018a), the Electoral Commission (TEC, 2017) and the DCMS Committee of the House of Commons (DCMS, 2019) in the UK, and the Mueller investigation in the US (Mueller, 2019). Where it has been pointed out that adversarial processes in courts can figure as "orgies of deconstruction" for factual evidence and truth claims made by scientific experts (Jasanoff, 1997, p. 53), similarly these public regulatory bodies constitute sites for public dissection of ICT infrastructures and networks around fake news and post-truth. The dissections pertain to the technological architectures and flows of (personal) information involved in the controversies.[50]

This brings us to the British Information Commissioner's Office (ICO), the British privacy authority that is an independent public body reporting to Parliament. After the CA revelations in *The Observer* (Cadwalladr, 2017), ICO started their own investigation (ICO, 2018a, 2018b). It was focused on the use of personal data to micro-target voters in political campaigning around the Brexit referendum, the nature of data analytics technologies used, and the complex ecosystem of actors involved. ICO points at the limits of its competence in addressing the broad range of socio-technical uncertainties and ethical questions, surrounding the overall question whether democracy was disrupted. It has a mandate to check whether the collection and use of personal information relating to people complies with the principles of data protection law. The legal concepts used to formulate these principles constitute the lenses to qualify the data-driven campaigning ecosystem. They simultaneously limit the scope of the research, but also make it more precise through a range of investigation powers and render the results actionable by a range of penalties.

The investigation started with an inquiry into Cambridge Analytica, but quickly expanded into other commercial, political, and academic sites within a more extensive "big data ecosystem". This dissection spanned the interactions between a range of actors such as online social media, companies, data brokers, analytics firms, university institutions, political parties, and campaign groups. The flows of personal information throughout these ecosystems were scrutinised through the legal lenses of how these data were collected and used, by which actors, for which purposes, on the basis of which grounds and whether the processing was done in a fair, lawful, and transparent manner. The result was a sketch of a political micro-targeting

system, in which data is used to build personal profiles of voters, and big data analytics are used to send them personalised political messages on social media.[51]

In the process of investigating this big data ecosystem, the public agency had to upscale its efforts. The size of the controversy, the different actors involved and the amount of data stored and processed, made this "the largest investigation of its type by any Data Protection Authority" (p. 7). This forced ICO to increase capacity by assigning a large team of internal researchers and external experts to the investigations and to use the maximum of its regulatory investigation powers based on the new European General Data Protection Regulation (GDPR). These powers included the unprecedented step of obtaining warrants to search the premises of Cambridge Analytica and to seize documents, servers, and other equipment for evidence gathering purposes. They further included data processing audits, monetary fines, and criminal prosecutions (see ICO, 2018b). The stretch in use of capacity and investigation powers highlighted ICO's institutional and regulatory shortcomings. This led to requests for expanded powers and resources,[52] which were granted by the British legislator (in the 2018 Data Protection Act).[53] Since many of the issues unearthed in the investigation went beyond the scope of ICO's legal mandate, this also forced them to upscale their international and *interagency networking* between different Data Protection and other public authorities (e.g. Electoral Commission, National Crime Agency) (ICO, 2018b, p. 17).

The controversy transformed ICO into a more powerful privacy watchdog within the networks that try to assert control over flows of data in the broader political landscape (sharpening Leviathan's sword[54]). These efforts also contribute to pushing the field of data protection more frontstage as a solution to the online manipulation of elections through disinformation.[55]

Public experiments with assemblies for digital macro-gangsters. Parliamentary inquiry

This brings us to the fake news inquiry by the Digital, Culture, Media and Sport Committee, a Select Committee of the British House of Commons (DCMS, 2019). The Committee had been conducting a broad inquiry on how to regulate fake news and disinformation since early 2017, focusing on how false, misleading, or persuasive content was spread to influence or manipulate people. Such a Committee has different, sometimes broader possibilities for investigation than the data protection authority. Its mandate extends to all matters of regulation of digital technologies, culture, and media and can thus cover the wider responsibilities of search engines and social media platforms and to explore regulatory responses (to be) taken by government.[56] This makes it a typical site of "ontological surgery" in which decisions on how to characterise and describe problematical phenomena are first required, before they can be dealt with by regulatory

actions (Jasanoff, 2011). Such exercises classically start with "What is?" questions. In this case, these are in fact the first term of reference for the inquiry: "*What is 'fake news'? Where does biased but legitimate commentary shade into propaganda and lies?*"[57] The problem is that fake news is a complex dispersed phenomenon with many different meanings including fabricated content, manipulated content, imposter content, misleading content, false context, satire, and parody.

> The difficulty here is that most of this information is not true or false; it is somewhere on a spectrum. […] Many people believe that there is not an obvious truth, where we know that something is 100% inaccurate. […] This gets to the question of definitions. When we are talking about this huge spectrum, we cannot start thinking about regulation, and we cannot start talking about interventions, if we are not clear about what we mean.[58]
>
> (Claire Wardle)

The nature of the fake news phenomenon needs to be delineated through definitional stabilisation before one can apply regulation. Furthermore, the term is often used by people for strategic purposes to indicate a statement one does not like or agree with. We get full circle when the Committee refers to Donald Trump's tweets calling "Fake News Media" the "enemy of the people" (DCMS, 2019, p. 7). It urges the British government to drop the term fake news and substitute it by "disinformation" and "misinformation" that can be more readily defined.

> With such a shared definition, and clear guidelines for companies, organisations, and the Government to follow, there will be a shared consistency of meaning across the platforms, which can be used as the basis of regulation and enforcement.[59]
>
> (DCMS, 2018a, p. 7)

When the Cambridge Analytica scandal became public after *The Observer*'s scoop in 2018 and the fake news phenomenon had targeted the core of democratic and political institutions, the Committee's inquiry became more specifically directed at disinformation to affect democratic elections. Similar to ICO, the Parliamentary Select Committee's inquiry was large in scope and had to sometimes innovatively fall back on unconventional procedural powers and mechanisms in dealing with unforeseen circumstances. We will focus on two of these: the seizure of sealed evidence in a foreign court case, and the assemblage of a multi-parliamentary Grand International Committee.

The inquiry included many oral evidence sessions in which witnesses or experts were invited to testify and provide written submissions and evidentiary documents. When witnesses did not show up, the Committee issued summons for them to appear. Quite unprecedented, sometimes these

summonses were also ignored. This was the case with Dominic Cummings, the now infamous cyber-political strategist and director of the "Vote Leave" campaign,[60] but, more relevant for our case, also with Facebook CEO Marc Zuckerberg. Zuckerberg had been several times invited to appear to testify about the role of Facebook in the Cambridge Analytica scandal. He however declined on all occasions, instead sending Facebook staff to replace him (Figure 6.4). These events highlighted the difficulties in enforcing these summoning powers.

The refusals prompted the DCMS Committee to explore other, more drastic options to obtain information about how the Facebook platform works and its role in the Cambridge Analytica scandal. This included interposing itself in a court case in California against Facebook. The case was brought before the court by the American app-developing company Six4Three. The company had accused Facebook of violating user privacy of US citizens by exploiting its privacy policy and for engaging in unfair monopoly business practices by suppressing competition of successful apps on smartphones. The DCSM used its specific powers to *confiscate sealed documents* Facebook had provided to the foreign court. These are old and rarely used parliamentary privileges that allow parliamentary subcommittees to order the seizure of documents for evidentiary purposes.[61] As Damian Collins, the chair of the DCMS Committee stated:

> This is an unprecedented move but it's an unprecedented situation. We've failed to get answers from Facebook and we believe the documents contain information of very high public interest.[62]

These documents provide a "behind the screen" picture of Facebook's broader socio-technical architecture including a dissection of its user data-driven business model, its digital market positioning and the privacy design differentiation between user-oriented and developer-oriented data access interfaces and policies. Even when new privacy settings were introduced into the platform in 2012 that allowed users to seemingly exert a certain degree of control over their personal data, "whitelists" were still maintained of app developers that had preferential access to these user data and the data of his or her friends. "Facebook prioritises these developers over their users".[63] In fact, the whole business model of Facebook was predicated on the financial value represented by friend's data and on offering app developers access to these data in return for payment of significant amounts of money. The principle of "data reciprocity" between Facebook and app developers plays a crucial role here: Facebook allows app developers access to user data in return for the possibility for the users of these apps to share their data back with Facebook.

> Sometimes the best way to enable people to share something is to have a developer build a special purpose app or network for that type of

> content and to make that app social by having Facebook plug into it. However, that may be good for the world but it's not good for us unless people also share back to Facebook and that content increases the value of our network. […] The purpose of the platform is to tie the universe of all the social apps together so we can enable a lot more sharing and still remain the central social hub. I think this finds the right balance between ubiquity, reciprocity and profit.
>
> (Mark Zuckerberg in an inhouse e-mail conversation at Facebook)[64]

Here we get at a broader techno-economical imagination placing these discussions in a scaled-up context of Facebook's own Leviathan-building process. The digital social "universe" of online content sharing between users increasingly transpires through specialised software programs or "apps" focused on enabling the sharing of specific types of content. Facebook wants to be positioned as the spider in the digital web at the centre of all these data flows. It aims at building a digital "ecosystem" of social applications whose flows of user data are tied together through its online platform. In this market positioning, the principle of reciprocity also has immediate consequences for those app developers who want to build up their business outside of, and in competition with Facebook's digital ecosystem. As Facebook states this "is something that we will not allow".[65] Facebook has taken aggressive action against other successful app developers by denying them access to user data, sometimes in spite of earlier agreements.

Through a procedural innovation, the Committee had thus been able to access documents that allowed to dissect the design architecture of Facebook, which paved the way for discussing the conditions for assigning accountability:

> Facebook was violating user privacy because, from the beginning, its Platform had been designed in that way. Facebook fostered a tension between developer access to data and user privacy; it designed its Platform to apply privacy settings for Facebook apps only, but applied different and varying settings for data passed through the Platform's APIs.
>
> (DCMS 2019, p. 39)

The privacy architecture needs to be differentiated. The user interfaces of the OSN platform seemingly apply "privacy by design", by putting into place privacy policies and data controls for access and processing of personal information of users and their friends. The interfaces and policies for apps (APIs) however install a kind of "privacy infringement by design" or "surveillance by design" by granting whitelisted app developers access to the databases with user data.

These links between Facebook's personal data-driven business model and compliance with privacy regulation further came to light in Facebook refusal to fully comply with requests by users to receive information about

their personal data processed by the company (so-called data subject access requests).[66] Facebook argued this would require a disproportionate effort given that "they are so big that there is no way they could provide me with this information; the cost would be too large". MP Brendan O'Hara concludes that what

> Facebook are saying is that they are too big to be managed and controlled by existing laws and, therefore, they almost should be exempt from them?[67]

These findings lead to, by all accounts, an extraordinary "verdict" by a parliamentary committee:

> From the documents we received from Six4Three, it is evident that Facebook intentionally and knowingly violated both data privacy and anti-competition laws. […] Companies like Facebook should not be allowed to behave like "**digital gangsters**" in the online world, considering themselves to be ahead of and beyond the law.[68]
>
> (DCMS, 2019, p. 42)

Finally, similar to the ICO case, we can also see a scaling up through networking taking place. When the Committee first summoned Zuckerberg, it argued it represented 40 million British Facebook users. In letters to the DCMS Committee, Facebook refused stating Zuckerberg already testified in the US Senate, US Congress, and the EU Parliament and that "it is not possible for Mr. Zuckerberg to be available to all Parliaments" of individual countries.[69] These events raised the question about the appropriate assembly for scrutinising this disinformation assemblage around this public issue of election manipulation.[70]

As a second public innovation to dissect the relevant ICT architecture, the Committee scaled up the inquiry by *experimenting with new forms of assembly*. It engaged in an alliance with 24 members of parliaments of eight different countries, to form an International Grand Committee on disinformation and fake news.[71] This was the first time so many parliamentarians from different countries joined together in the House of Commons.[72] The strategy was one of size and representativity. If Zuckerberg could not visit individual parliaments, here was a multi-national super-parliamentary network, formally representing around 447 million people. Each country had their own stakes and interests in finding out more about Facebook's role regarding the fake news phenomenon, but they found common cause in assembling around the goal "to promote further cross-border co-operation in tackling the spread of disinformation, and its pernicious ability to distort, to disrupt, and to destabilise" (DCMS, 2019, p. 5). This approximates a network of sovereign Leviathans in the more classical political sense.

Figure 6.4 Absence of Facebook's CEO at GIC Commons by members of nine different national parliaments. Photo by Gabriel Sainhas.

Nevertheless, Marc Zuckerberg also did not appear before the Grand International Committee (Figure 6.4), causing condemnation from the assembled members and the press. The absence of the head of this body corporate within this public assembly, became integrally linked to the lack of accountability of big technology platforms in tackling the disinformation phenomenon in light of democratic crises. It highlighted the need for looking into new ways to keep these companies in line with national law and hold them to account for violations. One of the solutions brought up during the GIC hearing by Canadian MP Charlie Angus involved Leviathan disassemblage:

> The problem that we have with Facebook is that there is never accountability, so I would put it to you that when we talk about regulation, perhaps the best regulation would be antitrust?
>
> (DCMS, 2018b, p. 58)

He added that given its "unprecedented economic control of every form of social discourse and communication", perhaps "the simplest form of regulation would be to break Facebook up or to treat it as a utility". At the outcome of the session, the members of this Grand International Committee signed a declaration on the international "*Principles of the Law Governing*

the Internet", which stated that social media companies such as Facebook need to be held liable when they don't comply with regulations regarding disinformation).

The links between regulation, privacy, accountability, and breakup of big digital tech platforms do not come in isolation, especially in relation to the "too big to regulate" refrain. Earlier that year, also in the wake of Facebook's role, the Cambridge Analytica scandal, French president Emmanuel Macron had called for a "European sovereignty in AI". He argued that there will be "sovereignty battles to regulate, with countries trying to defend their collective choices". The election scandals provide similar lessons as the role of the banks in the 2007 global financial crisis about the size of certain macro-actors and the dependency of national (financial and information) infrastructures on them: "They are too big. Not just too big to fail, but too big to be governed. … So at this point, you may choose to dismantle".[73] Disassemblage would be one strategy to reassert control and even sovereignty. A second one would be the "redesign" of these companies to legally incorporate at the national level to ensure compliance with privacy regulation, "because accountability and democracy happen at national or regional level but not at a global scale". Ursula von der Leyen echoed these points as President of the European Commission, by calling for European "technological sovereignty" in key technological areas such as A.I. She here mentioned the GDPR as a main example of the EU setting the global norms for the development of new digital technologies (von der Leyen, 2019). This story is currently ongoing and far from settled. The latest instalments to date have been reports by the British and US Competition authorities (ACAL, 2020; CMA, 2020). Partly in light of the controversies described in this chapter, both authorities have recommended new antitrust measures, including a "breakup of platforms" such as Facebook, to tackle the issues of market power, consumer privacy, and weakened democracy. The chair of the ACAL also stressed the need for the people to assemble behind the proposed reforms to be able to win this "big fight" for scale.[74]

Summary and discussion: mutual (dis-)assemblage of techno-political Leviathans in information wars for scale

Leviathan was written against the backdrop of historical events of great societal turmoil in which the ICT technologies of the time – printing press and pamphlets – played an important role. Hobbes personified the state as an artificial man with a richly imagined anatomy. Its body is assembled out of many well-ordered and functioning institutional parts in a public machine, including specific roles for the courts and other public regulatory bodies, but also for science and the media given the co-productive influence of news and knowledge on societal order. The generative political principle of the Leviathan is the unification of disordered multitudes of people into a representative form, which allows a representative to speak in the name of

this assemblage. The state has a soul of sovereignty, the ghost in the public machine, which gives life to this body politic and makes it the seat of political authority. But what is once assembled can become disassembled as well, and there are certain "infirmities" that weaken the state. According to Hobbes, one such agent of "internal disease" was the circulation of seditious books and pamphlets proclaiming false doctrines and information. These, in turn, can create divisions within the public and affect the way people assemble or unify (Hobbes, 1998). Interesting for the STS debate is that Hobbes' account ties the political roles of *both* the scientific production of knowledge and facts, and of the circulation of disinformation within society, to the issue of political organisation of sovereign power.[75]

A focus on techno-political Leviathans retains some of these insights, but amplifies them by looking at the pluriform ways in which macro-actors can become constructed (not merely states, although they are crucial protagonists in the story), the networking actions involved in these constructions, and the crucial mediating role that technologies play here. In our case, this pertained to the role of present-day infrastructures mediating flows of (dis) information around moments of political assembling, such as elections and referenda. Expanding on Hobbes's, admittedly wrought, anatomical imagery, this chapter has focused on Leviathan's nervous system.[76] Whereas historical political theory during the Enlightenment period was centred on giving the state an "artificial soul" (sovereignty) or artificial joints (courts), we can here study contemporary efforts by various actors to give this artificial man an "artificial intelligence".

We started this chapter with Trump's tweets in which the term fake news was related to branding mainstream media as "enemies of the people". Contestations of certain truth standards have been used by certain actors to weaken epistemic authority of the media, politicians, scientists, and courts, and to declare informational war against them. It provided a glance at efforts to dissolve a constellation of institutions that have come to formally and informally constitute the body politic within the state. At the same time, underneath, there have been infrastructural machinations for the circulation of disinformation through digital online networks. Post-truth turned out to be intertwined with the dynamic interplay of tribal epistemology, political enemisation strategies, and the (historical) role of information and communication technologies.

The post-truth situation has led to a debate in the field of STS on whether their descriptions of the networks used in the sciences to produce facts have played into these developments. Although the argument of infrastructure was brought up in STS literature, it was still mainly applied to the scientific modes of producing facts, rather than to the techniques and tools of digital wizardry involved in the production and dissemination of disinformation. For this purpose, the argument of symmetry was "radicalised" and applied to the study of the Cambridge Analytica controversy around Brexit and the 2016 US presidential election, to explore how these

digital disinformation infrastructures could be traced. Do these involve a "narrower and very different range of resources" from the ones normally observed in science, as Sismondo (2017b, p. 589) claimed in response to Collins and co-authors? Although, echoing Latour's words, they definitively involve a "politics by different means" from those used in science, the networks of resources mobilised in the "hyperpartisan digital eco-system" are not necessarily narrower. Quite the opposite. We here got a large picture filled with all kinds of new actors, organisations, places, technologies, knowledge types, and networks all implicated in the production and circulation of disinformation.

We covered the endeavours of several actors engaged in exposing their different networked aspects. The first were data journalists tracing many of the pathways by which disinformation was spread online and the digital surveillance apparatus that followed around the people who engaged with this information. This rendered a first visual map showing the complexity of the networked information infrastructures implied in these controversies, e.g.; the main "nodal" actors involved such as mainstream media, OSNs, search engines, content sharing sites, wiki's; the technologies used such as hyperlinks, search criteria, cookies, tracking scripts, APIs, identifiers and display ads; and the inbound-outbound and central-peripherical nature of linking practices established. Second, we saw how investigative journalists traced the social networks of several actors that were centrally involved in these controversies, amongst which was Cambridge Analytica. Information warfare figured as an important framing trope of the disinformation operations, with terms like "enemy of the people", "psyops", "cultural war", and "weaponization" of digital media.

These investigations also provided a first public view into the psychometric science behind the data-mining operations used throughout these networked infrastructures for post-truth. Whereas these technologies might have undermined the authority of science and the facts they produced, these types of computational social science or "social physics" do themselves rely on different conceptions of fact and truth, which may have fuelled the machinery of post-truth and which had remained black-boxed.

Afterwards, we turned to how regulatory bodies performed a series of public dissections of the big data ecosystem implied in the controversies. The first one was by the British privacy regulator (ICO) that investigated the controversy through the lenses of data protection law. In the disinformation (or larger post-truth or fake news) debate, this approach implies a shift away from the truth and falsity qualities of the information at stake, towards questions whether this information was personally related to certain people and whether it had been duly processed. Flows of personal information throughout these ecosystems were qualified according to which practices, actors, purposes, grounds, and principles were involved. At the same time, through the controversy, the ICO upscaled itself by increasing its capacity, resources, expertise, powers, and international and interagency

networks. It transformed into a more powerful actor within the networks trying to assert control over information flows in the broader political landscape. In neo-Hobbesian fashion, it would constitute an agent of neuro-regeneration that prunes old and new synaptic information signals within the body politic.

These studies also show we must nuance the concept of the techno-political Leviathan. In this intertwined digital ecosystem, there are all kinds of distributed networked activity at different decentralised places. There is no one central entity in control, no head of a single Hobbesian sovereign but rather a network with several actors trying to enrol others for their interests (Facebook, Cambridge Analytica, political campaigns, data brokers). The appropriate image would here rather be like some imaginations of the original Leviathan sea monster as a mix of a hydra and octopus with its many arms and heads tied together in a technological body politic.

The second public dissection was done in the parliamentary inquiry (DCS Committee) on the spreading of disinformation to manipulate elections. Ontological surgery of the disinformation phenomenon was necessary to stabilise it for regulation. When the Cambridge Analytica controversy unfolded, the committee eventually traced the business models, market positioning, legal compliance strategies, and privacy technologies deployed by online platforms such as Facebook to turn themselves into a macro-actor and an "obligatory passage point" for flows of social information. This dissection of Facebook's design architecture paved the way for a discourse about the conditions for assigning accountability. In the process, the reluctance of this macro-actor to submit to regulatory control led the committee to procedurally experiment with unconventional powers and mechanisms. These "public innovations" to re-establish state sovereignty over information flows included the seizure of sealed evidence in a foreign court case and the assemblage of a multi-parliamentary Grand International Committee. Here we also find an upscaling strategy by forming a network of parliaments, thus increasing size and representativity.

We here see the creation of a new experimental assembly around a networked disinformation assemblage, which gradually becomes traced and reconstructed in inquiry. This inquiry was itself sparked by a public controversy related to the truth and falsity (of news and information), its circulation, and the way that its enabling digital infrastructures have been built. This new assembly eventually explored strategies to unscrew and disassemble this counter-Leviathan, which had affected its democratic assembling practices. This confrontation can be seen as a war for scale between different networking macro-actors, but also as attempts by states to bring their counterparts back under their scales of justice.[77] The controversy reveals a struggle for control of the median ICT infrastructures in networked societies. It gives some insights into the attempts and counter-attempts of how actors are trying to unscrew the old techno-political Leviathan, whereas simultaneously re-assembling new ones.

Notes

1 This is the more radical conception of public enemy of Cicero (see Jal, 1963).
2 *R (Miller) v Secretary of State for Exiting the European Union* [2016] EWHC 2768 (Admin), CO/3809/2016 and CO/3281/2016.
3 https://www.independent.co.uk/news/media/daily-mail-nazi-propaganda-front-page-ipso-complaints-brexit-eu-enemies-of-the-people-a7409836.html
4 https://www.dailymail.co.uk/news/article-3903436/Enemies-people-Fury-touch-judges-defied-17-4m-Brexit-voters-trigger-constitutional-crisis.html
5 Much has been written about this topic (von Storch, 2009) both disputes claims by climate sceptics that the 'Climategate' showed climate change is a hoax, and argues that climate research practices failed to satisfy basic 'scientific virtues' like openness and independence.
6 https://theclimatescum.blogspot.com/2010/09/guest-post-by-rush-limbaugh-universe-of.html
7 Roberts (2017).
8 See Rommetveit (this volume).
9 Fuller (2016, 2017), Sismondo (2017a), Collins, Evans and Weinel (2017), Lynch (2017), and Sismondo (2017b).
10 A prime example are the Marprelate Tracts.
11 Hobbes was therefore an advocate of censorship in publishing doctrinal texts and opinioned pamphlets, where he crucially linked the notion of "truth" to "political peace" (Hobbes, 1998, pp. 118–119, 360).
12 Hobbes (1998, p. 7). See van Dijk (2019).
13 Hobbes (1998, pp. 214, 460).
14 The main cases to which (Callon and Latour, 1981) applied their theory were large private companies such as Electricity of France (EDF) and Renault. In this chapter, these Leviathan assembling practices pertain again to the public bodies like the state (or several states) as macro-actor(s) trying to upscale against other (private) macro-actors.
15 For a distinction between actor-networks and digital networks, see (Venturini, Munk and Jacomy, 2019), see fn 26.
16 Shapin and Schaffer (1985).
17 See Rommetveit (this volume).
18 For Sismondo's response, see Sismondo (2017b).
19 cf. Fuller, (2016), Rommetveit (this volume).
20 Truth and post-truth (or fake news) are not symmetrically situated at the intersection of science and politics. Whereas truth was still centred on the practices and institutions of science (even as its representation to the outside world and to political practices), post-truth seems mainly centred around political practices (towards science and media).
21 This further extension of the symmetry principle would imply including in the study, in Fuller's words, 'the range of agents' who themselves apply this principle for their own purposes (Fuller, 2016), e.g. disinformation campaigns and their enabling infrastructures, but also the actors exposing these, and the tools and powers they use for this.
22 There has been much discussion about the role of the 'principle' of symmetry in the STS debate on post-truth. I agree with Lynch (2017) this principle is methodological, not ontological or metaphysical. In Latour's words: 'ANT is not, I repeat is not, the establishment of some absurd 'symmetry between humans and non-humans'. To be symmetric, for us, simply means not to impose a priori some spurious asymmetry among human intentional action and a material world of causal relations' (Latour, 2005a, p. 76). Cancelling preliminary asymmetries actually opens up for empirical study.

23 Although disinformation phenomena clearly did not start with these digital infrastructures, they have always been (historically) constituted in interaction with (transitions in) information and communication infrastructures. We have seen examples in the previous section. Tracing such infrastructures aims at articulating these co-constitutive relations.
24 An ethnography of building subversive information infrastructures for large political events like the US presidential elections is challenging both in size (many candidates, large networks of actors) and in gaining access (secrecy). A study by Woolley and Guilbeault (2017) into computational propaganda in these elections used both ethnography and web tracking and shows the strengths and limitations of both methods in exploring such complex controversies.
25 These two approaches (controversy and infrastructure tracing) are linked within ANT theory (Latour, 2005a, p. 1, n.) and also relate to the construction of Leviathans (p. 245).
26 It is however important to distinguish actor-networks from digital networks. (Venturini, Munk, and Jacomy, 2019) mention four differences: partiality of digital inscriptions, broader actor concept, inseparability of actors and networks, and dynamics of relational change.
27 The involvement of the data analytics firm Cambridge Analytica in the Ted Cruz campaign in mid-2015 had already been covered, https://www.politico.com/story/2015/07/ted-cruz-donor-for-data-119813.
28 Note on terminology: in what sense are the digital networks and technologies studied in this chapter part of 'infrastructure'? They are not about the roll-out of infrastructures such as 5G, nor about IP protocols, but are rather situated at the level of platforms and networks that channel data flows. The difference between both is however increasingly blurring: see (Plantin et al., 2016) on the platformisation of infrastructure and the infrastructuralisation of platforms, also applied to Facebook.
29 As sometimes portrayed in ANT approaches (Latour, 2005a).
30 http://nymag.com/intelligencer/2016/11/donald-trump-won-because-of-facebook.html; http://fortune.com/2016/11/10/facebook-blame-trump/; https://www.niemanlab.org/2016/11/the-forces-that-drove-this-elections-media-failure-are-likely-to-get-worse/
31 This is also where the catch is in these digital methods: what do they use as their starting point for 'fakeness'? The notion of 'ground truth' in computer science gets a quite literal meaning here, especially given that is provided by fact-checking sites. For a critique see Marres (2018).
32 Faris et al. (2017) reached similar conclusions based on mapping the same Breitbart-centred media ecospace.
33 For digital methods for studying these matters, see Bounegru et al. (2017).
34 'Privacy by design' approaches are also increasingly targeting the networked infrastructural dimension to seize back control over flows of personal information, leading to what we have called 'privacy by network' (van Dijk et al., 2018).
35 Other research nuanced this image, showing the ad-tech on these sites is less sophisticated than in mainstream sites, because it is not primarily used for earning money through commercial advertisements, but to deliver political advertisement. https://digiday.com/media/study-mainstream-sites-double-the-ad-tech-as-fake-news-sites/
36 We can shortly note the specific notion of 'truth' in investigative journalism and its relation to uncovering issues by following networks. 'An investigative journalist … discover[s] the truth and … identif[ies] lapses from it in whatever media may be available […] distinct from apparently similar work done by police, lawyers, auditors and regulatory bodies in that it is not limited as to target, not

legally founded and closely connected to publicity' (de Burgh, 2000, p. 17). We will later touch upon the differences with truth-finding by regulatory bodies.

37 Gold (2017).

38 A second project was the Government Accountability Institute that funded investigative journalism into the finances of political opponents, which could then be launched to feed stories into mainstream media sites.

39 Just like the differences between tracing actor-networks and digital networks (see fn. 26), there are also differences between actor-networks and investigative journalist network mapping. The weaknesses of the detective's 'Who'se dunnit?' approach is the lack of focus on non-human mediated action, whereas the weakness of ANT is its incapability to assign the culprit in these socio-technical mappings (see Latour, 1996).

40 The journalistic descriptions also focus on this aspect, reflected in the titles: '*Robert Mercer: the big data billionaire waging war on mainstream media*' (Cadwalladr, 2017) and '*I made Steve Bannon's psychological warfare tool*' (Cadwalladr, 2018).

41 In a similar case, pertaining to the strategies applied by the Vox party in the Spanish elections of 2019, Vox politician Bardají states that 'we are entering into a period of time when politics is becoming something different, politics is warfare by another means' (quoted in *The Washington Post*, May 2, 2019). This comment links the political enemisation strategies seen at the beginning of this chapter, to the building of ICT architecture. The phrase inverts Clausewitz original 'warfare is politics by other means' and these 'other means' also relate to infrastructure building.

42 The Mueller report into Russian interference in the US presidential elections described similar operation performed by the Russian Internet Research Agency. 'The IRA later used social media accounts and interest groups to sow discord in the US political system through what it termed "information warfare"' (Mueller, 2019, p. 4).

43 The application of statistical method from natural phenomenon to populations coincided with the idea of 'social physics' (Saint-Simon, Comte, Quetelet) and ideas about detecting real properties of populations. The (Durkheimian) notion of a 'social fact' is also closely intertwined with statistics.

44 After the 2016 presidential elections, the Cambridge team, perhaps self-reflexively, conducted experiments into the effects of psychological mass persuasion and behavioural change due to targeted personalised content (Matz et al., 2017).

45 I will leave aside the question of effectiveness of this approach. In the final findings by the British Information Commissioner (ICO), doubt was cast upon this point: 'there was a degree of scepticism within [the company] as to the accuracy or reliability of the processing being undertaken. There appeared to be concern internally about the external messaging when set against the reality of their processing' (ICO, 2020, p. 17).

46 Moreover, according to data protection laws Kogan only had permission to use these Facebook data for academic purposes, not to sell them to commercial third parties like Cambridge Analytica without the user's consent.

47 This notion of 'fact' (e.g. see Galton's quote), refers to numerical inscription of data in a table, especially social and physical data relating to people. For the evolution of the concept of the modern fact and this role of statistic, see (Poovey, 1998, Chs. 6 and 7). There is also the interesting notion of 'ground truth' in machine learning (like psychometrics) as calibration for the accuracy of algorithmic inferences by comparing them to 'real-world' data or human corrections.

48 Morozov (2019) in a similar context, talks about the hyper-truth of digital technologies, which contribute to the post-truth condition (see Rommetveit and van Dijk, this volume.)
49 This goes back to the 'small world problem' articulated by Stanley Milgram investigating the 'degrees of separation' between people (Milgram, 1967). OSNs made such relations easier to track, but also to establish (Backstrom et al., 2012).
50 They also pertain to the *flows of money* used for financing political campaigns, exposed in the Electoral Commission's report (TEC, 2017). This is a more classical topic of post-election scrutiny. Due to the permeation of the role of ICTs in this controversy, the focus on *flows of information* pushed the envelope of ICO's analysis deeper into the controversy.
51 The investigation especially focused on the role played by Facebook.
52 https://ico.org.uk/about-the-ico/news-and-events/news-and-blogs/2018/05/blog-new-regulatory-powers-for-the-digital-age/
53 DCMS (2018a, pp. 4–5).
54 Even for the eventuality of the State's neural self-surgery.
55 Echoing recommendations by the European Data Protection Supervisor (EDPS, 2018).
56 Their recommendations ranged from privacy, competition law, education, media law, election law, to criminal law.
57 https://www.parliament.uk/business/committees/committees-a-z/commons-select/culture-media-and-sport-committee/news-parliament-2015/fake-news-launch-16-17/
58 DCMS, Oral evidence: Fake News, HC 363, February 8, 2018, Witness: Claire Wardle (Q573), http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/digital-culture-media-and-sport-committee/disinformation-and-fake-news/oral/78195.html
59 In response, the UK Government defined disinformation as 'the deliberate creation and sharing of false and/or manipulated information that is intended to deceive and mislead audiences, either for the purposes of causing harm, or for political, personal or financial gain' (DCMS, 2018a, p. 2).
60 See Rommetveit (this volume) on Cummings larger role in Brexit and UK-style alt-epistemologies.
61 Standing order 152(4) states that 'Select committees appointed under this order shall have power … to send for persons, papers and records'.
62 https://www.theguardian.com/technology/2018/nov/24/mps-seize-cache-facebook-internal-papers
63 US Federal Trade Commission (FTC) consultant A. Soltani quoted in (DCMS, 2019, p. 29).
64 Summary of key issues from the Six4Three files, Exhibit 48, p. 10, https://www.parliament.uk/documents/commons-committees/culture-media-and-sport/Note-by-Chair-and-selected-documents-ordered-from-Six4Three.pdf
65 *Ibid*., Exh. 43, pp. 10–11.
66 Data protection law grants users the right to access the personal data stored and processed by Facebook and to be informed about whom it was shared with. Article 15 GDPR.
67 DCMS, Oral evidence: Fake News, HC 363, March 27, 2018, Witness: Paul-Olivier Dehaye (Q1393). http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/digital-culture-media-and-sport-committee/fake-news/oral/81022.html
68 In response to the DCMS Committee's report, Labour MP Tom Watson stated that: 'Few individuals have shown contempt for our parliamentary democracy

in the way Mark Zuckerberg has,' he said 'If one thing is uniting politicians of all colours during this difficult time for our country, it is our determination to bring him and his company into line.' https://www.theguardian.com/technology/2019/feb/18/facebook-fake-news-investigation-report-regulation-privacy-law-dcms

69 https://www.parliament.uk/documents/commons-committees/culture-media-and-sport/181102-Rebecca-Stimson-Facebook-to-Chair-and-Bob-Zimmer-MP-re-Zuckerberg-oral-evidence.pdf

70 On this notion of finding adequate assemblies for the assemblages around public issues, see Latour (2005b).

71 These countries included Argentina, Belgium, Brazil, Canada, France, Ireland, Latvia, Singapore, and the UK.

72 The last time multiple Committees joined together for a hearing in the British House of Commons dated back to the Joint Committee on Indian Constitutional Reform in 1933 (DCMS, 2018b, p. 2).

73 https://www.independent.co.uk/news/world/europe/facebook-google-too-big-french-president-emmanuel-macron-ai-artificial-intelligence-regulate-govern-a8283726.html

74 https://newsakmi.com/news/tech-news/big-data/antitrust-chair-says-congress-will-need-the-peoples-help-to-rein-in-powerful-big-tech-companies/

75 See also van Dijk (2019).

76 We are here deviating from Hobbes who either compared nerves of the political body to punishment and reward, or to public ministers executing the sovereign's will (Hobbes, 1998, p. 160).

77 The terminology of 'gangsters' used by the parliament notably contrasts with that of 'enemies' used by the post-truthsters. Carl Schmitt's once differentiated between legal judgements branding someone as a criminal according to predetermined constitutional norms, and political decisions about who counts as an (internal) enemy of the state itself. This is a difference between law and the constitution, with politics and the re-constitutable (Schmitt, 2007, pp. 46–47).

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7 Governing the Median Estate

Hyper-truth and post-truth in the regulation of digital innovations

Kjetil Rommetveit and Niels van Dijk

Introduction

Post-truth discourse seems to thrive on the assumption that before there was truth in public, whereas now there is not. As testified by the contributions to this book, this assumption is simplistic. Yet, as the book's various contributions also argue, *something* has changed: post-truth discourse prevails and translates into new shapes, territories, and problem domains. A more promising approach is to argue with Foucault and Pellizzoni (2017, this issue) that post-truth denotes intensifications of certain of modernity's core dynamics, especially those concerning uses of science in public. In this chapter, we pursue this intuition into major areas of the production of knowledge, namely (European) legal and regulatory efforts to steer digital innovation and render it more accountable (see also van Dijk, this volume). Here, there are direct connections with post-truth (ibid.), and more indirect ones, by which we refer to the developments of digital innovation and regulation more generally. As a starting point, consider how, according to Evgeny Morozov: "One unappreciated paradox of today's 'digital condition' is that it celebrates post-truth and hyper-truth simultaneously" (Morozov 2019).

Through our descriptions of two cases, *privacy engineering* and *personhood for machines*, we shall make two interlinked points that connect post-truth to the theme of governance and regulation of the digital: (1) alongside post-truth there is also hyper-truth, i.e. innovation policies imagined as so self-evidently true that they cannot be questioned, as captured in Morozov's quote, and these may be more closely related to post-truth than previously recognised; (2) modern western societies rely on different modes of truth-telling, such as those of law, science, markets, technology, and politics. Post-truth entails intensified *blurring and remaking of fundamental boundaries* between these modes (conceptual and institutional), and these are reflected in broad-scale changes to collective imagination through the knowledge and information economy.

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Post-truth discourse and digital hyper-truths

As to the first, we point to an omission in the discussions around post-truth, indicated in the introductory quote from Morozov, and topic of several of the contributions to this volume. This is the occurrence of certain digital hyper-truths, or digital imaginations, underpinning agendas such as Internet of Things, Smart developments, and Fourth Industrial Revolution, and granted "automatic authority in public issues" (Wynne 2014). The introductory quote from Morozov posits this as a conundrum: whereas under post-truth conditions seemingly any truth and its wider framing can be questioned, this unfolds alongside digital innovation regimes whose basic assumptions and premises seem so self-evidently *true* that they are almost impossible to question. Whereas it is *possible* to publicly question the reality of human-induced climate change, it actually seems harder to challenge the necessity and desirability of the smart phone, the next generation of cloud-based processing, storage, and networked services, and the digitalisation of evermore aspects of physical and social reality. It is seemingly only when major institutions such as parliaments, courts, and mainstream media become exposed to existential danger by digital technologies, that broad public questioning becomes possible (van Dijk this volume, Rommetveit, this volume). If this is the case, then a likely explanation is that there is a dynamic relation at work, also implied by Morozov, where hyper-truth produces post-truth conditions, as we shall describe in our two cases.

What kind of "truth" is "hyper-truth" in our case? This self-evident type of "truth"[1] can pertain to different things. First, the digital technologies that have been instrumental in undermining the epistemic authority of institutions such as science, politics, and the media through the spread of disinformation, themselves rely upon conceptions of fact and truth that have become black-boxed and taken for granted. These are based in computer science and historically derive from the epistemology of statistics (van Dijk, this volume). Second, Morozov points rather at the attribution of objectivity to information on digital platforms and algorithmic ledgers, such as Wikipedia and Blockchain.[2] These are digital means of producing knowledge and evidence in non-expert related ways. In this chapter, we expand on this diagnosis, to also include main digital imaginaries and innovation agendas for the future of our societies, presented as inevitable collective developments and self-evident public truths (Wynne 2014). Digital technologies framed as smart and enabling, and as contributing to a new industrial paradigm (Industry 4.0), come enshrined in a strongly universalistic rhetoric where *digital* applies to *any thing, anywhere* and at *any scale* (i.e. from nano-molecules to smart cities to IBMs *Smart Planet*), any *process* (of work, traffic systems, manufacture value chains, or news feeds), to any *person*, *organisation*, or *collective* (i.e. Facebook "Global Community").

"Truth" in this sense does not refer to the classical (early 20th-century) image of a correspondence between factual representation and reality;

rather, we point to meanings, imaginations, and future pathways enabled through digital technologies. Heidegger (1978) referred to the technological making of new worlds and meanings, as a "revealing that orders".[3] This ordering is embedded in the many "interlocking parts" that make up technological systems and infrastructures, and the activities and practices enabled through them: "unlocking, transforming, storing, distributing and switching about are ways of revealing" (ibid., 322). *What* is revealed and ordered is not merely technology, but societal and human meanings and relations, and the capacity for creating collective orders (Bijker et al. 1987). To Heidegger, this was a specifically futures-oriented mode of *Being-in-the-World*. This future-orientation is part of what has intensified, since it is increasingly also revealed through highly mediated visions and promises of technological, societal, and industrial convergence of today's most powerful technologies,[4] whose function is also strongly political, since the promise is to address societal problems and to remake the global economy. As testified by sociologists (Brown and Michael 2003, Fortun 2008), innovation as futures promise and expectation has increasingly been pushed to the forefront of collective meaning- and market-making. Concomitant with this, *imagination* has long since been recognised as a performative and constitutive force (Appadurai 1996), and the imagined-possible a source of epistemic, industrial, and political authority within intensified networked innovation (Rommetveit and Wynne 2017, Rommetveit, this volume, Wynne, this volume).

The imaginary of Fourth Industrial Revolution is for instance predicated on "a fusion of technologies that is blurring the lines between the physical, digital, and biological spheres" (Schwab 2016). It performatively draws together, *at the level of the imagined-possible*, most of today's powerful technologies, opening up new domains of nature and society to market-making, exploitation, technological and economic development. In ways similar to Heidegger's concept of the technological framework (*Gestell*), it is the creation of future pathways that become inscribed into collective consciousness as destiny[5]: "In its scale, scope and complexity (…) the Fourth Industrial Revolution is unlike anything humankind has experienced before (…) from the perspective of human history, there has never been a time of greater promise or potential peril" (Schwab 2016). Following the disclosure of this future potential, the ensuing task for policy makers and regulators is to create the terrain on which the mission can be carried out. It is a *will* increasingly targeted towards, and predicated upon, the overcoming of barriers in the bio-physical world, namely those that stand in the way, *qua* obstacles, of the expansion of technoscientific potential and realisation. Thus, the basic orientation is ontological (or: ontic) and not epistemic, and the underlying imagination of nature is as investment-resource: it is projected as plastic and amenable to be shaped through technoscience (Pellizzoni 2015). This boundary-blurring and constructivist orientation feeds directly into efforts to regulate, as we now describe.

Blurring boundaries between modes of veridiction

Post-truth characteristics understood as blurring and remaking of boundaries replicate within efforts to regulate digital innovations. Law and regulation are different modes or practices of truth-telling or "veridiction", and are different from scientific truth (Latour 2013). The specific theme on which we focus here is the capacity of digital technologies to *blur major boundary distinctions* taken as constitutive of western societal orders, such as *fact* versus *value*, *human* versus *machine, science* versus *politics*. Ensuing incapacities to work out the different modes of truth-telling is at the core of STS and philosophical discussions of post-truth (Collins et al. 2017, Jasanoff and Simmet 2017, Sismondo 2017, Fuller 2018, Nordmann 2020). Here, we stick with this theme, and point to its intensification into novel domains and practices, with (we claim) unprecedented implications: Whereas such blurring may not lead directly to post-truth conditions, it certainly feeds into them, since there is a lack of easily available categories (epistemic and institutional) for sorting out novel phenomena, and for making collective sense. Furthermore, insofar as post-truth is taken to imply the dominance of value, opinion, and imagination over scientifically proven fact, the strong investments into the shaping of collective imaginations and futures, indicate also more direct relations of mainstream knowledge production to post-truth.

Blurring of boundaries and hybridisation is a major theme of STS, including in works on science and politics (Latour 1993, Weingart 1999, Jasanoff 2004, Bijker et al. 2009). The STS thesis of co-production (Shapin and Schaffer 1985, Jasanoff 2004) states that there are strong intrinsic relations between the ways in which scientific facts, technologies, and societal and cultural values evolve. The thesis demonstrates how these different sources of legitimacy were balanced and kept separate through buffers (Wynne this volume) upholding a "modern framework" (Toulmin 1990). Considerable practical work and resources went into keeping Nature and Culture separate, termed work of purification (Latour 1993), boundary work (Jasanoff 2011), or (balancing hybridisation with purification) coordination work (Bijker et al. 2009). The practical *work* to keep domains separate, and in mutual balance, can be observed in classical studies from STS about the creative relations and tensions between science, technology, and law: technosciences such as biotechnology or climate science introduce novel entities such as the global climate system, or genetically engineered embryos. They upset existing meanings and procedures: are they human or non-human? Nature or Culture? Do they belong within the realm of the scientists and engineers, or those of lawyers and politicians? They trigger efforts to remake order and to accommodate the new entities (hybrids) within existing institutions and meanings. As described by Jasanoff (2011), it has become the task of professional actors such as lawyers and ethicists

to reconstitute ontological and institutional boundaries. By sorting things out (Bowker and Star 1999) and giving each thing its proper ontological status, such creative and adaptive boundary work situates the new entities within cultural and institutional meanings and categories, and enables society to go on with its business.

Yet, as already argued: crucial mechanisms of digital technologies and their related forms of socialisation upset these capacities, and sometimes also actively overturn them. They thereby catalyse the blurring of boundaries between central "modern" conceptual distinctions, which has been one of the central themes of the post-truth discourse (see Rommetveit, this volume). As we note in the conclusions, this poses a tricky question: whereas STS has, almost by routine, used hybridisation and the front-staging of non-humans as a critical corrective to overtly idealistic and purified notions of truth, when hybridisation itself is part of the regulatory response by main institutions, this critical repository is no longer available *qua critique*, and may even turn into a reactionary principle.

One paradigmatic case of such intensified blurring and remaking of boundaries are attempts at the intersection of computer science and ethics at building morality and moral agency into robots, since this cuts through both distinctions between facts and values and between humans and machines (Wallach and Allen 2009, Vanderelst and Winfield 2018), as illustrated in this figure:

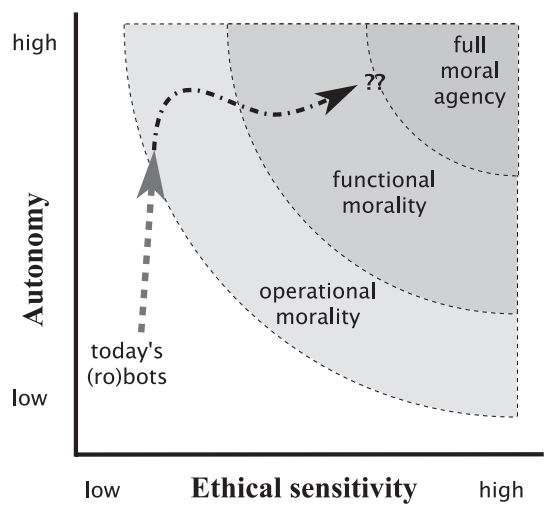

Figure 7.1 Intensification of modernity's forces: Building morality into machines. From: Wallach and Allen (2009), Copyright © 2009 by Oxford University Press, Inc. Reproduced with permission of the Licensor through PLSclear.

We include the case of engineering of morality as emblematic of the problems discussed in this chapter, but we do not analyse it here. Our two cases are however closely related, dealing with privacy engineering and legal personhood for machines. Common to these cases are how digital technologies have become sufficiently powerful, their dynamics so intense, that they not merely infringe on core normative and legal domains, but crucially also *renders them objects of design and engineering interventions*. The effect is, as we said, a blurring of basic distinctions, categories, and institutional arrangements, basic to western orders, with resulting incapacities for sorting things out, for making and upholding the existing social metaphysics.

Governance of the Median Estate

This institutional remake was captured by Lessig's (1999/2006) emblematic and provocative statement: that digital code *is* law. Yet, if this statement is accepted, it means that regulatory practices generally are not up to the task of regulating (since most regulatory practices do not comply with the ideal of becoming code): Law and regulation must be redesigned on a grand scale. This remaking of regulatory practices and law must be seen against the background of quite profound shifts in the political economy of knowledge. It is the distributed nature, complexity, and *speed* of developments that demands new governance mechanisms. Returning to the agenda of Fourth Industrial Revolution,[6] or Industry 4.0, this challenge has been captured through a concept of *agile governance*:

> *Agility* implies an action or method of nimbleness, fluidity, flexibility or adaptiveness. In the software sector, the concept of agile or "agility" has been around since the 1990s. The difference between plan-based methods of policy-making and the concept of agile governance relates to the shift in the value placed on time sensitivity.
>
> (WEF 2018, 4)

This logic of agile, networked governance replicates the "connectivist" logic of ICTs, and mobilises strongly universalist rhetoric taken from cybernetics, systems theory, converging technologies, informatics, and data science (Bowker 1993, Nordmann 2004, Kline 2015). The rhetoric is at once inclusive, since it aims to mobilise the actors and networks (the "multistakeholders") necessary for enabling digital innovation, *and* excluding, insofar as individuals and publics identified with obstacles to innovation are deliberately left out or circumvented. When perceived as standing in the way of the digitally driven networks, the publics can simply be ignored or deleted, resulting in an obstacle model of publics (Rommetveit and Wynne 2017, cf. Welsh and Wynne 2013), and of other modes of public veridiction such as science, law, or morality (Rommetveit et al. 2020).

It is here, in the midst of the technological economy and the tying of technological markets into weakly defined structures of governance, that we locate what we call *the Median Estate*. It denotes a normative change in the nature of the median space between the institutional stratifications of modernity, coinciding with its uptake in governance and innovation frameworks. There is an increasing policy related push for dissolving ontological, disciplinary, sectoral, and societal boundaries within technoscientific innovation networks targeted at addressing societal challenges. Old "trading zones" hereby move from their peripheral or residual positioning to the intermediary region "between" institutional or disciplinary "silos" between human and machine, facts and values, nature and culture, effectively acting as an innovation imperative. Here they become new centres of socio-technical ordering (apparent in imperatives to break silos, be interdisciplinary, cross domains and sectors). It is catalysed by the expansion of digital networked and networking technologies across and into evermore domains of society.[7] Innovation for a long time (i.e. since the early 1970s) belonged mainly within industrial domains. The concept of the Median Estate captures the expansion of the logics and discourses of informational machines into core institutional (even constitutional) domains: morality and legality, and also democracy.

Case studies: law becoming technology, technology becoming law?

We now turn to our two cases, of privacy by design and electronic personhood, where this problematic is described and analysed. Our accounts are based in prior investigations, including document studies, issues mapping, interviews, and focus group consultations with main concerned parties and salient forms of expertise (see van Dijk et al. 2016, 2018, Rommetveit et al. 2018, 2020). In both cases, we observe how fundamental sources of legitimacy as described in this section, are not so much separated, singled out, and relegated to different institutional, ontological, and expert domains, but rather fusioned and brought together, within the same space of representation and intervention.

Data protection by design: inserting a human in the smart loop?

Our first case pertains to the institutionalisation of the fact/value distinction, and its gradual change through networked co-regulation and techno-regulatory approaches, aimed at the creation of new markets and protection of legal rights. We observe how, within these novel forms of governance, new articulations of data protection and privacy emerge. We refer to these articulations and relations as *privacy-by-network*.

The 1990s brought the development of the Internet, through rapid expansions of personal computing power and networking capacities. Whereas

initially accompanied by celebratory and highly optimistic visions for democratisation of information, the 2000s saw rapid incursions of corporate and commercial interest into cyberspace. This shaped the emergence of a ubiquitous "surveillance capitalism" (Cohen 2017, Zuboff 2018) predicated on profiling and individualised targeting of consumers behaviours through online platforms. All along, these developments have been accompanied by privacy concerns, as surveillance capitalism is, *as if designed* that way, predicated on the breach of privacy and data protection principles, such as purpose specificity, data minimisation and informed consent. Public regulators were met with demands from critical publics that the privacy concerns be dealt with, but also from corporations in need of predictability and safeguarding of reputations in rapidly expanding digital markets. Upscaled regulatory measures were seen as necessary in the face of a second wave of technological explosion: smart technologies and the Internet of Things, predicated on new data sources across the digital–physical interface (through sensors, social media, handheld devices, etc.), increasing algorithmic capacities to merge data from various sources, and machines that think, learn, connect, and (sometimes) act. Within emerging digital imaginaries *any source* of data may be connected to any other source of data that link it to people in unforeseen ways, and therefore constitute potentially personal sensitive data, triggering rights to protection (Purtova 2018).

The perception has emerged that law was "lagging behind" technological developments (Reidenberg 1998) and needed to catch up by adapting technological characteristics: more pro-active, incorporated into the design of systems, user-centric, and oriented towards futures developments. As stated in a foundational document on privacy by design, privacy by design "anticipates the risks and prevents privacy invasive events *before* they happen" (Cavoukian 2009). This preventive regime increasingly becomes continuous with logics of pre-emption (cf. Pellizzoni, this volume) in highly competitive technological markets, the main point being to demonstrate how privacy concerns have *already* been taken care of through proper procedures.

A new professional field of *privacy engineering* has emerged to take care of and implement these developments in more holistic and cross-cutting manners (Dennedy et al. 2014, Gürses and Del Álamo 2016). Privacy engineering denotes the *integration of privacy concerns into engineering practices for systems and software engineering life cycle processes* (ISO). Privacy engineers work to bridge across law and engineering, seeking to design and engineer legal principles into technological artefacts and infrastructures (Rommetveit et al. 2018). Professionals within this emerging field are envisioned to work across boundaries and scales: the individual technological application,[8] within organisations, and at standardisation and infrastructural levels. Several of these developments come enshrined in the recently (2018) adopted General Data Protection Regulation (GDPR) of the European Union, where both data protection by design (Art. 25)

and data protection impact assessments (Art. 35) are mandatory for those who process personal data, and are backed up by enhanced accountability mechanisms. A prime example here is the European Citizen-Centric approach to Data,[9] aimed to design privacy and data protection into emergent infrastructures, technologies, and services at the level of European (smart) cities (Ballo and Vaage, this volume), in ways that are conducive to the needs of citizens and protective of their rights. Here, privacy by design is mobilised for the pro-active making of new technology-driven markets, infrastructures, and living environments.

The first initial steps towards the present practices had already been taken in the mid-1990s under the heading of Privacy Enhancing Technologies (PETs) and were important to Lessig's (2006) formulation that "law is code". These were mainly targeted at self-protective measures by users engaging in "informational self-determination", through techniques such as encryption, anonymisation, and data minimisation (Hes and Borking 2000). Yet, due to technical complexity and widespread proliferations of data, informational self-determination is beyond the capacities of most users. The European General Data Protection Regulation (GDPR) and Privacy by Design before it, therefore, introduced obligations of data controllers to shift responsibilities onto *organisational*, not individual, levels. GDPR Art. 25 prescribes Data Protection by Design to be undertaken by data controllers (not the user), and this is accompanied by requirements to carry out risk assessments, also at the organisational level, so-called Data Protection Impact Assessments (GDPR Art. 33, cf. van Dijk et al. 2016).

Yet, most information flows, and especially those of smart interconnected technologies, cities, and societies, span more than one organisation only. They have to rely on pre-made technologies (made by other actors), network connections and platforms (such as Google), collaborations with other businesses or organisations, not to forget the "downstream" users (professionals, consumers, patients, etc.). There is little sense in Data Protection by Design becoming implemented at the level of one organisation, if these other actors do not engage in similar and coordinated data protective measures. As explained to us by one privacy engineer working for an energy utility: "the discussion should have been taken from the chain point of view. In this way the transparency of the smart meter would have been discussed in an early stage with all the stakeholders that are related in the chain". Weaknesses in one link may cause rapid escalations of risk throughout the entire chain or ecosystem, and this in turn becomes an argument for scaling up.

Efforts and strategies are made therefore to capture and incorporate individual and collective perceptions of privacy threats into the ongoing infrastructural construction work.[10] Privacy has been called a "subjective" value (Solove 2008) with strong contextual variations (Nissenbaum 2004). One of the main "gaps" to be filled is that between the privacy perceptions

of users and citizens, and the technical characteristics of emerging systems. This task, however, poses a Catch 22-like situation: the engineer cannot explain the problem to "the user" (who remains unknown) before the technicalities are in place. Yet, the technicalities are considerable, and cannot be encoded before the privacy concerns are known. Thus, as explained by one privacy engineer "Many efforts currently go into putting technical complexity at work…99% focus of technical people is about solving that" (privacy engineer). If technical challenges are not somehow overcome (at early stages of implementation), it is difficult to see how rights can be built into the information infrastructures, in ways that are explainable and acceptable to users and citizens, but also to the courts (cf. van Dijk et al. 2018).

Because of this complexity, main strategies and approaches come to hinge on the creation and use of proxy user profiles (cf. Silvast et al. 2018), and customer management approaches. The concept of "user" as a holder of rights in the emergent Internet of Things, therefore, is predicated on technical and managerial requirements revealed by engineers and consumer studies, rather than those of law. Yet, as also happens inside organisations (van Dijk et al. 2016), privacy becomes a managerial and organisational principle whose main purpose is to provide temporary stabilisation of expectations: setting forth a promise that rights shall be implemented and protected, thereby enabling mutual alignments between involved actors. Within this reconfigured space, privacy takes on decisive characteristics of what STS scholars term *boundary objects* (Bowker and Star 1999), representing different realities within different public, professional, and private domains (cf. Ballo and Vaage, this volume). Thus, a privacy engineer explained to us how privacy becomes a kind of "transversal concern" alongside other values and requirements:

> When we want to take into account privacy and other concerns, we have to take them into account as transversal concerns […] security, privacy, safety, energy consumption or taking into account ethical aspects and things like that. […] we need to be able to engineer transversal concerns and 'capabilities' in things (privacy designer).

In such ways, the overall purpose and scope of data protection expands considerably, not merely as a consequence of technological developments and "data explosion", but as the result of political and industrial motivations to create the internal (European) digital market. *Privacy-by-network*, thus, emerges simultaneously as: a fundamental right, as a regulatory measure (aimed to provide predictability and stability), as a market-making device (aiming to enhance competitiveness), as a matter for engineering, a principle for implementation in large organisations, and as innovation imperative (to create the digital market). This implies that the protection and regulation of the fundamental rights to privacy and data protection, move out of legal-regulatory institutions, and into more privatised, and also

technology-centred, environments, captured by terms such as co-regulation, standardisation, and public–private partnerships.

Personhood for machines: new members of society, or threats to human rights?

Our next case concerns more basic (ontic) perceptions of the fundamental distinction between human and machine, and the normative and institutional implications thereby entailed. In this sense, it enters at a more basic level of collective imagination than the previous case. In Europe, robotics come embedded in increasingly institutionalised initiatives through governance and innovation schemes such as Joint Technology Initiatives, technology platforms, and public–private partnerships (PPPs). Through increasing entanglements of innovation agendas with public institutions, robotics is promised to contribute to a number of societal challenges, or "missions", such as caring for the ageing society, remaking European industries in highly competitive global markets (following the 2008 economic downturn), and rendering the world of work more efficient through increased human–machine interactions (cobots) and automation. This can be seen clearly in the field of robotics, and its role within a "Fourth Industrial Revolution" (cf. Schwab 2016, Fuchs 2018). Whereas most digital innovation agendas are predicated on the convergence of a whole host of different technologies, robotics is the literal embodiment of such initiatives: seen as a kind of "discipline of disciplines", it assembles technologies that sense, think, act, and feel into concerted plans for innovation and development. Projects are now under way to implement robotic technologies into self-driving cars, drones operating by themselves, as "cobots" at work, and as robot companions for care and companionship at home. These initiatives go well beyond the confines of research laboratories or factories and are implemented as large-scale industrial and technological remakes in and on society itself (Rommetveit et al. 2020).

Yet, the technological and market structures in which robotics applications would thrive only exist partially, and mainly as promise: they are in need of being built and made. This poses huge challenges on a number of levels, from deep-seated public fear and stigma of machines (going all the way back to the Luddites), to hugely complex legal and technical matters relating to control, and to loss of control. Specifically, since the machines are intended to operate "autonomously", and to take on capacities of learning and adaptation in unstructured environments, their behaviours will be unpredictable. This has issued in a diagnosis of a "responsibility gap" (Matthias 2004) and an "accountability gap", referring to the impossibility of predicting and controlling the behaviours of "intelligent" machines that act (seemingly) autonomously, but also the organisational challenges of implementing responsibility across value- and production chains that cut across national, regional, and institutional boundaries. Yet, it is also a "market

gap" and an "innovation gap", since there is a need to provide certainty (about possible adverse consequences) in the face of the insecurities introduced by autonomous machines, among groups as diverse as policy makers, investors, innovators, entrepreneurs, researchers, users, and publics. It was within this broad context that propositions were made (in Europe) for the creation of "electronic personhood" for machines, as one way of addressing the regulatory gaps.

The idea of an artificial personhood had circulated for years in academic and legal scholarship (Solum 1992). Yet, it was introduced to a European legislative agenda by industrial robotics networks, setting themselves up as main actors at a European institutional level: first through the making of a technology platform, then by entering into a public–private partnership with the European Union. The robotics industry has gradually become more assertive and has established itself as a main mover and a key enabler in the making of a European market for robotics (in manufacture, care, and companionship, at work and in public spaces). Following the Covid-19 pandemic, the role and promise of robotic automation of tasks can be expected to increase even more, across fields of application (care, services, infrastructure repair, farming, etc.).

In 2012, the industry network *euRobotics* issued a Green Paper on *Ethical Legal and Societal issues in robotics* (Leroux and Labruto 2012). The main purpose was "to act and find ways to favour the development of European robotics" and this included taking care of "worries about the consequences of introducing robots into society" (ibid., 5). Framing ethical, legal, and societal issues as "obstacles and barriers" to be overcome, preferably *before* they arise and settle in society, a main task of the paper was to mobilise legal and ethical expertise in order to deal with problems of responsibility and liability. If new markets and value chains are to be created around learning machines that act autonomously in people's living and working environments, legal certainty about possible unintended consequences has to be established *first*.

It was to this end that the Green Paper, in a speculative vein, proposed the introduction of *Electronic Personhood* as a new kind of hybrid agency, granting to machines a limited legal status. The robot as a legal entity would be inscribed in a public registry and connected to a fund, paid into by various actors along the production and value chain, such as designers, manufacturers, vendors, professionals (e.g., care workers), owners and end-users (patients, consumers). If the machines are capable of learning, all these actors (and more) will take part in enabling and shaping their behaviours in different ways, and so be co-responsible for their actions and their consequences. This position was arrived at through consideration of different types of legal agency: from machines as physical instalments (i.e. a robot used for manufacture, locked up in the safe environment of the factory), to animals or children capable of moving around freely. In the case of animals and children, the responsible parties would be the guardians, i.e.

the *owners* or the *parents*. Note however that transferring such a scheme by legal analogy to the case of autonomous robots, would mark a transition and distribution of responsibility to users and others, at a stage where the robotic society is still primarily a project belonging to industry and roboticists.[11] In terms of distribution of risks and societal equity, the proposal was shaped by industry interest, and predicated on a machine-centric vision.

Whereas the construct was intended in a limited sense, if implemented, it would break down previous boundaries between machines as physical objects, and humans as (legal) subjectivities. This distinction, between humans and machines, was explicitly commented on and targeted by the Green Paper, as the main legal and constitutional *obstacle* or *barrier* for the entry of robots into society. The paper noted how a "strict differentiation between man and machine ('man-machine – dualism') is no longer acceptable", and that also in an ethico-legal sense "man and machine should be considered simultaneously and their actions should be seen as cooperation" (p. 58). This directly consolidates the cybernetic or hybrid ontology as part of the knowledgebase for subsequent regulatory initiatives.

The proposition, however, breaks with the human-centrism of European and western constitutions, and triggered critical responses. First, a "White Paper" (Bertolini and Palmerini 2014) centred around academic lawyers, emerged as a response to the "Green Paper", and it took a specifically human-centric and fundamental rights-based position. Rather than seeing human-centric constitutions as an obstacle, the lawyers took the position that fundamental rights would have to serve as the baseline for assessing the impacts of robots on society. Eventually, when a proposal was put forward by the European Parliament, it took a mixed approach: fundamental rights were underlined as basic. Yet, the idea of personhood for machines was retained: the EP proposed an insurance scheme, not dissimilar to the Green Paper, and proposed to the Commission the creation of

> a specific legal status for robots in the long run, so that at least the most sophisticated autonomous robots could be established as having the status of electronic persons responsible for making good any damage they may cause, and possibly applying electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently.
>
> (EP 2017, 18)

This proposal also met with fierce opposition: A group of more than 150 researchers and lawyers who referred to themselves as "Artificial Intelligence and Robotics experts" signed and submitted an Open Letter to Parliament where they strongly condemned the proposal for legal personhood (Nevejans et al. 2018). The Open Letter claimed that the European Parliaments proposal was based in speculation and science fiction, and furthermore that it would introduce machines to the universe of human rights (see also van

Dijk 2020). It was thus directly opposed to basic human rights, such as dignity, integrity, and citizenship. The proposal was opposed by the European Economic and Social Committee (EESC 2017), which also took a human-centric approach. When the European Commission finally issued an overall strategy for Artificial Intelligence (AI) and robotics (EC 2018), the idea of electronic personhood was nowhere to be seen.[12] In either case, the question denoted a major incursion of machine-centrism into legislative discourse and debate. And, due to the underlying machine-centrism of the technologies, we are quite certain that the problem has not been done away with. It may, for instance, re-emerge at national levels, if national governments would under-cut other countries' governments,[13] aiming to attract innovation, investment and market-makers.

Legitimation: from boundary work to boundary fusion

We started out with the claim that digital technologies and innovations feed into post-truth conditions by blurring *and* reconstituting basic categories (fact–value, human–machine, etc.). This propensity of the digital also feeds into regulatory efforts to stem and steer the technologies and their impacts, possibly triggering an overflowing of the boundaries of western constitutions, and resulting in decreased capacities for working things out. We singled out a specific discourse, one that is predicated on intensified networking across institutional domains through digital means. We argued that this discourse is part of what we have called the Median Estate, as it is targeted towards the making of a world predicated on mediations between previously autonomous institutions: technology, law, regulation, politics, markets, and publics, and with major implications for living, working, and professional environments. This thesis was then explored in two cases: privacy engineering and personhood for machines. We described in rudimentary ways the kinds of hyper-truth constituted by digital technologies, and to which the regulatory efforts have to bend to have an impact. Both were concerned with bridging the digital and the physical, in the case of privacy this referred to the Internet of Things, and in the case of electronic personhood to robotic applications. Compared with classical distinctions in western societies, and to classical STS analyses thereof, we detected significant shifts or intensifications. What are these shifts, what do they signify in terms of broader social ordering and legitimation, and what new starting points seem warranted?

First of all, the above does not mean that suddenly law has become engineering, and human has become machine; this would be too crude an interpretation of "blurring and reconstitution of boundaries". What is entailed is a reconfiguration of the general role of law and science in the creation and upholding of a certain social metaphysics, traditionally described through concepts such as work of purification and boundary work. These concepts would refer to separate domains of reality (nature/culture, science/politics,

humans/machines), traditionally enacted within discursively and institutionally distinct domains. Boundary work and coordination work (Bijker et al. 2009) would be concerned with working out the mutual relations and alignments of these domains.

Focusing on the modes of legitimation specific to such new regulatory regimes, then, one may also ask whether a concept of boundary work should be expanded into one of *boundary fusion*. As mentioned in the introduction, the main source of reference for this mode of legitimation emanates from cybernetics and its off-springs (bioinformatics, data science, machine learning, robotics, etc.). Strongly present in the public legitimation of such disciplines is the rhetoric strategy articulated by Bowker (1993) as *legitimacy exchange*: legitimacy and authority are built by merging together powerful sources of authority, such as law and engineering, as opposed to their mutual separation and discursive purification (cf. Rommetveit and Wynne 2017). When expanded to regulatory institutions, boundary fusion refers to a generalised space of possibility, in which citizens law and engineering are situated at *the same plane* of representation and intervention (cf. Pellizzoni 2015).

Concomitant with this, we also see that the *sites for articulation of rights have shifted*: from law and classical regulatory agencies (bureaucracies) and into new places, such as technological artefacts and infrastructures, innovation networks, standardisation bodies and organisations. This was implied by concepts such as "co-regulation", (distinct from a concept of self-regulation), stakeholder capitalism and "agile governance" (WEF 2018). And, whereas some of these sites may reside in national regulatory agencies, some of which may also become strengthened (i.e. data protection authorities with the GDPR), the developments are increasingly also global and cross-European.[14] This dynamic can be illustrated by shifts of emphasis in salient research programmes in the EU: it goes from embedding science *in* society to embedding society *in* science, where relevant disciplines (ethics, law, social, and humanistic sciences) are brought *into* innovation networks rather than serving the function of embedding innovation networks in broader society.[15]

Within this reconfigured space of possibility, the *meaning of a right* also changes, since it explicitly takes on a more hybrid character: Rights themselves become more material, insofar as they become built and hardcoded into emerging infrastructures. They *also* become more virtual, since these infrastructures are strongly inscribed into the imagined-possible and the speculative drive of Information and Communication Technologies (ICTs), innovation and market-making. Hence, rights also take on much more performative and promissory characteristics. The promise is of more ethics and better rights protection, as co-emergent with, and enabling of a digital market. This kind of promise, embedded in institutions and protected by law is a classical task for legal regulation of stabilising expectations under conditions of uncertainty (cf. Luhmann 1983), and in this sense not novel.

Yet, Luhmann's description presupposed a certain kind of stable environment and embedding within the institution of law. In the Median Estate, however, stabilisation is no longer dependent on law alone, but on its interactions with a number of other actors and institutions, and strongly shaped by technologies that keep changing and upgrading.

Reflecting back on our two cases, then, privacy by design and electronic personhood emerge not so much as efforts to identify and separate a vulnerable subject worthy of protection, as a kind of connecting principle: a boundary-fusion-object for the making of infrastructures for the digital economy (captured by our term privacy-by-network). This was clearly demonstrated in the title of a recent report on ethics for AI set up by the European Commission in the extension of developments described in this article. The name of the report is *Trustworthy AI*, and it is explicitly inscribed in a universe of providing trust and predictability, argued to boost the competitiveness of the European Digital Market *and* protecting fundamental rights (AI HLEG 2019).[16] The shifting modes of legitimation, from boundary work to boundary fusion, thus indicates what, in this volume is referred to as a need for new starting points.

This means that ethics, law, and regulation are not merely embedded within a technological universe, but also within an ecology of fierce (global) economic competition, with the future as investment object. Focusing on the dimension of time, a fundamental motive is that of rendering "the future" an object of intervention through engineering. As described by Nordmann (2010, 5) the future is imagined as "*an object of technical design, the realisation of technical possibility*". Through intensification and proliferation into new areas, this logic now includes ethics and legal regulation within the fold of futures to be designed, engineered, and promised. A main logic here is that of pre-emption, since rendering futures objects of design also simultaneously forecloses other futures, and possible contestations of innovation pathways (Pellizzoni, this volume). We have previously described this as an obstacle model of public issues (Rommetveit and Wynne 2017), pointing to the relational and social dynamics involved.[17]

Conclusions: new starting points?

We first claimed that the post-truth discourse and certain (academic, media, political) responses to it have been too focused on binaries that do not do justice to the underlying dynamics ("before there was truth, now there is not"). We also pointed to omissions of hyper-truth, pertaining to how certain technoscientific imaginaries and agendas are posited as so evidently true that they cannot be questioned. We then claimed that post-truth discourse, since it is about the public uses of science, can also be read as expression of deeper shifts in our societies, and in the political economy of knowledge. These shifts have been identified, in the STS debate and elsewhere, as being concerned with the blurring of distinctions constitutive

of modernity, i.e. those between fact and value, science and politics, and humans and machines. But they have not been adequately investigated and analysed, since the debate was not really taken seriously, but rather as something to be avoided (an exception to this is the provocative argument of Steve Fuller). Through our cases of privacy by design and electronic personhood we demonstrated how science and politics, humans and machines, facts and values, become muddled up and actively reconstituted in actual practice, through processes and modes of legitimation referred to as boundary fusion. Such blurring and reconstitution of boundaries has been a main theme in (critical) STS scholarship, whose main innovation was to position itself "in between" science and society, nature and culture, demonstrating their mutual dependence (co-production). This was relied upon as a critical corrective to idealised and purified institutionalisation and practice. Yet, the developments that we describe also demonstrate that main powerful actors are positioning themselves in similar ways. This means that the old recipes for critique are not as strong as they used to be. We argued that this state of affairs underlies and informs the post-truth debate and may well explain the reluctance of some main participants in the debate towards spelling out its full implications (this is why Fuller's critique is misdirected, but also on to something). This indicates to us how the post-truth debate, and some of the real-world phenomena with which it is associated, demonstrate a need for new starting points, taking into account such shifting dynamics of legitimation and ordering.

Notes

1 As philosophers, the authors are intrinsically sceptical of 'truth', not to say it's adverse, 'post-truth'. We use 'truth' interchangeably with 'publically validated knowledge', underlining that such validation takes place in different ways in different knowledge practices and institutions.
2 "As narratives get fragmented, allowing competing truths to proliferate, there's also a concurrent effort to deploy bots, ledgers, and algorithms to produce a singular, objective, and eternal truth" (Morozov 2019).
3 Heidegger had a different notion of truth (Aletheia) as revealing or bringing forth of what is concealed. Whereas modern technology is also a mode of revealing by enframing the world around us in a certain way (for it to work well or efficiently), it conceals other ways in which the world can be revealed, but it also conceals this act of revealing (or truth) itself, in projecting the frame as the real towards which we become predisposed (Heidegger 1978).
4 Among the main technological application domains Schwab (2016) mentions: implantable technologies, our digital presence, vision as the new interface, wearable internet, ubiquitous computing, a supercomputer in your pocket, storage for all, the internet of and for things, the connected home, smart cities, big data for decisions, driverless cars, artificial intelligence, and decision-making, AI and white collar jobs, robotics and services, bitcoin and the blockchain, the sharing economy, governments and the blockchain, 3D printing and manufacturing, 3D printing and human health, 3D printing and consumer products, designer beings, neurotechnologies.

5 "The essence of modern technology starts man upon the way of that revealing through which the actual everywhere becomes standing-reserve. "To start upon a way" means "to send" in our everyday language. We shall call the sending that gathers (versammelnde Schicken), that first starts man upon a way of revealing, destining (Geschick). It is from this destining that the essence of all history (Geschichte) is determined" (Heidegger 1978, 329).
6 According to its authors, this term can be seen as the extension of the Third Industrial Revolution, which was brought by digital networks, the Internet and social media, into physical reality itself. It was pre-figured by RFID chips in the 1990s, and continued in Smart technologies, the Internet of Things, and now, Industry 4.0 (Schwab 2016).
7 Castells networked society argument in fact joins new networked modes of organisation (in economic and sociological theories) with networked information technologies that intensify this development (Castells 2010).
8 Through Privacy Enhancing Technologies, PETs.
9 See https://eu-smartcities.eu/initiatives/2/description
10 Recall the ISO definition of privacy engineering as *integration of privacy concerns into engineering practices for systems and software engineering life cycle processes*.
11 A French law professor, Nathalie Lavejans, argued that "By adopting legal personhood, we are going to erase the responsibility of manufacturers" (Delcker 2018).
12 The reason for its disappearance in the EC proposal is unknown to the authors: it may have come as result of the human-centric criticism levelled at it. It may also have come, as argued by Burri (2018) from the realisation that the capacity to create legal personhood actually does not reside with the European Parliament, but at national and member state level.
13 Thus, Saudi Arabia (not famous for its record on human rights) bestowed citizenship on the humanoid Sophia.
14 This happens at the same time as significant societal forces seek to 'take back control', and to build autonomy and sovereignty at national, local, or regional institutional levels. Innovation and techno-regulation, therefore, enter into increasingly conflictive political spaces, and can be read as a pre-emptive strategy for dealing with conflict and antagonism.
15 Other examples of this dynamic are given by the inclusion of RRI and "Integrated Social and Humanistic Science" as cross-cutting in EU research programs, in ethics-by-design and legal co-regulation.
16 This was illustrated in a media report, where the following quotes occurred: "Ethics and competitiveness are intertwined, they're dovetailed," (Pekka Ala-Pietilä chairs of the high-level expert group on AI). Similarly, digital commissioner Mariya Gabriel was quoted as saying: "I am personally convinced that ethical guidelines will be enablers of innovation for artificial intelligence" (Politico newspaper 17.03.2019).
17 To exemplify, one representative of the robotics industry told us how "The obstacles for robots have to be investigated… ELS (Ethical Legal and Social) issues need to be investigated that hinder solutions. European robotics industry has to be made world leader" (Rommetveit et al. 2020). And, a digital rights activist invoked the same logic, from the point of view of publics trying to engage with privacy infringements, but seeing the path as forestalled by the use of privacy risk assessments (PIAs, which frequently feed into design procedures): "'We do a PIA so it is okay'. It is used as a palliative to make it impossible for people opposing, to raise issues that certain developments infringe fundamental rights" (van Dijk et al. 2018, 18).

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