

Governing and Probing the Future

The Politics and Science of Prevision

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1 Governing and probing the future

The politics and science of prevision

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To muse about the things to come is a common characteristic of human life, an anthropological constant, regardless of historical epochs or cultural belongings. No matter whether the prevalent notions of time and cosmology cast the future as ‘God’s predestined gift’ or as an ‘empty territory that is to be settled’ (Adam 2010), human beings seek to anticipate and prepare themselves for what is lying ahead. Beyond the many ‘small futures’ that get enacted continuously in people’s day-to-day lives, social and political communities also like to envision ‘big futures’ with much larger temporal and spatial horizons (Michael 2017).

That way, politics and the wish to assemble future knowledge through scientific means are intricately interwoven. The desire to govern the future through science arose in parallel to the rise of the modern nation state and a more technocratic and scientific approach to public administration in the nineteenth century. With the dawn of modernity, foreseeing and preparing for possible future developments became a key task for policy-makers, bureaucrats and scholars alike. Today, future knowledge offers the administrative basis and justification for state intervention and societal, military and economic planning (Bell 1964; Seefried 2015). To govern the future, both with regard to long-term strategic planning and the prevention of and preparation for unforeseeable ruptures and crises, can be seen as the political task par excellence for today’s states (Landwehr 2018: 38). It is, after all, the promise to order and govern not only the present, but to anticipate, manage and secure the future that gives legitimacy and a ‘raison d’être’ to the modern state (Henne *et al.* 2018: 9).

Science and politics are no easy bedfellows, however. This is largely due to the different knowledge conceptions that are at work in the two fields, or what Maasen and Weingart describe as ‘knowing’ vs. ‘deciding’:

The mode of science is oriented to the continuation of systematic knowledge production, to learning and, thus, to the questioning of existing knowledge. The mode of politics, by contrast, is oriented to the closure of public conflicts through compromise, using knowledge strategically as it unfolds.

(Maasen and Weingart 2005: 7)

As a consequence, the knowledge that is produced in science is not necessarily the same as that required by politics.

In addition, there is a disparity in the temporal orientation of decision-makers and scholars. Adam describes this as a disjuncture between ‘the futurity of social life’ (and one might add: futurity of political life) and ‘the present and past-based empirical study’ of this life in the social sciences and history (Adam 2010: 362). Gavin provides a similar explanation to describe why decision-makers rarely draw upon the conclusions provided by historians: ‘Forced to make difficult choices under enormous time pressures, government officials want “usable” knowledge that provides guidance for making the best decisions. Understandably, they seek certainty, particularly about the future, and are grateful for clear-cut rules and parsimonious explanations’ (Gavin 2008: 163; also Brands 2017).

And yet, perhaps paradoxically, we observe growing demand for and interest in governing and probing the future at the intersection of politics and academia today. While in politics the openness and temporal horizon of the future are contested, in academia we witness renewed reflection and debate about the purpose, epistemologies and methodologies of probing the future. The politics and science of anticipating the future are clearly intertwined – and it is the goal of this book to inquire into the epistemological possibilities and pitfalls of prediction, while at the same time assessing the political and ethical implications of future-oriented policy-making across different policy fields. This introductory chapter provides the background to this endeavour, situating any attempt to understand the future for political reasons in a larger socio-political context.

Governing the future: the co-constitution of future visions and politics

Different visions of the future as well as social and political orders and governance mechanisms evolve together over time. Accounts of past futures, i.e. historical imaginaries of a possible future, tell us a lot about the historical political and cultural circumstances under which they were sketched, regardless of whether they later prove to be accurate or not. From them, it becomes visible which ideational patterns, knowledge regimes and political orders gave rise to a particular sketch of the future. Thus, pre-modern prophecies and divinations tell us more about then-prevalent religious cosmologies and eschatology than about the veracity of expectations (Adam 2010). The same can be said about utopias or dystopias: they are not primarily meant to predict a state of the world that is to materialize at a specific point in time, but rather contain a proposal for an alternative order to the present one (Landwehr 2018: 39).

That humans accommodate and locate themselves in a narrative mesh of past, present and future holds across time and culture. What differs is the specific temporal horizon of the imaginaries to which they adhere: Either their life script is organized around certain memories of the past or it is subordinated to some kind of futurity (Hölscher 2016: 91). Unlike pre-modern societies which

seem to have predominantly oriented themselves towards the past, modern societies are characterized by their orientation towards the future and a belief that said future can and even should be shaped by actions in the present. Future-orientedness as we commonly understand it today is therefore a phenomenon closely tied to the modern era (Jordheim 2012: 153). At the dawn of modernity, a process of reordering the temporal thinking was set in motion in the Western world that marked the beginning of the parallel rise of a rapidly growing interest in the future and the industrial nation state. It is that intersection we need to understand to be able to situate our own undertaking in the flow of history.

The advent of modernity: a new openness of the future and the rise of the industrial nation state

With the advent of modernity people's 'space of experience' and their 'horizon of expectation' disintegrated, as Koselleck explains: In the post-Enlightenment period individuals and communities could no longer primarily rely on tradition, previous experience and past historical knowledge to cope with the new and the coming, because the accelerated societal, political and cultural upheavals were too fundamental and too swift. Increasingly, history came to be seen as fundamentally different from the present and the future (Koselleck 1989: 349ff.). The new epoch reflected a new temporality – a linear, directional understanding of time – and spurred the perception of a fundamental openness of the future. This enabled a form of anticipation of the unfolding and a propensity to imagine and proactively shape the future that had been unknown in previous historical periods (Koselleck 1990: 541).

The preoccupation with the upcoming greatly expanded in the context of the Western state building process that not only established state bureaucracies – tasked with upholding the internal (police) and external (army) state monopoly of violence and the establishment of a tax system – but a more scientific and technocratic approach to public administration and economic affairs more generally. The new interest in expectations and plans was further facilitated by an emerging enthusiasm in numbers and numerical analyses of demographical, economic or agricultural trends. The resulting upsurge of statistics reflected a broader ideational shift characteristic for the era of the Industrial Revolution, as Hacking explains: 'The acquisition of numbers by the populace, and the professional lust for precision in measurement, were driven by familiar themes of manufacture, mining, trade, health, railways, war, empire' (Hacking 1990: 5; Agar 2003).

Projects of state modernization and rationalization vastly heightened the demand for systematic and structured academic advice geared towards the future and increased the pressure put on academia to provide such insights – a task that was facilitated by the expansion and differentiation of the academic landscape and the growing importance of an empiricist epistemology in the late nineteenth century. Foreseeing and preparing for possible future developments became thus key tasks for scholars and bureaucrats and the administrative basis and justification for the interventionist planning activities of states

(Seefried 2015: 40). State intervention peaked in the war economies of World War I and in post-depression era efforts to avoid similar economic crises by developing more efficient tools to anticipate and steer economic development. The economic ideas of anticyclical fiscal spending and fiscal policy interventions developed by John Maynard Keynes were especially influential in fostering a future-oriented, prognostic perspective on processes of socio-economic planning (Van Laak 2008).

The trend towards anticipating, planning and engineering the future was intensified further in the years to follow, when notions of technocratic rationalization, resource optimization and societal engineering emerged simultaneously in Europe and the US. Under both fascist and communist rule, these ideas soon acquired a totalizing determination as revolutionary blueprints of a new socio-political/racial order, which drew upon large amounts of newly generated statistical and planning data. They culminated in the brutal race policies, forced displacements and genocidal policies emblematic for both regimes, as well as in many of their totalitarian architectural, infrastructural and engineering projects. While the totalitarian character of planning and societal engineering was thoroughly discredited thereafter, scientific approaches to the future kept blossoming on a different basis in the decades after World War II (Van Laak 2008; Seefried 2015).

The golden age of future studies: big science and the dark side of modernity

The 1950s and 1960s are often described as the ‘Golden Age’ of future studies. Geopolitical, technological and social drivers contributed to the parallel rise of big social and political planning ambitions, on the one hand, and big science, on the other. First, the economic reconstruction and recovery efforts of the post-war years led to big investments in research and a large growth in the number of trained scientists working in a diversified landscape of research institutions on both sides of the Iron Curtain. This in turn triggered a phase of professionalization and specialization as well as a general ‘science boom’ and blossoming of academic output (Rossiter 1985; Holloway 1999). Second, this trend was fostered by the establishment of ‘big science’ projects commissioned and funded by big states, resulting in a dense entanglement of academic work with governmental interest. Early on, and building upon vast wartime efforts such as the *Manhattan Project* that had led to the development of the US atomic bomb, these ‘big science’ project concentrated on the defence sector. Later, however, they rapidly spread to a wide variety of social and natural sciences disciplines (Reynolds 2010; Solovey 2001; Galison 1992).

Third, the invention, improvement and fast diffusion of computers contributed heavily to the rise of future studies in the decades after World War II. New technologies made the collection, structuring and processing of large amounts of data possible and raised the hope that computational models could be built to anticipate future developments (Agar 2003; Edwards 1996). Fourth,

the growing interest in the future was not only driven by material factors but also stimulated by new ideological-intellectual currents that gained hold in the middle of the twentieth century, as Andersson and Rindzevičiūtė explain convincingly:

Different strands in futures research stood in either striking proximity to or critical engagement with modernization theory, which garnered authority in both social science and politics by the early 1960s. Similarly important were emerging postulates of rationality, created with an aim to explain and foretell social developments so that desirable ones could be privileged and undesirable ones avoided. Through such approaches in the social sciences, the future reemerged as a scientific interest, but also as an object of control and intervention.

(Andersson and Rindzevičiūtė 2015a: 3)

Several of these trends became manifest in the newly founded interdisciplinary research domain of cybernetics. Based on the premise that natural, social and technological processes and systems all behave according to similar patterns, this new meta-discipline aimed to uncover the information transfer and underlying rules and mechanisms within a certain system but also between the system and its environment. The proximity to the future studies field is evident: If all systems behave according to a set of specific rules and information transmission patterns, this would allow the simulation and modelling, and ultimately also the predicting and forecasting, of natural and social actors' behaviour and even of complex systemic processes. Unsurprisingly, these convictions fed into an outright and arguably quite paternalistic euphoria for steering, planning and social engineering that culminated in the 1950s and 1960s (Seefried 2013, 2015; Van Laak 2008).

While large parts of this cybernetic-inspired research remained staunchly empirical and positivist in its outlook, there was also new space for a critical-normative investigation of alternative, emancipatory, even utopian futures. Writings within this latter research strand provided discursive space for discussions about multiple possible futures, change and agency vis-à-vis mankind's futurity as well as about participation, responsibility and empowerment to actively shape what is to come. At the same time, and in light of new cultural currents, non-traditional political actors had begun to fundamentally problematize the orthodoxy of Western political and economic principles and had called for a discontinuation or at least recalibration of the capitalist orientation on growth and consumption (Radkau 2017: 242ff.).

The 1970s witnessed the emergence of a new perception of the 'dark side of modernity' (Giddens 1990: 9) in the West, as the almost mythical expectations raised by the positivist steering and planning ambitions of the previous decade had remained unfulfilled. The appearance of hitherto unknown, potentially existential risks to humanity and the planet's ecosystems triggered apocalyptic scenarios and future scepticism among many in the Western world (Beck 1986).

The pessimistic economic and ecological forecasts contained in the widely acknowledged 1971 report ‘The Limits of Growth’ by the Club of Rome nurtured these concerns – despite strong criticism of the report’s underlying methodology and data basis (Seefried 2015). The future was no longer considered an untouched space to be colonized, but came to be seen as a ‘crowded territory’, filled with the actualized desires, hopes and fears of previous generations (Adam 2008: 115).

A contested future: between visions of colonizing and visions of abolishment

Since the – unforeseen – ending of the Cold War, the status of the future as a point of orientation and its openness has remained contested – vacillating between visions of colonizing and visions of abolishment. The end of the bipolar superpower confrontation led some to envision a new and open globalized – perhaps even cosmopolitan – future freed from the ideological chains of the past (e.g. Blechman 1998; Held 1995a, 1995b). Others foresaw ‘the end of history’ and a closure of political futures and future possibilities, because the victory and universalization of the liberal democratic order represented the final stage in the ideological evolution of mankind (Fukuyama 1992). While the latter left little room (and need, some would say) to shape and design trajectories toward the future, the former contained a far more activist understanding of designing, governing and even colonizing of what is yet to come. It opened up scope for a – perhaps even participatory – ‘future imagining’ and ‘future making’. According to such an understanding, perceptions of the future not only provide orientation between the past – as a source for the extrapolation of knowledge, the present – as the space for planning and decision-making, and the future – as the teleological goal. They also blend ‘the descriptive and the performative’ (Nelson *et al.* 2008). By producing and acting upon knowledge of the future, we might actually change the very course the future takes – or at least attempt to shape and forge it. Thus, prophecy and control converge, as Choucri argues: ‘The possible/desirable becomes the domain of policy planning which, in turn, results in some institutionalized imperative for forecasting. Viewing the future involves, to some extent, creating it’ (Choucri 1978).

However, in light of new dramatic challenges such as climate change, resource scarcity or emerging new diseases the imaginaries of a possible future and the possibility of human control have become more pessimistic, as Assmann observes:

In many areas such as politics, society and environment, the future has lost its lure. It can no longer be used indiscriminately as the vanishing point of wishes, goals and projections. ... The future, in short, has become an object of concern, prompting ever-new measures of precaution.

(Assmann 2013: 41)

Digital technologies and their interlinkages with newly emerging technologies in the fields of AI (artificial intelligence), space-based technologies and quantum computing promise great benefit, but also come with increasing vulnerabilities and great uncertainty (Dunn Cavely and Wenger 2019). Moreover, the technologies that we invent and implement today potentially trigger such momentous, delayed consequences that the ‘temporal category of the future is being abolished and replaced by that of the extended present’ (Nowotny 2018: 51).

Perhaps yet another fundamental alteration in our temporal thinking is under way, creating a paradox at the science–policy interface: The rise of the precautionary principle and the concept of resilience in many public policy fields reflect a growing feeling among policy-makers that in a world of great complexity and interconnectedness risks cannot always be controlled and disruptions and discontinuities are inevitable (Dunn Cavely *et al.* 2015). At the same time, reminiscent of earlier beliefs, the current advances in the data sciences come with the promise that the integration of new analytical tools together with the availability of new data and rapidly growing computing power will allow to address the future in policy-making on an unprecedented scale and speed (Hofstetter and Lieberherr 2019).

In sum, policy-makers – at least in the West – seem to live in a world in which the horizon of possibilities is shrinking at the very time that the technical possibilities to influence and shape the immediate future are rapidly expanding. It is within this context marked by new technological risks and opportunities and a related, new awareness for the future in politics and academia that this book is situated.

Probing the future: epistemological choices and their socio-political consequences

Policy-makers seek knowledge as a form of guidance for policy-decisions that are necessarily geared towards the future. They require concrete and often specific knowledge that enables them to take decisions which, in many cases, will only become manifest in the mid-to-long-term, and to proactively manage the future with all its uncertainties and unknowns (Bobrow 1999; Byman and Kroenig 2016). That means that policy-makers have little choice, they need access to scientifically robust knowledge and future-oriented policy-advice to muster public support for solutions of increasingly complex policy problems, from modelling climate change and explaining the causes of the recent global financial crisis to preventing deadly conflicts and reducing urban violence. Scientific progress and the invention of new technologies come with the promise of considerable economic and social benefits, but at the same time contain considerable technical, social and political risks.

This is one of the reasons why almost all academic disciplines from the social sciences and humanities to the natural sciences and engineering are increasingly expected not only to deal with politically, economically, socially

relevant issues, and to commit to outreach and science communication strategies, but also to preview, anticipate and provide solutions to future problems and challenges (Kristof 2014). At the same time, whenever a major crisis or turning point in global affairs occurs, it is particularly the social sciences and humanities that are criticized for failing to predict key global events. Prime examples are IR (International Relations) scholars who did not foresee the end of the Cold War; Middle East experts who did not anticipate the Arab Spring; or EU scholars and political scientists who failed to foresee developments such as Brexit or the rise of populism in recent years.

Such criticism is not new and at times it goes along with growing pessimism towards science, technology and experts more generally. For many years now, voices from both within and outside the academic field have criticized the social sciences for focusing on the wrong issues and being too absorbed in questions that have little or no policy-relevance; for failing to generate the kind of future-oriented knowledge that allows policy-makers to take action to avoid future crises. According to this view, scholars should strive for a better toolkit to solve pressing policy problems, instead of getting lost in philosophical and meta-theoretical debates. Disciplines such as Political Science, International Relations, Security Studies or History are strongly pressured to justify their funding by being policy-relevant and by making future-related, forward-looking contributions (George 1993; for a different view see Zambenardi 2016).

Future studies and future politics

We see that the future as an object of scholarly contestation is back in the social sciences and beyond – stimulated by increasing demand for policy-relevant work in general and for future-oriented knowledge in particular; by a process of introspection why many disciplines failed to anticipate some of the key global events of recent decades; and by the emergence of new analytical and technical tools for prediction and anticipation. Today we observe renewed reflection and debate about the intricacies and fallacies of probing the future (Ward 2016; Montgomery 2016) in a time of complexity, uncertainty and seeming unpredictability.

This new impetus spurs new questions and contributes to an innovative research agenda on future studies and future politics. Which means do we possess to generate knowledge about the future? What type of future knowledge do policy-makers seek and what type of knowledge can academia provide (Avey and Desch 2014; Desch 2015)? What are the anticipatory practices and modalities prevalent in specific cultural and political contexts and policy domains? Do we have to question foreseeability in (international) politics altogether (Gaddis 1992; Taleb 2009) and instead turn to precaution, preparedness and resilience (Aradau 2014; De Goede 2008)? Do we need to adapt our methodologies and turn to game-theoretical mathematical modelling (Bueno de Mesquita 1998, 2002, 2010)? Will ‘big data’ analytics pave the way for ‘cybernetics 2.0’ (Helbling *et al.* 2019;

Kitchin 2014; Jäger 2016)? Or is the anticipation and forecasting of the future an – individual or crowd-based? – skill that needs to be cultivated, trained and practised (Tetlock and Gardner 2016; Mellers *et al.* 2015)?

In light of these questions and puzzles, this book brings together contributions by an interdisciplinary group of international scholars from Political Science/International Relations, Security Studies, International Political Economy, International History, Sociology of Technology and the Life Sciences. The research endeavour profited a lot from the rich body of work on the future that has emerged in the recent decade in history, sociology and political science. This includes inquiries into the role of risk and uncertainty in International Political Economy (Beckert 2013; Kessler 2008; Nelson and Katzenstein 2014); critical security scholars' work on the governance of risk (Aradau and van Munster 2001, 2007); qualitative (Berenskoetter 2011; Meyer 2011; Neumann and Øverland 2004; Feder 2002; Montgomery 2016) and quantitative (Bueno de Mesquita 2002; Doran 1999) theoretical work in IR more traditionally; empirically driven analyses in specific subdisciplines of political science (Montgomery and Mount 2014; Montgomery and Sagan 2009; Ward 2016; Ward *et al.* 2010; Ward *et al.* 2013); or psychological (Mellers *et al.* 2015; Tetlock and Gardner 2016) as well as sociological and historical studies (Jasanoff 1994; Jasanoff and Kim 2015; Andersson and Rindzevičiūtė 2015b; Seefried 2015).

Also, numerous studies on future-thinking have inquired into the politics of anticipating the future: Who has the power to decide which future is desirable (Grunwald 2008; Brown *et al.* 2000)? Power and hierarchy at work in bureaucracies and the public often predefine whose predictions and scenarios are heard and gain traction in policy-making (Connelly *et al.* 2012; Connelly 2008; Andersson and Rindzevičiūtė 2015b; Radkau 2017). Alternative scenarios can have far-reaching political implications and specific previsions are sometimes bluntly (mis)used for (partisan) political purposes. Across time and space, the presumed authority of scientists, policy-consultants and political experts has been used by policy-makers to limit the discursive space for disagreement and opposition, thereby enabling decisionist modes of government (Habermas 1968; Schelsky 1970).

The current literature on future thinking in politics and IR distinguishes three different types of 'forward reasoning': forecasts, predictions and scenarios (Choucri and Robinson 1978). In sociology, science and technology studies, and economics, we also find concepts such as expectations, promises, imaginaries, visions and fictions which all share a more normative valuation (Konrad *et al.* 2017; Beckert 2013). In addition to these broader distinctions, future-oriented studies differ along several other analytical dimensions: the role of contingency vs. *ceteris-paribus* conditions; agency vs. structural determinism; their normative-prescriptive content; or the time horizon (short-term/long-term) under consideration (Bernstein *et al.* 2000; Grunwald 2008; Meyer 2011; Becker *et al.* 2016). However, this attempt at categorizing the different forms of future thinking cannot conceal that the terms are often used interchangeably and that the different analytical standpoints and assumptions remain hidden. Foregrounding

those by making different ways of thinking about the future explicit is where this book hopes to make its contribution.

The goal and structure of the book

The goal of the book is to inquire into the renewed interest in governing and probing the future at the intersection of politics and academia. In the second part, the book adds to an understanding of the diversity and pluralism of contemporary future-oriented work, systematically analysing the underlying epistemological assumptions and ethical and political implications of different academic perspectives on and contributions to future-oriented policy-making. In the third part, the book discusses the role of future knowledge in decision-making across different empirical issues, analysing how prediction is integrated into public policy and governance and how in return governance structures influence the making of knowledge about the future.

That said, Part II of the book is not just about the science of prevision, as Part III is not only about the politics of prevision. The point is rather that the politics and science of anticipating the future are closely interlinked: All of the book's contributions integrate the two analytical dimensions – the epistemology of prevision and the political and ethical implications of prevision – in an attempt to analyse how the science of addressing the future is integrated into the politics of anticipating the future and vice versa. This way, the book would like to contribute to a better understanding of the complex interaction and feedback loops between the processes of creating knowledge about the future and the application of this future knowledge in public policy and governance.

Academic perspectives on and contributions to future-oriented policy-making

Part II of the book discusses different academic perspectives on and contributions to future-oriented policy-making. The first two chapters address the two main analytical dimensions – the role of prediction at the intersection of power and democracy and the epistemology of prediction in the social and political sciences – in greater detail. The next three chapters introduce the reader to some pressing 'practical issues' of future-thinking at the science–policy interface. They look at prevalent biases; examine the role and contribution of thinking historically for policy; and provide a typology of different forms of future studies.

Opening Part II of the book, *Sheila Jasanoff* analyses how the predictive politics of future-making fundamentally alter existing practices of constitutional democratic government by upsetting three archetypical foundations: its materiality, its presentism and its localism. The outcomes of contemporary political struggles, Jasanoff argues, are no longer conceived as immediate, tangible and available for popular evaluation and judgement. Instead, contemporary political

contestations revolve around collective political imaginations of the future in which different, often even conflicting or opposing, visions are negotiated. These negotiations – what one might term the ‘politics of the future’ – thus continually enact and engender possible ‘dreamscapes’ and provide a space in which visions of the future originate and flourish or are met with resistance. The consequences of these negotiation processes are far-reaching, because once a certain vision of the future is embedded and acted upon, it co-constitutes and precipitates a specific future trajectory, while necessarily also precluding ‘alternative futures’. It is crucial to understand the power-laden, hierarchically structured nature of these negotiations in order to restore and reclaim democratic participation in the politics of the future. But the changes brought about by the rise of science and technology as major forces in world-making go even beyond the domestication of the future for present-day political action. Predictive politics have also fundamentally changed the objects of governance, the instruments of political intervention, and the political subjects and polities. Drawing on her rich work in Science and Technology Studies (STS) and political theory, Jasanoff shows how prediction as a new form of governance uproots existing practices of constitutional government, brings new questions of trust and accountability into national and global debates, and spurs new movements in political and social thought that amount, in effect, to a reconstitutionalizing of contemporary politics (Jasanoff 2020).

Following this, *Gunther Hellmann* introduces a pragmatist perspective on foresight and hindsight that conceptualizes knowledge as ‘know how’ that is largely the same about the past, the present and the future. Explaining backward and predicting forward reflect a similar narrative structure in which concepts (‘why’ questions) and facts (‘what’ questions) are ‘hanging-together’ in some form. Knowledge about the past, present and the future are all based on acknowledgement and applied by pragmatist problem-solvers – be they policy-makers or academics – to solve some problem in order to cope. Such a perspective of redescriptive sense-making, Hellmann argues, offers a different perspective on the future than both a perspective from the natural sciences – in which the future needs to be discovered and invented – as well as from the perspective of a positivist and realist social science point of view – which separates concepts (‘why’ questions) and facts (‘what’ questions). While positivists use probabilistic vocabulary grounded in theory-based backward-looking explanation, thereby closing the past by getting it right or wrong, pragmatists opt for the expansion of the horizon of possibility, encouraging human agency and creativity (Hellmann 2020).

Michael Horowitz addresses the issue of cognitive biases in future thinking. To structure our understanding of how biases shape our ability to forecast, he addresses three areas. The first is about the object. Some things – those that occur with a certain regularity – are easier to forecast than others, such as emotional acts. The second is about the type of individual, group or organization which does the forecasting in order to tackle well-known individual or group biases. The third is about the methodology that is used. Each of the three areas

come with their own challenges, but many of them can be overcome. If the possibilities and pitfalls are addressed at the very beginning of a forecasting process and expectations about what type of knowledge a given process can generate are an important part of the communication between policy and analysts, then the overall validity, legitimacy and efficiency of forecasting activities can be improved (Horowitz 2020).

The relationship between historians and policy-makers – or for that matter history and policy-making – is an uneasy one, *Francis J. Gavin* reminds us in his chapter. Policy-makers demand certainty, prediction and actionable knowledge, whereas most historians are wary about the political misuse of historical analogies, see their primary role as one that confronts and challenges power, and often focus on the underrepresented voices without power. Yet a historical sensibility, *Gavin* argues, can be helpful to policy-makers and act as bridge between the past and the present. History is not about policy relevance per se, but it helps to develop a perspective of public-mindedness. Thinking historically goes along with an appreciation that history is not linear, that at times it accelerates in unanticipated ways, that decisions need to be taken in a context of complexity and specificity and therefore may well have unintended consequences beyond the immediate issue, time and place. Historians are pragmatists in so far as they combine a macro-view with a micro-view and events with causes in a narrative that connects the past with the future (*Gavin* 2020).

Myriam Dunn Cavelty's chapter looks at the assumptions and expectations that drive the applications of different scenario planning methods in bureaucracies, moving in three steps from context to practice to impact. In the context of an environment dominated by risks and different levels of uncertainty, relevant actors in public policy employ two different forms of scenarios for future planning. The first type is used for risk assessment, which is then typically used as an input for contingency planning. The second type is used to depict possible future situations in a narrative way, used more often as a basis for the development of long-term strategies. The most substantial difference between these practices is the type of knowledge sought to build them. In the first type, scenarios are understood as 'adverse event illustrations' and are thus based on 'secured' knowledge, which relates to experiences made in the past. In the second, a group of usually diverse people is brought together in order to be creative and imaginative in the process of drafting visions of the future. Interesting and somewhat paradoxical dynamics are revealed: Actors in public policy mainly strive for actionable, 'secure' knowledge, but they also know quite well that the results obtained are much higher in uncertainty than the methodologies suggest. Therefore, they start acting accordingly: by managing the risks of being wrong about risks. Due to this awareness, the future and status of 'old-school' prediction is potentially declining. However, a destabilization of the belief that the future can be known also opens up new possibilities for public policy, such as the establishment of inclusive, interdisciplinary and democratic forecasting exercises in many different areas of policy-making (*Dunn Cavelty* 2020).

***The role of prediction in public policy and governance:
empirical perspectives across different policy fields***

Part III of the book analyses the role of prediction in public policy and governance, illustrating how risk and uncertainty are dealt with across different policy-fields – from climate, health and markets to bio- and nuclear weapons, civil war and crime. It discusses whose predictions are integrated how deeply into what forms of governance systems and what consequences this has for the making of future knowledge, on the one hand, and the socio-political order on the other. In order to make the empirical chapters comparable and systematic, all authors structure their chapters around the two dimensions of epistemology and politics.

Opening Part III of the book, *Maria Carmen Lemos* and *Nicole Klenk* analyse the complexities of climate adaption decision-making at the science and policy interface, where the uncertainties of the scientific models interact with the uncertainties of policy-making. Global climate models from a scientific point of view leave little room for doubts that climate adaption is warranted. Yet most climate adaption decisions are taken at the local and national levels, where the uncertainties of the models become bigger and the policy trade-offs with other socio-economic and political risks and interests are more pronounced. Within this broader context, the two authors show how the knowledge that underpins decision-making is co-produced by science and policy, at times paralysing politics while politicizing science. They highlight the political and ethical consequence of adaption research and policy-making summarizing three case studies. These case studies show that the climate models may empower technocrats to have a disproportionate influence in decision-making over social and political distributional conflicts; that local attempts to mobilize adaption capacities are often not in alignment with planning at higher levels of government (resulting in plans without implementation); and that vulnerability assessments at the local level may have unintended consequences, producing risky knowledge that may change property values, creating legal uncertainties as regards who is liable for such risks (Lemos and Klenk 2020).

Ursula Jasper demonstrates how governing and managing the uncertain future has become an increasingly important reference point in individual and global public health. She argues that both domains – while building upon different methodologies and tools – are driven by a growing ‘anticipative medicalization’: They are shaped by attempts to implement comprehensive and all-encompassing networks of diagnostics and disease surveillance that allow fewer and fewer risks to our well-being – from defective genes to newly emerging pathogens – to go unnoticed. This development has largely been enabled by the unprecedented progress in digital health technologies and artificial intelligence and by the accumulation of massive amounts of health related data. Yet, while we currently witness an almost unfettered optimism in technological feasibility and the benefits of these advances, many fundamental ethical and political-regulatory questions remain unsolved (Jasper 2020).

Peter J. Katzenstein and *Stephen C. Nelson* take the fact that economists failed miserably in anticipating the 2008 financial crisis as a starting point for an analysis of financial market governance and the role economic models play within these markets. The looming catastrophe of uncontrollable instability, they argue, reminded markets players and policy-makers that we live in a world of risk *and* uncertainty, in which pragmatic international actors needed to rely on social conventions and institutions to cope with epistemic uncertainty and guide future-oriented decision-making. As a corollary, the crisis should remind economists that their models do not only analyse markets, but at the same time alter them. Recognizing the ambiguity of financial markets, stabilized by self-validating feedback loops between economists, market players and policy-makers, economists should put the social back into the science that analyses markets. The authors use two case studies – one on a public actor (the US Central Bank), one on a private actor (rating agencies) – to highlight that financial markets are deeply intertwined with social institutions and conventions and that out of a process of social interaction a fictional future emerges that in the form of discursive politics helps to govern future uncertainty and adapt the post-crisis market order (Katzenstein and Nelson 2020).

In their examination of the role of popular culture in imagining future bio-threats, *Filippa Lentzos*, *Jean-Baptiste Gouyon* and *Brian Balmer* turn to a policy field characterized by growing concern about potential new threats and erosion of the barriers to bio-weapons development and use, on the one hand, and almost no public knowledge about past weapons programmes and deliberate outbreaks, the intentions and motivation of potential malevolent state and non-state actors, or on-going public but secret assessment of threats by other states as regards method, data and outcome, on the other. The authors show how in such situations public actors like NATO and the Pentagon have turned to science fiction to explore and imagine how new technologies may impact on future military operations. In such indeterminate contexts science fiction may play an important role in the wider process of anticipatory knowledge production. Novels and movies are an especially accessible source of imagined futures, because they focus on the human dimension – not technology – and on non-linear dynamics in the evolution of technological risks and threats. More research is needed, the authors conclude, to better understand how science fiction influences the political discourse about bio-weapons and how it can help to develop ideas about their control and elimination (Lentzos *et al.* 2020).

Corinne Bara offers an overview of the subfield of conflict research dedicated to the prediction of civil war and political violence. Civil wars are a hard target to predict, because they are rare events, result from people breaking rules, and are often triggered by unpredictable human behaviour. The subfield shares methodological and epistemological foundations that are characterized by a positivist paradigm of scientific research, natural-scientific and mathematical approaches and sophisticated computational models. Building on a conviction that the limits of prediction are better explored and tested than simply assumed, the literature treats explaining the past and predicting the future as two distinct

tasks. Risk factors identified in past conflicts may fail to predict in unseen (future) data. As consequence, the standard procedure for forecasting the onset of war relies heavily on the ‘out-of-sample’ evaluation of the predictive (statistical or algorithmic) models. As regards the question how academic civil war prediction can and should influence policy-making, Bara concludes, the primary contribution so far is cutting-edge methodological expertise. The development of more directly policy-relevant predictive research remains – with a few notable exceptions – uncharted terrain (Bara 2020).

The question of how accurate the intelligence services of the United States assessed the global spread of nuclear weapons during the Cold War is the topic of *Jonas Schneider*. This is another case in which uncertainty abounds, because of the pervasive secrecy of the weapons programmes, the dual-use character of the technology and the associated politics of ambivalence, and the absence of a robust theory of why states build or do not build nuclear weapons. US intelligence services tended to overestimate nuclear proliferation, although their estimates – reassessed against today’s state of knowledge – varied over time. The main reason for nuclear alarmism reflected how the agencies dealt with uncertainty: Lacking information about potential proliferators’ intent and, more generally, about domestic and international demand-side factors, they placed too much emphasis on the technical capability of a state to build the bomb and on overall supply-side trends. While the intelligence analysts were aware of the perils of predicting other states’ behaviour under uncertainty, policy-makers wanted clear instead of qualifying language. Paradoxically, the pessimistic forecasts played a crucial role during the 1960s in legitimizing a shift of US policy from nuclear sharing to nuclear nonproliferation, thereby shaping a new global nuclear order at the very time that at the bureaucratic level the intelligence estimates were the least alarmist (Schneider 2020).

Finally, *Matthias Leese* examines how predictive policing makes criminal futures visible and renders them actionable in practice. The industry that develops the software projects a vision of the future in which the algorithmic exploitation of data allows near-real-time decision-making, culminating in the promise to catch a criminal before the crime. Yet in practice, the software needs to be integrated in institutional structures and organizational routines that restrict the theoretical flexibility of situational analysis via limits in terms of planning and dispatching capacity. Updating the system once per day fits the institutional and operational context of existing policy work in Switzerland and Germany, although it only partially fulfils the managerial aspiration of increased efficiency and effectiveness of a reorganized police work. Predictive policing, Leese argues, is not just a technology, but a socio-technical assemblage. The growing computing power and the further algorithmic exploitation of data has the potential to fundamentally transform the relationship the police has with the future. Different societies and political systems will make different use of this emerging opportunity to address the future on an unprecedented scale and speed (Leese 2020).

As summarized and discussed in the conclusion, this book is not so much about the ‘rights’ and ‘wrongs’ or the precision of future projections, but about

inquiring into the politics of anticipating and predicting the future: The contributors to this book seek to understand why futures are sometimes contested while in other instances seem to be almost certain; why one particular account of the future eventually prevails while others fail; who has the power and expertise to preview the future, and whose voices are marginalized; how states and communities use their anticipatory knowledge for decision-making in the present and how they handle knowledge gaps and uncertainties; how the future co-constitutes, reflects back on and shapes the contemporary socio-political order; and what we can learn about how present beliefs, ideas and preferences shape assumptions about what is yet to come (Wenger *et al.* 2020).

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