European Review, Vol. 27, No. 3, 317–327 © 2019 Academia Europæa
doi:10.1017/S1062798719000012

Introduction: Big Data – Digital Technology, Loads of Empirical Materials, and a Daring Vision

CHRISTIAN MUNTHE* AND URBAN STRANDBERG**

*Department of Philosophy, Linguistics, Theory of Science, University of Gothenburg, Sweden
**Centre for European Studies, Department of Political Science, University of Gothenburg, PO Box 720, SE-405 30 Gothenburg, Sweden. Email: urban.strandberg@gu.se

The daring vision of using big data technology to substantially advance the scientific understanding of human nature, individually and socially, and possibly solve age-old challenges of bridging the subjective and objective sides of human nature, rests on substantial assumptions about the concept of a human being. The daring big data vision may at the same time, in itself, serve to change the very concept of a human, regardless of how well the vision's assumptions and prospects hold up to scrutiny. This issue of the *European Review* presents an attempt to critically engage with the question of how this complex situation affects the content and prospects of the vision of reconsidering humanity with the help of big data. In this introduction, the landscape of the issue is sketched and some general remarks of where the emerging map might take future research are made. In general, even if the assumptions of the daring big data vision turn out wanting, pragmatic factors may very well transform our own image of ourselves to fit it.

Digital technology drastically increases opportunities and reduces costs for the allocation and analysis of information, at the same time as the internet and social media help to create gigantic volumes of digitally stored empirical information about humans in all their dimensions, such as body, thoughts, feelings, actions, appearance, life situations, placement in space and time, and so on. Part of this consists of data produced in real time on a daily basis. Some of the data is generated with the intention of being used for some purpose, but a lot of it appears as a side effect of activities pursued for other reasons. Sources of these data consist partly of so-called user-generated content, via button presses and taps on smart phones, tablets and personal computers, as well as uploaded content in shared databases of social media formats: videos, images, audio and texts. Other data from the same sources are (from the user's standpoint) less obvious side effects of such activities, in the form of personal

https://doi.org/10.1017/S1062798719000012 Published online by Cambridge University Press

data and survey data that are stored in databases for commercial or marketing purposes. In parallel, and increasingly, sophisticated analytical methods facilitate rapid and often automated analysis of such data to unravel and describe hitherto elusive connections, relationships and complexities in the understanding of human nature.

Digital sensors, including the so-called RFID technology, which reads information remotely by microchip transponders called tags, also produce data. Digital sensors of this type are embedded in cars, oil pipelines, power lines, roads, traffic lights, water pipes, hospital instruments, etc. Digital sensors are also commonly integral to bus passes, lift tickets, road tolls, passports, anti-theft systems in shops, booking systems, library loans, etc.

Data are also produced in the form of traditional 'qualitative' materials for arts and social science studies, which document and inform about humans, human cultures, behavioural patterns, ways of thinking, communities, etc. These databases already exist but are under substantial expansion, thanks to the new digital technological possibilities. Data are also produced within existing and still growing repositories or 'banks' of information from medical, neurological and/or scientific research, and related technical product development and business operations (for example, pharmaceutical and healthcare testing industry, implant industry, and so on). A strong trend is that such databases are or will be open, i.e. available for research and scientific analysis. Finally, the development of the 'Internet of Things', E-/M-health, subcultural movements such as 'The Quantified Self', and the like, accelerate the development of large amounts of personal data that become available for analysis from a research perspective.[1]

One particularly important aspect of big data is the development of methods that can be called 'Big Data Analytics'. This refers to methods for speedy, systematic, and adequate extraction of new information about people, people's bodily facilities, human behaviour, thoughts, emotions, communities, lifestyles, cultures, etc., based on big data. The temptation to manage the very large volumes of data speeds up hardware and software development, which is supported by increasingly sophisticated mathematical-statistical models. Voluminous and complex data sets require complicated systems and analytic methods for data processing, which also are highly automatized. A particular feature of big data is that it is less homogeneous than the usual bases of researchers' studies, and therefore requires special solutions – e.g. for automated analysis of combined qualitative and quantitative materials from radically different fields.

Another special feature of big data analytics is the increasing ability to analyse and process data in real time to control analyses, statements and information that are made on the basis of, and/or is spread by, the same technology that creates big data. This development contributes to increasing the complexity of big data, because it creates awareness of new types of information to store. One more technical aspect of big data is the need for visualization. The combination of very large data volumes, complex systems, and analytical methods for the processing of data implies that visualization is important in the research process, to provide the researcher with an overview of a vast and complex set of data, to design research and carry out

https://doi.org/10.1017/S1062798719000012 Published online by Cambridge University Press

analysis. The increased dependence on visualization is also exemplified in the process where the research results are communicated to the public and to stakeholders.

All this can be summarized under the admittedly broad category 'big data'. However, big data related to research on human beings and societies is not only about novel technologies or unprecedented volumes of empirical materials, it is also a daring vision, resembling a veritable movement. Primarily, it is this aspect of big data that is analyzed and discussed in this issue of *European Review*. Some of the practices and ideas around big data are already under discussion and are being scientifically analyzed. To give some examples, one can find quite vivid academic debates on the prospect of digitalizing qualitative research materials (turning them into potential or actual quantitative data). There are also debates on quantified surveillance of increasingly intimate aspects of human life using online- and mobile technology.[2] Another example are debates on the inclusion of people in general as co-researchers and the power of the design of algorithms governing these processes.[3]

However, there are few articulated critical appraisals of the theoretical premises underlying the most daring visions on big data's potential to revolutionize the scientific knowledge of humans and societies. If these visions and projections were to materialize, culture and society could face a drastic change in terms of the quantitative scientific method's potential to contribute to a previously inaccessible understanding of the nature of humans and humanity. On this account, big data could produce new views of humanity, which could pave the way for a paradigm shift comparable to what came out of the Renaissance, the scientific revolution, and the quantitative social science major breakthrough after the Second World War. Common to these historical events is that the shifts in perspectives and methods in the scientific study of humanity have had major consequences for how humans – both as individuals and as collective entities – came to understand themselves from ideological, moral, cultural, political and ontological perspectives.

The objective of this issue is thus to initiate an in-depth critical exploration and discussion of the way and extent to which big data could change the premises of scientific empirical research on humans, and what impact big data in this particular respect would have on the images of what it means to be human, and, ultimately, for human identity. Notice that we therefore choose not to focus on other bases of the images of humans, for example religions or philosophical teachings. Also note that we do not take for granted that big data already is, or will be, developed into, a paradigm shift – it is the idea of a real potential for such a shift that occupies us here.

Substantially, we want to get to grips with the often explicit images of humans in prevalent taxonomies and conventions, embedded in scientific knowledge, such as: 'humans are all different, 'humans are all equal'; 'every person is unique'; 'humans are complex'; 'humans are ever the same' (cf. Levi Strauss' notion of the universally human); 'humans cannot be seen as just biological or physical'. The daring visions of big data hold out the prospect to empirically explore and reconsider the viability of such necessarily imprecise and vague – but nonetheless deeply meaningful – images and conceptions of humans. This journal issue highlights a specific thematic avenue of the many aspects of reconsidering humanity through the lens of big data: that of

https://doi.org/10.1017/S1062798719000012 Published online by Cambridge University Press

making sense (finally!) of human subjective agency, experience, personhood and life, scientifically as well as for humans themselves, embedded in everyday social reality.

Admittedly, the critical issues that inspired us to produce this journal issue are not new. We find them in Aristotle's and David Hume's pondering of human nature, in Ludwig Wittgenstein's attempts to reach an understanding of the nature of language and social practice, and in the big 'unity of science' debates of the 1900s. The grand visions of humanities and social science big data research once again push these drifting anchors of human intellectual endeavour to the surface, forcing us to another storm-ridden journey on that ship of Otto Neurath, which constantly requires reconstruction to keep afloat.

The Contributions

Carrie Figdor, Associate Professor of Philosophy at the University of Iowa, opens her article by summarizing what a big data humanities and social science research strategy fundamentally amounts to – a theme revisited in the contributions by Barry Smith and Palle Dahlstedt. Noting some of the existing academic debates, especially those regarding ethical issues, Figdor then poses the question about how a fundamental conceptualization of human beings, as agents or as persons, may be affected by reconsidering human beings through the big data lens. Considering both dimensions of the humanities and social science big data vision, Figdor argues that, due to the nature of the big data strategy, and what assumptions it necessitates with regard to uniformity and quantifiability, this vision suggests a remoulding of the notions of a human person taken for granted in both research and daily life. If the daring vision about big data is to deliver as promised, humans may have to accept a view of themselves, and also from a subjective point of view, as much less private, less clearly demarcated from other people and, ultimately, from other beings and things, than we usually uncritically assume (e.g. in current ethical debates related to digital technology and how it affects humans and the world). Viewing human beings as more clearly understandable 'from the outside' opens the door to applying that frame of understanding to other things to which it may be fitted – be it animals, machines, or natural and artificial systems. This shift may evolve in two opposite directions, Figdor notes.[4] On the one hand it may serve to deflate current valuations of humans in terms of agency, personhood, subjectivity, and our capacity for social organization. On the other hand, it may just as well lead to an elevation of many things that are currently held to be of lesser worth. Both these directions fundamentally reshape how humans view the world in ethical terms, such as the common good, harm, interests and responsibility.

However, is the assumption about the increased opportunity for understanding humans 'from the outside' true? Alternatively, if we adopt Figdor's point that the big data vision may simply change fundamental concepts of what is human, will such a conceptual reorientation make researchers miss something of fundamental importance? The article by Paula Droege, Professor in Philosophy at Pennsylvania State

https://doi.org/10.1017/S1062798719000012 Published online by Cambridge University Press

University, attacks this important aspect independently of the *big* feature of the big data vision. Droege poses the question of whether the sort of *data* this vision has to work with (quantifiable, publicly accessible, determinate and uniform) can ultimately do the job of realizing the vision. Droege emphasizes the content of conscious human subjective experience, and her argument uses the philosophical challenge of making sense of the notion of meaning (of thoughts, of experiences, of statements) in a way that will lend itself to support hypotheses regarding such content, using the fundamental data source of brain science. Working through a series of central ideas in twentieth-century philosophy of language, Droege ends up with the idea of (evolutionary) function as the source of meaning (and thereby of the content of conscious subjective experience) and Ruth Millikan's prized 'telosemantic' theory of language to best enable what the big data vision would require, while escaping recognized traps (such as accounting for linguistic error).[5] However, Droege notes, while such a theory does provide a fundament for quantifying meaning (and thus the content of consciousness) based on how it is used, describing such use with the required precision will necessitate a choice of interpretation loaded with extra assumptions about the nature of humanity and human experience, and thus is not determined 'by data alone'.

Both Barry C. Smith and Anil Seth add to and complicate this challenge for the big data vision by pursuing avenues outside of Droege's inquiry, considering the role of the perceptual apparatus as well as that of the brain. Barry C. Smith, Professor at the Institute of Philosophy, School of Advanced Study, University of London, dwells on a number of conceptual and philosophical uncertainties of the big data vision. Smith holds out the importance of clarifying to what extent the vision amounts to finding correlation, explanation, or even causation. Smith also adds to Droege's argument that data alone cannot fulfil the vision: a big data strategy requires analysts to 'datafy' more basic research materials, necessitating more layers of interpretation, and even more are added in the choice of how the analytics will then work through the thus generated big data sets to produce actual research outputs. All of these steps need the adding of a 'creative mind', someone who 'curates' the initial state of the data set to help guide an expanded understanding of human beings. Smith also argues that even if we, as humans, generate data, the final output will be less curated by us than *for* us by these curators. He concludes by maintaining that existing prejudice about the human condition is likely to guide rather than be straightened out by how the dataset and the analytics of the big data vision are curated.

To Droege's already complex image of how to get hold of the content of human thoughts, Smith adds fresh scientific studies suggesting that human experience has to be viewed as very much richer and varied than just cognition. In addition, Smith argues, the content of human experience (in terms of meaning), also seems to depend not only on the function of language, but also on non-cognitive content of sensory experience, such as smell and taste. Human beings' own basic curation of what they perceive as meaningful experience is thus partly determined by sensory mechanisms beyond meaning in ways that humans do not understand. This also holds for whoever is (or are) curating the input, assembly and analysis of a human big data

https://doi.org/10.1017/S1062798719000012 Published online by Cambridge University Press

set, thus installing that lack of understanding of the human condition into the basics of a research vision aimed at understanding this very thing. Once again, this may amount to either missing something essential regarding the human condition, or of adjusting (and simplifying) the conceptualization of being human, but in a way that fails to expand human self-understanding. Alternatively, the flaws are recognized and the human and social science big data strategy is adjusted to avoid them, leading back to Figdor's point (and Smith's addition to it).

Anil K. Seth is Professor of Cognitive and Computational Neuroscience at the Sackler Centre for Consciousness Science at the University of Sussex, UK. Seth's article spans the range from probing general philosophical uncertainties of the big data vision to more immediately intra-scientific ones. Most importantly, Seth pushes the critical appraisal of this vision further into the human organism, beyond its interface with the world, by stressing the importance of considering the very physical basis of the creative mind of any curator who is providing humans with a sense of the meaning of what is experienced. Seth thus returns the discussion back to the brain that Droege addressed, but through the eyes of a neuroscientist, whose notion of the brain's inner workings, just as Smith's account of what shapes experience, radically challenges the big data vision in new ways.

Initially, Seth's notion of the predictive and generative nature of the perceptual processing of the brain presents a possibility for a common home for both dimensions of the creative mind – the cognitive and the non-cognitive. On the one hand, the interpreting curator chooses from a non-cognitive stream of sensory input what becomes our big data image of humanity. On the other hand, multimodal synergies between the two dimensions of the creative mind help in deciding what is to be chosen as our conscious idea of ourselves. An essential notion of Seth's theorization is that researchers have to abandon the simplistic notion of data lying around waiting for collection into the big set for the processing of ready-made analytics into a finalized view of who and what humans and societies are. The brain – the generator both of data and of the human's attempt to understand it – as well as the big data vision itself do not work like that, but rather like an apparently haphazard or intuitive assembly, of whatever materials happen to lie around, into a meaningful work of art. Seth's idea is that this forces the big data vision into hitherto unexplored territory to deal with the human production of meaning, where the arts and humanities have less to learn from neuroscience than what neuroscience can learn from the arts and humanities. Seth explores this analogy through a multitude of examples, suggesting how a facilitation for this bridging of hard science with 'softer' areas of advanced human creativity and exploration may be envisioned.

Seth's account sketches a stepping-stone for how the study of the cognitive and the non-cognitive dimensions of human agency, experience, personhood and life may be integrated with the crucial understanding of how humans produce meaning individually as well as collectively. However, inviting artistic creativity and temperament into the scientific process at the same time means accepting a wide variety of novel ways of conceiving *how* anything can be made meaningful, and perceived as rational or sensible. This is the core message of Palle Dahlstedt's article.

https://doi.org/10.1017/S1062798719000012 Published online by Cambridge University Press

Dahlstedt is a musical composer, improviser, and Lecturer at the Academy of Music and Drama at the University of Gothenburg. However, he is also Obel Professor in Art & Technology at Aalborg University, and Associate Professor in Applied Information Technology at the University of Gothenburg and Chalmers University of Technology. In his article, Dahlstedt uses this broad range of scholarship to challenge central notions of the big data vision regarding what may be data, the notion of a large volume (of data), how meaning may be drawn from (a big) data (set), and what an explanation based on such ingredients will amount to. One of Dahlstedt's main arguments is that the big data vision in its current form is ill equipped to handle various expansive consequences of making artistic creativity a core force of the vision's realization. Dahlstedt thus emphasizes that a daring big data vision that projects a radically enhanced scientific understanding of humans as individuals and collectives, comes with a risk of deception: instead of knowledge expansion, the boldness may serve to mostly preserve prejudice, or at least fail to track truth and rather look for whatever makes humans (in a broad sense) enjoy themselves in various ways. Alternatively, the increase of intellectual rigour, systematics, and method required by any scientific approach may rather destroy whatever artistic creativity is injected into the realization of the big data vision – thus defeating Seth's envisioned way to solve the meaning-seeking puzzle of the big data curation. Eventually, Dahlstedt cautiously points to ways forward. Perhaps, after all, Dahlstedt's view from the position of a creative artist, and Seth's from that of a hard scientist, on what it would take to realize the big data vision (also accounting for the challenges posed by Droege and Smith) can be truly reconciled, at least partly, but even that will take considerable patience on both sides.

While researchers and advanced creative artists engage in trying to understand how big data can be exploited for their respective purposes, data is produced, assembled, analysed and, not least, *used* by ordinary people around the world. Whatever rational arguments are deployed to support or doubt the big data vision, this use can be expected to transform humans' self-understanding, and maybe even shift the basis for considering to what extent the big data vision is warranted. Dawn Nafus' contribution explores one such avenue of use, the *quantified self*-movement. Nafus works as an anthropologist at Intel Labs, and holds a doctoral degree from the University of Cambridge.

Starting from a history of 'citizen science', Nafus looks at a currently ongoing expansion both of personal data generation outside of science, and quickly evolving ways to make scientifically consistent (big) data sets out of such sources analyzable by uniform tools of scientific analytics. What Nafus highlights most importantly is that, whatever the philosophical and intra-scientific arguments may suggest about the plausibility of the big data vision, people are already using data generation, assembly and analysis to reshape their image of themselves and others, their personal relationships, and their wider social circumstances, and this to a rapidly growing and increasingly systematic extent. This observation takes us back to Figdor's initial notion of conceptual drift regarding the notions of a human being, agent and person, but now in social science rather than philosophy clothing. Engaging with data and

https://doi.org/10.1017/S1062798719000012 Published online by Cambridge University Press

analytics as a way of defining oneself (individually as well as socially), especially if the sources of these phenomena are increasingly coming from, or being integrated with, big data science, seems to transform humans, and thus possibly move the core of what it means to be a human living in a human society, which has been pointed out as a challenge for the big data vision by Droege, Smith, Seth and Dahlstedt.

Discussion

One particularly provocative transformation coming out of an expanding and intensifying engagement with big data is that humans come to increasingly discount subjectivity and individuality for objectivity and uniformity as what defines being human. In effect, we would be muddling what John Rawls once held out as an ethically and politically fundamental notion[6] – the idea of a sharp distinction between unique individual persons – increasingly accepting a view of humans as readily quantifiable, externally accessible and rationally assessable regarding such basic qualities as the meaning humans find and produce together in a variety of arenas. In this way, the big data vision may, through its own process to promote its completion, produce a humanity that fits better the big data vision, and thus make the challenges set out above less formidable. As long as humans accept this, a science that reshapes its object of study to fit its own models and methods is a rationally viable prospect. While such a conception of what humans may make of themselves through the tools of big data may appear both scary and ethically upsetting, one must once again point to Figdor's observation that a conceptual drift of this sort may take humanity in radically different directions. Looking at the scenario from the current position it is easy to spontaneously identify a discounting or objectification of humanity, and of human beings. However, if one instead considers Figdor's idea of expanding the concept of the human to include more types of entities, it is just as viable an idea that humans are then similarly expanding their notion of whatever they find valuable in the human existence, in effect humanizing and elevating what humans have before unwarrantedly discounted and objectified.

At the same time, one should not deny the difference between viewing humans primarily in terms of distinct subjects of unique experiences, and viewing them as uniformly quantifiable objects. Conceptual drifts of the sort sketched by Figdor, and exemplified by Nafus, may be more or less fitting for different areas of human and social life. When studying such things as political opinion and democratic voting, or trade marketing, for example, one might accept a view of humans as predictable based on statistical patterns, coming out of some taxonomic sorting of different types of voting and consumption behaviour in the past. Accommodating such a view would be due to the pragmatics of human's interest: humans are not really searching for any 'deeper' or subjective truths in these areas, but for prediction of individual and collective behaviour (how will citizens' vote? what will consumers buy?). In other instances, the pragmatics may instead be about what values humans associate with

https://doi.org/10.1017/S1062798719000012 Published online by Cambridge University Press

viewing themselves in a more uniquely subjective or a more uniformly objective way, such as when we create and enjoy art and literature.

One area in which big data has very quickly been advancing is investment market trading. If it became clearly superior to view 'the art of trading' in terms of how investment market robots function, rather than some idea of intuition, judgement and deeper understanding of the market by human investment managers, assessing human investment decisions to the same standards as robot performance starts to make sense (as it makes us succeed economically). Another example of how pragmatic factors may make us readily accept radical adjustments of humans' self-understanding is the already quite entrenched transformation of how humans view themselves through the lenses of biomedicine – as chemical, mechanical engines – due to the health improvements coming out of this perspective. Relating to Droege's conceptualization of meaningfulness in systems, it is mind-opening to ponder the potential of consulting biomedical big data sources driven by AI analytics in the quest for individuals or collectives' meaningfulness.

A pragmatic view on a conceptual drift from natural to social science, as highlighted by Figdor, could also come with a secondary and unintended consequence, namely supporting the big data vision in a very concrete, material sense. A continued evolvement of having people in their daily lives look at themselves, each other and society through the lenses of science, may also serve to enhance the overall societal legitimacy of such a scientific endeavour.

Acknowledgements

This issue of *European Review* is the outcome of an interdisciplinary collaboration that started with the symposium, *Reconsidering Humanity: Big Data, the Scientific Method, and the Images of Humans*, which we organized, and which ran from 24–26 June 2015 in Gothenburg, Sweden. All ten key-note addresses as well as our own introduction and concluding remarks were filmed and live streamed, and are openly available for viewing at https://cergu.gu.se/Events/konferenser/big+data+june+2015. Our gratitude goes to the presenters at the symposium, as well as the engaged participants. We are very happy that six of the speakers could take part in the eventual production of this issue of *European Review*, including a manuscript workshop at the Swedish Institute in Paris, 12–13 September 2016. Turning to acknowledgements, we would first of all like to thank our fellow authors, who bravely answered our call to convey forward-looking, bold, and provocative ideas about big data, well outside the academic comfort zone of each. Secondly, we express our gratitude to Riksbankens Jubileumsfond for providing encouraging and invaluable funding of both the symposium and the publishing project, and to the Swedish Institute for housing our Paris workshop. The interfaculty Center for European Research at the University of Gothenburg hosted our inter-disciplinary endeavour, and we extend special warm thanks to research coordinator Birgitta Jännebring for patient and stellar support from the organization of the symposium through the publication

https://doi.org/10.1017/S1062798719000012 Published online by Cambridge University Press

project. Visual Arena Lindholmen, Lindholmen Science Park, Gothenburg, provided the symposium with an inspiring venue. We would also like to thank our fellow members of the Riksbankens Jubileumfond's sector committee 'Technology, Institutions, and Change', where our initial idea for the symposium and its topic was born. Riksbankens Jubiliumsfond's Chief Executive Göran Blomqvist, who chaired the mentioned sector committee, supported our ideas all the way through. With regard to the current issue of *European Review*, we want to thank 12 anonymous referees, who contributed invaluable comments on the articles, and Theo D'haen, the *European Review* editor-in-chief, for supporting our proposal and for helpful contributions towards its final realization. Last, but not least, we want to thank Alice and Daniel for their exceptional generosity in treating us to amazing wines from their cellar when we summoned the authors to dinner in Paris the night before the manuscript workshop in September 2016.

Notes and References

1. Also belonging to the large-scale production of data is target-oriented fact-finding for intelligence, police and military purposes. This information will, at least not in the initial stage, be available for research – although the methods used for the analysis and formulation of conclusions in these respective areas, may eventually manifest themselves in the form of publicly noticeable consequences for scientists to ponder.
2. See, for instance, the Big Data Surveillance project: http://www.sscqueens.org/projects/big-data-surveillance
3. C. Kullenberg and D. Kasperowski (2016) What is citizen science? – A scientometric meta-analysis. *PLOS ONE*, **11**(1), e0147152. https://doi.org/10.1371/journal.pone.0147152
4. In this way, Figdor's analysis adds to existing initiatives in philosophical ethics to attribute moral status to non-human entities: expanding the concept of the human agent, person or subject may just as well take us in the opposite ethical direction, notwithstanding the fact that many philosophers would argue that such a development is irrational or implausible.
5. In 2017, Millikan received the Rolf Schock Prize in Logic and Philosophy for her work in this area.
6. J. Rawls (1971) *A Theory of Justice* (Cambridge, MA: Harvard University Press).

https://doi.org/10.1017/S1062798719000012 Published online by Cambridge University Press

About the Authors

Christian Munthe is Professor of Practical Philosophy, Department of Philosophy, Linguistics, Theory of Science, University of Gothenburg, Sweden. He conducts research and expert consultation on ethics, value and policy issues at the intersection of health, science and technology, the environment and society. He is a founding and steering committee member of the Centre for Antibiotic Resistance Research (CARe) and the Centre for Ethics, Law and Mental Health (CELAM). Publications of particular interest related to this journal issue include *The Price of Precaution and the Ethics of Risk* (Dordrecht: Springer, 2011); *The Ethics of Screening in Healthcare and Medicine* (Dordrecht: Springer, 2012; by Juth and Munthe); and the special symposium 'New media, risky behaviour and children', *Public Health Ethics*, **7**(1), 2014, pp. 1–66 (edited by Munthe and Karl de Fine Licht). Major recent and forthcoming publications are 'Bioethics, disability, and selective reproductive technology: taking intersectionality seriously', in D.T. Wassermann and A. Cureton (eds), *The Oxford Handbook of Philosophy and Disability* (Oxford: Oxford University Press, doi: 10.1093/oxfordhb/9780190622879); and 'The black hole challenge: precaution, existential risks and the problem of knowledge gaps', *Ethics, Policy & Environment*, 22, online first: https://doi.org/10.1080/21550085.2019.1581415.

Urban Strandberg is Associate Professor of Political Science and Director of European Studies, Centre for European Studies, Department of Political Science, University of Gothenburg, Sweden. In his research, Strandberg focuses on the prerequisites for political legitimacy in contemporary democratic government. Strandberg has a special interest in the intersections between technology and democracy, private and public, national and international, and politics and religiosity. Previous and forthcoming publications include 'How could expert involvement compensate for an incomplete capability of legitimization through democratic representation? Debating the grounds for political legitimacy in the EU', *European Review*, **27**(2), 2019 (co-authored with Lena Caspers); *Contextualizing Nuclear Waste Management – Experiences from Canada, Germany, France, India, Sweden, UK, and the U.S.* (London: Routledge, 2011, edited by Strandberg and M. Andrén.); 'Focus: Religiosity and public spaces. expressions, mediations, and exclusions in post-secular societies', *European Review*, **20**(1), 2012 (guest edited by Strandberg and K. Grinell); 'Symposium: Consolidated or eroded political legitimacy? Perspectives on Scandinavian democracies', *Journal of European Public Policy*, **13**(4), 2006 (guest edited by Strandberg).

https://doi.org/10.1017/S1062798719000012 Published online by Cambridge University Press