

## **Introduction: "Big Data" – digital technology, loads of empirical materials, and a daring vision<sup>1</sup>**

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### **Abstract**

The daring vision of using big data technology to substantially advance the scientific understanding of humans' nature, individually and collectively societal, and possibly solve age-old challenges of bridging the subjective and objective sides of human nature, rests on substantial assumptions about the concept of the human being. The daring big data vision may at the same time in itself serve to change the very concept of humans, regardless of how well the vision's assumptions and prospects hold up to scrutiny. This Focus presents an attempt to critically engage with the question 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 Focus 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, helps 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, etc. Part of this consists of data produced in real time on a daily basis. Some of the data is generated with direct view to be used for some purpose, but a lot of it appears either as a side effect of activities pursued for other reasons. Sources of this data consist partly of so-called user-generated content via button presses and taps on the 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 source are less obvious (the user's standpoint) side effects of such activities, in the form of personal 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 is also produced in the form of traditionally "qualitatively" materials for arts and social science studies, which documents and informs about humans, human cultures, behavioral patterns, way 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 (ex. pharmaceutical and healthcare testing industry, implant industry, etc.). A strong trend is that such databases are or will be open, i.e. available for research and scientific analysis. Finally, the development of "Internet of things", E-/M-health, subcultural movements like "The Quantified Self", and the like, accelerate the development of large amounts of personal data that become available for analysis from the research perspective.

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 behavior, thoughts, emotions, communities, lifestyles, cultures, etc. based on big data. The temptation to manage the very large volumes of data speed up the 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 usual bases of researchers' studies, and therefore requires special solutions – e.g. for automatized analysis of combined qualitative and quantitative material from radically different fields.

Another special feature of big data analytics is the increasing ability to analyze 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 increase 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 analysis. That big data increase the dependence on visualization is also exemplified in the process where the research results are communicated to the public and the interests involved.

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, reminding of a veritable movement. Primarily, it is this aspect of big data that we analyze and discuss in this Focus. Some of the practices and ideas around big data are already under discussion and scientific analysis. To give some examples, one can find already 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.<sup>3</sup> 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.<sup>4</sup>

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 paradigm shift in terms of the quantitative scientific method's potential to contribute to previously inaccessible understanding of the nature of humans and humanity. On that 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 has 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 Focus are thus to initiate an in-depth and 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 is already is, or will be developed into, a paradigm shift – it is the ideas of the potential for such a shift that is the attention of our interest.

Substantially, we want to get to grips with the often explicit images on 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 holds out the prospects to empirically explore and reconsider the viability of such necessarily imprecise and vague, but nonetheless deeply meaningful, images and conceptions of humans. This Focus highlights a specific thematic avenue of the many aspects of reconsidering humanity through the lens of big data: that of 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 trigger us to produce this Focus 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 1900's. The grand visions of humanities and social science big data research once again pushes these drifting anchors of human intellectual endeavor to the surface, forcing us to another storm-ridden journey on that ship of Otto Neurath constantly requiring reconstruction to keep afloat.

### **The contributions**

Carrie Figdor, Associate Professor of Philosophy at the University of Iowa, opens her article by recapitulating what a big data humanities and social science research strategy fundamentally amounts to (this theme is revisited, not least, 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, what assumptions it necessitates with regard to uniformity and quantifiability, this vision suggests a remolding of 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, also from subjective points of view, as much less private, less clearly demarcated from other people and, ultimately, from other beings and things, than what 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 for applying that frame of understanding to other things to which it may be fitted – be it animals, machines, or natural and artificial systems. That shift may evolve in two opposite directions, Figdor notes.<sup>5</sup> On the one hand it may serve to deflate current valuation 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, adopting Figdor's point that what the big data vision may do is simply to change fundamental concept of what is human, will such a conceptual reorientation make researchers miss something of fundamental importance? The article by Paula Droege, Teaching Professor in Philosophy at Pennsylvania State University, attacks this important aspect independently of the *big* feature of the big data vision. Droege poses the question if 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 20<sup>th</sup> century philosophy of language, Droege ends up in the idea of (evolutionary) function as the source of meaning (and thereby of the content of conscious subjective experience) and Ruth Millikan's prized<sup>6</sup> "telosemantic" theory of language<sup>1</sup> to best enable what the big data vision would require, while escaping recognized traps (such as accounting for linguistic error). 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 required precision will necessitate choice of interpretation

loaded with extra assumptions about the nature of humanity and human experience, thus not determined "by data alone".

Both Barry C. Smith and Anil Seth add to and complicate this challenge for the big data vision by considering avenues outside of Droege's inquiry, considering the role of the perceptual apparatus as well as that of the brain. The article by 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 fulfill 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 holding out that existing prejudice about the human condition is likely to guide rather than be straightening out by how the data set and the analytics of the big data vision is curated.

To Droege's already complex image of how to get hold of the content of human's 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 contents 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 holds also for whoever is (or are) curating the input, assembly and analysis of a human big data set, thus installing that lack of understanding of the human condition into the basics of research vision aiming 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 here 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 a Professor of Cognitive and Computational Neuroscience at the Sackler Centre for Consciousness Science at the University of Sussex. Seth's article spans 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 providing humans with a sense of the meaning of what is experienced. Seth thus brings 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, choosing from a non-cognitive stream of sensory input, what becomes our big data images of humanity. On the other hand multimodal synergies between the two dimensions of the creative mind deciding what is to be chosen to be 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 readymade analytics into a finalized view of who and what humans and societies are. The brain, the generator both of data, and of human's attempt to understand it, as well as the big data vision itself, does 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 paper.

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 width of scholarship to challenge central notions in the big data vision regarding what may be data, the notion of a large volume (of data), how meaning may be drawn out of (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 rigor, 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. At the end of the day, Dahlstedt cautionary 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 (accounting also 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, analyzed and, not least, *used* by ordinary people around the world. Whatever rational arguments 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 analytics as a way of defining oneself (individually as well as socially), especially if the source of these phenomena are increasingly coming from, or being integrated with, big

data science built on that, seems to transform humans, and thus possibly move the core of what it means to be a human living in a human society that 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 what it is to be human. In effect, we would be muddling what John Rawls once held out as an ethically and politically fundamental notion<sup>7</sup> – the idea of a sharp distinction between unique individuals – 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 that way, the big data vision may, through its own process to promote its completion, produce a humanity fitting better to the big data vision, and thus making the challenges set out above less formidable. As long as humans accept that, 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 consider 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 behavior 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 behavior (how will citizens' vote?, what will consumers buy?). In other instances, the pragmatics may instead be about what values humans associate with 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 would become clearly superior to view "the art of trading" in the terms of how investment market robots function, rather than some idea of intuition, judgement and deeper understanding of the market of human investment managers, assessing also human investment decisions on the same standards as assessing 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 great advancement for health improvements coming out of that perspective. Relating to Droege's conceptualization of meaningfulness in systems, it is mind opening to ponder the potential of consulting biomedicine big data sources driven by AI analytics in the quest for individuals or collectives' meaningfulness.

A pragmatic view on a conceptual drift from science 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. In a continued evolvement of having people in their daily lives look at themselves, each other and society through the lenses of science, that may also serve to enhance the overall societal legitimacy of such a scientific endeavor.

## Notes

1 This Focus 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, June 24-26, 2015, Gothenburg. 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 <https://cergu.gu.se/Events/konferenser/big+data+june+2015>. Our gratitude 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 Focus, including a manuscript workshop at the Swedish Institute in Paris, September 12-13, 2016. Turning to acknowledgements, we would first of all like to thank our fellow authors in this Focus, 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 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 symposium and through the publication project. Visual Arena Lindholmen, Lindholmen Science Park, Gothenburg, provided the symposium with a an inspiring venue. We would also like to thank our fellow members of the Riksbankens Jubileumsfond's sector committee 'Technology, Institutions, and Change', where our initial idea of the symposium and its topic was born. Riksbankens Jubileumsfond's Chief Executive Göran Blomqvist, who chaired the mentioned sector committee, supported our ideas all the way through. With regard to this

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2 To the large-scale production of data belongs also the target-oriented fact-finding for intelligence, police, and military purposes. This information will, at least not in the first stage, be available for research – although the course used for the analysis and formulation of conclusions in these respective areas, may eventually manifest itself in the form of publicly noticeable consequences for scientists to ponder.

3 See, for instance, the Big Data Surveillance project: <http://www.sscqueens.org/projects/big-data-surveillance>

4 Kullenberg, C., Kasperowski, D. (2016) 'What Is Citizen Science? – A Scientometric Meta-Analysis'. *PLOS ONE* 11(1): e0147152. <https://doi.org/10.1371/journal.pone.0147152>

5 In this way, Figdor's analysis add 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 such a development to be irrational or implausible.

6 In 2017, Millikan received the Rolf Schock Prize in Logic and Philosophy for her work in this area.

7 Rawls, J (1971). *A Theory of Justice*. Cambridge, MASS.: Harvard University Press.

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