

Imaginary of Behavioral Governing

From Nudges to Algorithms

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The US public health crisis in Flint, Michigan, that started in 2016 after the city's water supply was contaminated with lead has become an example not only of the incompetency and irresponsibility of public authorities, problems with the country's aging infrastructure, and environmental racism, but also of effective civic activism. Flint is less known as a site where the Social and Behavioral Sciences Team under the Obama administration tried to bring in insights from behavioral science to address some aspects of the crisis. The team directed by Maya Shankar planned to use subtle forms of peer pressure to encourage handwashing and to remind people to change water filters distributed by the local community. They also sought to deploy new strategies of framing information to deal with misinformation about the quality of water (Stillman 2017). These simple interventions were inspired by scientific knowledge of how people process information based on cognitive and social psychology. The Social and Behavioral Sciences Team was dismantled after President Obama left the White House in early 2017 and its behavioral science interventions were not introduced in Flint. Nonetheless, they remain a good illustration of how behavioral experts think about addressing societal challenges.

The Rise of Behavioral Policy and Nudging

The idea of bringing behavioral science to policy gained momentum in 2008 after the publication of the book *Nudge* by the Nobel Prize-winning behavioral econ-

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omist Richard Thaler and the Harvard University professor of law Cass Sunstein (Thaler and Sunstein 2008). Behavioral policymaking aims to approach economic and societal issues with the help of policy solutions justified by behavioral science (e.g., Shafir 2012; Oliver 2013). It relies on the behavioral sciences (mostly cognitive psychology and behavioral economics) to diagnose and address societal challenges such as poverty, unsustainable consumption patterns, social interactions during pandemics, obesity, and decreasing retirement savings. Behavioral policy is aligned with the so-called evidence-based approach to policymaking.¹ Cognitive psychology and behavioral economics are supposed to provide evidence about cognitive processes to diagnose causes of societal challenges. Research on people’s limited attention, reactions to framing of information, and intuitive judgments about probability, which lead to systematic behavioral patterns often called *biases* (such as loss aversion or status quo bias), is also used to design policy interventions, sometimes called *nudges*. Nudges are a public policy technology that allows people’s behavior to be guided by small changes in the contexts in which they make choices—changes in the “choice architecture.” Nudging is defended, normatively and politically, from a position called libertarian paternalism. The claim is that the shaping of people’s choices by governments is justifiable when it preserves freedom of choice (that is, if one can easily abstain from nudging) and when it brings welfare-promoting outcomes. This approach to policymaking has been implemented across the globe by state and public-private organizations: from the United Kingdom’s Behavioral Insights Team and the Social and Behavioral Sciences Team in the United States, via nongovernmental and nonprofit initiative Nudge Lebanon to the Government of Singapore’s Behavioral Insights Unit.

Behavioral policy has been already extensively studied and discussed. Scholars view the rise of nudging, with its focus on changing individual behaviors as the target of public and social policies, as part of the neoliberalization of the state (Leggett 2014; Jones, Pykett, and Whitehead 2013; Wirth 2020). Others suggest it is a technocratic approach advanced by “nudge” experts invoking the authority of behavioral research to gain influence in the policy context (Strassheim, Jung, and Korinek 2020). Foucauldian scholars analyze behavioral policy as the biopolitical project par

1. Evidence-based policy is an approach to policymaking that advocates designing policy solutions on the basis of the best available scientific evidence. Its proponents suggest that scientific research should be consulted to diagnose a problem that policymakers address and to test policy proposals in experimental settings, during randomized controlled trials. The idea of experimental tests of policies is closely related to the view of policymaking as finding efficient and effective interventions (so-called what works policymaking), which was promoted by the new public management approach (Head 2013). Adherents of such an approach believe that it allows us to limit or eliminate “ideologically-based decision making” (Banks 2009; see also Cartwright and Hardie 2012).

excellence, with its declared interest in increasing the “wealth, health, and happiness” of populations (Jones, Pykett, and Whitehead 2013; McMahon 2015). When applied in the Global South, along with evidence-based policies, it promotes a version of modernity along with material power relations extending from the colonial era (Berndt 2019; Greenhalgh and Russell 2009). We also know that nudging is being employed by several types of organizations (states, charities, universities, private companies) and that recently the architects of these technologies of behavior are increasingly utilizing big data and AI tools to infer information about patterns in people’s behavior (Yeung 2017; Whitman 2020). Accordingly, behavioral policy and nudge have been criticized for perpetuating neoliberalization of societies and polities; for their incompatibility with democratic legal institutions (Lepenies and Małecka 2015); for manipulation of citizens’ choices (Bovens 2009) and infringement of their autonomy (Cohen 2013). Acknowledging many of these criticisms, still other authors argue that behavioral policy is not necessarily an ally of technocracy, neoliberalism, or new managerialism, but could also be aligned with democratic projects of self-governing (John, Smith, and Stoker 2009).

Defining the Imaginary of Behavioral Governing

This scholarly reflection allows us to grasp and critically assess diverse aspects of behavioral policy and nudge. However, the debates take for granted claims about behavioral science made by proponents of nudging: it is presumed that cognitive psychology and behavioral economics identify robust behavioral patterns caused by cognitive processes. It is also widely accepted in the discussion that behavioral policy, based on behavioral science, can produce specific and targeted outcomes. Neither of these presumptions is warranted. In what follows, I argue that the knowledge provided by behavioral science does not justify the claims that are made about applicability of behavioral research to policymaking. I show that behavioral policy and a large part of the debate operate within what I call *the imaginary of behavioral governing*. This imaginary obfuscates understanding of what can and cannot be known on the basis of behavioral research. I elaborate on this concept, suggesting that criticism of the behavioral sciences, which are used to justify behavioral policies, may prove a fruitful critical strategy for challenging proposals of behavioral public policymaking and nudge.

The concept of the imaginary of behavioral governing that I introduce in this essay is inspired partly by the work of Michel Foucault on governmentality and partly by the analysis of science and technology (STS) scholars who rely on the notion of sociotechnical imaginary to study mobilization of science in political proj-

ects. Let me start by explaining the Foucauldian inspiration. By *governmentality* Foucault meant the emergence of new practices of governing that marked the shift from feudalism “into the administrative state during the fifteenth and sixteenth centuries” in Western Europe (Foucault 2009: 144) and have continued throughout Western modernity. Governmentality refers not only to this historical shift but also to the form of governing constituted by the relationship between power and knowledge. Governing or government is understood by Foucault as the “conduct of conduct”: shaping, guiding, affecting the conduct of some person or persons, based on knowledge of who and what are to be governed (Dean 2010). The modern technique of power is characterized by forming a specific type of subjectivity through “the development of knowledge of man around two roles: one, globalizing and quantitative, concerning the population, the other, analytical, concerning the individual” (Foucault 1982: 784). This technique was born within liberalism and has been carried out by neoliberalism (Foucault 2008).² The originality of Foucault’s analysis lies in understanding liberalism as a way of governing and not as an economic theory or political ideology. In the so-called governmentality lecture Foucault made the following remark:³

In contrast to sovereignty, government has as its purpose not the act of government itself, but the welfare of the population, the improvement of its condition, the increase of its wealth, longevity, health, etc.; and the means that the government uses to attain these ends are themselves all in some sense immanent to the population; it is the population itself on which government will act either directly through large-scale campaigns, or indirectly through techniques that will make possible, without the full awareness of the people, the stimulation of birth rates, the directing of the flow of population into certain regions or activities, etc. (Foucault [1978] 1991: 100)

Note that the indirect techniques “directing . . . the flow of population” “without the full awareness of the people” are exactly how nudging techniques are defined, though in the depoliticized terminology of policy’s behavioral influence.

2. One of the important differences between liberalism and neoliberalism, according to Foucault, lies in the understanding of the subject. In classical liberalism *homo economicus* is understood as an agent whose activity should remain untouchable by government, whereas in neoliberalism a subject is redefined as someone who is responsive to modifications in the environment through which power is exercised; this “is someone who is eminently governable” (Foucault 2008: 270).

3. The governmentality lecture was a portion of the lecture series delivered by Foucault at the Collège de France in 1977–78 and later published under the title “Security, Territory, Population.”

Nudges and behavioral policies influence, direct, and govern people in a particular way. Thus, they are a way of exercising power. The aim of nudging is to conduct behaviors of people in a socially desirable direction backed by a policy-maker, but also in a direction people would wish for themselves. Hence, nudging is a form of governing for the well-being and health of the population based on knowledge about both individualizing processes that concern individual preferences and their heterogeneity, and totalizing processes that concern the entire population. Behavioral science purports to provide knowledge about behavioral regularities at the level of population (such as loss aversion, framing effect, status quo bias) and explanations of these regularities by the cognitive processes at the individual level, the “psychological principles that underlie human behavior” (Thaler and Sunstein 2008: 112).

This view of behavioral research’s role in influencing or governing behavior is widely shared by proponents of behavioral policy and its critics. It is believed that behavioral science provides knowledge of stable regularities of behavior and the cognitive processes that produce them, and that policymakers or governments act on this knowledge to change or govern the behavior of individuals. I call this idea *the imaginary of behavioral governing*. The concept of the imaginary is often used by STS scholars to analyze how science and technology are invoked to define and design political and social projects. For instance, they have introduced the notion of *socio-technical imaginaries*: “Collectively held, institutionally stabilized, and publicly performed visions of desirable futures, animated by shared understandings of forms of social life and social order attainable through, and supportive of, advances in science and technology” (Jasanoff 2015: 4). One of the seminal examples of the socio-technical imaginaries is the redefinition of nationhood in the United States and South Korea through the relations of these states to nuclear power (Jasanoff and Kim 2013).

Behavioral Policy Seen through the Lens of the Imaginary of Behavioral Governing

Clearly, nudging as part of behavioral policy is a political project defined by references to the current state of the art in behavioral research. It is imagined that behavioral science offers knowledge about population (behavioral patterns) and individuals (cognitive mechanisms), which can be used to influence (govern) behavior to achieve policy and societal goals, such as welfare, well-being, or health. As we have seen, this vision of public policy, its goal, and how it “works” is almost a paraphrase

of Foucault's work on governmentality, in which he identified an imaginary of governing individuals through knowledge that appeared in modern Western Europe.⁴ Behavioral policy, as well as the academic and public debates about it, operate within this imaginary. Even though most discussions about nudging are not formulated in the Foucauldian terminology, they all presume that behavioral science provides knowledge to influence (govern) the behaviors of individuals. However, it has not been recognized yet in the discussions, including in STS and Foucauldian scholarship, that this imaginary—the view of how policy (power) and behavioral science (knowledge) relate to each other—simplifies the understanding of what can and cannot be known on the basis of behavioral research.

The behavioral sciences of nudging policies have roots in the cognitive revolution in psychology of the 1970s, particularly in the interdisciplinary research settings that merged computer science, cybernetics, and cognitive science and were funded by US military research agencies during the Cold War era (e.g., Edwards 1996; Erickson et al. 2013). An offspring of the cognitive revolution, cognitive psychology presumes that the human mind is analogous to the computer. Its theories model cognitive processes as processes of information processing (Miller 2002), but they are not causal theories about how cognitive factors influence behavior (Eronen 2020). This is contrary to the way these findings, in particular the work of Tversky and Kahneman (Kahneman and Tversky 1979; Tversky and Kahneman 1974), are being interpreted in the debates on behavioral policy and nudging. Furthermore, the behavioral patterns studied are less robust than typically claimed. For instance, the phenomenon of loss aversion, defined as “the aggravation that one experiences in losing a sum of money appears to be greater than pleasure associated with gaining the same amount” (Kahneman and Tversky 1979: 273), has been called particularly robust by proponents of behavioral economics, but the robustness has been questioned by researchers who point out that the phenomenon is highly dependent on experimental design (Małecka 2021).

What does this mean? The project of behavioral policy and nudge rests on a set of widely accepted claims about the knowledge provided by the behavioral sci-

4. Foucault looked at how the relationship between governing and knowledge was thought of, imagined, and postulated to work, but not how it actually worked. For instance, his interpretation of liberalism and neoliberalism is based on his reading of treatises and works of political and economic thinkers (John Stuart Mill, Friedrich Hayek, Gary Becker, Walter Eucken). However, the way in which Foucauldian scholars analyze behavioral public policy and nudging (Leggett 2014; McMahon 2015; Jones, Pykett, and Whitehead 2013) does not suggest that they interpret Foucault's work as identifying an imaginary of how behavioral science influences behavior via policy. Like most other scholars participating in the debate on nudges, they seem to presume that behavioral policy influences (governs) behavior of individuals on the basis of insights from behavioral science.

ences that is not substantiated in behavioral research (Małecka 2021). Behavioral policies are promoted, discussed, and criticized as if we really had the knowledge that the proponents of behavioral policy claim to have. Relying on behavioral science to design nudges is justified by the ability of policymakers to influence behaviors by mobilizing the cognitive processes. Critics of nudging argue that behavioral policy may manipulate behaviors by influencing cognitive mechanisms of individuals' minds or brains. However, behavioral research does not offer such knowledge: it is much less robust than typically claimed, and importantly, it does not identify causal psychological mechanisms. It may still be the case that people are manipulated by nudge policies, but a mechanism through which this happens must be different from the one *imagined* in the debates about nudge policy.

The imaginary of behavioral governing influences the understanding and interpretation of scientific knowledge invoked for the sake of governing (nudging) behaviors by states and other organizations. The formal theoretical frameworks of behavioral science that provide procedures of decision-making come to be interpreted as relating to human agents which power can act on. For instance, the research of Tversky and Kahneman is interpreted as studying cognitive processes underlying behavior and as providing a “realistic” account of human cognition and decision-making. As noted above, however, this research assumes an analogy between a human mind and a computer. Thus, it comes up with abstract, highly formal, algorithmic-like procedures of decision-making. There is nothing straightforwardly “realistic” nor “human” about the research. It produces formal, abstract architectures of decision-making that are very difficult to interpret as causal mechanisms of the human mind (Marr 1982).⁵ When we look closely at the details of the formal frameworks of this research, we notice procedures of decision-making that can be performed by the computer rather than agency of biased human subjects. The imaginary of behavioral governing provides the lenses through which knowledge produced by behavioral science is interpreted as applicable to human agents. It also obfuscates the Cold War military legacy of behavioral economics and cognitive psychology (Sent 2000; Mirowski 2002).

5. The imaginary of behavioral governing has also played an important role in producing behavioral science. The idea of producing scientific research to control, influence, or change behavior facilitated development of the behavioral sciences. This ranges from the behavioral social science funded by the Ford Foundation in the 1950s, the aim of which was to transform the social sciences into policy-relevant research based on general “laws of behavior” (Crowther-Heyck 2006), through behaviorism in US psychology, particularly in B. F. Skinner’s research, that came up with technologies of behavior aimed at changing people’s habits or routines (Rutherford 2009), to cognitive psychology that had affinities with the military’s research communication, command, control, information approach (Edwards 1996). However, it does not mean that this research indeed “delivered” the knowledge that its patrons, donors, and proponents hoped, and imagined, to gather.

Recently, the proponents of nudges, such as Cass Sunstein, have begun to elaborate on algorithms as tools of governing (their term!) by an administrative state (Sunstein 2022). One could think that Sunstein's interest in this topic is just jumping on the bandwagon of the hype of AI, algorithms, big data—and their policy relevance. This may well be the case. Yet once we understand the links between cognitive psychology, behavioral economics, cybernetics, computer science, and research on AI, such a move may seem less surprising. All these sciences have Cold War origins and were influenced by information sciences and information technology. In light of this, the recent merging of nudging with behavioral data science and algorithmic tools is a development that has a common basis in the history of behavioral science, as well as in the interest of controlling, steering, and influencing behaviors that have facilitated the emergence of behavioral research since the beginning. Note that the contemporary discussion about the role of algorithms in generating knowledge about stable behavioral patterns and the possibility of big tech companies or states to use this knowledge to influence people's behavior operates also within the imaginary of behavioral governing: knowledge about patterns in behavior is supposed to help steer the behavior of individuals, this time with the mediation of AI technology. Such use of big data and algorithms to influence behavior is often called *automated influence* (Benn and Lazar 2022). There are many ways in which these proposals and developments are criticized (e.g., Eubanks 2018; Barocas and Selbst 2016; Benn and Lazar 2022). I believe it is worth considering whether an understanding of the knowledge about behavior obtained by algorithms is not simplified and obfuscated as in the cases of cognitive psychology and behavioral economics, and for the same reason: it may get interpreted via the imaginary of behavioral governing.

What Next? Critique of the Imaginary and Critique of Behavioral Science

What is the possible point of entry for critique of this imaginary and its effects? One way to start is by analyzing the kind of knowledge actually produced by the behavioral sciences. Once we understand what we know on the basis of behavioral research, then we can juxtapose this understanding with the imaginary of behavioral governing which *imagines* knowledge that power could frictionlessly act on. In my previous work I have initiated such an analysis by following analytical strategies of feminist philosophers of science (Matecka 2021). We learn from feminist philosophers of science that to understand the knowledge produced in science, it is not enough to look at end results of experimental work or theoretical claims made

by scientists. We have to understand how evidence is produced; in light of which background assumptions data is treated as evidence for a hypothesis; and how concepts are defined, operationalized, and measured (e.g., Longino 1990, 2013; Anderson 2004; Haraway 1981). We still need such a detailed engagement with scientific research produced by behavioral scientists.

Let me come back to the Flint water crisis and the attempts to use behavioral science to address aspects of it. The Social and Behavioral Sciences Team under the Obama administration was aware of the social and political complexity of this public health crisis and “its racial history, its socioeconomic circumstances, all of it,” as the director of the team stated (Stillman 2017). Yet it is difficult not to feel dissatisfaction with “behavioral tweaks” that the team wanted to introduce. They seemed banal, neutralizing the politics of the crisis. However, pointing out that depoliticization is achieved via reliance on behavioral science often also presumes that this science provides a value-free account of “mechanisms of human cognition underlying behavior.” As I have argued, such a presumption is also widely shared in the debates about behavioral policy and is a result of operating within the imaginary of behavioral governing by most scholars. Research in cognitive psychology and behavioral economics does not offer robust knowledge about cognitive causes of human behavior. Furthermore, this research is not free, as no science is, from value-laden preconceptions entering it at diverse stages of scientific investigation. Behavioral science is embedded in preconceptions about social reality, but this point remains unscrutinized in the debates about its use in policy (Małecka 2021). These preconceptions may not allow for the generalization of the results of behavioral research to all humankind (if this research concerns human agents at all), as moral, social, or political values permeating background assumptions of behavioral science—behavioral economics and cognitive psychology—may make it difficult to apply its results to contexts that differ from conditions assumed in the background of behavioral research. The feeling of uneasiness about behavioral interventions proposed in the context of the Flint crisis may be related to the fact that the attempts to employ them in this particular context revealed and made visible, at least partly, values embedded in behavioral research. Analysis of the knowledge produced within the behavioral sciences allows us to challenge claims about the ways in which policies informed by behavioral research impact individuals, which are a manifestation of the imaginary of behavioral governing. Such analysis can also be helpful in detecting the politics of this research, which, it seems, may carry on since the Cold War era in the United States.

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References

- Anderson, Elizabeth. 2004. "Uses of Value Judgments in Science: A General Argument, with Lessons from a Case Study of Feminist Research on Divorce." *Hypatia* 19, no. 1: 1–24.
- Banks, Gary. 2009. *Evidence-Based Policy Making: What Is It? How Do We Get It?* Canberra: Productivity Commission.
- Barocas, Solon, and Andrew D. Selbst. 2016. "Big Data's Disparate Impact." *California Law Review* 104: 671–732.
- Benn, Claire, and Seth Lazar. 2022. "What's Wrong with Automated Influence." *Canadian Journal of Philosophy* 52, no. 1: 125–48.
- Berndt, Christian. 2019. "Behavioural Economics and Development Policy." In *Handbook of Behavioural Change and Policy*, edited by Holger Strassheim and Silke Beck, 242–56. Cheltenham, UK: Elgar.
- Bovens, Luc. 2009. "The Ethics of Nudge." In *Preference Change*, edited by Till Grüne-Yanoff and Sven Ove Hansson, 207–19. Dordrecht, Netherlands: Springer.
- Cartwright, Nancy, and Jeremy Hardie. 2012. *Evidence-Based Policy: A Practical Guide to Doing It Better*. New York: Oxford University Press.
- Cohen, Shlomo. 2013. "Nudging and Informed Consent." *American Journal of Bioethics* 13, no. 6: 3–11.
- Crowther-Heyck, Hunter. 2006. "Patrons of the Revolution: Ideals and Institutions in Postwar Behavioral Science." *Isis* 97, no. 3: 420–46.
- Dean, Mitchell. 2010. *Governmentality: Power and Rule in Modern Society*. Thousand Oaks, CA: Sage.
- Edwards, Paul N. 1996. *The Closed World: Computers and the Politics of Discourse in Cold War America*. Cambridge, MA: MIT Press.
- Erickson, Paul, Judy L. Klein, Lorraine Daston, Rebecca Lemov, Thomas Sturm, and Michael D. Gordin. 2013. *How Reason Almost Lost Its Mind: The Strange Career of Cold War Rationality*. Chicago: University of Chicago Press.
- Eronen, Markus. 2020. "Causal Discovery and the Problem of Psychological Interventions." *New Ideas in Psychology* 59: article 100785.
- Eubanks, Virginia. 2018. *Automating Inequality: How High-Tech Tools Profile, Police, and Punish the Poor*. New York: St. Martin's.
- Foucault, Michel. (1978) 1991. "Governmentality." In *The Foucault Effect: Studies in Governmentality, with Two Lectures by and an Interview with Michel Foucault*, edited by Graham Burchell, Colin Gordon, and Peter Miller, 87–104. Chicago: Chicago University Press.
- Foucault, Michel. 1982. "The Subject and Power." *Critical Inquiry* 8, no. 4: 777–95.
- Foucault, Michel. 2008. *The Birth of Biopolitics: Lectures at the Collège de France, 1978–1979*. Translated by Graham Burchell. London: Palgrave Macmillan.
- Foucault, Michel. 2009. *Security, Territory, Population: Lectures at the Collège de France, 1977–1978*. Translated by Graham Burchell. London: Palgrave Macmillan.
- Greenhalgh, Trisha, and Jill Russell. 2009. "Evidence-Based Policymaking: A Critique." *Perspectives in Biology and Medicine* 5, no. 2: 304–18.

- Haraway, Donna. 1981. "The High Cost of Information in Post-World War II Evolutionary Biology: Ergonomics, Semiotics, and the Sociobiology of Communication Systems." *Philosophical Forum* 13, nos. 2–3: 244–78.
- Head, Brian W. 2013. "Evidence-Based Policymaking—Speaking Truth to Power?" *Australian Journal of Public Administration* 72, no. 4: 397–403.
- Jasanoff, Sheila. 2015. "Future Imperfect: Science, Technology, and the Imaginations of Modernity." In *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*, edited by Sheila Jasanoff and Sang-Hyun Kim, 1–33. Chicago: University of Chicago Press.
- Jasanoff, Sheila, and Sang-Hyun Kim. 2013. "Sociotechnical Imaginaries and National Energy Policies." *Science as Culture* 22, no. 2: 189–96.
- John, Peter, Graham Smith, and Gerry Stoker. 2009. "Nudge Nudge, Think Think: Two Strategies for Changing Civic Behaviour." *Political Quarterly* 80, no. 3: 361–70.
- Jones, Rhys, Jessica Pykett, and Mark Whitehead. 2013. *Changing Behaviours: On the Rise of the Psychological State*. Cheltenham, UK: Elgar.
- Kahneman, Daniel, and Amos Tversky. 1979. "Prospect Theory: An Analysis of Decision under Risk." *Econometrica* 47, no. 2: 263–91.
- Leggett, Will. 2014. "The Politics of Behaviour Change: Nudge, Neoliberalism, and the State." *Policy and Politics* 42, no. 1: 3–19.
- Lepenies, Robert, and Magdalena Malecka. 2015. "The Institutional Consequences of Nudging—Nudges, Politics, and the Law." *Review of Philosophy and Psychology* 6, no. 3: 427–37.
- Longino, Helen E. 1990. *Science as Social Knowledge*. Princeton, NJ: Princeton University Press.
- Longino, Helen E. 2013. *Studying Human Behavior: How Scientists Investigate Aggression and Sexuality*. Chicago: University of Chicago Press.
- Malecka, Magdalena. 2021. "Knowledge, Behaviour, and Policy: Questioning the Epistemic Presuppositions of Applying Behavioural Science in Public Policymaking." *Synthese* 199, no. 1: 5311–38.
- Marr, David. 1982. *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information*. San Francisco, CA: Freeman.
- McMahon, John. 2015. "Behavioral Economics as Neoliberalism: Producing and Governing *Homo Economicus*." *Contemporary Political Theory* 14, no. 2: 137–58.
- Miller, George A. 2002. "The Cognitive Revolution: A Historical Perspective." *Trends in Cognitive Sciences* 7, no. 3: 141–44.
- Mirowski, Philip. 2002. *Machine Dreams: Economics Becomes a Cyborg Science*. Cambridge: Cambridge University Press.
- Oliver, Adam. 2013. *Behavioural Public Policy*. Cambridge: Cambridge University Press.
- Rutherford, Alexandra. 2009. *Beyond the Box: B. F. Skinner's Technology of Behaviour from Laboratory to Life, 1950s–1970s*. Toronto: University of Toronto Press.
- Sent, Esther-Mirjam. 2000. "Herbert A. Simon as a Cyborg Scientist." *Perspectives on Science* 8, no. 4: 380–406.
- Shafir, Eldar, ed. 2012. *The Behavioral Foundations of Public Policy*. Princeton, NJ: Princeton University Press.
- Stillman, Sarah. 2017. "Can Behavioral Science Help in Flint?" *New Yorker*, January 23.
- Strassheim, Holger, Arlena Jung, and Rebecca-Lea Korinek. 2020. "Reframing Expertise: The Rise of Behavioral Insights and Interventions in Public Policy." In *Moment of Valuation: Exploring Sites of Dissonance*, edited by Ariane Antal, Michael Hutter, and David Stark, 249–68. Oxford: Oxford University Press.
- Sunstein, Cass R. 2022. "Governing by Algorithm? No Noise and (Potentially) Less Bias." *Duke Law Review* 71, no. 6: 1175–1205.

- Thaler, Richard H., and Cass R. Sunstein. 2008. *Nudge: Improving Decisions about Health, Wealth, and Happiness*. London: Penguin.
- Tversky, Amos, and Daniel Kahneman. 1974. "Judgment under Uncertainty: Heuristics and Biases; Biases in Judgments Reveal Some Heuristics of Thinking under Uncertainty." *Science* 185, no. 415: 1124–31.
- Whitman, Maddison. 2020. "'We Called That a Behavior': The Making of Institutional Data." *Big Data and Society* 13, no. 1: 1–13.
- Wirth, Manuel. 2020. "Nudging Subjects at Risk." *Historical Social Research* 45, no. 3: 184–205.
- Yeung, Karen. 2017. "'Hypernudge': Big Data as a Mode of Regulation by Design." *Information, Communication, and Society* 20, no. 1: 118–36.