Oscar H. Gandy, Jr.   Selena Nemorin
University of Pennsylvania   London School of Economics
oscar.gandy@asc.upenn.edu   S.Nemorin@lse.ac.uk

Neuroeconomics, Behavioral Economics and The
Political Economy of Nudge

The Political Economy Section
Submission No. 14366

Paper presented at the IAMCR 2017 Conference in Cartagena, Columbia, July, 16-20, 2017.

ABSTRACT

Neuroeconomics, Behavioral Economics and the Political Economy of Nudge

Transformations in the strategies and techniques of governmentality have been implemented around the globe through different versions of behavioral interventions being characterized as "nudges." Although the variety of areas in which the structuration of this so-called "libertarian paternalism" will occur is considerable, this paper will focus on the implementation of these practices within geopolitical areas being referred to as "smart cities."

Informed by earlier assessments of technologically based theories of communication and social change by Preston, this paper will briefly examine the relationships between technological advances in neuroscience associated with increasingly sophisticated brain scanning technology. It will then examine the impact of these and related technological developments on neuroeconomics and behavioral economics as foundational contributions to the governance of smart cities.

Because of the resonance between these developments and transformations in several areas of governmentality explored by Foucault in the 1970s, and by an increasing number of theorists of late, this paper sets out a program of research and policy analysis organized through the political economy of communications framework laid out by Mosco. Through an emphasis on the contributions to behavioral economics made by Thaler and Sunstein, smart city governance will be identified and assessed in terms of the processes of Commodification, Spatialization and Structuration as defined by Mosco. Part of what is being commodified in support of nudging policies implemented through public/private partnerships are the networked devices that capture cognitive, affective and behavioral information which are being used to alter strategies and targets of contemporary and emergent forms of correct training.

This paper also identifies the dominant firms operating in this rapidly evolving sector, including network providers such as Oracle, and those providing resources for advanced computing and analytics like Microsoft and IBM. For example, in our analysis of spatialization, these initiatives will be characterized in part by the frameworks being developed for implementation within

targeted areas and populations through which nudges, varying in intensity and levels of constraint will be delivered, evaluated and altered.

In this emergent governance arena, multiple forms of transaction-generated, and remotely sensed information about persons, devices and the relations between them will be subject to analysis by a variety of interested actors. Information derived from these analyses will play a critical role in the design, management and evaluation of nudges, some of which will be used to exploit, rather than to overcome common limitations in consumer decision-making.

The implications of this process for groups within society, especially those already disadvantaged by poverty, segregation and disregard, will be described, and illustrated with examples from around the globe. The paper will conclude with an articulation of public policy concerns, including those related to privacy and surveillance that will call for an organized response at the political level.

Introduction

Transformations in the strategies and techniques of governmentality have been implemented around the globe through different versions of behavioral interventions being characterized as "nudges." The design of these choice architectures, which work primarily through the framing of the default options that individuals don't actually choose or accept, because they are imposed, should be understood as communications strategies. While libertarian paternalism is said to require that individuals should not face meaningful costs in opting out, or choosing an alternative at odds with chosen default (Oliver, 2013; Sunstein, 2015b; Yeung, 2012), one should expect that the framing of such an option will be designed to exploit a common bias or heuristic strategy related to loss aversion, or increasingly, to exploit a cognitive bias for which members of a specific social category are especially vulnerable.

Because of the resonance between these developments and transformations in several areas of governmentality explored by Foucault in the 1970s, and by an increasing number of theorists of late, this paper sets out a program of research and policy analysis organized through the political economy of communications framework as conceived by Vincent Mosco (2009). Such a framework provides us with a useful entry point to explore the communicative aspects of the nudge agenda. Mosco's approach to communication focuses on three related processes: commodification, spatialization and structuration.

This paper will focus on the implementation of these practices within geopolitical areas being referred to as "smart cities." Informed by earlier assessments of technologically based theories of communication and social change by Preston (2001), this paper will briefly examine the relationships between technological advances in neuroscience associated with increasingly sophisticated brain scanning technology. It will then reflect on the impact of these and related technological developments on neuroeconomics and behavioral economics as foundational contributions to the governance of smart cities. The paper also identifies the dominant firms operating in this rapidly evolving sector, including network providers such as Oracle, and those providing resources for advanced computing and analytics like Microsoft and IBM. For example,

in our analysis of spatialization, these initiatives will be characterized in part by the frameworks being developed for implementation within targeted areas and populations through which nudges, varying in intensity and levels of constraint will be delivered, evaluated and altered. The implications of this process for groups within society, especially those already disadvantaged by poverty, segregation and disregard, will be described, and illustrated with examples from around the globe. The paper will conclude with an articulation of public policy concerns, including those related to privacy and surveillance that will call for an organized response at the political level.

Commodification, spatialization and structuration

Computerization of networked communications and information processing plays in the increasingly complex systems through which goods and services are transformed into commodities for sale. Mosco's framing of this process (2009, pp. 130-133) emphasizes a connection between capitalist exploitation of labor, and the transformation of things valued for their uses, into things valued for their contribution to the realization of profits, or surplus value within markets. A political economy of communication is understandably concerned with media content as a primary commodity form, but early in its development as a point of theoretical interest, the audiences or consumers of that content (Bermejo, 2007; Napoli, 2003) became the focus of debate regarding the extent to which some of those audience members were being exploited as labor (McGuigan & Mazerolle, 2014; Mosco, 2009, pp. 136-143).

Although he does not place much emphasis on the processes through which information about audiences is transformed into strategic intelligence in support of marketing and social control, his characterization of ratings and other measures of audience behavior as an "immanent process" of surveillance through which "one commodity gives rise directly to another one" identifies a key concern (Mosco, 2009, pp. 141-143). The nature of this process of transforming transaction-generated information (TGI) gathered through a multiplicity of data-

gathering systems and devices into technologies of control (Gandy, 2011) will be a central focus of our examination of the surveillance processes taking shape within smart cities.

The importance of TGI and its relationship to surveillance and control is reflected in the definition of spatialization as a process through which the constraints of space and time are overcome. Changes in the nature of globalization are attributable to the fact that "the means of communication, including new technologies… have made it cost-effective and easier for firms… to operate efficiently across several borders" (Mosco, 2009, p. 161). The ability to exercise managerial control from afar, in part through an expanded role for shared data storage and analysis accessible through "the cloud" (de Bruin & Floridi, 2017), adds to the flexibility of management structures, and collaborative arrangements.

Of course, the expansion of multinational corporations doing business in a broad range of industrial sectors, including the producers of mass media content, has also meant that telecommunications, marketing, and data processing firms have emerged into this global market space. In his comments about Wal-Mart, Mosco (2009, pp. 174-175) describes how this powerful merchandiser coordinates its global network of suppliers and distributors, but also notes its leadership in "its ability to extract value from practically every bit of information the company collects on customers, workers, suppliers, distributors, and so on…"

The addition of social media giants like Facebook into the global information network has introduced yet another disturbance into the social, cultural and political environment that we are just beginning to understand (Fuchs, 2015). Many of these corporations have become active in the development of promotion of smart cities as they enter into public/private partnerships (P3s) with governments. Neoliberal strategies for governance in this new industrial age, known as "liberalization, privatization, and internationalization," have become some of "the more significant examples of the state's constitutive role" in this process (Mosco, 2009, p. 178).

Lastly, the concept of structuration plays an important role in extending our understanding of the relationships between the structures and institutions that both enable and constrain the kinds of actions we take, and activities that we engage in, to incorporate the differences between us in the ways we act, individually and collectively to shape those structural features (Mosco, 2009). Giddens' emphasis on the role of "knowledgeable actors" in pursuit of their interests, as they understand them, requires us to consider aspects of those efforts that might not be considered within mainstream economic theory.

In understanding agents and their agency, we need to understand the roles, resources and routines that explain the differences in power and influence that exist between groups within society at particular points in time. Mosco (2009) explores some of the differences between groups, defined categorically, and experienced subjectively, such as those identified by race, class and gender, and we might add today, national origin. Central to this process of structuration are the direct and indirect social interactions, including those experienced through communication and media consumption, that play a role in the formation and reproduction of social identities or group consciousness (Gandy, 1993, pp. 25-35; Gandy, 1998).

Mosco adds social movements, and hegemony to the list of key considerations that play a central role in the structuration of powerful institutions of governance as explored within the political economy of communication. Social movements, including those that have been a part of the continuing struggles of marginalized and disadvantaged groups to gain access to the rights and resources that define group privilege for more advantaged members of society are motivated by a set of common interests. Strategic communication campaigns designed to mobilize support or opposition to public policies, or institutional activities have to be understood in the context of the economic, social and political resources that these social movements can bring to bear (Manheim, 2011). The success of these groups is determined by a variety of factors, including the extent to which different interest groups are able to form collaborative alliances, despite the differences in their primary interests.

An additional factor that may either enable or constrain their ability to effect the mobilization of public opinion in support of their policy goals is related to what Mosco (2009, pp. 206-209) identifies as hegemony. Giving credit to the insights derived from Antonio Gramsci, Mosco calls our attention to the role played by views of the world that have come to be accepted as "common sense." The debate is often about normalized understandings that are the product of interactions throughout society, rather than simply an ideological frame that powerful actors seek to impose on the population. As Mosco notes (2009, p. 207) "Global neoliberalism, the vision of the world as one large market managed by global business with support from national governments and international organizations constitutes a powerful hegemony." It is this hegemony that we are forced to confront as we seek to develop a response to the problems we see in the development of smart cities around the globe.

The Smart City

As Robert Hollands (2008, p. 303) implies with his symbolic request "will the real smart city please stand up?", we have a lot to learn about the nature of those places that are referred to as smart cities by their leaders, if not by others. He wonders in his critical assessment whether so-called smart cities "can be understood as a high-tech variation of the 'entrepreneurial city'." For Hollands, an important question is whether the use of the label invites certain positive assumptions, at the same time that it might "play down some of the underlying urban issues and problems inherent in the labelling process itself" (Hollands, 2008, p. 304).

Over the last decade, urban developments have been reimagined as smart spaces that can integrate a range of networked systems, sensors, and analytical resources to manage and govern a city's functions. These cities have been envisioned as spaces that hold the computational power to monitor, gain knowledge on, and adapt to both the physical architectures that comprise these spaces as well as the people who inhabit them (Batty, Axhausen, Giannotti, Pozdnoukhov, et al., 2012). The vast amounts of data extracted from smart city devices is said to aid with the management of its transport, environmental, social, and economics systems. As such, a smart city is not only wired to smart sensors and devices, it

also comprises a larger network of actors and institutions, including smart governments, businesses, schools, hospitals, homes, and citizens.

A useful definition of smart cities is elaborated by Giffinger et al. (2007) who explain that while there is no common agreement on an all-encompassing definition of the space, it is possible to identify shared characteristics:

>
> *Smart economy*: Comprising industries in the ICT sector into smart city processes. This kind of economy is connected to innovation, entrepreneurialism, labour market flexibility, economic image and trademarks, globalization, and ability to transform.
>
> *Smart people*: This aspect is related to educational attainment, tendency towards life-long learning, open-mindedness, cosmopolitanism, and participation in public life.
>
> *Smart governance*: The use of new channels of communication for citizens to be involved in participatory decision-making processes; for example, "e-democracy" or "e-governance". Such processes hinge on transparent and accountible systems of politics/governance, as well as accessibility of public services.
>
> *Smart mobility*: The availability of ICT infrastructure, local and international accessibility, sustainable, safe, and innovative transport systems.
>
> *Smart environment*: lack of pollution, environmental protection, and sustainable management of natural resources.
>
> *Smart living*: the maximization of well-being and quality of life, social cohesion, accessibility to cultural and educational services, quality of housing, tourist attractions, personal safety. (p. 12)

Although the definition is indeed helpful for making sense of smart city structures, as Vanolo (2013) reasons, while the separation into six dimensions is likely informed by "conventional wisdom", it could also potentially naturalize and depoliticize political choices as evidenced by the idea of a flexibile labor market, which is not assumed as an option but rather as an explicit aim of a smart city economy. Furthermore, "smartness" is gradually becoming a discourse of

social control that normalizes government and coporate incursions into an individual's private life.

Among the positive attributes that might be associated with smart city as a designation is the use of networked infrastructures for economic and political efficiency, as well as social, cultural, and urban development (Hollands, 2008, p. 307). It has been suggested that a smart city is a utopian vision of a sustainable urban environment that produces wealth and well-being through innovative use of new technologies to confront various operational problems (Greenfield, 2013). For example, Huawei, a leading proponent of Smart City initiatives, focuses on the many benefits of smart cities, where advanced wireless networks can make ubiquitous connectivity and collaboration possible. In its evaluation of the "ten leading smart cities in the UK," Huawei (2016, pp. 5-6) identifies criteria for evaluating these projects in terms of strategy and execution, using them to identify cities as Leaders, Contenders, Challengers or Followers. Common to these projects is an "underlying emphasis on business-led urban development," and an associated understanding that this expanded role of corporations and technology will lead to significant changes in the "role and function of urban governance" (Hollands, 2008, pp. 307-308).

The challenges that Holllands and others see on the horizon are the difficulties associated with the need to balance community needs with those of business and local government, especially when the leaders of local governments are driven by an economic imperative to "attract capital, particularly knowledge and informational capital to their city" (Hollands, 2008, p. 311). This understandable desire to derive the benefits of investments and expenditures by well-resourced firms leads city managers to enter into deals, including heavily subsidized P3s that can easily backfire, or evaporate because "information technology capital may flow elsewhere depending upon what advantages are available to aid further capital accumulation" (Hollands, 2008, p. 314).

The criticisms of smart city initiatives have been extensive, and many of them have been identified as converging into a set of challenges (Kitchin, Lauriault & McArdle, 2015). The first challenges the underlying belief that all the problematic aspects of urban communities can be managed with technological resources, guided by an instrumental rationality. Although some have argued that it is indeed possible for a smart city to think with its collective social / political brain rather than through its 'technological tools', which foregrounds collective action in the process of building the smart city and potential for good governance (Lam, 2005).

The second concern being examined is the extent to which these developments or transformations are being shaped by corporate interests, led by a cohort of global leaders of the information sector. Observers have pointed out that governing these spaces with coded devices and infrastructures that rely on dynamic data might result in technocratic and/or corporatization of governance, as well as difficult issues of surveillance (Kitchin, 2014). The third concern, and one which resonates with our primary framework, is the manner in which surveillance, profiling and discrimination enabled by the commodification of transaction-generated information (TGI), seems likely to "lead to highly controlling and unequal societies in which rights to privacy, confidentiality, freedom of expression and life chances are restricted" (Kitchin, Lauriault & McArdle, 2015, p. 20).

The fourth concern is directly related to the third to the extent that policies regarding the collection and use of TGI are being framed in such a way as to hide the political and ideological realities of this process behind a screen of scientism in active pursuit of efficiency and effectiveness for the benefit of all. While our primary focus is on the nature of transformations taking place within smart cities, it is also important to place those changes in the context of structurational processes unfolding across a greater spatio-temporal landscape.

Techno-economic and socio-technical paradigms

Paschal Preston (2001) provides an extended introduction to a variety of assessments and predictions of the socioeconomic impacts of the rapidly developing and widely distributed

technological systems referred to as information and communication technologies (ICT). He describes a number of the theoretical frameworks that had been developed to shape our understanding of the transformative role that ICTs were expected to play in the emergence of a new social order. A number of these frameworks attempt to characterize the historical moments within which fundamental changes in technology, social relations, and political ideology, were accompanied by altered systems of legal, regulatory and institutional governance designed to impose order on the chaos that often accompanied such change.

Because communication is not itself a new technology, most references to ICTs as a transformative technology are made with regard to the networked communications enabled by digital computers. The computer is especially important because of its role in information processing, in addition to its supportive roles in the capture, storage, and transmission of information in an expanding array of forms. The functions initially associated with digital computers have been implemented in another rapidly expanding set of devices that may be specialized and limited in functionality, such as the range of environmental sensors measuring temperature, rainfall, or monitoring the entrance, exit, or presence of persons, to those multifunctional devices, such as mobile telephones, some of which match the capabilities of desktop computers.

Among the changes in the nature of ICTs that many consider to be most transformative is the reduction in the size and weight of these devices. Miniaturization of complex systems not only makes them portable, indeed, wearable, but it is fully expected that some form of ICT will be incorporated into every product, if not in every item, then in the packages that store them. This ubiquity of networked devices has led to its characterization as the "internet of things" (IoT) (Gubbi, Buyya, Marusic & Palaniswami, 2013). With regards to the networked devices operating within "smart cities," the nature of the functions being performed by computers has been expanded so far beyond what was once referred to as information processing, that distinctions are now made in terms of the degree of intelligence these devices can display, and put into use in support of autonomous decision-making. Along with other questions related to governance

in this new moment of change, are those we intend to explore with regard to the development of new forms of collaboration, such as those extending beyond the public/private partnerships that the management of complex systems within smart cities will require. As important as these socio-technical transformations may be in shaping the environment in which we make our lives, we would like to suggest that a set of transformations taking place in the social and behavioral sciences are equally important in helping us to understand these changes, and to guide our participation in shaping a collective political response.

While much of the focus among communication scholars is on the new media and social communication networks, the place of these intelligent systems within the economy, including its impact on the labor force and rising inequality is central in our analysis (National Academies, 2017; Schiller, 2014). As such, it is important that our examination of the forces involved in the reshaping of communications not be limited to either the technological, or the strictly economic aspects of the changes taking place. We wish to suggest that the kinds of transformations that have taken place in and around the mainstream economic vantage point within the public policy infrastructure (Gandy, 2009, pp. 145-162) have such important implications for the nature of governmentality (Foucault, 1991; Kear, 2012; Pykett, 2013) that it would be a grave error to minimize them. The concept of governmentality, in this capacity, refers to the integration of data-driven inferences into governmental practices. Power, then, becomes the product of data tactics used to normalize social behavior. As Vanolo (2014) reasons, governmentality is implicated in the way subjects make sense of themselves, constructing their identities "through processes of government which control, incite or suppress actions by drawing a line between what is 'acceptable' and what is 'unacceptable'" (p. 885).

Although challenges to the dominance of neoclassical economics have been delivered from a number of important and influential positions within the scholarly academy, we have chosen to focus our attention on two related perspectives, in addition to that presented by critical political economy. Both neuroeconomics and behavioral economics share a common interest in

the cognitive, affective, and behavioral responses of humans to information about the myriad choices that confront them throughout their lives. The fact that they share an attachment to empirical, and often experimental research to test theories about the way decisions are made, may explain the commonality within their assaults on the fundamental assumptions about the rational processes that economists have long held to be true (Wright & Ginsberg, 2012, pp. 1036-1052).

Political economists have consistently challenged numerous core assumptions about the choices made by citizens and consumers, including limits on their rationality, but these critiques have focused more on the limitations placed on access to the information that rational decision-making requires than on the cognitive limitations of the choosers. Criticism from political economy also emphasizes the strategic efforts by promoters of commercial as well as political goods and services, to establish or alter tastes and preferences (Van Tuinen, 2011), rather than to assume that preferences were either "given," or generated by forces external to market systems (Baker, 2002, pp. 87-95; Bowles, 1998). These and other challenges that have emerged in opposition to dominant constructions of an idealized consumer will be explored in some detail.

Neuroeconomics and Dual Process Theories

In the view of some, questions being raised about the nature of individual human choice can only be answered satisfactorily through a combination of insights from empirically based studies in neurobiology, psychology, and economics under the label of neuroeconomics (Glimcher, 2009). A definitive statement of the promise of this field was provided by Colin Camerer (2007, p. C28): "The neuroeconomic theory of the individual replaces the (perennially useful) fiction of a utility-maximizing individual which has a single goal, with a more detailed account of how components of the individual—brain regions, cognitive control, and neural circuits—interact and communicate to determine individual behavior." The pursuit of this new approach has been driven, in part, by the realization that only a quite limited number of

neoclassical economic theories about consumer preferences and choice are actually supported by the empirical evidence.

Early efforts to contribute to the development of these insights were focused on understanding the distinctions, at a neurological level, between the valuation of objects, and choices made between them. The nature of the evaluative process, and its influence on the extent to which preferences based on these values, could be seen to be transitive, as mainstream economic theory suggests they must be (Hausman, 1992, pp. 13-27) was a central focus of early studies in neuroeconomics (Glimcher, 2009). Insights into the nature of choosing, have been a bit more challenging, as the number of biomechanical systems involved in actually affecting a choice, such as selecting an apple, rather than an orange, are far greater than those involved in producing or recalling an evaluative assessment of each. Distinctive alternatives to theories of a unitary brain, one making decisions in stages, and those popular with psychologists, which include the notion of two seemingly independent decision-making systems, one thought to be automatic, reactive, emotional or limbic, and the other, a more rational and reflective systems, continue to be explored (Camerer, Loewenstein & Prelec, 2005; Schüll, N. D. & Saloom, 2011).

Important theoretical issues that relate to present versus future cost and rewards that may be evaluated and represented mathematically in terms of time-discounted rates and values are central to preferences for one or the other of these models (Harrison, 2008). How these issues are resolved is vitally important for the justifications that can be offered in support of particular policies designed to alter the behavior of individuals in ways that benefit them and society at the same time (Schüll, N. D. & Saloom, 2011). Models describing how an individual makes a decision can be elaborated in terms of measurable neural activities: those involved in gathering information about the environment, those involved in assigning values to the varieties of actions that might be taken, and those related to actually making a selection (Bissonnette, 2016).

The efforts being made to understand the nature of decision-making, well enough to predict cognitive, affective and behavioral responses, seem to lead quite naturally toward efforts to influence those responses (Rose, 2016). As we will discuss in the context of our review of behavioral economics, the approach to the design of government-led interventions, or nudges, under what many see as a neoliberal project operating under an ill-fitting ideological garment called "libertarian paternalism" (McMahon, 2015), appears to favor the dual process model (Michalek, Meran, Schwarze & Yildiz, 2016).

Behavioral Economics

While some neuroeconomists seem content to pursue greater understanding on how the brain functions as an aid to decision making, others seemed especially motivated to demonstrate the limitations within neoliberal economic theories with regard to core assumptions about rational decision-making, as well as to demonstrate the need for alternative explanations for the kinds of choices being made (Bissonnette, 2016). Important conceptual frameworks, many of which emphasized the quite limited capabilities of most people to actually perform all the assessments of choices, including estimates of the probabilities of different states of the environments they might encounter, justified a modification of the meaning of rationality to incorporate its boundaries or constraints (Simon, 1955). A slightly different purpose and strategic approach generated an impressive array of experimental tests of theories that might help to explain the quite common departures from, or exceptions to, the rules that were supposed to govern choices made by rational economic agents (Tversky & Kahneman, 1990).

Cognitive limitations

Among the many constraints on human decision-making illustrated by Kahneman, Tversky, and a host of behavioral scientists, those related to the limited ability of adults to allocate their attention to more than a comparatively small number of relevant features in their environment (Kahneman, 2003), recall facts and experiences (Drobac & Goodenough, 2015), organize comparisons and evaluations in a consistent manner (Bar-Gill & Warren, 2008), and assign

probabilities and appropriate weights to a variety of threats and opportunities (Sunstein, 2012) add up to substantial barriers (Simon, 1955) to be overcome by unaided rational thought.

Among the most important of these limitations, because of their implications for the kinds of strategies that would be developed by behavioral economists and others to protect consumers against themselves, and against the strategic efforts of those who would lead them astray, is their susceptibility to the influence of the manner in which their choices were framed (Tversky & Kahneman, 1990). The experimental approach used by Tversky and Kahneman generally involved the construction of two messages in which the probabilities and the values associated with a particular choice were precisely the same, but the framing of each message was designed to emphasize a particular character, concern, orientation, or belief that would dominate the subsequent choice, such as a loss, versus a gain, a discount, versus a surcharge or a tax, or a host of representations inviting differing perceptions of risk (Tversky & Kahneman, 1990, pp. 63-80).

Heuristics and other Bad Habits

Behavioral economists provided numerous examples of the kinds of cognitive biases that led to a variety of irrational decisions, commonly experienced throughout the population. One such bias was related to "time discounting," and what has been identified as a "present bias" (Camerer, 2007, pp. C32). This bias has been identified as an especially troublesome tendency with regard to making economic decisions, including those related to savings, investments, and consumer credit, such as the interest rates associated with "pay-day loans" (Bar-Gill and Warren, 2008, pp. 144-145). Other biases include a tendency to perceive events or circumstances that are easily remembered as being more likely to occur, than those that don't readily come to mind (Institute of Medicine, 2013, pp. 204-206). This "availability" bias influences our estimation of risk.

A somewhat different bias is that which we readily understand, but often fail to recognize it

when it distorts our assessments of choices. This is the "confirmation bias," which leads us to adjust new information in ways that make it easier to accommodate within our already existing set of beliefs. A closely related bias is the tendency to be over-confident about the kinds of decisions we have made, or are about to make, based on some familiar decisional strategy. Indeed, because of the cognitive limitations that most of us share to some extent, we are thought to develop decision-making strategies, or heuristics that support more rapid, less cognitively burdensome procedures. Unfortunately, these heuristics frequently lead to shortsightedness, or ill-considered choices, such as those that are likely to be made in the context of uncertainty, as is common during crises or emergencies (Brudermann, Rauter & Yamagata, 2013), or where circumstances, including the strategic framing of choices that leads one to believe that an immediate decision is required.

Decision scientists have concluded that people are generally poor "intuitive statisticians." That is, we "have a difficult time thinking about the world in probabilistic terms. Instead there tends to be a strong tendency to reduce or disregard uncertainty, leading to insufficient use of prior information and a tendency to be overconfident" (Kleindorfer, Kunreuther & Schoemaker, 1993, p. 100). While behavioral scientists tend to explain most of our problems with statistical reasoning in terms of cognitive limits, some observers have consistently argued that the problems we face with regard to predictions and assessments of risk are actually the result of educational deficits—statistical illiteracy that can be overcome through instruction (Gigerenzer, Gaissmaier, Kurz-Mileke, Schwartz, et al., 2008; Grüne-Yanoff & Hertwig, 2016), rather than being reinforced through its exploitation with nudges.

Social Influence

As we have suggested, neoclassical economics has tended to reject the notion that the tastes and preferences governing choices within markets are influenced by powerful actors within the marketplace, claiming that whatever influences there may be, they are exogenous, and therefore not worthy of attention from economists (Bowles, 1998). In direct opposition,

Bowles offers substantial evidence and argument in support of his contention that economic institutions are a powerful and theoretically significant endogenous influence on economically relevant preferences. These institutions play an important role in framing the kinds of decisions we make within markets, and they also influence the development and reproduction of behavioral norms, or valued cultural traits such as "reputations for trustworthiness, generosity, and vengefulness" (Bowles, 1998, p. 92), each of which serves beneficial purposes within markets.

What Bowles (1998, p. 103) observes, however, is the fact that we have only limited understanding about how other, non-institutionalized sources of influence such as "parents, other family members, friends, teachers, and others" affect the learning of norms, values and cultural traits. As a result, we were, and still are largely ignorant about the role of social learning on the development of those "behavioral market failures" that behavioral economics is being organized to address (Bubb & Pildes, 2014, p. 1603; Hawkins, 2016; Sunstein, 2014).

The influence of applied behavioral economics has been widespread. While not actually approaching the levels of influence enjoyed by the mainstream neoliberal versions of economics, the development of Behavioral Law & Economics (BL&E) as a high level participant in policy relevant debates has been substantial (Bubb & Pildes, 2014; McMahon, 2015; Wright & Ginsberg, 2012). While the future is obviously not yet here, the signs are quite clear in their suggestion that the influence of behavioral economics is likely to be greatest with regard to its capture of public attention and governmental willingness to rely on its theory, research and leadership in the design and implementation of policy oriented nudges in a wide variety of areas.

The Nudge

The use of "nudge" as a term of art in discussions of public policy formation, implemention and evaluation owes its current position to the widely read and often criticized book by Thaler and

Sunstein (2008) about what might be done to correct the systematic errors that people make in their efforts to realize the idealized, but rarely obtained goals of utility maximization that economists have claimed we share. Three degrees of nudge have been identified, varying in terms of effectiveness, and each resulting in distinct issues of representation and ethics.

First degree nudging is designed to respect the individual's decision-making autonomy, simply involving the dissemination of information to individuals and groups. Second degree nudging seeks to bias decision-making towards a desirable end. This attempt has a greater impact on autonomy, seeking to direct an individual's automatic responses towards a particular action. However, upon reflection, the target of the nudge is able to understand that a nudge has been "administered" as well as being able to ascertain its effect. The third degree nudge has a more serious impact on autonomy in that it aims at a form of behavioral manipulation that the other degrees do not. Here, the tools used have the capacity to bypass if not block an individual's ability to reflect on and assess the nature of the nudge. In this instance, the individual being influenced is targeted at an emotional level rather than in a reflective capacity (Baldwin, 2014).

Much of the continuing, and often rancorous debate about nudging as a more efficient, effective, and ethically justifiable alternative to more coercive governmental strategies is focused on the extent to which its characterization as libertarian paternalism is actually an oxymoron (Sunstein, 2015a). Despite these and other critiques (Amir & Lobel, 2008; Kosters & Van der Heijden, 2015; Oliver, 2013; Yeung, 2012), several governments have followed the leadership of Thaler in the UK, and Sunstein in the US, and have not only begun to experiment with a variety of behavioral interventions designed to shape a broad range of behaviors, but they have established specialized administrative units with the responsibility for promoting the use of these techniques (Selinger & Whyte, 2011).

Although the formal evaluations of nudges, and nudge programs, have been limited, and rarely comparative, there has been very little attention paid to the possibility that the designers of nudges, or the "choice architectures," through which they are often delivered, might also suffer

from cognitive limitations or biases (Berggren, 2012; Grüne- Yanoff & Hertwig, 2016, pp. 166-167). As we will explore in more detail in the remainder of this paper, many of the interventions being designed and implemented are focused primarily on exploiting the limitations and biases in human decision-making to change behavior in specific target areas, rather than seeking to improve decision-making skills more generally.

In ways quite similar to some of the applications of the nudge as a corrective for "behavioral market failures," smart city collaboratives are also viewed as an alternative path to the good life, such as seen in the approach to smart growth. "Rather than letting the market dictate the way cities grow and sprawl, smart growth is a movement that implies we can achieve greater efficiencies through coordinating the forces that lead to laissez faire growth…" (Batty, Axhausen, Giannotti, Pozdnoukhov, et al., 2012, p. 486). On this view, many challenges faced by smart cities cannot be resolved through traditional institutions and their classical processes of governing (Rodrıguez, 2015), hence innovative forms of data-driven governance must be put in place. These new modes of governance have been identified as ''smart governance'' under which the government manages and enacts policies that are intended to improve quality of life through efficient ICT use and active participation of a range of stakeholders, with a focus on industry involvement.

The Political Economy of Nudge

The challenge of defining a political economy of nudge is influenced by, but not fully determined by, the role that notions of irrationality have played in mobilizing widespread support for the social interventions being designed by behavioral economists. Political economy differs from neoclassical economics in large part due its determination to understand the nature and extent to which power plays a role in the structure and performance of markets (Black, 2013), and in those systems, institutions and technologies that facilitate the exercise of that power. The bureaucratic state, and its administrative agencies that share responsibility for improving the status and performance of the economy, in all of its sectors, as well as those with

shared responsibilities for the maintenance, and where possible, the improvement of the health, welfare, and safety of its residents, has taken a leading role in the utilization of nudges in smart cities and beyond. We will place our attempt to extend the nature of the engagement by political economists and other critical analysts with the emergence of nudge within a critical framework informed by Foucauldian studies of governmentality.

Neoliberalism and Governmentality

Although Foucault (1991) took due note of the great number and variety of forms of governing, he devoted special attention to those modes of governance that were specific with regard to the state, including its role in management of the economy: "To govern a state will therefore mean to apply economy, to set up an economy at the level of the entire state, which means exercising towards its inhabitants, and the wealth and behaviour of each and all, a form of surveillance and control as attentive as that of the head of a family over his household and his goods" (Foucault, 1991, p. 92).

While Foucault did not refer specifically to nudges in this context, his usage of governance in terms of "disposing things," implied that the state would be "employing tactics, rather than laws, and even using laws themselves as tactics—to arrange things in such a way that, through a certain number of means, such and such ends may be achieved" (1991, p. 95). In his discussion of the focus of state action, the meaning of the family, and its relationship to the economy, as represented through population statistics, becomes the goal of governance. As he suggests (Foucault, 1991, p. 100), "it is the population itself on which the 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 realization of the "interest of the population," which marks the "birth of a new art, or at any rate of a range of absolutely new tactics and techniques."

As Sellar and Thompson (2016) argue, what is important about the statistical construction of populations as the "ultimate end of government" is the ontological status of the individuals as objects or "things" that can be reduced to calculations. Governmentality in this sense, makes use of technologies of statistics and calculation. Of primacy, then, are the ways in which calculations can create categorizations, subjectivities, and a belief in objectivity.

For some, these new tactics and techniques have much in common with the commercial marketing of goods and services, except that when envisioned in the context of government initiatives, increasingly organized through a variety of public/private partnerships, or lucrative contracts, they tend to be referred to as "social marketing" where the "product is usually some kind of behavioural change" (Pykett, Jones, Welsh & Whitehead, 2014, p. 97). An important aspect of the technologies being applied in support of "management at a distance" through code is the extent that they reinforce the distinctions that have been drawn between the disciplinary and security oriented approaches to management. A central part of this distinction is the fact that a disciplinary process begins with an already existing, or "predefined optimal model," while an orientation toward security, merely establishes "the limits of the acceptable," while the "parameters of reality" continue to change, along with "the shifting context and conditions of regulation" (Klauser, Paasche & Söderström, 2014, p. 874).

The fact that a precise goal is not established in advance, but seems likely to be discovered, or derived from the most recent analysis of data, means that the challenge becomes one of determining, for example, "how can electricity consumption on the household and industrial level, with its internal complexities, regularities, effects, and problems be taken into account within, and interaction with, the wider context of grid stability, increased use of renewal energy, and customer needs and preferences" (Klauser, Paasche & Söderström, 2014, p. 877). This kind of flexibility within the context of the supply of energy is seen as a beneficial outcome of this orientation toward security, rather than discipline, but this case study has largely excluded consideration of the already existing efforts in other cities that are designed to

nudge household consumers to make more intelligent decisions about energy usage (Allcott & Kessler, 2015).

A distinct mode of governmentality emerges when one considers the hegemonic assumptions underpinning smart city implementation. Here the urban landscape and its citizenry are understood as problematic; thereby becoming the statistical targets for interventions. The city as both a structural and social body becomes the object of data-driven analysis and management. Informational databases are created which include geo-spatial analytics and various behavioural patterns, all relating to specific smart city processes. These data are then used to inform the construction of algorithms as social and political solutions (Vanolo, 2014).

Not all observers of the changing nature of the relationships between the state and its populations are willing to accept the primary assumption that neoliberalism has attained the status of a successful hegemonic project. Barnett (2005, p. 8) suggests that such a theoretical construction makes it difficult to understand how such a transformation would actually come to be. In part this is because stories "about 'neoliberalism' pay little attention to the pro-active role of socio-cultural processes in provoking changes in modes of governance, policy, and regulation." He identifies a number of these factors that seem likely to play a role, such as "changing consumer expectations," a "decline of deference," and the associated "refusals of the subordinated," which emerge as "contested inequalities." What he sees as populist tendencies that clearly are not an expression of a hegemonic project that instead, "are effects of much longer rhythms of socio-cultural change that emanates from the bottom-up" (Barnett, 2005, p. 8).

Structuration and Surveillance

The widespread implementation of behavioral nudges in a broad range of governmental programs should be seen as part of the *structuration* process developed within a neoliberal response to a series of economic challenges, with the Great Recession being the latest. One of

the concerns that have emerged as vitally important in our assessment of the nudge as a governmental policy tool within smart cities is the implications that this and related approaches to the management of populations from afar have for the uses of direct and indirect surveillance of people, places and things. ICT, in all its many forms, is expected to play a central role here through its extension of surveillance through multidimensional analysis of massive TGI, environmental and personal sensing, and what we have come to refer to as the big data that enable the management by code from afar. Operationally, these "codes constitute often invisible processes of classification and prioritization, which may affect the life-chances of individuals or social groups in ways that are often unseen by the public and that easily evade conventional democratic scrutiny" (Klauser & Albrechtslund, 2014, p. 274).

In one example, the Behavioral Insights Team in the UK, is said to have introduced a policy that would require applicants for unemployment benefits to complete an online "assessment of personality or character" to help address the problem of "worklessness" that had become a serious constraint within the nation's "austerity" program (Cromby and Willis, 2013, p. 242). Making a determination of eligibility on the basis of a psychometric test raises a number of concerns, beginning with those related to accuracy, precision and reliability across populations. Using the results of the test to make recommendations to applicants to change their behavior raises concerns more directly linked to the use of behavioral nudges to influence the choices being made by those seeking or relying on public benefit programs, especially those related to one's personal responsibility for working on the self, in light of test results (Cromby and Willis, 2013, p. 251).

Despite Giddens' association of personal agency with "knowledgeability" (Giddens, 1986), it is becoming quite clear that residents of these cities will know less and less about the kinds of data that are being gathered (Gandy, 1993, pp. 28-29), or about the kinds of profiles, predictions, prescriptions and proscriptions that are being generated in support of their guidance through nudges, budges, or architectural constraints. We are reminded that smart city projects or programs such as IBM's Smarter Cities variant "are presented by IBM as the object

of a wide range of technologically mediated practices of control and management-at-a-distance based on carefully orchestrated assemblages of computerized systems that act as conduits for multiple cross-cutting forms of data gathering, data transfer and data analysis" (Klauser & Albrechtslund, 2014, p. 277).

Although the internet of things (IoT) is increasingly cited among the technological components that have to be integrated within the infrastructural networks being developed within smart cities, it is only more recently that attention has been drawn to the fact that these systems and their data will come to reside primarily within the resource known as the "cloud" (de Bruin & Floridi, 2017; Mosco, 2014). The technological challenges that have to be overcome in providing support to an unimagined diversity of sensor-based applications through the development of sophisticated software (middleware) that provides a high degree of interoperability, are quite significant (Petrolo, Loscri & Mitton, 2015).

More challenging are the concerns being raised about the collection and use of information about the users of cloud based services—a population that is bound to increase as the direct cost of acquiring, maintaining, and updating the hardware and software that modern computation and communications require, is reduced through the sharing of these resource on an as-needed, or contractual basis (de Bruin & Floridi, 2017, p. 27). The inclusion of genuinely informed consent as a part of the contracts that are agreed to in order to take advantage of these resources is rare, at best, and generally inconceivable in the context of the kinds of data mining that are enabled by tightly integrated systems operated by a comparatively small number of providers.

Often noted, but rarely addressed, are the conflicts of interests between the residents, and the various stakeholders within a city that will place demands upon the service providers, and those who will design, produce, deliver and operate the complex layers of the technology. Among the most problematic conflicts are those related to the privacy, surveillance, monetization and security policies related to the collection, sharing and use of TGI. The problems of design

related to meeting these diverse interests and demands are expected to be especially

burdensome because there will not be, at least not in the short term, anything approaching a

standard model, or system architecture, especially because the cities in which they have to be

built differ so dramatically from each other.

To the extent that the orientation toward the development of policies related to limiting the

public's exposure to privacy risks, and the host of disparate impacts that flow from such

exposures are examined at all, it is important to consider whether self-reliance or regulatory

constraints will be the primary policy response. As many see it (Hull, 2015), "privacy self-

management" is best understood as another example of a successful project in "ethical subject

formation," that some might see as hegemonic. In his view, "the current reliance on privacy

self-management, epitomized by notice and consent regimes, not only completely fails to

protect privacy, but that it does so in a way that encourages adherence to several core

neoliberal techniques of power…" (Hull, 2015, p. 90).

Providing individuals with more information about the uses to which information might

be used by the primary gatherer of that information does not add much at all to the capacity of

individuals to make an informed choice about whether to provide the information in the first

place. They face a near-zero chance of being able to predict even a representative sample of

the uses to which it might be put by the myriad of other users that will gain access to it. More

troublesome, in the context of big data analysis, individuals will have even less understanding

of the implications for their well-being that will be derived from their information being

combined in analyses with information captured about hundreds, perhaps millions of others in

similar positions of vulnerability.

Although the choices that individuals are effectively compelled to make are seen as " a

choice between making oneself increasingly transparent to corporate and governmental

entities, or being denied access to something of importance." Each time we make what we

come to accept as an autonomous choice, "we further naturalize these regimes, the endpoint

of which lies in a mode of governmentality whose objective is not that we desire a particular thing or not, but that we only have the sorts of desires that can be monetized" (Hull, 2015, p. 96). This is the essence of what Zuboff (2015) refers to as "surveillance capitalism."

Commodification, Collaboration and the Spatial Dimension

A major source of concern regarding the development of smart cities is the fact that the driving force behind this global movement is the pursuit of new markets by trans-national corporations. It is quite clear that many of "the world's largest digital technology and consulting companies operate smart city initiatives, including IBM, Cisco, Intel, Microsoft, Huawei, SAP and Arup, and have become active players in city management," either by helping to build these cities from scratch, or through partnerships created to transform existing cities (Kitchin, Lauriault & McArdle, 2015, p. 19). At the same time, there are initiatives, such as those supported by the European Commission, that have exhibited an openness, if not a preference for the development of "user driven open innovation smart city ecosystems which include: citizens, governments, enterprises and researchers" (Clohessy, Acton, & Morgan, 2014, p. 839). However, as Vanolo (2014) reasons, even though most European smart city funding schemes explicitly address the idea of "communities" and participatory practices such as e-governance and e-citizenship, "smart city aesthetics seem to support a political unconsciousness that relegates social importance to the invisible periphery of a technological discourse" (p. 892), a discourse that reduces the complexities of urban spaces into statistical markers that must be constantly watched and controlled by governments and corporations.

ICT firms like IBM have played a key role in the trajectories along which smart cities have developed. The scope of their intervention programs has been extensive, ranging from public administration, through education and workforce development, to transportation and urban planning (Wiig, 2015, p. 7). While the smart city initiative helped to mark a point of strategic correction for IBM and other ICT firms seeking markets for new technology and services at the same time they were hoping to realize the benefits of neoliberal strategies of government that

encouraged deregulation, privatization, and collaborative arrangements that would support more rapid and efficient capital accumulation (Kitchin, 2014, p. 3; Rossi, 2016).

Government agencies have also initiated smart city initiatives within particular service sectors, such as health care, public safety and transportation. The US Department of Transportation (USDOT) initiated its own "Smart City Challenge" in 2015 asking mid-sized cities to develop proposals for the development of a "smart transportation system that would use data, applications, and technology to help people and goods move faster, cheaper, and more efficiently" (U.S. Department of Transportation, 2017, p. 2). 78 cities submitted applications for development grants, and what is especially notable about these proposals is the fact that "53 cities proposed implementing Dedicated Short Range Communication (DSRC) to connect vehicles to infrastructure and each other" (p. 5). Out of the seven cities identified as finalists, Columbus, Ohio was selected as the winner for its comprehensive, highly integrated plan, which included an integrated data exchange that was expected to "deliver enhanced human services" that included systems designed to improve access to needed health services in order to realize the goal of reducing "infant mortality by 40 percent and to cut the health disparity gap in half by 2020" (U.S. Department of Transportation, 2017, p. 20).

Concerns about structuration become salient in the context of debates about the processes through which decisions are made about the how authority, accountability, and transparency are to be allocated and evaluated within smart city environments. Associated concerns about spatialization also arise with regard to temporal dimensions of activity in that "past, present and future are connected in a way where the continuous documentation and reconstruction of everyday life is the basis for relevant predictions and recommendations for the future" (Klauser & Albrechtslund, 2014, p. 279). Zuboff's (2015) musings about data extraction and analysis also address some of the alterations of structure that she sees emerging as the dominant characteristics of surveillance capitalism. In particular, she notes the re-direction of capitalist attention to data from assessments of the past, to an emphasis on the means through which "knowledge about real-time behavior that creates opportunities to intervene in and modify

behavior for profit" to be realized at some point in the future with the assistance of predictive analytics (Zuboff, 2015, p. 84).

Debates about the socioeconomic consequences that flow from efforts to initiate place-based policies combine concerns about structuration with those focused on shifts in the nature of spatialization. For example, critical engagements with the impact of housing policies, such as those intended to assist the poor by providing them with targeted subsidies, often conclude that "location-based programs intended to help poor communities will have limited effect on the well-being of local residents, simply amounting to a transfer of wealth to landowners in targeted areas" (Kline & Moretti, 2014, p. 633). As economists often note, in an "ideal world, efficiency would be achieved by directly removing existing distortions. But this is not always feasible, politically, institutionally, or technologically" (Kline & Moretti, 2014, p. 657), and while "the second best," is theoretically preferable to the status quo, neither its identification, nor its realization is any more easily achieved.

Spatialization is also invoked as a point of concern with regard to the utilization of locational information derived from the geocoding of signals emanating from devices and sensors within and external to the city (Barreneche, 2012). Spatio-temporal information becomes relevant to structuration when being in a particular place, at a particular point in time seems likely to put a particular kind of person in a position of conflict with their actual, or inferred preferences for security (Thatcher, 2013). For example, a Microsoft patent for a routing technology would make recommendations on the basis of past behaviors of the driver, along with socio-demographic information about areas she might pass through on her way to a particular destination. In the view of Microsoft, these recommendations from the routing agent are simply behavioral nudges that work by "limiting our choices, but in ways that enhance and automate our lives" (Thatcher, 2013, p. 73). However, there is an assumption being made here that the socio-spatial dimensions of a smart city can be measured and understood as "technical problems", that are potentially reducible to technical questions responded to by objective and depoliticized technical solutions. As Kitchin (2014) observes, these perspectives do not consider context and

various other structural aspects of mobility; there is an apparent failure to consider that social and territorial actions may also reproduce inequalities and alter power relations experienced as externalities that neither the driver nor Microsoft accept responsibility for.

Choosing Targets of Influence

The use of behavioral nudges by a seemingly unconstrained variety of collaborators and contractors providing services to smart city strategic initiatives is likely to involve the design, production and delivery of precisely targeted and framed messages along with spatially calibrated architectural arrangements (Allcott & Kessler, 2015; Grier & Kumanyika, 2010; Oliver, 2013; Pierce, Siddiki, Jones, & Schumacher, et al., 2014). To the extent that the reduction of inequality, at its sources, and at its various points of impact on the quality of life that residents of urban communities can hope to enjoy, not only remains on the agendas of policy entrepreneurs and activists, but has become a significant focus of government policy (Obama, 2017), we would expect that nudges would be focused on members of the most disadvantaged communities.

Schneider and Ingram (1993) have led a continually expanding cohort of social policy planners to consider these policy targets in terms of the power they have, as well as how they are discursively constructed. In their analytical framework, four groups of policy targets are arrayed in a 2x2 table with their outermost ends being anchored by those who are most *advantaged* and positively constructed, and those deviants who have limited power, who "are negatively constructed and are expected to receive limited to no benefits and a disproportionate share of burdens" (Pierce, Siddiki, Jones & Schumacher, et al., 2014, p. 5). In this capacity, algorithms take subjects and the physical environment they live in as "objects of observation, classification and evaluation" (Rouvroy, 2011). Although this process might allow for more granular detail in analysis and efficient management of the smart city, the process assumes a certain kind of subject and particular mode of behavioral structuring. Rouvroy (2011) claims that these processes can also restructure what is viewed as relevant, and visible, and thereby considered of political importance.

Policy targets are not defined entirely by the characteristics of individuals or groups, but also on the categories of behavior or domains in which the choices made by individuals might have consequences for themselves as well as for the well-being of the general public. Thus, as we have noted, the design, production, delivery and evaluation of nudges have reflected the influence of specific concerns about the consequences that flow from decisions that affect health, education, the environment, industrial productivity, and public safety, among others. Some of these targets are defined spatially, as with regard to the neighborhoods in which people live (Economic Innovation Group, 2016), or in which the consequences of their activities are more widely felt, as with the negative environmental impacts of pollution (Ramo, 2013). The policy targets within these broad classes of concerns that have become associated with "behavioral market failures," are readily distinguished as a function of whether they are focused upon segments of populations defined as being *at risk*, or as population segments defined as being *risks to* others. Risk assessments are not only focused on classes of persons, they may also be made with regard to systems and institutions that are at risk, or impose risks on others. Just as there are individual criminals, there are also criminal organizations, such as cartels and syndicates.

However, as we have already noted, in order to be truly successful in counteracting the forces increasing cumulative disadvantage (Gandy, 2009), more nudging and budging efforts (Oliver, 2013) will have to be directed toward the more powerful actors within public, private, and collaborative networks whose orientations toward members of these population segments tend toward exploitation, rather than enhancements of their well-being (Bubb & Pildes, 2014; Christl & Spikermann, 2016, pp. 118-130). Indeed, as Leggett (2014, pp. 14-15) suggests, there may be a need for state actors to go beyond the nudge in order to shove some commercial actors in order to protect "citizens against proliferating attempts to shape their behaviors and subjectivity."

An important question, not often explored in assessments of the use of the nudge as a form of social marketing by the state, is the extent to which the members of the public actually have an opportunity to engage in meaningful public deliberation about whether, and in what form these behavioral interventions ought to be initiated in the first place (Pykett, Jones, Welsh & Whitehead, 2014, p. 98). Of particular interest is the extent to which members of the public are involved in the identification of policy targets (Pierce, Siddiki, Jones, & Schumaker, et al., 2014; Schneider & Ingram, 1993). Somewhat ironically, the fact that these initiatives are initiated within a framework that claims privilege in public engagement and responsibility, "by reframing behavioural insights in terms of individual choices as opposed to political, ethical and structural concerns, social marketing has the unintended consequence of radically diminishing the scope of political action and potentially enfeebling public policy" (Pykett, Jones, Welsh & Whitehead, 2014, p. 109).

One of the most salient justifications for the quite rapid adoption of the nudge and other behavioral economic strategies is the suggestion that they are cost effective, at a time when governments are facing serious budgetary constraints. Benefit/Cost Analysis (BCA) has long come under criticism for the difficulties involved in assigning dollar values to the costs and benefits thought to be associated with some government program, including regulations (Cochrane, 2014; Institute of Medicine, 2013, pp. 79-102). These analyses are routinely identified as a requirement in the evaluation of social programs in the US, including those making use of some form of behavioral nudge. In some cases, a BCA will be a projection, and a decision about which, if any proposed project will be allowed to proceed, is based on the estimated ratio of benefits to costs. Although BCAs rarely include assessments of the distributions across population segments (Banzhaf, 2012), this concern is often raised by critics.

But even here, debates about the choice of an actual, or proxy measure of the inputs and outputs associated with a particular intervention have a characteristic form and tone across project types. Policy analysts emphasize the extent to which uncertainty, including that related to expectations about the future, including those related to the changeable political climate,

affect the reliability of these assessments. It is noted that although "social considerations such as environmental justice and the political climate affect EPA's decisions and there is uncertainty in those factors and how they influence decisions, there is seldom any discussion concerning just how these factors and their uncertainty affect a decision" (Institute of Medicine, 2013, p. 100). Cochrane (2014, p. 65) suggests that an "explicitly political and public choice philosophy" is precisely what is needed, especially with regard to economic regulatory decisions. But, it is also noted that consumers are likely to be irrational, or at least ill-informed and subject to strategic manipulation, with regard to the choices they make as part of the political process (Smith & Zywicki, 2015, p. 230).

Ethical Concerns

In addition to concerns about efficiency and effectiveness, there are a whole host of concerns about the ethics of nudging. An important one which is not often addressed, is the fact that nudge strategies primarily take advantage, or exploit cognitive biases or inappropriate heuristics, which reinforces them, rather than replacing, or displacing them through the development of cognitive skills that generalize. This difference is at the heart of the distinction between nudging and boosting, as promoted by Gerd Gigerenzer and his colleagues (Gigerenzer, Gaissmaier, Kurz-Mileke, Schwartz, et al., 2008). While the nudge strategy can readily be seen as re-biasing, or reinforcing bad habits, the educational approach is arguably de-biasing (Grüne-Yanoff & Hertwig, 2016, p. 163).

Big data analytics of the sort that we see expanding within the context of smart city environments are increasingly being identified as threats to privacy and decisional autonomy. Because of the nature of the computationally intense process that is becoming automated, or performed autonomously by intelligent machines, the utility of dominant policy frameworks that identify self-defense, or privacy self-management, as the preferred responses to whatever risks that transactions pose within a digital environment, has all but evaporated (Baruh & Popescu, 2015; Hull, 2015; Richards & King, 2014).

Paternalism vs Coercion

Among the many points of contention raised in response to the determination by Thaler and Sunstein to refer to their program of nudges is that their form of "libertarian" paternalism is different from the efforts of marketers and other persuaders to change people's minds through argumentation and debate. Instead, nudges are supposed to work because they "trigger an unconscious action," of the sort we associate with those automatic, reflexive System 1 responses that occur quickly and consistently with others made habitually (Oliver, 2013, p. 688). It is also argued that the paternalist nudges need to be seen as merely a "first stage of sequenced regulation where, inevitably, more coercive measures are required in later stages" (Amir & Lobel, 2008, p. 2100).

Sunstein (2012) responds in considerable detail to the charges that paternalism, whether hard or soft, still bears the weight of concerns about threats to individual autonomy. His response to this critical challenge is based on an association between autonomy and welfare, in which welfare, associated with enjoyment, happiness or pleasure, can be read in terms of the extent to which people enjoy making their own choices (p. 1882). What he refers to as the "thick version" of autonomy is that which values it as an end in itself, or at least a very "weighty matter, to be overridden only for the most compelling reasons" (p. 1883). This is a serious challenge. Sunstein (2012) suggests that if "people have to be treated as ends rather than as mere means, and if this principle requires government not to influence private choices, there is not a lot of room for further discussion" (p. 1885). His arguments here, and in other vigorous defenses of nudges, including the establishment of defaults by governments, especially those established in the best interests of choosers, need to be considered in the context of a host of other threats to autonomy, and what really matters is whether people are made better off in ways that they would recognize as such (Sunstein, 2015a; Sunstein, 2015b).

Perhaps it is as Sunstein suggests, that autonomy should always be considered in relationship to the kinds of outcomes that affect individual welfare which seem most likely to accompany a variety of nudges, or defaults that actually "run contrary to any particular

individual's preferred choice, but that individual fails to opt out of the default." What matters is whether the benefits are substantial, and if the damage to one's dignity and self-respect is minimal; if that is the case, then we might agree that "the nudge is arguably justified" (Yeung, 2012). What becomes important then is the consideration of these welfare outcomes in terms of their distribution across the population being governed.

Distributional Impacts

Critical geographers invite us to consider spatiality as a critical policy concern, for example in cases where discrimination by neighborhood takes place, such as in the case of automobile insurance, where one does not need to have an analyst who is a racist, because the algorithm itself may be racist (Sandvig, Hamilton, Karahalios & Langbort, 2016). Spatial considerations also arise with regard to the determinations made by choice architects about which population segments are more likely, than the average chooser, to make an inappropriate choice about matters of health, education, or welfare. The process by which decisions are made about who the targets of nudge interventions should be seems likely to face moral, ethical and technical challenges in deciding whether the problems are related to undesirable goals, or irrational tendencies in deciding how to realize them (Grüne-Yanoff, T. & Hertwig, R., 2016, pp. 170-172).

This problem is only made more concerning when we consider that decisions about the allocation of resources for behavioral interventions require advance knowledge about the distributions of problematic goals or decision strategies, in the context of the need to also consider whether the policy goal is individual, or collective benefit or welfare maximization. The impact of nudge programs, especially those implemented in the context of neoliberal interests in the improvement of those seen as less socially and behaviorally responsible, is quite likely to be more intense, extensive, coercive and least likely to be respectful of the dignity due to individuals on the basis of their humanity.

The conditions of abjection that are common to members of the poor and marginalized populations of the world "are increasingly viewed as problems to be managed with surveillance" (Monohan, 2017, p. 191) of the sort that seem likely to be normalized within the context of nudges within smart cities. As Monohan (2017, pp. 193-195) sees it, a form of "marginalizing surveillance" is an appropriate label for "the production of conditions and subjectivities of marginality through the application of surveillance systems." For those for whom nudging is not sufficient as a tool of "invisibilization," then we can expect that the "state then turns to criminalization and incarceration, as techniques of securing the neoliberal social order," for those who "persist in asserting their visibility."

Within the neoliberal project in which nudges are just a part, Monahan suggests that the "cultural narratives surrounding everyday abjection tend to mark marginalized subjects as responsible for their own plights, or sometimes even as manipulative or dangerous threats to society as a whole" (2017, p. 196). And, in what we might see as the most damaging consequence of this marginalizing surveillance that is finding its place within surveillance capitalism as it evolves, is the fact that it "possesses a cultural dimension that thrusts marginalized and dehumanized subjectivities upon the abject, marking them as complicit victims, societal outcasts, invasive species, or swarms" (Monahan, 2017, p. 202).

The Need for a Policy Response

We have explored considerable terrain in our movement toward defining a political economy of the nudge as it relates to the development of smart cities around the globe. We emphasized the central role played by assessments of the cognitive capacity of individuals in their roles as citizens, consumers, and residents of smart cities. While the primary focus of neuro-and behavioral economists has been on the limitations in the ability of individuals to make rational choices in their own best interest, we have called attention to the concerns expressed by political economists about the need to also consider the strategic attempts by marketers, governmental bureaucrats and other "choice architects," to exploit cognitive biases and heuristic strategies in order to nudge those choosers in particular directions.

We have attempted to place these concerns about manipulative communication strategies in the context of rapidly developing socio-technical systems that have the capacity to capture transaction-generated information across time and space, and transform it into strategic intelligence about when, where and how to apply it with maximal efficiency and effectiveness. We have noted some of the distributional effects of these efforts that raise concerns about the reproduction and expansion of already unacceptable levels of social, economic and political inequality.

Because we believe that some of the most advanced applications of these socio-technical systems are being introduced within smart cities, where new forms of governance involving collaborations, or public/private partnerships (P3s) involving globally dominant firms threaten individual and collective agency and self-determination, we would like to conclude this paper by exploring some of the possibilities that remain for democratic public participation in the formation of governance strategies and tactics that affect the quality of life.

At the heart of our concerns about transformations in governmentality is the extent to which the science and technology of nudging is being applied in the context of P3s making decisions about the kinds of people that smart cities need to cultivate in order to realize the benefits of higher scores, or cumulative ratings of "smartness" that are believed to attract a broad variety of capital investments. The fact that a great majority of nudges exploit cognitive biases, rather than actually attempting to expand the capability and the commitment of individuals and their social contacts to invest in learning (Gigerenzer, Gaissmaier, Kurz-Mileke, Schwartz, et al., 2008; Grüne-Yanoff & Hertwig, 2016), leads us to suggest that we need to shift the focus of attention of the nudge brigade away from reinforcing bad habits toward modifying the behavior of the choice architects toward the enhancement of decisional competence. This would mean that the so called "defaults" established by public and private choice architects should be those which are demonstrably the most rational, while still allowing the choosers to opt-out (Pridgen, 2013 p. 431). While regulatory policies often do require increased disclosure about the policies,

practices and values of the commodities being offered by commercial providers of goods and services, it would also make sense to nudge, or even shove those vendors toward making such disclosures both engaging and intelligible to the average reader (Alemanno & Spina, 2014, p. 437) .

As we have noted with regard to the evaluative strategies that are commonly applied to regulatory policies, such as environmental impact assessments or benefit-cost analyses, these assessments are rarely focused on the distributional aspects of economically oriented policy outcomes. Although greater awareness of the impact of inequality at a societal level has been achieved around much of the globe (McGuire, 2014), there is little evidence that the development and evaluation of behavioral nudges within the context of smart city initiatives has identified the reduction of inequality as one of the key index measures of smartness. Indeed, as Shelton, Zook and Wiig (2014, p. 21) see it, "rather than solving problems of inequality, the smart city is likely only to reproduce them in new ways."

We have also noted important changes taking place with regard to the characteristics of the contexts within which smart city policies are established, including those involving behavioral modification. These changes represent a critical challenge to the nature and extent of public participation in the determination of those policies. While requirements for some degree of public participation in government policy deliberations have become commonplace within the United States, the reach of those requirements seems unlikely to have much influence over the decisions made by corporate actors and implemented through P3s. These economically dominant transnational entities are likely to be the key players in the strategic games that will determine who bears the risks and who gathers the benefits from a whole host of informational transactions, including those involving the masses of data derived from the operation of sensors, meters, and survey responses. Government actors might be able to negotiate some degree of influence over the continually varying terms of trade being altered by algorithmic systems; however, most members of urban publics will have little chance of even staying up to

date and understanding those changes, and the consequences that flow from them (Danaher, 2016).

Policy agendas are now being formed at the local, regional, national and global level in response to concerns rising in response to socio-technical developments, including those related to developments in the allocation of decision-making authority to autonomous intelligent systems. The fact that these systems will play an increasingly influential role in managing the public and private debates about the consequences of their use (Woolley & Howard, 2016) raises the stakes for ensuring meaningful public engagement in shaping emergent forms of governmentality.

We need to get busy; nudge, nudge...

References

Alemanno, B. M. & Spina, A. (2014). Nudging legally: On the checks and balances of behavioral regulation. I-CON, 12(2): 429-456. Retrieved May 18,2017 from https://doi.org/10.1093/icon/mou033.

Allcott, H. & Kessler, J. B. (2015, October). *The Welfare effects of nudges: A case study of energy use social comparisons*. Working paper 21671. Cambridge, MA: National Bureau of Economic Research. Retrieved April 6, 2017 from http://www.nber.org/papers/w21671.

Amir, O. & Lobel, O. (2008). Stumble, predict, nudge: How behavioral economics informs law and policy. *Columbia Law Review*, 108(8): 2098-2137. Retrieved April 4, 2017 from http://www.jstor.org/stable/40041817.

Baker, C. E. (2002). *Media, Markets and Democracy*. Cambridge, UK: Cambridge University Press.

Baldwin, R. (2014). From regulation to behaviour change: giving nudge the third degree. *The Modern Law Review*, 77 (6), 831-857.

Banzhaf, S. (2012). Regulatory impact analyses of environmental justice effects. *Journal of Land Use and Environmental Law*, 27(1): 1-30. Retrieved, April 6, 2017 from http://www.law.fsu.edu/journals/landuse/vol27_1/banzhaf.pdf.

Bar-Gill, O. & Warren, E. (2008). Making credit safer. *University of Pennsylvania Law Review*, 157(1): 1-101. Retrieved April 3, 2017 from http://www.jstor.org/stable/40041411.

Barnett, C. (2005). The consolidations of "neoliberalism." *Geoforum*, 36(1): 7-12. Retrieved April 6, 2017 from http://dx.doi.org/10.1016/j.geoforum.2004.08.

Baruh, L. & Popescu, M. (2015). Big data analytics and the limits of privacy self-management. *new media & society*, (November): 1-18. Retrieved April 7, 2017 from https://www.researchgate.net/profile/Mihaela_Popescu2/publication/283459625_Big_data_analytics_and_the_limits_of_privacy_self-management/links/57dfe34708ae5272afd09ac8.pdf>

Batty, M., Axhausen, K. W., Giannotti, F., Pozdnoukov, A., Bazzani, A., Wachowicz, M., Ouzounis, G., & Portugali, Y. (2012). *Smart cities of the future. The European Physical Journal Special Topics*, 214(1): 481-518. Retrieved April 12, 2017 from http://discovery.ucl.ac.uk/1388243/.

Berggren, N. (2012). Time for behavioral political economy? An analysis of articles in behavioral economics. *The Review of Austrian Economics*, 25(3): 199-221. Retrieved April 4, 2017 from <https://link.springer.com/article/10.1007/s11138-011-0159-z>.

Bermejo, F. (2007). *The Internet Audience: Constitution & Measurement*. NY: Peter Lang.

Black, J. (2013). Reconceiving financial markets—from the economic to the social. *Journal of Corporate Law Studies*, 13(2): 401-442. Retrieved April 6, 2007 from < http://dx.doi.org/10.5235/14735970.13.2.401>.

Bissonnette, J. F. (2016). From the moral to the neural: Brain scans, decision-making, and the problematization of economic (ir)rationality. *Journal of Cultural Economy*, 9(4): 364-381. Retrieved April 2, 2017 from http://nca.tandfonline.com/doi/abs/10.1080/17530350.2016.1181097.

Bowles, S. (1998). Endogenous preferences: The cultural consequences of markets and other economic institutions. *Journal of Economic Literature*, 36(1): 75-111. Retrieved April 1, 2017 from <hettp://www.jstor.org/stable/2564952>.

Brudermann, T., Rauter, R. & Yamagata, Y. (2013). Behavioral aspects of urban resilience. *Innovation and Supply Chain Management*, 7(3): 83-91. Retrieved April 3, 2017 from <https://www.jstage.jst.go.jp/article/iscm/7/3/7_83/_article>.

Bubb, R. & Pildes, R. H. (2014). How behavioral economics trims its sails and why. *Harvard Law Review*, 127(4): 1593-1678. Retrieved April 3, 2017 from http://cdn.harvardlawreview.org/wpcontent/uploads/2014/04/vol127_bubb_pildes.pdf

Camerer, C. F. (2007). Neuroeconomics: Using neuroscience to make economic predictions. *The Economic Journal*, 117 (March): C26-C42. Retrieved April 3, 2017 from http://onlinelibrary.wiley.com/doi/10.1111/j.1468-0297.2007.02033.x/full.

-------, Loewenstein, G. & Prelec, D. (2005). Neuroeconomics: How neuroscience can inform economics. *Journal of Economic Literature*, XLIII(March): 9-64. Retrieved April 3, 2017 from http://www.jstor.org/stable/4129306.

Christl, W., & Spikermann, S. (2016). *Networks of Control. A Report on Corporate Surveillance, Digital Tracking, Big Data & Privacy*. Vienna: Facultas. Retrieved April 14, 2017 from <http://crackedlabs.org/en/networksofcontrol>.

Clohessy, T., Acton, T., & Morgan, L. (2014). Smart city as a service (SCaaS)- A future roadmap for e-government smart city cloud computing initiatives. *Proceedings of the 2014 IEEE/ACMACM 7th International Conference on Utility and Cloud Computing*. Retrieved April 12, 2017 from http://dl.acm.org/citation.cfm?id=2760073.

Cochrane, J. H. (2014). Challenges for cost-benefit analysis of financial regulation. *The Journal of Legal Studies*, 43(S2): S63-S105. Retrieved April 6, 2017 from http://www.journals.uchicago.edu/doi/abs/10.1086/678351.

Cromby, J. & Willis, M. E. H. (2013). Nudging into subjectification: Governmentality and psychometrics. *Critical Social Policy*, 34(2): 241-259. Retrieved April 8, 2017 from http://journals.sagepub.com/doi/abs/10.1177/0261018313500868.

Danaher, J. (2016). The threat of algocracy: Reality, resistance and accommodation. *Philosophy & Technology*, 29(3):245-268. Retrieved May 20, 2017 from https://link.springer.com/article/10.1007/s13347-015-0211-1.

de Bruin, B. & Floridi, L. (2017). The ethics of cloud computing. *Science and Engineering Ethics*, 23(1): 21-39. Retrieved May 27, 2017 from < https://link.springer.com/article/10.1007/s11948-016-9759-0>.

Drobac, J. A. & Goodenough, O. R. (2015). Exposing the myth of consent. *Indiana Health Law Review*, 12(2): 471-531. Retrieved April 3, from https://mckinneylaw.iu.edu/ihlr/pdf/vol12p472.pdf

Economic Innovation Group. (2016). *The 2016 Distressed Communities Index. An Analysis of Community Well-Being Across the United States*. Retrieved April 15, 2017 from

http://eig.org/wp-content/uploads/2016/02/2016-Distressed-Communities-Index-
Report.pdf.

Foucault, M. (1991). Governmentality. In G. Burchell, C. Gordon & P. Miller (Eds.), *The
Foucault Effect: Studies in Governmentality,* pp. 87-104. The University of Chicago Press.

Fuchs, C. (2015). *Culture and Economy in the Age of Social Media*. NY: Routledge.

Gandy, O. H., Jr. (1993). *The Panoptic Sort. A Political Economy of Personal Information*.
Boulder, CO: Westview Press.

-------(1998). *Communication and Race: A Structural Perspective*. London: Arnold.

-------(2009. *Coming to Terms With Chance. Engaging Rational Discrimination and Cumulative
Disadvantage*. Burlington, VT: Ashgate.

------- (2011). Consumer protection in cyberspace. *tripleC: Communication, Capitalism &
Critique*, 9(2): 175-189. Retrieved April 5, 2017 from
<http://www.triplec.at/index.php/tripleC/article/view/267>.

Giddens, A. (1986). *The Constitution of Society*. Cambridge, UK: Polity Press.

Giffinger, R., Fertner, C., Kramar, H., Kalasek, R. et al. (2007) Smart cities: ranking of European
medium-sized cities. Retrieved April 28, 2017 from www.smart-cities.eu/
download/smart_cities_final_report.pdf.

Gigerenzer, G., Gaissmaier, W., Kurz-Milcke, E., Schwartz, L. M., & Woloshin, S. (2008).
Helping doctors and patients make sense of health statistics. *Psychological Science in the
Public Interest*, 8(2): 53-96. Retrieved April 8, 2017 from
http://pubman.mpdl.mpg.de/pubman/item/escidoc:2100705/component/escidoc:210070
04/   GG_Helping_2008.pdf.

Glimcher, P. W. (2009). Choice: Towards a standard back-pocket model. In P. W. Glimcher, E.
Fehr, C. Camerer, & R. A. Poldrack (Eds.), *Neuroeconomics,: Decision Making and the
Brain,* 1st, Edition, pp. 501-519, London: Elsevier. Retrieved April 2, 2017 from
http://www.decisionsrus.com/documents/choice_towards-a-standard-back-pocket-
model.pdf.

Grier, S. A. & Kumanyika, S. (2010). Target marketing and public health. *Annual Review of Public
Health*, 31: 349-369. Retrieved April 14, 2017 from
http://annualreviews.org/doi/abs/10.1146/annurev.publhealth.012809.103607.

Grüne-Yanoff, T. & Hertwig, R. (2016). Nudge versus boost: How coherent are policy and theory? *Minds & Machines*, 26(1): 149-183. Retrieved April 7, 2017 from https://link.springer.com/article/10.1007/s11023-015-9367-9.

Gubbi, J., Buyya, R., Marusic, S. & Palaniswami, M. (2013). Internet of Things (IoT): A vision, architectural elements, and future directions. *Future Generation Computer Systems*, 29: 1645-1660. Retrieved March 30, 2017 from http://www.sciencedirect.com/science/article/pii/S0167739X13000241.

Harrison, G.W. (2008). Neuroeconomics: A critical reconsideration. *Economics and Philosophy*, 24(3): 303-344. Retrieved April 2, 2017 from https://doi.org/10.1017/S0266267108002009.

Hausman, D. M. (1992). *The Inexact and Separate Science of Economics*. New York: Cambridge University Press.

Hawkins, J. (2016). Using advertisements to diagnose behavioral market failure in the payday lending market. *Wake Forest Law Review*, 51( ): 57-102. Retrieved April 3, 2017 from http://dx.doi.org/10.2139/ssrn.2638481.

Hollands, R. G. (2008). Will the real smart city please stand up? Intelligent, progressive or entrepreneurial.*City*, 12(3): 303-320, Retrieved April 11, 2017 from http://dx.doi.org/10.1080/13604810802479126.

Huawei, & Navigant Consulting (2016). UK Smart Cities Index. Assessment of Strategy and Execution of the UK's Leading Smart Cities. Retrieved April 18, 2017 from http://www-file.huawei.com/-/media/CORPORATE/PDF/News/Huawei_Smart_Cities_Report_FINAL.pdf.

Hull, G. (2015). Successful failure: what Foucault can teach us about privacy self-management in a world of Facebook and big data. *Ethics and Information Technology*, 17(2): 89-101. Retrieved April 6, 2017 from https://link.springer.com/article/10.1007/s10676-015-9363-z>.

Institute of Medicine. (2013). *Environmental Decisions in the Face of Uncertainty*. Washington, DC: The National Academies Press.

Kahneman, D. (2003). Maps of bounded rationality: Psychology for Behavioral Economics. *The American Economic Review*, 93(5): 1449-1475. Retrieved April 3, 2017 from https://www.jstor.org/stable/3132137.

Kear, M. (2013). Governing *Homo Subprimicus*: Beyond financial citizenship, exclusion, and rights. *Antipode*. Retrieved March 31, 2017 from <http://onlinelibrary.wiley.com/doi/10.1111/j.1467-8330.2012.01045.x/full>.

Kitchin, R. (2014). The real-time city? Big data and smart urbanism. *GeoJournal*, 79(1): 1-14. Retrieved April 11, 2017 from https://link.springer.com/article/10.1007/S10708-013-9516-8.

-------, Lauriault, T. P., & McArdle, G. (2015). Smart cities and the politics of urban data. In S. Marvin, A. Luque-Ayala & C. McFarlane (Eds.), *Smart Urbanism: Utopian Vision of False Dawn?,* pp. 17-34. Routledge. Retrieved April 12, 2017 from http://eprints.maynoothuniversity.ie/7323/1/smart.

Klauser, F. R. & Albrechtslund, A. (2014). From self-tracking to smart urban infrastructures: Towards an interdisciplinary research agenda on Big Data. *Surveillance & Society*, 12(2): 273-286. Retrieved, May 27, 2017 from < https://queens.scholarsportal.info/ojs/index.php/surveillance-and-society/article/viewFile/infrastructures/infrastructure>.

Klauser, F., Paasche, T. & Söderström, O. (2014). Michael Foucault and the smart city: Power dynamics inherent in contemporary governing through code. *Environment and Planning D: Society and Space*, 32(5): 869-885. Retrieved April 6,2017 from http://journals.sagepub.com/doi/abs/10.1068/d13041p.

Kline, P. & Moretti, E. (2014). People, places, and public policy: Some simple welfare economics of local economic development programs. *Annual Review of Economics*, 6: 629-662. Retrieved April 13, 2017 from http://annualreviews.org/doi/abs/10.1146/annurev-economics-080213-041024.

Kleindorfer, P. R., Kunreuther, H. C., & Schoemaker, P. J. H. (1993). *Decision Sciences. An Integrative Perspective*. NY: Cambridge University Press.

Kosters, M. & Van der Heijden, J. (2015). From mechanism to virtue: Evaluating Nudge theory. *Evaluation*, 21(3): 276-291. Retrieved April 2, 2017 from <http://journals.sagepub.com/doi/abs/10.1177/1356389015590218>.

Lam, W. (2005). Barriers to e-government integration. *The Journal of Enterprise Information Management,* 18: 511–530.

Leggett, W. (2014). The politics of behavior change: Nudge, neoliberalism and the state. *Policy & Politics*, 42(1): 3-19. Retrieved April 10, 2017 from http://dx.doi.org/10.1332/030557312X655576.

Manheim, J. B. (2011). *Strategy in Information and Influence Campaigns. How Policy Advocates, Social Movements, Insurgent Groups, Corporations, Governments and Others Get What They Want*. NY: Routledge.

McGuigan, L. & Manzerolle, V., eds. (2014). *The Audience Commodity in a Digital Age: Revisiting a Critical Theory of Commercial Media*. NY: Peter Lang.

McGuire, J. (2014). How increasing income inequality is dampening U.S. economic growth, and possible ways to change the tide. *RatingsDirect.* Retrieved May 20, 2017 from http://www.ncsl.org/Portals/1/Documents/forum/Forum_2014/Income_Inequality.pdf.

McMahon, J. (2015). Behavioral economics as neoliberalism: Producing and governing *homo economicus*. *Contemporary Political Theory*, 14(2): 137-158. Retrieved April 2, 2017 from   https://link.springer.com/article/10.1057/cpt.2014.14.

Michalek, G., Meran, G., Schwarze, R. & Yildiz, R. (2016). Nudging as a new "soft" policy tool—An assessment of the definitional scope of nudges, practical implementation possibilities and their effectiveness. *Economics Discussion Papers*, No 2016-18, Kiel Institute for the World Economy. Retrieved April 2, 2017 from http://www.economicsejournal.org/economics/discussionpapers/2016-18.

Monohan, T. (2017). Regulating belonging: surveillance, inequality, and the cultural production of abjection. *Journal of Cultural Economy*, 10(2): 191-206. Retrieved May 26, 2017 from http://www.tandfonline.com/doi/abs/10.1080/17530350.2016.1273843?journalCode=rjce20.

Mosco, V. (2009). *The Political Economy of Communication*, 2nd Edition. Los Angeles, Sage.

--------- (2014). *To the Cloud: Big Data in a Turbulent World*. Boulder, CO: Paradigm Publishers.

Napoli, P. M. (2003). *Audience Economics. Media Institutions and the Audience Marketplace*. NY: Columbia University Press.

National Academies of Sciences, Engineering & Medicine. (2017). *Information Technology and the U.S. Workforce: Where Are We and Where Do We Go from Here?* Washington, DC: The National Academies Press. doi:10.17226/24649. Retrieved March 29, 2017 from http://www.nap.edu/24649.

Obama, B. (2017, January) *Economic Report of the President, together with The Annual Report of the Council of Economic Advisors*. Washington, DC: The White House. Retrieved April 15, 2017 from https://obamawhitehouse.archives.gov/administration/eop/cea/economic-report-of-the-President/2017.

Oliver, A. (2013). From nudging to budging: Using behavioral economics to inform public sector policy. *Journal of Social Policy*, 42(4): 685-700. Retrieved April 4, 2017 from https://doi.org/10.1017/S0047279413000299.

Petrolo, R., Loscri, V., & Mitton, N. (2015). Towards a smart city based on Cloud of Things, a survey on the smart city vision and paradigms. *Transactions on Emerging Telecommunications Technologies,* pp. 1-11. Retrieved April 12, 2017 from https://hal.inria.fr/hal-01116370.

Pierce, J. J., Siddiki, S., Jones, M. D., Schumacher, K., Pattison, A., & Peterson, H. (2014). Social construction and policy design: A review of past applications. *The Policy Studies Journal*, 42(1):1-29. Retrieved April 7, 2017 from <http://onlinelibrary.wiley.com/wol1/doi/10.1111/psj.12040/full>.

Preston, P. (2001). *Reshaping Communications. Technology, Information and Social Change*. London: SAGE Publications.

Pridgen, D. (2013). Sea changes in consumer financial protection: Stronger agency and stronger laws. *Wyoming Law Review*, 13(2):405-437. Retrieved 5/18/17 from < http://repository.uwyo.edu/cgi/viewcontent.cgi?article=1052&context=wlr>.

Pykett, J. (2013). Neurocapitalism and the new neuros: Using neuroeconomics, behavioral economics and picoeconomics for public policy. *Journal of Economic Geography*, 13(5): 845-869. Retrieved March 31, 2017 from <https://academic.oup.com/joeg/article-abstract/13/5/845/918547/Neurocapitalism-and-the-new-neuros-using>.

-------, Jones, R., Welsh, M., & Whitehead, M. (2014). The art of choosing and the politics of social marketing. *Policy Studies*, 35(2): 97-114. Retrieved April 6, 2017 from http://dx.doi.org/10.1080/01442872.2013.875141.

Ramo, A. (2013). Environmental justice as an essential tool in environmental review statutes—A new look at federal policies and civil rights protections and California's recent initiatives. *Hastings W.-N.W. Env. Law & Policy*, 19(1): 41-80. Retrieved April 15, 2017 from http://digitalcommons.law.ggu.edu/cgi/viewcontent.cgi?article=1569&context=pubs.

Richards, N. M. & King, J. H. (2014). Big data ethics. *Wake Forest Law Review*, 49 : 393-432. Retrieved April 7, 2014 from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2384174.

Rodriguez, B.M.P. (2015). Smart cities: Big cities, complex governance? In M. P. Rodriguez Bolivar (Ed.) *Transforming City Governments for Successful Smart Cities*, pp. 1-8. Switzerland: Springer.

Rose, N. (2016). Reading the human brain: How the mind became legible. Surveillance *and Embodiment*, 22(2): 140-177. Retrieved April 3, 2017 from <http://journals.sagepub.com/doi/abs/10.1177/1357034X15623363>.

Rossi, U. (2016). The variegated economics and the potential politics of the smart city. *Territory, Politics, Governance,* 4(3): 337-353. Retrieved April 13, 2017 from<http://dx.doi.org/10.1080/21622671.2015.1036913>.

Rouvroy, A. (2011). Governmentality in an age of autonomic computing: technology, virtuality and Utopia. In M. Hildebrandt & A. Rouvroy (eds.), *The Philosophy of Law Meets the Philosophy of Technology: Autonomic Computing and Transformations of Human Agency*. Routledge

Sandvig, C., Hamilton, K., Karahalios, K. & Langbort, C. (2016). When the algorithm itself is a racist: Diagnosing ethical harm in the basic components of software. *International Journal of Communication*, 10 4972-4990. Retrieved April 6, 2017 from http://ijoc.org/index.php/ijoc/article/view/6182.

Schiller, D. (2014). *Digital Depression. Information Technology and Economic Crisis*. Urbana: University of Illinois Press.

Schneider, A. & Ingram, H. (1993). Social construction of target populations: Implications for politics and policy. *The American Political Science Review*, 87(2): 334-347. Retrieved April 7, 2017 from https://doi.org/10.2307/2939044.

Schüll, N. D. & Saloom, C. (2011). The shortsighted brain: Neuroeconomics and the governance of choice in time. *Social Studies of Science*, 41(4): 515-538. Retrieved April 2, 2017 from http://journals.sagepub.com/doi/abs/10.1177/0306312710397689.

Selinger, E. & Whyte, K. (2011). Is there a right way to nudge? The practice and ethics of choice architecture. *Sociology Compass*, 5(10): 923-935. Retrieved April 4, 2017 from <http://onlinelibrary.wiley.com/doi/10.1111/j.1751-9020.2011.00413.x/full>.

Sellar, S. & Thompson, G. (2016). The becoming-statistic: Information ontologies and computerized adaptive testing in education. *Cultural Studies ↔ Critical Methodologies*, 16(5): 491-501. Retrieved May 27, 2017 from < http://journals.sagepub.com/doi/abs/10.1177/1532708616655770>.

Shelton, T., Zook, M. & Wiig, A. (2015). The "actually existing smart city." *Cambridge Journal of Regions, Economy and Society*, 8(1):13-25. Retrieved April 11, 2017 from < https://academic.oup.com/cjres/article/8/1/13/304403/The-actually-existing-smart-city>.

Simon, H. A. (1955). A behavioral model of rational choice. *Quarterly Journal of Economics*, 89: 99-118. https://doi.org/10.2307/1884852. Retrieved April 2, 2017 from <http://www.math.mcgill.ca/vetta/CS764.dir/bounded.pdf>.

Smith, A. C. & Zywicki, T. (2015). Behavior, paternalism, and policy: Evaluating consumer financial protection. *New York University Journal of Law & Liberty*, 9: 201-247 Retrieved April 7, 2017 from http://lawandlibertyblog.com/s/SmithZywicki9.pdf.

Sunstein, C. (2012). The Storrs Lectures: Behavioral Economics and paternalism. *Yale Law Journal*, 122(7): 1826-1899. Retrieved April 3, 2017 from <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2182619>.

------- (2014). Nudges vs. shoves. *Harvard Law Review Forum,* 127: 210-217 Retrieved April 3, 2017 from < http://www.harvardlawreview.org/wp- content/uploads/2014/04/Sunstein-Final1.pdf>.

-------(2015a). Nudges, agency, navigability, and abstraction: A reply to critics. Draft for *Review of Philosophy and Psychology,* Special Issue on Nudges. Retrieved April 4, 2017 from https://ssrn.com/abstract=2577018.

-----(2015b). The ethics of Nudging. *Yale Journal on Regulation*, 32(2): 413-450. Retrieved April 5, 2017 from < http://digitalcommons.law.yale.edu/yjreg/vol32/iss2/6>.

Thaler, R. H. & Sunstein, C. R. (2008). *Nudge: Improving Decisions About Health, Welfare and Happiness.* New Haven, CT: Yale University Press.

Thatcher, J. (2013). Avoiding the Ghetto through hope and fear: an analysis of immanent technology using ideal types. *GeoJournal*, 78(6): 967-980. Retrieved April 12, 2017 from https://link.springer.com/article/10.1007/s10708-013-9491-0.

Tversky, A. & Kahneman, D. (1990). Rational choice and the framing of decisions. In K. S. Cook & M. Levi (Eds.), *The Limits of Rationality*, pp. 60-89, Chicago: University of Chicago Press.

U. S. Department of Transportation. (2017). *Smart City Challenge: Lessons for Building Cities of the Future.* Washington, D.C. Retrieved April 14, 2017 from https://www.transportation.gov/smartcity https://www.transportation.gov/policy-initiatives/smartcity/smart-city-challenge-lessons-building-cities-future.

Van Tuinen, H. K. (2011). The ignored manipulation of the market: Commercial advertising and consumerism require economic theories and policies. *Review of Political Economy*, 23(2): 213-231. Retrieved April 1, 2017 from <http://www.tandfonline.com/doi/abs/10.1080/09538259.2011.561558>.

Vanolo, A. (2014). Smartmentality: The smart city as disciplinary strategy. *Urban Studies*, 51(5): 883-898. Retrieved April 10, 2017 from <http://journals.sagepub.com/doi/abs/10.1177/0042098013494427>.

Wiig, A. (2015). IBM's smart city as techo-utopian policy mobility. *City*. 19(2-3): 258-273.
    Retrieved April 11, 2017 from
    http://www.tandfonline.com/doi/abs/10.1080/13604813.2015.1016275.

Woolley, S.C. & Howard, P.N. (2016). Communication, computational propaganda, and
    autonomous agents. *International Journal of Communication*, 10: 4882-4890, Retrieved
    May 20, 2017 from < http://ijoc.org/index.php/ijoc/article/viewFile/6298/1809>.

Wright, J. D. & Ginsburg, D. H. (2012). Behavioral law and economics: Its origins, fatal flaws,
    and implications for liberty. *Northwestern University Law Review*, 106(3): 1033-1088.
    Retrieved April 3, 2017 from
    <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2147940>.

Yeung, K. (2012). Nudge as fudge. *Modern Law Review*, 75(1): 122-148. Retrieved April 4, 2017
    from http://onlinelibrary.wiley.com/doi/10.1111/j.1468-2230.2012.00893.x/full.

Zuboff, S. (2015). Big other: Surveillance capitalism and the prospects of an information
    civilization. *Journal of Information Technology*, 30(1): 75-89. Retrieved April 14, 2017
    from https://link.springer.com/article/10.1057/jit.2015.5.