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Research Article

Behavioral Public Administration *ad fontes:* A Synthesis of Research on Bounded Rationality, Cognitive Biases, and Nudging in Public Organizations

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Abstract: *This article provides a comprehensive overview of how policy makers, practitioners, and scholars can fruitfully use behavioral science to tackle public administration, management, and policy issues. The article systematically reviews 109 articles in the public administration discipline that are inspired by the behavioral sciences to identify emerging research trajectories, significant gaps, and promising applied research directions. In an attempt to systematize and take stock of the nascent behavioral public administration scholarship, the authors trace it back to the seminal works of three Nobel Laureates—Herbert Simon, Daniel Kahneman, and Richard Thaler—and their work on bounded rationality, cognitive biases, and nudging, respectively. The cognitive biases investigated by the studies reviewed fall into the categories of accessibility, loss aversion, and overconfidence/optimism. Nudging and choice architecture are discussed as viable strategies for leveraging these cognitive traps in an attempt to alter behavior for the better, among both citizens and public servants.*

Evidence for Practice

- Understanding how public decisions may predictably go wrong is imperative to improve the architecture of public organizations and services.
- Cognitive biases systematically affect public policy and management decisions.
- Behavioral science illuminates the gap between how people should behave and how they actually behave, thus moving beyond traditional models of full rationality in decision making.
- Nudging and choice architecture represent viable tools for policy makers and public managers interested in altering the behaviors of citizens and public employees, respectively, for individual and societal better.

> *"A choice architect has the responsibility for organizing the context in which people make decisions … there is no such thing as a 'neutral' design."*
>
> —Richard H. Thaler and Cass R. Sunstein (2008, 1).

Decisions in the public sector are often shaped by a complex array of forces. This is especially true in the fluid environment of the information age, when public managers are inundated with countless challenges (e.g., Kelman, Sanders, and Pandit 2016). Ready access to data, adaptable technology, and an ever-combative political environment contribute to the complexity of decision making in the public sector. Taking action on public policy means public managers must overcome not only these complexities in their environment but also their own cognitive limitations and moral impasses. Understanding how supposedly irrelevant factors of choice architecture may alter public decision making in predictable ways (Thaler 2017; Thaler and Sunstein 2008) is an increasingly germane topic for further research (Gordon, Kornberger, and Klegg 2009; Kelman, Sanders, and Pandit 2016; Moynihan, Herd, and Harvey 2014; Vlaev et al. 2016). Influencing public managers' decision processes from a more informed assessment of cognitive biases and libertarian paternalism has the potential to improve effectiveness through strategic choices that shape goal attainment.

A more robust analysis of the micro-level foundations (e.g., Jones 2003) of public decision making is timely, given the numerous and often insurmountable complex influences facing public managers (Kelman, Sanders, and Pandit 2016). Behavior modification techniques offer a better understanding of how we might influence decision making through heuristics that nudge public managers in ways that result in outcomes that are more favorable. Structuring decision making in ways that positively influence cognitive biases has the potential to moderate complexity in the public sector environment, subsequently reducing learning, psychological, and

compliance costs (Cantarelli, Bellé, and Belardinelli 2018). From a practical standpoint, such cognitive strategies have the potential to nudge public managers in a direction that improves individual performance, overall productivity, and informs evidence-based policy (Clement 1987; Vlaev et al. 2016).

A robust discussion has begun on decision-making biases in public management, administration, and policy. Most scholars have investigated how citizens make informed assessments of government policies (see, e.g., Andersen and Hjortskov 2015; Geys and Sørensen 2017; Grosso, Charbonneau, and Van Ryzin 2017; Jilke, Van Ryzin, and Van de Walle 2016; Marvel 2015b; Olsen 2017b). Fewer studies, however, have reviewed the decision processes of public managers (e.g., Bellé, Cantarelli, and Belardinelli 2017) and policy makers (e.g., Moynihan and Lavertu 2012). This research supports the need for continued systematic literature reviews of cognitive biases as a means for providing useful information for how we might affect individuals' estimates, judgments, preferences, and behaviors.

Indeed, recent work conducted by the Organisation for Economic Co-operation and Development (OECD) has highlighted the usefulness of behavioral and cognitive sciences toward sustainable public administration. Analyzing 159 case studies from 60 public bodies in 23 states and 2 international institutions, the OECD (2017) reported that attempts to use behavioral insights to inform policies are underway across numerous policy areas, including, consumer behavior, education, energy, environment, finance, health and safety, labor market, service delivery, taxes, and telecommunications.

However, seeing through a glass darkly may be a more apt assessment of the broader contribution of behavioral sciences to public administration. A systematic review at this time in the field provides an opportunity for moving beyond how systematic errors work to pinpointing which have proven useful in our research and the means for moving toward more fruitful heuristic interpretations. Thus, our study aims to provide greater clarity in an effort to avoid wrong assumptions about the use of choice architecture to curtail biases in decision making. Specifically, this article provides a research synthesis of the public administration, management, and policy studies linked to the work of the three Nobel Laureates: Herbert Simon, Daniel Kahneman, and Richard Thaler. By looking at their seminal works on bounded rationality, cognitive biases, nudging and choice architecture, our comprehensive synthesis traces behavioral public administration scholarship back to its sources (*ad fontes*) and highlights promising research directions and practical implications. Simon's theory of bounded rationality provides a more circumspect assessment of factors that limit rational choices by individuals. Kahneman's work, which is empirically driven and descriptive in nature rather than normative, unveils a number of heuristics that people adopt to make difficult decisions and a series of cognitive biases that systematically lead us astray. Thaler's nudge theory systematizes the use of behavioral science to influence high-stake choices through low-powered incentives, thus paving the way toward libertarian paternalism.

Bounded Rationality, Cognitive Biases, and Nudging

Several decades of behavioral research have buttressed Simon's (1947, 1956) claim that we are endowed with bounded rationality and, in the face of information that is either intractable or incomplete, tend to find solutions that are adequate rather than optimal (e.g., Olsen 2015b). Simon's conceptualization of this "satisficing" strategy paved the way for later work aimed at providing a more realistic representation of human decision processes compared with postulates by rationalistic models, such as Bernoulli's ([1738] 1954) expected utility theory. In particular, Kahneman and Tversky's prospect theory (1979) has extended Bernoulli's utility theory along several dimensions. First, they demonstrate that utility does not depend exclusively on the amount of wealth one has at any given time, but rather on whether that wealth is the result of a gain or a loss from a particular reference point—an irrelevant supposition according to rational choice models. Another supposedly irrelevant factor—whether the same piece of information is framed in terms of prospective losses or in terms of prospective gains—makes individuals risk seeking, thus violating the tenet of risk aversion that underpins expected utility theory (Tversky and Kahneman 1981). The fact that these deviations from rational decision making tend to be systematic—hence predictable—under specific conditions (e.g., Kahneman 2011) brings with it the possibility of strategically exploiting cognitive biases, for better or worse (Thaler and Sunstein 2008).

Rational choice models and behavioral theories portray two different types of agents, which Thaler and Sunstein (2008) identify as "Econs" and "Humans," respectively. Econs do not follow fashion and make unbiased estimates. More precisely, their estimates are not necessarily perfect, because this would convey omniscience; rather, when their judgments are wrong, they are not systematically so in a predictable direction. Conversely, Humans are social animals (i.e., they are influenced by the behaviors of others) and make predictable errors.

Kahneman (2011) traces systematic patterns of deviation from rational decision making to system 1 thinking, which, along with the perceptual system, presides over intuition. The perceptual system processes percepts, deals with stimulations in the moment during which they are administered, and is stimulus-bound. System 1, instead, deals with conceptual representations; can refer to past, present, and future; and is evoked by language. Both are fast, automatic, effortless, slow learning, and associative. They produce impressions of the attributes of objects that are to be evaluated automatically, involuntary, and even without the need of being verbally overt. Reasoning, instead, happens in system 2 thinking, which is slow, controlled, effortful, flexible, and rule governed. Like system 1, system 2 uses cues; can refer to past, present, and future; and is evoked by language. System 2 thinking produces judgments based on either intuitions or deliberate reasoning. Judgments are an intentional and explicit process, regardless of whether they are verbally expressed or not (e.g., Kahneman 2002, 2011). Overall, individuals make decisions through one of the following mechanisms, in order of likelihood: (1) an intuitive judgment is elicited and endorsed by system 2; (2) an intuitive judgment is evoked and serves as an anchor to be adjusted by system 2 in light of other situational features; (3) a deliberate judgment is created by system 2 because no intuitive judgment is accessible; or (4) a deliberate judgment is generated by system 2 because the intuitive judgment that came to mind is identified as incorrect. System 1 and 2 are also known as automatic and reflective systems, respectively (Thaler and Sunstein 2008).

Differences in the degree of accessibility of the features of a given situation set the stage for a better understanding of how individuals actually make decisions. Indeed, heuristics generate systematic errors through the attribute substitution mechanism, which implies that people tend to "evaluate a difficult attribute by substituting a more accessible one" (Kahneman 2002). In the first example provided by Tversky and Kahneman (1974), the blur and contours of a mountain are typically substituted for the evaluation of its distance. The use of clarity in assessing distance has some validity but may also lead to systematic errors: distance overestimation on foggy days and underestimation on sunny days. Heuristics, therefore, are effective from an ecological perspective because they are shortcuts that reduce complexity (e.g., Gigerenzer, Todd, and ABC Research Group 1999; Smith 2003). Yet heuristics may also lead to systematic errors because they lead individuals confronted with difficult questions into choosing the path of least resistance instead of using features for a situation of high accessibility (e.g., Ariely 2010; Kahneman 2002, 2011). However, it is not necessarily the case that the most accessible mental content is also the most relevant to good decisions. Systematic errors stemming from reliance on heuristics are known as cognitive biases—systematic deviations from the norm whereby individual subjective social reality directs responses to stimuli as opposed to objective standards (Bless, Fiedler, and Strack 2004) (table 1).

Work on how to intervene on cognitive biases and improve decision making in individuals' own interests has flourished recently. Based on Thaler's 2017 Nobel Prize–winning research, libertarian paternalism rests on the assumption that decisions occur in a context in which small variations in said context can greatly influence final decisions (Sunstein and Thaler 2003). Choice architects, for better or worse, can exert that influence. Public administrators can exert libertarian paternalism by simultaneously preserving everyone's freedom of choice and using nudges that influence choosers' behaviors so that they will be better off, as judged by themselves. Indeed, subjects often make decisions that they would have avoided if they had full attention, complete information, unlimited cognitive abilities, and complete self-control. In other words, individuals need help to make good decisions and governments may be a perfect candidate to take on this role (Thaler 2017; Thaler and Sunstein 2008).

Table 1 Behavioral Public Administration Back to Its Sources (*ad fontes*)

THINKING MODE	
System 1	System 2
Intuition	Reasoning
Automatic system	Reflective system
THINKING PROCESS	
Fast	Slow
Parallel	Serial
Automatic	Controlled
Effortless	Effortful
Associative	Rule governed
Slow learning	Flexible
DEFAULT FOR	
Humans	Econs
Doers	Planners
DECISION-MAKING ERRORS	
Predictable	Random
NUDGES MAY MITIGATE DECISION-MAKING ERRORS	
Yes	No

Sources: Adapted from Kahneman (2002, 2011), Thaler (2015, 2017), and Thaler and Sunstein (2008).

Nudging seeks to change behaviors among those actors who, upon deliberate reflection, would have made different decisions for themselves (e.g., Beattie et al. 1994). A nudge is "any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid. Nudges are not mandates. Putting the fruit at eye level counts as a nudge. Banning junk food does not" (Thaler and Sunstein 2008, 6). The selection of one default option instead of another is an example of a nudge that has gently guided individuals' decisions toward desired outcomes across policy domains (e.g., Abadie and Gay 2006; Carroll et al. 2009; Cronqvist and Thaler 2004: Duflo et al. 2006; Johnson and Goldstein 2003). As subjects like to conform to others (e.g., Bond and Smith 1996), information and peer pressure are also potential tools to nudge citizens via social influence in different public policy areas (e.g., Christakis and Fowler 2007; Cialdini 2003). Priming and self-persuasion exercises may also serve the same purpose of gently leading choosers in a desired direction (e.g., Aronson 1999; Levav and Fitzsimons 2006). In our field, Linos, Reinhard, and Ruda (2017) showed how nudges can be used to increase diversity among police forces. Nudges preserve individuals' liberty of choice rather than being rigid in nature, are informed by behavioral science evidence rather than by rational models of decision making, and address negative internalities (i.e., improving the welfare of those toward whom the intervention is targeted) instead of externalities (Oliver 2015).

Individuals tend to benefit the most from the presence of a nudge when they have to make a difficult and/or rare choice, they have to make a decision for which they do not get prompt feedback, or when they are not well equipped for translating some aspects of the situation into terms that they can easily understand. Such situations include, for example, the selection of how much to save for retirement (e.g., Benartzi 2001; Benartzi and Thaler 2007; Thaler and Benartzi 2004), the decision of whether to be an organ donor, the selection of a health insurance plan (e.g., Abaluck and Gruber 2011), or the choice of how much pollution to emit in the environment (e.g., Ellerman and Buchner 2007; Schultz et al. 2007).

Additional tools to intervene on cognitive biases are debiasing and re-biasing strategies. Larrick (2004) identifies three categories of debiasing strategies: motivational, cognitive, and technological. According to Heath, Larrick, and Klayman (1998), these debiasing strategies are more effective when they are simple as opposed to complex, domain-specific rather than domain-general, socially instead of individually administered, and bottom-up rather than top-down. Motivational strategies rest on the assumption that cognitive biases—that is, any systematic gaps between normative and descriptive decision making—can be reduced by motivating individuals to perform well. Provided that the incentives are large enough, logic asserts that individuals will pay more attention and system 2 thinking will kick in. Motivational strategies entail the use of either incentives or social accountability. Incentives seem to have a limited effect beyond motivating individuals to perform boring tasks or utilize beneficial skills for a short time (Camerer and Hogarth 1999). Motivational strategies may even backfire, for example, by exacerbating justification-based biases. Cognitive strategies, then, include three main techniques: asking

individuals to consider the opposite, training in rules, and training in representations. Encouraging individuals to consider the opposite or to ask themselves some reasons why their initial judgments may be wrong have proven effective in decreasing confirmation bias and anchoring effects (Arkes 1991; Mussweiler, Strack, and Pfeiffer 2000; Soll and Klayman 2004). Whereas experience may not help counteracting cognitive biases (Hogarth 2001), scholars have demonstrated that training may be effective in enhancing the strategies in system 2 and helping individuals understand when to use them as a system 1 process (Larrick, Morgan, and Nisbett 1990; Lehman and Nisbett 1990; Nisbett 1993). Training in representations (Sedlmeier 1999) entails training individuals to translate probabilities into frequencies on the grounds that people tend to reason more accurately about frequencies than probabilities (Tversky and Kahneman 1983). Lastly, technological strategies entail supporting individuals through external tools such as decision models, decision-making software, or group decision making. As an example of the latter, simply averaging individual forecasts has proven effective in improving predictions and estimations (Clemen 1989). In line with debiasing strategies, scholars have proposed re-biasing strategies that entail the use of one bias to offset another (e.g., Thaler and Benartzi 2004).

Remedying the potential effects of cognitive biases is far from easy since decisions about the future are consistently affected not only by the choice architecture of options and decision environments but also by memories of the past. Yet memories of the past are imperfect, prone to biases themselves, and susceptible to failures. Extensive scholarship has shown that when individuals assess a past experience, they are insensitive to its duration and weight two singular moments, the peak and the end, much more than any others. The combination of these two mechanisms systematically make subjects prefer a shorter period of intense happiness over a longer period of moderate joy or a longer period of moderate pain over a shorter period of intense pain (e.g., Kahneman et al. 1993; Redelmeier, Katz, and Kahneman 2003). In a study by Redelmeier, Katz, and Kahneman (2003), all participants underwent colonoscopy, and a random half of them experienced a strictly worse procedure: they had a short interval of time added to the end of the conventional procedure during which the colonoscope remained within the body. Compared with patients who underwent the shorter procedure, patients who had the longer procedure rated the final moment as less painful, scored the overall experience as less unpleasant, and were slightly more likely to return for a repeat colonoscopy on average. The addition of a nonpharmacological and clinically irrelevant step in the medical procedure, thus, lessened participants' memories of pain and increased the likelihood of desired future behaviors. Similarly, 80 percent of participants in the Kahneman and colleagues' study (1993) preferred more pain over less because the more painful experience had left them with a better memory. After being exposed to two aversive experiences (immersion of one hand in water at 14 °C for 60 seconds; immersion of the other hand in water for 90 seconds, at 14 °C for 60 seconds and at 15 °C for 30 seconds), the majority of subjects chose to repeat the long trial.

The foregoing evidence supports the human tendency to confound experience and the memory of it eliciting a distinction between the experiencing self and the remembering self—concepts that should be considered jointly since their interests often collide. The experiencing self evaluates actual experiences underway, replies to the question "does the experience hurt now?" and does not make any decisions. The remembering self, on the contrary, retrospectively rates past experiences overall, replies to the questions "how was the experience, on the whole?" and exerts decision-making power by depositing stories for future reference. The remembering self is a product of system 2 thinking and is based on the duration neglect mechanism and the peak-end rule—a psychological phenomenon in which people base their assessment of an experience on a singular intensity and end as opposed to the sum total of said experience. In the words of Kahneman, "odd as it may seem, I am my remembering self, and the experiencing self, who does my living, is like a stranger to me" (2011, 390).

In the following sections, we describe the methodology for our systematic review of studies in public administration. Using this methodology, we trace the body of behavioral public administration knowledge to its source in our discipline. We then classify the cognitive biases, research designs, units of analysis, countries, and decision domains that characterize behavioral public administration scholarship (e.g., Grimmelikhuijsen et al. 2017). We conclude by discussing emerging research trajectories, significant gaps, and promising applied research directions that may be of interest to policy makers, practitioners, and scholars alike.

Methods

To synthesize research on cognitive biases in our field, we systematically reviewed articles published in 10 journals. Following recent practices (e.g., Bellé, Cantarelli, and Belardinelli 2017), we used the most recent ISI Journal Citation Reports—Social Science Edition (Thomson Reuters 2017) for the public administration category to identify the outlets that have at least two of the following characteristics: (1) are top-tier journals in public administration; (2) are most likely to consider work grounded in behavioral science in their stated scope; (3) have recently published behavioral studies. Based on these criteria, we selected the following nine journals (in alphabetical order): *Governance* (*Gov*), *International Public Management Journal* (*IPMJ*), *International Review of Administrative Sciences* (*IRAS*), *Journal of Policy Analysis and Management* (*JPAM*), *Journal of Public Administration Research and Theory* (*JPART*), *Public Administration* (*PA*), *Public Administration Review* (*PAR*), *Public Management Review* (*PMR*), and *Review of Public Personnel Administration* (*ROPPA*). The tenth outlet that we reviewed is the *Journal of Behavioral Public Administration* (*JBPA*), which only recently published its inaugural issue. We included JBPA because its mission to "reflect [on] the application of behavioral science to questions of either theoretical or practical relevance to the field of public administration" (Jilke, Meier, and Van Ryzin 2018, 1) perfectly matches the nature of our systematic review.

Building on the methodological approach of extant research syntheses on cognitive biases in specific professional domains (e.g., Blumenthal-Barby and Krieger 2015; Saposnik et al. 2016), we conducted a preliminary search for articles in our 10 journals using "cognitive bias" and "nudge" as keywords to be found anywhere in the article. This preliminary phase enabled us to identify a set of specific systematic errors, which we search for separately in turn. More precisely, we used as keywords the combination of biases listed in the second column of table 2 with "bias" or "effect." For

Table 2 Cognitive Biases Investigated in Behavioral Public Administration through a Descriptive Approach

Latent Cognitive Cause	Observable Cognitive Bias	Primary Study	Research Design	Unit of Analysis (sample size)	Country	Decision Domain	Outcome Variable	Estimated Effect on Outcome
Accessibility	Anchoring	Bell, Huber, and Viscusi (2009), *JPAM*	Observational survey	Citizens (3,654)	USA	Environmental protection	Categorical; in favor of/against/indifferent to a policy	N.A.
	Anchoring	Feeney (2012), *JPART*	Survey experiment	Public managers (902)	USA	Public personnel management	Interval discrete scale; red tape	Significant
	Anchoring	Gregory, McDaniels, and Fields (2001), *JPAM*	Case study	Hydroelectric facility	Canada	Environmental protection	Evidence-based policy making and adoption of superior policies	N.A.
	Anchoring	Grimmelikhuijsen and Porumbescu (2017), *PMR*	Survey experiment	Citizens (309)	USA	Urban services	Interval discrete scale; satisfaction and performance evaluation	Mixed
	Anchoring	Pandey and Marlowe (2015), *ROPPA*	Survey experiment	Senior managers (372)	USA	Public personnel management	Interval discrete scale; red tape	Mixed
	Anchoring, halo	Bellé, Cantarelli, and Belardinelli (2017), *ROPPA*	Survey experiment	Public managers and employees (600)	Italy	Public personnel management	Ratio continuous scale; performance evaluation	Significant
	Anchoring, proportion dominance, status quo	Bellé, Cantarelli, and Belardinelli (2018), *PAR*	Survey experiment	Public managers and employees (600)	Italy	Public policy and management	Ratio continuous scales; days needed to reply to inquiries, working hours dedicated to a project	Significant
	Anchoring, bandwagoning, halo, denominator neglect	Cantarelli, Bellé, and Belardinelli (2018), *ROPPA*	Survey-in-the-field-experiment	Nurses	Italy	Public personnel management	Ratio continuous scale; performance evaluation and propensity to implement a project	Significant
	Anti–public sector	Marvel (2015b), *JPART*	Survey experiment	Citizens (299)	USA	Postal services	Interval discrete scale; performance evaluation	Significant
	Anti–public sector bias	Christensen et al. (2018), *JPART*	Survey experiment	Elected officials (988)	Denmark	Education	Binary; two schools	Significant
	Anti–public sector bias	Hvidman and *Andersen* (2015), PAR	Survey experiment	Students (148)	Denmark	Health care	Interval discrete scale; performance evaluation	Mixed
	Anti–public sector bias	Marvel (2015a), *IPMJ*	Field experiment	Citizens (1,200)	USA	Postal services	Interval discrete scale; performance evaluation	Significant
	Availability	Alon-Barkat and Gilad (2017), *JPART*	Survey experiment	Citizens (507)	Israel	Energy	Interval discrete scale; trust, satisfaction, and performance evaluation	Mixed
	Availability	Andersen and Hjortskov (2015), *JPART*	Survey experiment	Citizens (944)	Denmark	Education	Interval discrete scale; satisfaction and performance evaluation	Significant
	Availability	Haynes et al. (2013), *JPAM*	Field experiment	Citizens (5,450)	UK	Transportation	Ratio continuous scale; average amount paid	Significant
	Availability	Karens, Klijn, and Voets (2016), *PAR*	Lab experiment	Students (213)	Belgium, Poland, Netherlands	Public branding	Interval discrete scale; trust	Significant
	Availability	Marks and Gerrits (2017), *PMR*	Lab experiment	Students (275)	—	—	Binary; choice between two paired (self and co-player) payoffs	Significant
	Availability	John and Blume (2018), *JBPA*	Field experiment	Local Taxpayers (7,951)	UK	Collecting taxes	Amount of taxes paid	Significant
	Bandwagoning	Bellé et al. (forthcoming), *IPMJ*	Survey experiment	Public managers and employees (600)	Italy	Education and personnel management	Binary; choice between two software/training programs	Mixed
	Bureauphobia	del Pino, Calzada, and Días-Pulido (2016), *PAR*	Observational survey	Citizens (7,924)	Spain	Citizen-government relations	Interval discrete scale; trust	Mixed
	Confirmation	Baekgaard and Serritzlew (2016), *PAR*	Survey experiment	Citizens (1,784)	Denmark	Health care	Binary; best performers between two organizations	Mixed
	Confirmation	Filtenborg, Gaardboe, and Sigsgaard-Rasmussen (2017), *PMR*	Survey experiment	Citizens (1,425)	Denmark	Urban services	Interval discrete scale; satisfaction	Significant

Table 2 Continued

Latent Cognitive Cause	Observable Cognitive Bias	Primary Study	Research Design	Unit of Analysis (sample size)	Country	Decision Domain	Outcome Variable	Estimated Effect on Outcome
	Confirmation	Grimmelikhuijsen and Klijn (2015), *PA*	Field experiment	Citizens (1,049)	Denmark	Judicial system	Interval discrete scale; trust	Significant
	Confirmation	Grimmelikhuijsen and Meijer (2012), *JPART*	Survey experiment	Citizens (570)	Netherlands	Citizen-government relations	Interval discrete scale; trust	Not significant
	Confirmation	James (2007), *JPART*	Observational survey	Citizens (3,065)	UK	Urban services	Binary; satisfied/not satisfied with services	Significant
	Confirmation	James and Van Ryzin (2016), *JPART*	Survey experiment	Citizens (661)	USA	Health care	Interval discrete scale; evidence solidity	Mixed
	Confirmation	Morgeson (2013), *JPART*	Observational survey	Citizens (1,480)	USA	Citizen-government relations	Interval discrete scale; satisfaction and performance evaluation	Significant
	Confirmation, status quo	Moynihan and Lavertu (2012), *PAR*	Observational survey	Elected officials (1,468)	USA	Election administration	Interval discrete scale; policy and governance preferences	Mixed
	Confirmation	Pedersen, Stritch, and Taggart (2017), *PA*	Survey experiment	Citizens (823)	USA	Public personnel management	Interval discrete scale; procedural fairness	Significant
	Confirmation	Piehler, Wirtz, and Daiser (2016), *PMR*	Observational survey	Citizens (477)	Germany	E-government	Interval discrete scale; willingness to continue the use of e-services	Significant
	Confirmation	Porumbescu (2016b), *PMR*	Observational survey	Citizens (1,100)	South Korea	E-government	Interval discrete scale; trust	Mixed
	Confirmation	Van Ryzin (2004), *JPAM*	Observational survey	Citizens (1,500)	USA	Urban services	Interval discrete scale; satisfaction, and performance evaluation	Significant
	Confirmation	Van Ryzin (2006), *JPART*	Observational survey	Citizens (615)	USA	Urban services	Interval discrete scale; satisfaction, and performance evaluation	Significant
	Confirmation	Van Ryzin (2013), *JPAM*	Survey experiment	Citizens (964)	Canada, Europe, USA	Urban services	Interval discrete scale; satisfaction, and performance evaluation	Significant
	End of history illusion	Van Ryzin (2016), *PA*	Observational survey	Public employees (220)	Canada, Europe, USA	Public personnel management	Interval discrete scale; work motivation	Significant
	Halo	Burden et al. (2012), *PAR*	Observational survey	Municipal clerks (1,388)	USA	Election administration	Binary and interval discrete scales; policy and governance preferences	Significant
	Halo	Favero, Meier, and O'Toole (2014), *JPART*	Observational survey	Teachers (3,267)	USA	Education	Students' performance	Not significant
	Halo	Kisida and Wolf (2015), *IPMJ*	Field experiment	Students (1,230) and their parents	USA	Education	Interval discrete scale; satisfaction	N.A.
	Information	Korthagen (2015), *PMR*	Case study	News reports	Netherlands	Mass media	Media attention	N.A.
	Information overload	Walgrave and Dejaeghere (2017), *Gov*	Case study	Elite politicians (14)	Belgium	Information processing by policy elite	Information processing	N.A.
	Misconceptions of probability	Chirinko and Harper (1993), *JPAM*	Archival data	Citizens	USA	Transportation	Ratio scale; motor vehicle fatalities	N.A.
	Misconceptions of probability	Weil et al. (2006), *JPAM*	Case study	Policy areas (8)	USA	Transparency regulation	Effectiveness	N.A.
	Precision cues	Olsen (2017b), *PAR*	Survey experiment	Citizens (1,013)	Denmark	Health care	Binary, two types of information; interval discrete scale on performance evaluation	Mixed
	Precision cues	Olsen (2018), *JBPA*	Survey experiment	Citizens (1,505)	Denmark	Citizen-government relations	Binary, two types of information; interval discrete scale on confidence, and ratio (probability)	Significant

Table 2 Continued

Latent Cognitive Cause	Observable Cognitive Bias	Primary Study	Research Design	Unit of Analysis (sample size)	Country	Decision Domain	Outcome Variable	Estimated Effect on Outcome
	Psychological distance	Porumbescu (2016a), *PMR*	Observational survey	Citizens (1,100)	South Korea	E-government	Interval discrete scale; trust	N.A.
	Question order	Van de Walle and Van Ryzin (2011), *PA*	Survey experiment	Citizens (1,638)	USA	Citizen-government relations	Interval discrete scale; satisfaction and performance evaluation	Significant
	Recall	Henry, Lubell, and McCoy (2012), *JPAM*	Observational survey	Policy elites (752)	USA	Transportation	Ratio continuous scale; number of network members	Mixed
	Recall	Shinohara (2017), *JPART*	Observational survey	Citizens (245)	Japan	Economics and financial sustainability	Interval discrete scales; intention to move out of municipality and voice for local governance	Mixed
	Recall	Weiss (1982), *JPAM*	Lab experiment	Students (132)	USA	Public policy	Binary variable and open-ended questions; decision to adopt a policy and arguments in favor/against the decision	Significant
	Self-deception	Atkinson and Fulton (2013), *IPMJ*	Case study	Sponsorship scandals	Canada	Anticorruption	Adherence to rules	N.A.
	Status quo	Jilke 2015, *PA*	Observational survey	Citizens (24,815)	Europe	Telecommunication	Categorical; switching provider	Mixed
	Status quo	Jilke, Van Ryzin, and Van de Walle (2016), *JPART*	Survey experiment	Citizens (1,154)	USA	Energy	Categorical; service provider selection	Significant
	Status quo	McDaniels (1996), *JPAM*	Case study	Regional government	Canada	Election administration	Outcome of different methods for eliciting public preferences	N.A.
	Status quo	Moseley and Stoker (2015), *IPMJ*	Survey experiment	Citizens (4,005)	UK	Health care	Binary; click/lack thereof to an organ donation website	Significant
	Status quo	Shpaizman (2017), *PA*	Case study	Prescription drug coverage	USA	Health care	Policy drift	N.A.
Loss aversion	Decoy, framing	Bellé, Cantarelli, and Belardinelli (2018), *PAR*	Survey experiment	Public managers and employees (600)	Italy	Public policy and management	Categorical; three options of a newspaper's subscriptions. Ratio continuous scale; propensity to purchase a software. Binary; choice between contractors/ software/two plans	Significant
	Decoy, framing, zero-risk	Cantarelli, Bellé, and Belardinelli (2018), *ROPPA*	Survey-in-the-field-experiment	Nurses	Italy	Public personnel management	Categorical; three options of instruments. Ratio continuous scale; propensity to adopt a software. Binary; choice between two plans	Significant
	Framing	Baekgaard (2017), *PA*	Survey experiment	Citizens (1,395)	Denmark	Education	Binary; choice between two reforms	Significant
	Framing	Belardinelli et al., (2018), *PAR*	Survey experiment	Public managers	Italy	Urban services	Ratio continuous scale; performance evaluation, effort and budget allocation intentions	Mixed
	Framing	Gilad, Bloom, and Assouline (2018), *JBPA*	Field experiment	Public employees (165)	Israel	Public personnel management	Interval discrete scale; organizational identity and commitment	Not significant
	Framing	Grosso, Charbonneau, and Van Ryzin (2016), *IPMJ*	Survey experiment	Citizens (774)	USA	Health care	Interval discrete scale; satisfaction	Significant
	Framing	Hjortskov (2017), *PA*	Survey experiment	Citizens (1,608)	USA	Citizen-government relations	Interval discrete scale; satisfaction	Significant
	Framing, negativity	Olsen (2015a), *PAR*	Survey experiment	Citizens (3,443)	Denmark	Health care	Ratio continuous scale; performance evaluation	Significant

Table 2 Continued

Latent Cognitive Cause	Observable Cognitive Bias	Primary Study	Research Design	Unit of Analysis (sample size)	Country	Decision Domain	Outcome Variable	Estimated Effect on Outcome
	Negativity	Charbonneau and Van Ryzin (2015), *PMR*	Survey experiment	Citizens (595)	USA	Education	Interval discrete scale; performance evaluation	N.A.
	Negativity	Di Mascio and Natalini (2013), *IPMJ*	Observational survey	Public employees (169)	Italy	Reform implementation	Binary; implementation/lack thereof of performance management tools	N.A.
	Negativity	Dixon et al. (2013), *PA*	Archival data	Media coverage	Europe	Education	Number of articles	N.A.
	Negativity	George et al. (2018), *PA*	Survey experiment	Elected officials (1,240)	Belgium	Economics and financial sustainability	Interval discrete scale; performance information use	Mixed
	Negativity	Geys and Sørensen (2017), *PAR*	Survey experiment	Councilors (3,607)	Norway	Education	Categorical; adoption/lack thereof of policies	Significant
	Negativity	Holm (2017), *PA*	Survey experiment	School principals (158)	Denmark	Education	Ratio continuous scales; performance evaluation and need for action	Mixed
	Negativity	Holm (2018), *JPART*	Archival data	School principals (158)	Denmark	Education	Binary; goal prioritized or not	Significant
	Negativity	Hood and Dixon (2010), *JPART*	Archival data	Electoral opinion pool data and reports	UK	Health care and education	Credit obtained by incumbent politicians	N.A.
	Negativity	James and John (2006), *JPART*	Archival data	Local elections	UK	Urban services	Vote share of incumbents	Significant
	Negativity	James and Moseley (2014), *PA*	Field experiment	Citizens (624)	UK	Waste recycling services	Interval discrete scale; satisfaction	Significant
	Negativity	Jilke (2017), *Gov*	Observational survey	Citizens (3,353)	Netherlands	Citizen-government relations	Interval discrete scale; satisfaction	Mixed
	Negativity	Kuehnhanss et al. (2017), *PA*	Survey experiment	Civil servants (69)	European Parliament	Public policy	Binary; choice between two policies	N.A.
	Negativity	Moynihan (2012), *Gov*	Case study	Policy networks	USA	Crisis management	Blame and reputation	N.A.
	Negativity	Nielsen and Baekgaard (2015), *JPART*	Survey experiment	Elected officials (844)	Denmark	Education	Interval discrete scale; attitudes to spending and reform	N.A.
	Negativity	Nielsen and Moynihan (2017a), *JPART*	Survey experiment	Elected officials (1,016)	Denmark	Education	Interval discrete scale; attribution of responsibility to bureaucratic leaders	Mixed
	Negativity	Nielsen and Moynihan (2017b), *Gov*	Observational survey	Elected officials (996)	Denmark	Politician-bureaucrat relations	Interval discrete scale; responsibility attribution	Not significant
	Negativity	Overman (2017), *Gov*	Observational survey	Citizens (10,856)	Europe	Citizen-government relations	Interval discrete scale; satisfaction	Significant
	Omission	Olsen (2017c), *PMR*	Survey experiment	Citizens (2,007)	Denmark	Urban services/ employment policy	Ratio continuous scale; satisfaction	N.A.
	Reference point	Nicholson-Crotty, Nicholson-Crotty, and Fernandez (2017), *PAR*	Observational survey	Public employees (167,392)	USA	Public personnel management	Interval discrete scale; empowerment and innovation	Significant
	Reference point, negativity	Olsen (2017a), *JPART*	Survey experiment	Citizens (3,443)	Denmark	Education	Ratio continuous scale; performance evaluation	Significant
Overconfidence /Optimism	Overconfidence	Liu, Stoutenborough, and Vedlitz (2017), *Gov*	Observational survey	Public employees (579)	USA	Environmental protection	Interval discrete scale; knowledge	Significant
	Optimism	Barrows et al. (2016), *JPART*	Survey experiment	Citizens (4,206)	USA	Education	Interval discrete scale; performance evaluation	Mixed
	Optimism	Meier et al. (2015), *PA*	Observational survey	Principals (2,712)	Denmark, USA	Education	Interval discrete scale; performance evaluation	Significant

Note: The N.A. category includes studies that do not provide any quantitative estimates of the treatment effect.

example, our preliminary search returned a number of studies in our discipline that investigated confirmation and halo phenomena. Therefore, we separately searched for articles using "confirmation bias" and "halo effect" as keywords (in quotes) in the second phase. Overall, these searching criteria ensured that the returned articles would include all the typologies of work that are relevant for our research synthesis: works that study cognitive bias(es) strictly speaking, theoretically and/or empirically; works that investigate heuristics that lead to decision-making errors; and works that explore external interventions, such as debiasing and re-biasing techniques and/or nudges, aimed at mitigating or eliminating systematic errors in decision making.

Our two-step procedure returned 1,362 primary studies, which we screened by reading the titles and abstracts. After eliminating articles that were unequivocally out of the research synthesis scope (because, for instance, the focus was common source bias), we split among ourselves 391 primary studies to make an in-depth assessment of fit with the study purposes and retained two types of work. First, we kept articles that adopted a descriptive approach to investigate whether and how subjects' decision making departs from that of a robot confronted with the same alternatives. Using the terminology of Thaler (e.g., 2017), we retained empirical work that illuminates how the predictably irrational behavior of Humans differs from what one would observe if individuals were Econs, that is, perfectly rational agents—like those postulated by standard economics models—who only err randomly (Thaler and Sunstein 2008). A second typology of articles that we retained were studies that adopt a normative approach in the investigation of cognitive biases and nudging interventions. After separately reviewing a subset of the primary studies worth of in-depth analysis, we made a final decision about inclusion by consensus. In particular, we reviewed our individual decisions and discussed ambiguous cases until we reached an agreement. The final sample for our systematic review is composed of 109 primary studies that deal with cognitive biases and nudging in public administration.

We built a data set that reports the following information for each of the retained manuscripts: author(s), year of publication, journal, cognitive bias investigated, descriptive versus normative work, typology of research design, typology of unit of analysis, sample size, country, decision domain, typology of outcome variable, and typology of evidence for the cognitive bias. Additionally, we grouped cognitive biases based on their triggering mechanisms in attempt to identify a parsimonious list of latent cognitive causes. We envision cognitive causes as latent mental processes that give rise to observable deviations from rationality that are predictable. For instance, accessibility is the latent cognitive cause of the observable anchoring bias. Indeed, the tendency to provide estimates that are systematically affected by an initial piece of information is generated by the ease with which that information is accessible to the mind.

Findings

Our research synthesis shows that of the 109 primary studies in our final sample, 84 adopted a descriptive approach to investigate systematic deviation from rationality or nudging interventions in public sector domains. Table 2 reports their main characteristics. The systematic review illustrates our discipline's investigative focus on accessibility, loss aversion, and overconfidence as the cognitive causes that trigger cognitive biases. About 65 percent of descriptive studies fall into the former cause, whereas 33 percent fall into the latter (table 3). In 4 percent of the cases, overconfidence/optimism was identified as the cognitive cause of biased judgments. Systematic biases originate from accessibility when elements of the decision environment make some mental contents, instead of others, come to mind more easily and spontaneously. Accessibility is a continuum of the ease with which information is recalled rather than a dichotomy (Higgins 1996; Kahneman 2002). Determinants of the degree of accessibility of mental contents include availability, confirmation, anchoring and halo, bureauphobia, misconceptions of probabilities, and recall. Availability is the tendency to estimate the numerosity of a class or the chance of an event by the ease with which instances are available from memory. However, said instances tend to be systematically biased by such factors as familiarity or saliency, ease of imaginability, and illusory correlation of events. When availability is likely to generate predictably biased assessments, "decisions may be improved if judgments can be nudged back in the direction of true probabilities" (Thaler and Sunstein 2008, 28). Anchoring is the tendency to rely too heavily on the initial estimate, which biases our final answer. The most prominent consequence of anchoring is the systematic overestimation of conjunctive events and the underestimation of disjunctive events. Thanks to the essence of their functioning, purposefully selected anchors subtly suggested to the decision makers can serve as a nudge (Thaler and Sunstein 2008, 26). Confirmation bias is one of the most widely studied in public administration literature and is the tendency to selectively search for information that confirms our prior beliefs and neglects dis-confirmatory evidence.

Predictable differences in behavior, instead, derive from loss aversion when, keeping accessibility constant, decision features make "losses loom larger than gains" by speaking to the reference point, utility function, and/or probability function. At its core, prospect theory (Kahneman and Tversky 1979) posits that individuals' utility is influenced by changes in wealth—rather than the amount of wealth per se—and that we tend to dislike losses more than we like gains. In other words, an individual's utility function tends to be (1) sharply kinked at the reference point, from which we assess gains and losses as changes in wealth rather than final states; (2) concave for gains, which are above the reference point; (3) convex for losses, which are below the reference point; and (4) steeper for losses than for gains. The utility function of prospect theory predicts risk aversion in the domain of gains and risk seeking in the domain of losses, unveiling why people prefer avoiding losses to acquiring equivalent gains. In line with this prediction, studies on equivalence framing have empirically proven that people tend to overreact when the same piece of information is negatively rather than positively framed. Under the prospect theory framework, loss aversion predicts that individuals tend to demand far more to give up an object they already possess than they would pay to acquire it. In other words, subjects are psychologically wired to prefer avoiding losses rather than acquiring similar gains. As "loss aversion produce inertia, meaning a strong desire to stick with your current holdings" (Thaler and Sunstein 2008, 37), an illuminated choice architect would use aversion to losses and frames as nudges. Cognitive biases that trigger loss aversion include framing, negativity, and status quo.

Table 3 Classification of Reviewed Descriptive Studies by Latent Cognitive Cause, Research Design, Unit of Analysis, Country, Decision Domain, Outcome Variable, and Estimated Effect

Classification Variable	Category	N	Share
Latent cognitive cause	Accessibility	55	65%
	Loss aversion	28	33%
	Overconfidence/optimism	3	4%
Research design	Survey experiment	37	44%
	Observational survey	23	27%
	Case study	8	10%
	Field experiment	7	8%
	Archival data	5	6%
	Lab experiment	3	4%
	Survey-in-the-field	1	1%
Unit of analysis	Citizens	44	54%
	Public employees and managers	18	21%
	Elected officials	10	12%
	Students	4	5%
	Others	9	11%
Country	Europe	45	54%
	Denmark	18	21%
	UK	7	8%
	Italy	6	7%
	Netherlands	4	5%
	Other European countries	10	12%
	USA	32	38%
	Canada	5	6%
	Others (Israel, Japan, South Korea)	5	6%
Decision domain	Education	16	19%
	Urban, postal, waste recycling, transportation, telecommunication services	16	19%
	Public personnel management	9	11%
	Health care	8	10%
	Citizen-government relations	8	10%
	Others	28	33%
Outcome variable	Interval discrete scale	46	55%
	Binary	16	19%
	Ratio continuous scale	14	17%
	Categorical	6	7%
	Others	12	14%
Estimated effect on outcome	Significant	43	64%
	Mixed	20	30%
	Not significant	4	6%
	N.A.	19	—

Notes: (1) The sum of percentages within each variable may not add up to 100 because of one of the following reasons: (a) rounding errors, (b) one or more studies fall into more than one category, (c) the N.A. category was dropped from the denominator. For example, Meier et al. (2015) is a single study, but it was double counted in the country category because it presents data collected in both Denmark and the United States. (2) The N.A. category includes studies that do not provide any quantitative estimates of the treatment effect.

Overconfidence is the propensity to put too much faith in intuitions (e.g., Kahneman 2011). It entails that a decision maker's subjective confidence in his or her judgments is greater than the objective accuracy of those judgments. This can lead to unrealistic optimism, which in the domain of life and health may be associated with the underestimation of real risks and the failure to take adequate preventive measures: "If people are running risks because of unrealistic optimism, they might be able to benefit from a nudge ... if people are reminded of a bad event, they may not continue to be so optimistic" (Thaler and Sunstein 2008, 36). Among our primary studies, overconfidence has been shown as the cognitive cause of biased judgments in the domain of education (Barrows et al. 2016; Meier et al. 2015) and environmental protection (Liu, Stoutenborough, and Vedlitz 2017). Barrows et al. (2016) and Meier et al. (2015) investigated subjects' overconfidence in assessing organizational performance. Liu, Stoutenborough, and Vedlitz (2017) instead focused on respondents' overconfidence in their own knowledge.

Our analysis also unveiled studies that not only deal with cognitive biases in behaviors and judgments but also incorporate key tenets of nudging theory. These studies cover a variety of public decision domains, including improving attitudes toward government trustworthiness (Grimmelikhuijsen and Meijer 2012), increasing the collection of delinquent fines (Haynes et al. 2013), boosting organ donations (Moseley and Stoker 2015), reducing the likelihood that home buyers become delinquent or default on their mortgages (Moulton et al. 2015), and encouraging the adoption of desired health behaviors (Vlaev et al. 2016).

Among the descriptive studies in our final sample, the two most common research designs are survey experiments and observational surveys, which account for 44 percent and 27 percent, respectively. The research designs employed by the remaining manuscripts are case studies in 10 percent of cases, field experiments in 8 percent of the cases, archival data in 6 percent of the cases, lab experiments in 4 percent of the cases, and survey-in-the-field experiments in 1 percent of the cases.

As far unit of analysis, 52 percent of the descriptive studies that we reviewed investigate cognitive biases on samples of citizens. The predictable decision-making errors of civil servants and elected officials are explored in only 21 percent and 12 percent of the cases, respectively. About 5 percent of the manuscripts used samples of students.

The majority of the work on cognitive biases in public administration, management, and policy has been conducted in Europe and the United States, which count 54 percent and 38 percent of the studies in our subsample of descriptive work, respectively. Conversely, only 6 percent of the work has been conducted in Canada, and the remaining 6 percent in other countries such as South Korea, Israel, and Japan.

The decision domains in which cognitive biases have been studied are diverse. About 19 percent of the reviewed descriptive studies deals with cognitive biases in the delivery of public services such as urban, postal, waste recycling, transportation, and telecommunication. Some policy domains feature a handful or more manuscripts: 16 studies explore systematic errors in the education field, 9 in public personnel management, 8 in the health care field, and 6 in citizen-government relations. Other domains feature fewer studies: 5 in the energy and environmental protection and public policy domains and 3 in e-government, financial sustainability, election administration, and national safety.

As for the outcome variable, 55 percent of the descriptive studies in our final sample employ interval discrete scales, 19 percent binary variables, 17 percent ratio continuous scales, and 7 percent categorical variables.

The majority of the hypothesis-testing studies included in our review (64 percent) found a significant effect of the cognitive bias of interest on the outcome variable(s). About 30 percent of the studies found mixed results. In those cases, the study findings about the

effect of the systematic error on the decision task were significant in some statistical model specifications but insignificant in others—for example, when controls were added in observational studies or when the design was modified in randomized controlled trials. Only 6 percent of the reviewed work found a null effect of the cognitive bias on the outcome variable(s).

Of the 109 primary studies in our final sample, the remaining 25 used a normative approach. This line of research speaks to cognitive biases in public administration decision making from a theoretical perspective only, with varying degrees of breadth and depth. The manuscripts in this category deal with the following topics: loss aversion (Bregn 2008) and halo (Clement 1987) in public personnel management; loss aversion in public policy (Jacobs and Weaver 2015; Knetsch 1995); negativity (Hood 2007); groupthink (Kelman, Sanders, and Pandit 2016, 2017); nudging (Esmark 2018; Oliver 2015; Vlaev et al. 2016); herd behavior in public policy (Maor 2014); multiple cognitive biases (Bazerman and Watkins 2007; Camerer and Kunreuther 1989; Etzioni 2014; Kramer 2005; Moulton et al. 2015; Moynihan, Herd, and Harvey 2014; Preuss and Walker 2011; Thacher 2009; West and Bowman 2016); and bounded rationality and behavioral public administration in general (Grimmelikhuijsen et al. 2017; James, Jilke, and Van Ryzin 2017; Jones and Baumgartner 2004; Moynihan 2018; Nørgaard 2018).

Implications for Public Administration, Management, and Policy

Our systematic review retrieved 109 public administration studies that are directly or indirectly traceable back to the seminal work by Herbert Simon, Daniel Kahneman, and Richard Thaler's on bounded rationality, cognitive biases, and nudging, respectively. Our review reveals that behavioral public administration so far has focused on a series of observable cognitive biases that stem from three latent cognitive mechanisms, that is, accessibility, loss aversion and overconfidence/optimism. Among the reviewed studies that fall in the latent category of accessibility (i.e., the ease with which some mental content comes to mind), anchoring, availability, confirmation, and status quo are the observable cognitive biases that public administration scholars have investigated the most. Among the studies on loss aversion (i.e., the tendency to be loss averse in the domain of gains and risk seeking in the domain of losses), the negativity bias has dominated the scene so far. Research in this area can be characterized by a prevalence of empirical and descriptive studies over theoretical and normative ones, a dominance of survey experiments followed by observational surveys, a tendency to rely on samples of citizens, heterogeneity in decision domains and tasks, a prevalence of studies finding significant effects, and a scarcity of work leveraging nudge theory for practical implications.

The findings of our research synthesis highlight two primary substantive gaps between extant behavioral public administration scholarship and its behavioral science *fontes*. On the one hand, latent cognitive causes of cognitive biases other than accessibility and loss aversion have been underexplored. For instance, systematic deviations from rationality deriving from overconfidence and optimism certainly deserve more attention.

A second research gap in behavioral public administration speaks to the use of nudging and choice architecture as viable strategies to leverage on cognitive traps in an attempt to alter behavior for better. Indeed, choice architecture represents a broadly appealing way for dealing with not only straightforward policy issues (e.g., using plainer English in noncompliance notices for vehicular citations) but also more intractable policy problems (e.g., health, medicine, and welfare). In Kahneman's words, "a remarkable feature of libertarian paternalism is its appeal across a broad political spectrum" (2011, 414) representing a political and economic middle ground. As such, "many of the most important applications of libertarian paternalism are for government" (Thaler and Sunstein 2008, 14). The potential for such choice architecture to empower public managers and their organizations to make more effective policy decisions seems clear. Based on our analysis, high-stakes choices can be influenced through a combination of incentives and nudges. When incentives are strong enough to guide behaviors in the desired direction, then pure nudges are less necessary. Frequently, however, government cannot provide strong enough incentives. Indeed, the use of external incentives such as performance-based pay is not unconditionally effective, to say the least (e.g., Bellé 2015; Bellé and Cantarelli 2015; Perry, Engbers, and Jun 2009; Voorberg et al. 2017). Choice architecture offers a viable alternative for public managers to nudge citizens and public employees for better by exerting leverage on some of the cognitive biases that we have reviewed in our synthesis. For example, "the most powerful nudge we have in our arsenal is simply to change the default ... The default is what happens when you do nothing. Now, we are really good at doing nothing" (Thaler 2017). Ameliorating cognitive biases with nudges are an attempt to steer public managers, and subsequently policy decisions, toward more effective (and perhaps justifiable) ends (e.g., Quigley 2013).

Promising work in education suggests that carefully staged psychological interventions can have a powerful and long-lasting impact on student achievements and thus school success (Yeager and Walton 2011). Such interventions include, mentoring, exercises in goal setting, and group interactions. The crux of Yeager and Walton's findings is that interventions are not cure-alls for organizational effectiveness rather they achieve success through deliberately staged processes, which gain momentum over time. The interventions benefited from repeated behavioral experimentation and investigation supported by local stakeholders with the capacity to ensure the merits of their work were followed through in the local setting. For public administration, this may mean an incremental process of repeated experimentation that is fine-tuned over time by the interaction of behavioral experts and practitioners. Such a process is long and broad in scope and hinges on the careful selection of agency managers to assist in the engineering of the behavioral process for practice (Kahneman 2011). Related work has been conducted to understand and change problematic behavior that affects societies at large (Tybur and Griskevicius 2013). The extended interplay between scholars and practitioners envisioned by behavioral public administration contrasts with the individual's predisposition toward acting upon intuition. Focusing in on the areas highlighted in our findings represents a real opportunity for explicitly connecting behavioral experimentation with practical knowledge for public managers (Grimmelikhuijsen et al. 2017, 54).

A tangible example of nudging at work in public institutions is the United Kingdom's Behavioural Insights Team. The Behavioural

Insights Team is a Cabinet Office partner that works with more than 50 public institutions in the United Kingdom for finding innovative ways to improve public policy through choice architecture. A simple effort involved using plainer English in letters sent to U.K. citizens in noncompliance with vehicle taxes. The letters simply stated, "Pay Your Tax or Lose Your [Make of Car]," sometimes accompanied by a photo of the vehicle in question. The plainer text doubled collections, while the inclusion of the photo tripled collections (Cabinet Office, Behavioural Insights Team 2012). More broadly, the EAST framework is a simple tool created for applying behavioral insights into policy practice. At its core, it suggests that "if you want to encourage a behaviour, make it Easy, Attractive, Social and Timely (EAST)" (Cabinet Office, Behavioural Insights Team 2014, 4).

Frameworks like those developed by the United Kingdom's Behavioural Insights Team are a promising avenue for practitioners interested in incorporating the latest in "nudge" technology for practical purposes. Recent evidence of the effectiveness of such frameworks has proven useful in health care policy where applications may affect provider behaviors (e.g., improving clinical outcomes, controlling expenditures) as well as the choices made by patients (e.g., health lifestyle) (Vlaev et al. 2016). The development of effective frameworks offer practitioners and scholars a real opportunity for collaborating on viable heuristics that have the potential to improve decision making in a vast array of policy domains.

Frameworks are also useful in the development of a more robust approach to theoretical development. Attempts at providing more coherent theory to buttress practical "mechanisms for action" in the behavioral sciences have thus far proven a bridge too far (Vlaev et al. 2016, 556). Our review of behavioral research in public administration suggests that theoretical development in the field has pursued a narrow approach. Future work will need to incorporate a much broader perspective of latent cognitive causes and a greater appreciation for the nuances of biases in decision making.

A conceivable impediment to the use of choice architecture in public organizations is the potential for such instruments to be used to keep the status quo or, more worrisome, in a perverse manner. While we acknowledge the possibility of such actions, a robust analysis of the intentions of actors (i.e., public managers) is a topic for later inquiry. What is clear from our analysis is that choice architecture is a reality and it readily pervades the decision environment. More worrisome is government inaction in the face of such architecture, as Quigley notes, "whatever the legitimate ends of government consist of, they do not (and in practice cannot) entail that the state need remain silent or agnostic on matters affecting. .. its citizens, especially while private industry and corporate actors carry on regardless" (2013, 618).

Our systematic review also points toward the need to fulfill a few relevant methodological gaps. In trying to provide public administration practitioners with sound evidence aimed at improving public policy outcomes, scholars should pay more attention to how cognitive biases also affect the decision making within public organizations. In particular, more experimental and field experimental work with policy makers and public servants is needed to strengthen the ecological and external validity of behavioral public administration research. Indeed, one of the most promising outcomes from the behavioral approach to decision making is observable measures that provide a useful means to evaluation policy judgments and choices—a research heuristic beneficial to both scholars and practitioners. While behavioral approaches to public management and policy decisions should consider legitimacy concerns, they must also ensure that choice architecture is backed by empirically robust findings.

Our synthesis found that the majority of work in behavioral public administration is biased toward the proliferation of favorable findings (i.e., positive results): all of the experiments included in our synthesis were successful in detecting some statistically significant effect of their treatments. Publication bias against null results may have negative effects on both public administration theory and practice. As to the latter, for example, the tendency to disproportionately publish studies that show significant findings may lead policy makers and public managers to overestimate the likelihood that a specific program will work. Our field will definitely benefit from recent initiatives aimed at promoting the publication of null results, which can be particularly valuable in illuminating the contingencies under which the same intervention may or may not be effective.

Lastly, we fully acknowledge that our research synthesis is not immune to the same limitations that impinge on any effort to systematically review available evidence on a topic of interest (e.g., Bellé and Cantarelli 2017; Cantarelli, Belardinelli, and Bellé 2016; Gerrish 2016; Ritz, Brewer, and Neumann 2016). Those limitations should be taken into full account when considering the findings and the implications of our work. Most notably, we made judgment calls in selecting journals, defining inclusion and exclusion criteria, deciding which information to keep track of, and establishing codes to classify primary studies. In other words, for instance, our synthesis focused on public administration as a discipline, thus disregarding research on systematic decision-making errors that has been published in political science and economics journals. Making the judgment calls explicit is a partial remedy for this concern and might allow both the replication and expansion of our research synthesis of bounded rationality, cognitive biases, and nudging in public organizations.

Conclusions

In the wake of the Nobel Memorial Prize in Economic Sciences awarded to Richard Thaler, behavioral public administration is experiencing unprecedented momentum. Indeed, the findings of our research synthesis on bounded rationality, cognitive biases, and nudges in our discipline pave the way for more impactful work. The time is ripe for tackling the aforementioned challenges and take research in this area to a new level. Further developing behavioral public administration would benefit our discipline in a number of ways. First, applying state-of-the-art behavioral science to the study of public administration is imperative to generate impactful research that has the potential to advance theory and inspire practice at once. Moreover, elevating behavioral public administration may facilitate the dialogue between our field and other disciplines, such as political science and economics, in which the use of behavioral science has long been well established. In the marketplace of ideas, public administration suffers from an unfavorable balance because we tend to import way more from other fields than we export

(Moynihan, Vandenabeele, and Blom-Hansen 2013). Strengthening behavioral public administration may help narrow this trade gap and enhance our contribution to broader social science.

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