



Conservation of behavioral diversity: on nudging, paternalism-induced monoculture, and the social value of heterogeneous beliefs and behavior

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Abstract

Heterogeneous beliefs and decision processes generate positive externalities for social and economic systems, analogous to biodiversity in biological systems. Although some aspects of biodiversity (e.g., pests, parasites and bacteria) can lead to ecological and economic problems, biodiversity provides flows of beneficial ecological services and is widely regarded as a valuable natural resource and informational asset, whose value increases as we learn more and science progresses (Wilson in *Bioscience* 35(11):700–706, 1985). Heterogeneous beliefs and decision processes (and heterogeneous behaviors they generate) similarly provide flows of beneficial economic services. Behavioral diversity should therefore be seen as a natural resource and informational asset likely to improve human wellbeing in surprising ways in the future. Paternalistic policies motivated by the goal of “correcting” allegedly suboptimal beliefs and behavior that diverge from expert recommendations jeopardize behavioral diversity at a substantial cost to social welfare. The risk of encroaching on this beneficial behavioral heterogeneity with policies that aim to induce behavioral and belief monocultures should be included explicitly as costs when evaluating nudges and other paternalistic policies.

Keywords Paternalism · Nudge · Ecological rationality · Herbert Simon · Biodiversity · Social welfare

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Aims of life vary with each and every individual; and the more society is civilized, the more will individuality be developed, and the more will desires be varied.
—Kropotkin (1892, Chapter IX paragraph 1).

1 Introduction

Paternalistic policy making and Thaler and Sunstein's (2008) nudge program in particular assume there is a reliable and (relatively) stable expert consensus regarding what we should eat, how much we should save, which types of securities should be held in retirement portfolios, and how other decisions (large and small) ought to be made. Critiques of the nudging program are many. One critique argues that nudging policies rely on an inappropriately narrow normative standard based solely on internal logical consistency (i.e., axiomatic rationality), leading choice architects to aim for the wrong target of what rational behavior looks like (Gigerenzer and Selten 2001; Berg 2014a, b; Gigerenzer 2016). Philosophical and methodological concerns over autonomy and option value forgone (i.e., maintaining the ability to change one's mind) when people are subjected to nudging policies is another grounds for critique (Sugden 2017, 2018; Infante et al. 2016). About-faces in expert recommendations that governments promote are another problem (Berg 2018), as are the unstable social epistemologies upon which appeals to authority rest (Viale 2001, 2012, 2018, 2019), undermining claims that nudging campaigns in the domain of public policy respect individual liberties. Incentive problems well-known in the signaling literature underscore that there are risks associated with nudging and choice architecture that have yet to be fully incorporated into normative evaluation of nudging policies (Berg and Kim 2019), where experts may have an incentive to exaggerate or distort the information they transmit, thereby shifting from a good communication equilibrium with unbiased transmission of expert advice to a bad one in which no information is transmitted whatsoever.

Distinct from the critiques mentioned in the previous paragraph, we argue constructively for an expanded conceptualisation of *ecological rationality* (i.e., defined as whether a decision process is sufficiently well-matched to the reward-generating environment in which it is used)¹ that includes population- or group-level heterogeneity. To the best of our knowledge, ecological rationality is typically applied to individual-level analysis of a mental process for making judgments or decisions. Our argument is that group-level behavioral diversity among the mental processes that individuals use and the heterogeneous judgments and decisions they generate is itself a vitally beneficial public good.

¹ See, for example, Gigerenzer and Selten (2001), Smith (2003), Berg and Gigerenzer (2010), Berg (2014a) and Mousavi and Kheirandish (2014) for definitions of ecological rationality and the research program based on Herbert Simon's seminal work on bounded rationality. Ecological rationality measures "success" of procedures for making inferences or decisions, and the social institutions that influence those decisions and inferences, by domain-specific performance metrics (e.g., wealth in financial decision making tasks, clinical outcomes in health decision making tasks, objective accuracy in prediction tasks, happiness in mate choice, etc.).

We define *behavioral diversity* as population- or group-level heterogeneity of beliefs and decision processes that generate a profile of non-uniform judgments or actions in response to identical information and choice sets across multiple individuals. Behavioral diversity is observed when multiple individuals make different judgments or decisions in response to identical information and incentives. From the standpoint of future gains in social welfare afforded by discovery, innovation and entrepreneurship (not to mention other normative criteria at the population level, such as risk diversification, group-wise likelihood of survival, and both aesthetic and anti-authoritarian experiential value from living among free thinkers relatively unimpinged by coercion), behavioral diversity is a vitally beneficial public good. Thus, protecting the flows of services that group-level behavioral diversity generates is a compelling policy objective, which unfortunately appears to have been neglected in most benefit–cost or social welfare analyses of nudging and other paternalistic public policies. Inspired by Wilson’s (1985) arguments for taking into account the value of biodiversity itself as a public good, we argue that the normative concept of ecological rationality inspired by Herbert Simon’s research program in bounded rationality, commonly applied to individual-level normative analyses in previous work, can be usefully expanded to include population-level behavioral diversity.

The expanded conceptualisation of ecological rationality proposed here is to take note of and quantify in social welfare analyses the value of behavioral diversity. In comparing two social systems (corresponding to two different policy settings or other social institutions) with identical mean levels of individual-level performance, our social welfare scoring should strictly prefer the population profile with greater behavioral diversity. To the best of our knowledge, this principle of ranking population profiles with identical mean individual-level performance based on behavioral diversity is novel, although there are numerous models elsewhere in the economics and biology literatures in which population-level heterogeneity promotes social welfare (e.g., Arthur 1994; Gintis 2007; Harrison and Ross 2018; and no-trade theorems in financial economics showing the beneficial role of noise traders, e.g., Milgrom and Stokey 1982). In social welfare analyses of nudging, gains in mean individual-level performance (according to proponents of a nudging policy) should be traded off against the costs of population-level behavioral diversity forgone.

Heterogeneous beliefs and decisions can, of course, be costly. Not all behavioral deviations from what experts say we should do are good. Putting aside the uniformly distributed trembling hand as a model of the most famous behavioral “errors”, “biases” or “anomalies” (which are typically systematic rather than random), we observe that many of these compelling behavioral findings reflect *purposive* and *systematic* deviations from normative decision theory. Some lead to regret and others do not. Some deviations are deliberate and others are unconscious or autonomic (whether helpful or not, in the particular environment in which they are used). When well-matched to the environments in which they are used, there is scant evidence that famous behavioral deviations cause economic harm and abundant evidence that they confer individual-level advantages [i.e., deviators perform better than non-deviators in many well-defined reward-generating environments (Gigerenzer et al. 1999; Gigerenzer and Selten 2001; Berg and Hoffrage 2008; Berg et al. 2016b)]. Our purpose in this essay is to focus instead on less frequently considered *social* and

informational benefits of heterogeneity in beliefs and behavior. We argue that advocates of nudging policies risk jeopardizing both population- and individual-level benefits of behavioral diversity, in part, by inducing less resilient monocultures that appear to nudgers as social improvements based on higher rates of conformity with expert advice.

2 One-size-fits-all recommendations risk inducing monocultures

Kropotkin (in the epigraph above) expresses the idea that heterogeneity among the decision processes that individuals employ—and heterogeneity among the metrics that individuals use to assess how well they perform—is broadly normative (Berg 2003, 2018; Berg and Gigerenzer 2010). In many decision-making environments, there is no one-size-fits-all “optimal” or “best” decision process that should be used to make decisions, form beliefs, or evaluate outcomes (Simon 1957, 1979²; Gigerenzer and Selten 2001; also see Shafer 1986³). Social benefits from behavioral DIVERSITY include diversification of population-level risks, efficiencies from competition among differing views on how to interpret the available evidence, and beneficial coordination services achieved through voluntary choices in heterogeneous populations, which may be (inadvertently) blocked when paternalistic policies induce behavioral monocultures. For example, perfect conformity with government’s dietary advice is riskier than partial conformity. Competing interpretations of evidence and “settled science” frequently motivate research that eventually leads to reversals and seemingly unreliable or contradictory expert advice. And social networks generated from voluntary individual decisions to eat vegetarian or give money to charity lose social significance (or their social meanings change) once these behaviors are promulgated by policy makers as government’s desired outcome. Just as financial incentives crowd out cooperative or prosocial behavior (e.g., Eckel et al. 2005; Mellström and Johannesson 2008; Knowles and Stahlmann-Brown 2020), so, too, policy prescriptions may crowd out voluntary choice of a policy maker’s preferred behavior. Thus, policy prescriptions can be expected to disrupt coordination services, social meanings, and information that would otherwise be provided under the un-nudged counterfactual with voluntarily choice of the same action that policy makers wish to induce with nudging. In the so-called *triple-helix model* where economic

² Simon (1957, p. 198): “The first consequence of the principle of bounded rationality is that the intended rationality of an actor requires him to construct a simplified model of the real situation in order to deal with it. He behaves rationally with respect to this model, and such behavior is not even approximately optimal with respect to the real world.”

Simon (1979, p. 498): “The first is to retain optimization, but to simplify sufficiently so that the optimum (in the simplified world!) is computable. The second is to construct satisficing models that provide good enough decisions with reasonable costs of computation. By giving up optimization, a richer set of properties of the real world can be retained in the models...”

³ Shafer (1986): “The idea that subjective expected utility is uniquely normative plays only a regressive role; it obstructs the development and understanding of alternative tools for subjective judgment of probability and value. Thus, subjective expected utility is just one of several possible tools for constructing a decision.”

growth is nurtured by heterogeneous views and objectives among firms in a complex adaptive system, policy makers seeking to encourage entrepreneurship and innovation must be especially careful to avoid inducing a behavioral monoculture (Viale and Pozzali 2010).

Nudges introduce costly complexity in the form of strategic communication between experts and non-experts. Non-experts notice when experts shift from neutral dissemination of information toward dissemination *with paternalistic intent* to change their behavior (even in the absence of coercion where the choice set is simply re-described but not materially altered, e.g., nudging).⁴ Insofar as non-experts are unsure about what experts' objectives really are and how those objectives influence dissemination of information, information flows are reduced along with trust and social welfare (Berg 2018; Berg and Kim 2019).

Other informational benefits that heterogeneity of beliefs and behaviors confer would include future discovery of currently unknown benefits from minority behaviors. For example, therapeutic uses of nicotine in irritable bowel syndrome, Parkinson's and Alzheimer's Disease might never have been discovered (in epidemiological studies showing lower rates of those diseases among smokers) had stronger paternalistic sanctions such as tobacco bans been in place. The value of currently unknown future benefits latent in information generated by the heteroculture of human behaviors is directly analogous to one of Wilson's (1985) key arguments for valuing yet-to-be-described species and biodiversity in general. When the current state of knowledge in public health is used to justify restrictions on consumer choice (i.e., paternalism that goes beyond nudging), then new risks are raised jeopardizing the heterogeneous ecology of human behaviors, analogous to the risks that Wilson mentions of human populations being reliant on just a few varieties of flora and fauna for food.

Popper's critiques of seemingly benign sympathy for totalitarian means toward virtuous ends as developed in *The Open Society and Its Enemies* is relevant here, as is Hayek's (1973) discussion of *cosmos* versus *taxis*. In his analysis of *order*⁵ as a foundational public good, Hayek considered whether order should be understood as *cosmos* [endogenous or spontaneous order that arises through purposeful action in the face of "irremediable ignorance on everyone's part of most of the particular facts which determine the actions of all the several members of human society" (Hayek 1973, p. 12)] or as *taxis* [exogenously given, or "made order" (Hayek 1973, p. 36)] designed by policy makers (choice architects) or some other unitary entity.

As appealing as it may seem to use nudging to help individuals make (what some experts claim would be) better choices as judged by themselves (e.g., fewer saturated fats; more cancer screenings; greater contributions to employer-sponsored retirement savings programs), there *are* real risks of inadvertently hurting people, even

⁴ For example, we can expect some proportion of the population to formulate different beliefs and take different actions depending on whether expert advice is disseminated as "Consider this information and then you can decide what is best for you" as opposed to "This decision has been structured to influence you to choose what experts believe is best for you."

⁵ In *Law, Legislation and Liberty* (1973, p. 35), Hayek wrote: "Order is an indispensable concept for the discussion of all complex phenomena, in which it must largely play the role the concept of law plays..."

if they respond in the way that nudge policies were intended to work. These three allegedly “reasonable-sounding” recommendations (saturated fats, cancer screenings, pension contributions⁶) are examples of decision domains where advocates of nudges have succeeded at influencing real-world policy making despite *remarkable disagreement among experts* about whether one-size-fits-all recommendations on any of these decisions are likely to do more harm than good.

When populations respond to nudges as they are designed to, the population’s profile of beliefs and behaviors are brought into closer conformity. The resulting loss of heterogeneity implies that multiple beneficial streams of belief and behavioral heterogeneity are reduced. Paternalistic policies that succeed at achieving their goals therefore involve a subtle trade-off of forgone social benefits provided by heterogeneous beliefs and behavior (similar to forgone biodiversity in favor of greater GDP in the short term).

3 Ecological rationality

Inspired by Herbert Simon⁷Simon (1990, p. 1): “Human rational behavior is shaped by a scissors whose blades are the structure of task environments and the computational capabilities of the actor.”, the research program on *ecological rationality* (Gigerenzer and Selten 2001; Smith 2003; Berg and Gigerenzer 2010; Berg 2014a, 2015), focuses on a novel normative criterion that diverges from axiomatic definitions of rationality used elsewhere in economics. Rather than rationality being an attribute solely of the decision maker—or the decision-making process a decision maker employs (as in axiomatic definitions of a preference ordering’s rationality or the choice data it generates)—the definition of ecological rationality also depends on the external reward-generating environment in which the decision process is used.

Ecological rationality is a matching criterion. It requires that a decision process perform sufficiently well when measured by one or more performance metrics relevant to the environment in which it is used. Virtually no decision processes are ecologically rational universally across all decision domains (or reward-generating environments). Decision processes can be ecologically rational in one set of environments (or decision domains) and ecologically *irrational* in others. Ecological rationality is therefore not an inherent attribute of a decision maker or a decision process.

Another theme relevant to Simon-inspired behavioral law and economics concerns how law and regulation that materially alter the reward-generating

⁶ Zywicki (2018) reports that participants in the private nudging program, Save More Tomorrow, contributed significantly more to tax-advantaged 401 k retirement accounts. Those participants who were successfully nudged to save more also wound up with problems, such as significantly higher revolving balances on credit cards and other high-interest-rate credit products like payday lending. In Zywicki’s evaluation, although the nudge worked as designed, the evidence suggested its effects on participants’ financial and psychological wellbeing were net negative.

⁷ (Simon 1969, p. 53): “Human beings, viewed as behaving systems, are quite simple. The apparent complexity of our behavior over time is largely a reflection of the complexity of the environment in which we find ourselves.”

environment interact bi-causally with the population profile of decision processes in use. People may change the decision processes they use once they notice that the reward-generating environment has changed. Similar to measuring biodiversity, an important question for the research program on ecological rationality concerns how to measure diversity⁸ of beliefs, actions and their interactions across different social structures, reward environments and legal and regulatory systems. Should our aggregation rule or social welfare function explicitly account for beneficial heterogeneity when trying to assess how a new law or regulation that is likely to reduce behavioral diversity would affect social welfare?

We propose that it would indeed be worthwhile to introduce new population-level (in addition to individual-level) metrics measuring diversity of belief-formation rules and decision processes among decision makers in an environment. Extending individual-level criteria in the definitions of ecological or axiomatic rationality to include population-level statistics measuring behavioral diversity (generated from profiles of individual beliefs or behaviors) would enrich our social-welfare analysis and help avoid potentially catastrophic policy mistakes inducing a monoculture clustered on a poor-performing belief or behavior. Our proposal would more directly take into account some of the potential social welfare costs imposed by the reduction of heterogeneity of beliefs and behaviors as part of an ecologically informed and Simon-inspired evaluation of public policy.

Another relevant methodological observation when comparing the performance of public policies based on ecological versus axiomatic rationality is that they can lead to different rankings of policies based on policy makers' objective. For example, Berg and Gigerenzer (2007) show that a society of satisficers requires less stringent paternalistic intervention from the risk regulator's point of view than a society of risk-averse expected utility maximizers does—to achieve the policy maker's goal of limiting behavior that only the policy maker regards as dangerous. Following Simon, Cyert and March, Gigerenzer and others, it is hard to not notice abundant evidence that high-performing organizations (e.g., Alphabet, Amazon, or the New Zealand rugby team, the All Blacks) are not optimizers (e.g., Cyert and March 1963; Gage 2012). Instead, they achieve world-class levels of performance (succeeding in their respective endeavors) using heuristics that are well-matched to the class of decisions and inference tasks in which they are used.

⁸ A similar tension can be seen in the sociology literature concerning ethnic and cultural diversity. Collins and Bilge (2016) advocate *intersectional praxis* acknowledging the autonomy and heterogeneity of individuals sharing a common *minority group* status. They argue for a pluralistic and context-specific approach rather than one-size-fits-all prescriptions for addressing social inequality based on single-identity factors (e.g., race, gender, social class). It is noteworthy that Collins and Bilge's arguments also apply to minority groups (defined by their anomalous dietary, health, and financial behaviors) targeted by nudge policies.

4 Heterogeneity of beliefs and behaviors as a public good

Although one should be cautious about attributing specific policy views to Simon, our reading of his body of work suggests that a Simon-inspired approach to the design of institutions in general, and legal or regulatory frameworks in particular, rests on the principle that behavioral diversity is itself a public good which confers important social benefits that are often difficult to observe. The expanded conceptualisation of ecological rationality which explicitly includes population-level behavioral diversity as a public good that we propose provides a novel defense against policies that risk encroaching on heterogeneous belief and behavior. In contrast, the nudging program aims to induce greater conformity with expert advice (crystallized at single point in time), drawing on the Kahneman-inspired biases and heuristics research program.⁹

This predominant normative view among advocates of nudging and stronger paternalistic interventions predicated on famous empirical findings in behavioral economics tends to see behavioral heterogeneity as a *problem* requiring heterogeneity-reducing policy prescriptions (Thaler and Sunstein 2008; Sunstein and Vermeule 2008). The slower speed of paternalistic policy making compared to that of the adaptive dynamics in decentralized systems (which generate value from individual experimentation with non-orthodox beliefs and behavior) implies that the nudging program risks reducing both individual and aggregate payoffs. Nudging policies adapt too slowly. They rely on misleading models of small-world risk (quantifiable in stable environments) when profound uncertainty pervades (thwarting reliable quantification of important risks, as reflected by conflicting and frequently changing expert views). Beyond the population-level benefits of heterogeneity in the face of profound uncertainty, losses from nudging due to lost social coordination and information-revelation services that would otherwise be provided by behavioral diversity would only compound, were we to also include autonomy itself as a weighted term in the social welfare function.

Viale (2018) argues that the hypothesized “System 1”, which uses fast, non-deliberative heuristic shortcuts, is one mechanism through which “choice architects” who advocate nudging policies such as defaults for organ donation believe that nudges affect decisions. Therefore, the claim that these nudges are “libertarian” is weakened because the preservation of a nudged decision maker’s choice set and their capacity to choose to not take up the nudge is never engaged [i.e., Rebonato’s (2012) so-called “reversibility” criterion, required for the libertarian interpretation of nudging]. Note that this hypothesized non-deliberative System 1 plays a key role in choice architects’ own theory of why the nudge will work, revealing coercive non-libertarian

⁹ Identification of rationality with internal logical consistency underpins the *biases and heuristics research program* inspired largely by Kahneman, which focuses on deviations from neoclassical rationality axioms and its prescriptive program of inducing greater behavioral conformity with those consistency requirements (de-biasing as in Jolls et al. 1998 or Thaler and Sunstein 2008; cf. Sheffrin 2017).

intent.¹⁰ Viale (2019) further analyses the implausibility of the dual theory of mind (i.e., Systems 1 and 2) upon which arguments for nudging policies frequently rely.

Is what we know about financial markets, human physiology and risk taking stable enough to justify nudging individuals toward expert views of optimal behavior, fixing those policy parameters at values reflecting the currently available body of evidence (which includes conflicting views and interpretations)? Do institutions that provide expert advice and influence public policy (e.g., recommending that people invest more in the stock market, give more to charity, avoid sugar, or eat “healthy fats” [whichever kinds those are]) get updated fast and flexibly enough as new information arrives (while avoiding regulatory capture and the influence of lobbyists?¹¹ Should we have confidence that reducing heterogeneity by inducing conformity with expert recommendations is a good idea? These questions call attention to the sensitivity of our welfare analyses of nudging to assumptions regarding the stability of experts’ partial knowledge about the reward-generating environment.

5 Heterogeneity forgone: costs and risks of nudging

Advocates of nudging do not seem to take into account how changes in the *population* distribution of beliefs and behavior could indirectly and adversely affect the social welfare function. Instead, they appear to rely on a *tacit* assumption of a Benthamite social welfare function under which payoff improvements at the individual level (predicated on the *explicitly* maintained assumption that individuals who respond to nudges will judge their own payoffs to have improved) cleanly aggregate into social welfare improvements.

Another problem when assessing possible payoff improvements achieved by paternalistic intervention—from the perspective of process-dependent (rather than consequentialist) preferences—concerns the loss of liberty. Some individuals will value the same outcome with a lower subjective payoff when it is nudged or coerced rather than voluntary (cf. Conly 2014, who argues against including loss of liberty in the social welfare function). If social welfare gains hypothesized by choice architects are the result of non-deliberative responses to nudges and fail the reversibility criterion emphasized by Rebonato (2012) and Viale (2018, 2019), then we should consider whether those subpopulations with process-dependent preferences which positively weight self-determination, autonomy and liberty might evaluate the resulting population profiles of nudged beliefs and actions less favorably than

¹⁰ In contrast, nudges designed to cue “System 2” such as cooling-off periods (i.e., more deliberation and analytic reflection of benefits and costs) are not vulnerable to this criticism.

¹¹ Hawkes (2018) reports allegations of influence from lobbyists representing pharmaceutical firms and complaints about removal of board members from Cochrane (a widely respected UK charity and Limited Liability Company). Many observers regard Cochrane as the most trusted and well-executed institutions committed to evidence-based evaluation of drugs and medical procedures using sophisticated meta-analyses of medical research studies. These allegations and controversy among former Cochrane Board members illustrate how fragile perceptions of experts’ objectivity are and their vulnerability to (perceived) un-transparent influence.

if arrived at without nudging. Insofar as some members of society do put weight on self-determination, autonomy and liberty, then even a utilitarian social welfare analysis should take such non-consequentialist aspects of individual preferences into account.

Violations of the consequentialist principle of invariance over an identical outcome arrived at via different allocation mechanisms in the subjective valuation of a particular weight-loss outcome, for example, are far from unimaginable. Suppose that the decision maker can achieve an identical weight-loss outcome by four different allocation mechanisms but has strict preferences, listed in descending order:

- (i) self-determined slimming (“I did it myself!”);
- (ii) market-assisted slimming (“I employed the services of a dietary coach or a spa that restricted what I could eat to achieve the desired result”);
- (iii) nudging (“I didn’t notice that the desserts in the lunch room were moved out of sight in the corner of the lunch room, and it seems this change has caused me to lose weight”);
- (iv) coercive paternalism (“I reduced my caloric intake after sin taxes raised the prices of foods I like to eat”).

A successful slimming nudge could reduce subjective payoffs derived from either of the first two voluntary slimming outcomes and thereby lead to the unintended consequence of fewer people choosing (i) or (ii). The social value of the same weight-loss outcome achieved by allocation mechanisms (i) through (iv) is likely to vary depending on the government’s decision of policy (iii), (iv) or neither (e.g., slimming may have greater subjective value when chosen autonomously rather than as the result of deception (iii) or coercion (iv)).

6 Invalid “libertarian” paternalism claim

One justification for nudging (Thaler and Sunstein 2008) with which we agree is that, in many cases, there is no neutral description of the choice set. For example, in arranging food items on a food buffet line, *some* item must be placed at the front. Similarly for defaults regarding organ-donor status: the law must take a non-neutral stand for people who have not expressed a legally binding preference (e.g., the default of non-donor status in Germany where organ donors must opt in versus the default of donor status in Austria where non-donors must opt out). Granting that a non-neutral choice-influencing default must be selected by law makers, this does not imply normative equivalence, as there are additional normative principles to consider.

The libertarian principles of self ownership and voluntarism, for example, clearly suggest that defaults should be set so that posthumous use of one’s organs reverts to the individual’s estate in the absence of any explicit directives “opting in” to organ-donor status. Based on polling data showing that a majority wants to be organ donors (e.g., in Germany where the majority’s legal status is non-organ-donor), advocates for nudging argue that changing the default policy to ‘organ donor’ would

help a greater number of individuals realize their otherwise unexpressed preference to be an organ donor. Social welfare analysis should at least acknowledge that there are conflicting normative principles and reasonable people can disagree about the appropriate weights on different principles and the risks they raise about unintended consequences.

Arguments for “libertarian paternalism” hold that as long as all elements of the choice set remain available (e.g., nudging only changes the default, or re-describes the choice set with a new framing), then consumer sovereignty is preserved. Although the choice architect influences the description of the choice set, Thaler and Sunstein claim that because its constituent elements remain unaltered (retaining all elements in the choice set that were available before the nudge was introduced), we should regard nudging policies as libertarian. If the decision maker never exhaustively considers all elements in the choice set, however (as in Rebonato 2012; Viale 2018, 2019), or if the social and individual values associated with some elements in the choice set are materially altered (as we argue in this essay), then the libertarian claim is unjustified.

7 Policy in a profoundly uncertain world

One of our arguments against modeling choice and inference *as if* it were the solution to a well-defined constrained optimization problem (Berg and Gigerenzer 2010) is instability of the reward-generating environment (i.e., profound uncertainty that cannot be well modeled as small-world risk with known outcomes and associated probabilities). If the reward-generating environment is unstable and therefore has no stable long-run conditional mean that large sample estimates can be expected to converge to, then we should have extraordinary evidence that observed inconsistencies in choice data are indeed behavioral “errors” (rather than successful rules of thumb reinforced through exposure to the unstable reward-generating environment). We should clearly rule out the possibility that observed behavioral anomalies are not experimentation heuristics required for survival in unstable reward-generating environments before jumping to the conclusion that people whose choice data violate axiomatic rationality require paternalistic policy interventions to help them make “better” (i.e., more internally consistent) decisions about savings, dietary choice and charitable giving.

Even with a well-defined and stable reward distribution, if that distribution were sufficiently fat-tailed so that its theoretical mean did not exist (e.g., the Cauchy distribution), then forming beliefs and basing actions on averages and population-wide correlations from the past would not provide a stable and informative set of mental processes to learn about the reward environment and make accurate predictions. Ignoring information, intransitivity, non-Bayesian belief updating, time-inconsistency, etc., could all be fully rational in such a fat-tailed environment (even with common knowledge of the shape of the reward-generating distributions). In such an environment where the law of large numbers and the central limit theorem no longer apply, there would be little basis for nudgers to prescribe optimal behavior.

Gigerenzer (2016, p. 364) draws on Simon's (1985) assertion that "people are generally quite rational; that is, they usually have reasons for what they do" to argue for education predicated on self responsibility and voluntarism:

...the dismal picture of human nature painted by behavioral economists and libertarian paternalists is not justified by psychological research. Rather, it is largely the product of narrow logical norms of rationality and selective reporting of the psychological literature. Most important for public policy, by comparing cognitive illusions with visual illusions, libertarian paternalists misleadingly suggest that attempts to liberate people from their biases through education are largely doomed to fail. However, as I will show, there is experimental evidence that even children can learn to deal with risk and uncertainty—if they are taught how. I will conclude that democratic governments should invest less in nudging and more in educating people to become risk savvy.

Epstein (1995) argues complementarily to Gigerenzer that a Simon-inspired behavioral and law economics founded on ecological rationality in *un-learnably unstable* and *unknowably complex* environments must rest on principles of liberty and voluntary choice, while mitigating the most harmful negative externalities (e.g., murder and theft) based on long-established and simple moral and legal codes. He argues for simple policies (in contrast to complex strategic communication induced by nudging policies) that support the collective benefits of social systems with wide-ranging heterogeneous preferences (Epstein 1995, 2003).

Observed behavioral violations of the consistency axioms upon which axiomatic rationality rests are not in doubt. Rather it is their normative *interpretation* that requires deeper investigation. Without disputing the damning empirical evidence against the descriptive realism of the assumptions of stable and consistent domain-general preferences, its normative implications are far from straightforward.

8 Harmful nudges

When nudging succeeds at concentrating a larger majority of the population distribution of decisions on an allegedly optimal action, then population-level behavioral diversity is likely to decline. We acknowledge that our claim that behavioral diversity declines depends crucially on the initial population distribution (before a new paternalistic policy is put into place) and a quantifiable definition of behavioral diversity. Contrary to our claim, for example, would be an initial distribution where the entire population is concentrated on the (allegedly) suboptimal choice. In that case, if population variance served as the statistical measure of behavioral diversity, then a paternalistic policy that shifted any positive percentage of the population less than 100% to the (allegedly) optimal choice would also increase behavioral diversity (increasing population variance from zero to something positive). We would argue that "improved behavioral diversity" should be counted in the paternalistic policy's favor, to be traded off against other normative principles used to evaluate its merits.

In many real-world cases in which nudging is applied, however, the population distribution begins with a majority already choosing the action that experts deem to be optimal. In such cases, nudging further increases the size of the majority choosing the recommended action. In so doing, paternalism reduces beneficial risk diversification that otherwise would have been afforded by a more heterogeneous population profile of behavior.

For example, nudging workers of a certain age into similar retirement portfolios increases payoff variance in the event of a financial crisis. A generation of Japanese retirement savers would have been far worse off had they been nudged out of low-return “postal savings accounts” into professionally managed funds with greater exposure to equities in the NIKKEI Index during the 1980s, which peaked in December 1989 and traded 80% lower more than 20 years later and currently, after a long bull market, continues to trade at less than 50% of its 1989 peak. Japan’s aggregate cumulated pension savings would have endured greater volatility translating into much lower levels of wealth had the Save More Tomorrow nudging program been used to influence Japanese savers to invest more in equities. Ignoring the nudges that Thaler and Benartzi (2004) proposed (retrospectively) would have protected against losses and provided substantial aggregate benefits in the form of reduced volatility in the value of retirees’ net wealth.

One may argue that the importance of the Save More Tomorrow nudge was to increase savings rather than shift the composition of retirement savings accounts (i.e., how retirement funds were invested). If the rate of savings flow from current incomes into retirement accounts is the sole normative criterion used to evaluate the nudge, then perhaps it could have been regarded as successful were it implemented in Japan in the later 1970s and early 1980s. If we expand the normative criteria to include savers’ subjective evaluation of their own consumption-savings paths and *ex post* experiential utility living with reduced disposable income (Zywicki 2018) and dramatic fluctuation in the value of pension savings accounts (including a 50% + drawdown in share prices), then the question of whether the nudge was objectively beneficial to savers remains ambiguous. For more on population- and individual-level benefits that simple heuristics generate and the social benefits of the behavioral heterogeneity, see Bookstaber and Langsam (1985); Todd et al. (2012); Hertwig et al. (2013); Mousavi and Kheirandish (2014).

Leading nutritionists seem to report contradictory findings and recommendations at least as frequently as leading finance researchers do. Reaching opposite conclusions based on the same available evidence is part of these disciplines’ normal science. We further note that this disagreement out in the open is socially valuable (i.e., heterogeneous interpretations of the available evidence), providing informational benefits for those who have access to open debate. The thinking that such debate provokes is, for many, far more beneficial than top-down, one-size-fits-all food-choice environments and incentive systems governed by sin taxes, agricultural subsidies, regulation of food imports, etc., rationalized on the basis of a static (and rapidly out-dated) conceptualization of “the expert consensus on nutrition.” Optimal macronutrient composition (fats, carbs, protein), for example, remains unknown and likely varies across people and within person over time. More difficult questions would include: Which fats?, Which carbs?, Which proteins? In which settings?

One thing that many nutrition researchers (and some economists) do seem to agree on, however, is the inappropriateness and ineffectiveness of food pyramids promulgated by the U.S. and foreign governments. For example, the U.S. Department of Agriculture (USDA) introduced its “Eating Right Pyramid” in 1991, followed by subsequent food pyramids, including “My Plate” (Rowland 2016), each eliciting controversial responses from nutrition experts and industry groups. Nudging programs designed to influence what food people choose risks inflicting similar harm by nudging toward food choices that are bound to be modified or contradicted in the future. They also risk wasting information that behavioral diversity affords about which diets work for which kinds of people and in which settings. If it turns out that population-level dietary recommendations are abandoned in the future in favor of heterogeneous approaches (i.e., different diets for different people rather than one-size-fits-all recommendations), then lots more observational evidence of heterogeneous dietary behavior will be required.

9 The authoritarian turn

Could behavioral economists become more committed empiricists? Could they record the richly heterogeneous human behaviour they observe, less beholden to neoclassical normative frameworks of axiomatic rationality? Yes. They could seek to describe different people’s multiple decision processes and normative evaluations that achieve success on their own terms, leading them to thrive and live “a life well-lived.”

Instead, the nudging program channels Orwellian visions of centralized control under the grimly pessimistic guidance of experts who regard people’s behaviour as generally pathological. Behavioral economists’ disregard for pluralistic normative criteria and the multiplicity of decision processes in use among the successful reveal an authoritarian turn in the intellectual history of behavioral economics. This authoritarian turn is based on narrow norms, misinterpretation of empirical evidence, and disregard for the profound social benefits that heterogeneous beliefs and behaviors provide at the population level.

Perhaps incidentally, the authoritarian turn also generates new demand for academics and “expert advice” as consultants on behavioral economics. Cynics could be forgiven for uncharitably interpreting the coincidence of increased reports of “irrationality” by behavioral economists and increased public money and power allocated to them (as policy influencers, providers of commissioned research reports, policy designers, program administrators and choice architects).

Behavioral economists should be lauded for their discovery that observed choice data often fail to conform to axiomatic rationality and the domain-general perfect internal logical consistency it requires. Axiomatic definitions of rationality rest solely on internal consistency even though real-world reward-generating environments are dynamic, unstable, uncertain and only partially known to individual decision makers. These consistency axioms were borrowed from neoclassical economics, where they were first introduced in utility representation theorems by Samuelson

and von-Neuman and Morgenstern, and later re-interpreted by Kahneman-inspired behavioral economists as a normative standard of rational or optimal behavior.

There is little evidence that violations of axiomatic definitions of rationality observed in choice data lead to measurable economic harm, however. There *is* substantial evidence that particular deviations from axiomatic rationality in specific classes of reward-generating environments *are* positively associated with success. Successful people (by many metrics of success) routinely violate the axiomatic definitions of rationality, which, one would think, should motivate reconsideration of those normative criteria used to evaluate rationality and raise awareness about the social value of behavioral diversity. It would be surprising, for example, if many non-economists regarded the stylized facts surrounding the Kahneman-Thaler biases and heuristics program as sound motivation for paternalistic intervention. Instead, theoretical shortcomings of narrow normative criteria invoked whenever behavioral economists label inconsistent choices as “irrational” even though they achieve high levels of performance suggest need for urgent revision and expansion of the way in which rational behavior is defined.

10 A Simon-inspired alternative view of heterogeneous beliefs and behavior

Following Simon’s notion of satisficing, ecological rationality requires that a behavioral rule or *heuristic*—a simple procedure for making a decision or inference—satisfies a threshold condition (i.e., is “good enough”) when evaluated by a metric of performance that makes sense in the particular context in which it is used. This threshold requirement in ecological rationality provides an objective standard that usually (but not always) allows for more behavioral heterogeneity than in Kahneman-inspired models of rationality. Although optimization problems may also have a large number of non-unique solutions and allow for an arbitrarily large degree of behavioral heterogeneity among optimizers, the economic models used by those who advocate nudging programs typically have starkly narrower views about what constitutes optimal behavior, in decisions about retirement savings, diet, organ donation, charitable giving, etc. This narrowness gives substance to our critique of nudging as ignoring its side-effect of reduced behavioral diversity.

The standard of ecological rationality allows for multiple ways of being objectively successful. Heterogeneous behavior often frustrates policy makers, however. For example, the literature documenting failures by policy makers to induce a particular behavior is vast: the War On Drugs aiming to reduce illicit drug use; Sarbanes–Oxley aiming to fix systematic risk caused by “too big to fail” financial institutions, which arguably led to increased market concentration in banking and finance since the Great Financial Crisis of 2008–2009; and immigration policies across many if not most G30 countries that delivered social outcomes roughly opposite from their stated intentions.

It would seem that more veridical description of the heterogeneous decision processes that people use—and the challenge of designing simple policies that lay out robust rules of the game, enabling (rather than thwarting) the social value generated

by interaction among profoundly heterogeneous agents—should be a research priority. Positive externalities from behavioral diversity are missing in most social-welfare analyses of nudging. Many advocates of nudging are, no doubt, genuine, and their concern for helping others avoid mistakes sincere. Nevertheless, the risks of paternalistic policies and lack of investigation into their unintended consequences are a dangerous threat to behavioral diversity. [See conservationist Reid's (2019) enumeration of unintended anti-conservationist consequences wrought by government programs attempting to incentivize farmers to plant trees and engage in carbon sequestration for insightful allegory to debates over nudging in the domains of diet, health and retirement savings].

In closing, the links between population heterogeneity, on one hand, and creativity and innovation on the other is remarkable. Simon's corpus of work alerts us to the many mechanisms through which successful adaptation can occur, especially when facing unstable or profoundly uncertain reward environments. Its implication is a behavioral law and economics that depends beneficially on high-dimensional heterogeneity of beliefs and behavior (e.g., Bennis et al. 2012; Berg 2003, 2006, 2010, 2014b, 2017; Berg et al. 2010, 2013, 2016a; Berg and Gabel 2015, 2017; Berg and Hoffrage 2008; Berg and Kim 2014, 2015, 2016, 2018a, b, 2019; Berg and Maital 2007; Berg and Murdoch 2008; Dold and Schubert 2018; Kameda et al. 2011; Sheffrin 2017; Rizzo and Whitman 2018).

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