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Behavioral innovations: The missing capital in sustainable development?

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ABSTRACT

Many scholars argue that environmental issues can be addressed through technological innovation, a proposal which echoes a lasting debate between environmental and ecological economics about the substitution rate between natural and manufactured capital. In addition to these two established types of capital, this paper introduces the idea of 'behavioral capital'. We define behavioral capital as the latent potential of behavioral change to affect improvement in environmental quality. Our contribution argues that technological and traditional regulatory innovations serve as insufficient tools for addressing modern environmental issues and ensuring sustainable development. Without discarding these solutions, we contend that because human behavior is a significant contributor to environmental problems, it should be regarded as a key component of continued solutions. We suggest that the dual interest theory can serve as an integrative framework for behavioral innovations related to environmental issues. In suggesting this, we assume that behavioral innovations can both overcome some of the limitations of technological innovations and offer new solutions. Our main insight is to suggest that some depletion of natural capital – but not all – can be offset by behavioral changes without decreasing, or even increasing, subjective well-being.

1. Introduction

During a severe famine in the late 18th century France, locals remained reluctant to eat potatoes despite having received encouraging messages about their edibility and nutritional benefits. In response to this crisis, a French pharmacist named Antoine-Augustin Parmentier strategically planted 100 acres of fallow land with potatoes and had royal soldiers stationed around it. However, he secretly ordered them not to protect the planted area, but to accept bribes to leave it unguarded. With their curiosity piqued by the presence of the guards, local residents took the bait, paying off soldiers to leave their posts in order to steal and eat the unguarded potatoes. This unconventional strategy effectively induced residents to eat the potatoes they had once refused.

Our current environmental predicament is strangely reminiscent of the situation that Parmentier faced in 1785. The severity of modern environmental problems such as climate change, water shortages, and biodiversity losses contrasts sharply with the indifference, unresponsiveness, and even active denial of those culpable for the damage. Some argue that environmental issues can be addressed through technological innovation (Lomborg, 2009), a proposal which echoes a lasting debate between environmental and ecological economics about the substitution rate between natural and manufactured capital. While standard environmental economics accepts manufactured capital as a pure substitute for natural capital, ecological economics maintains that the existing stock of natural capital must not be depleted beyond a certain threshold. Accordingly, this minimum stock level must be maintained and perhaps even enhanced because the functions it performs cannot be replaced by manufactured capital.[1]

In addition to these two established types of capital, this paper introduces the idea of 'behavioral capital'. We define behavioral capital as the latent potential of behavioral change to affect improvement in environmental quality. Our contribution, therefore, differs from that of most studies to date by arguing that technological and traditional regulatory innovations serve as insufficient tools for addressing modern environmental issues and ensuring sustainable development. Without discarding these solutions, we contend that because human behavior is a significant contributor to environmental problems, it should be regarded as a key component of continued solutions. In suggesting this, we assume that behavioral innovations can both overcome some of the limitations of technological innovations and offer new solutions. Our main insight is to suggest that some depletion of natural capital – though not all – can be

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[1] Ecological economics recognizes the importance of four primary types of capital that contribute to human wellbeing: natural capital, human capital, built capital, and social capital. Ecological economics further recognizes that they interact in a complex and dynamic system (Vemuri and Costanza, 2006). Even, if some behavioral based initiatives could to some extent be classified into the existing four types of capital, we contend that behavioral capital constitutes per se a fifth capital which interacts with the other types of capital.

offset by behavioral changes without decreasing, or even increasing, subjective well-being. Additionally, behavioral changes often prove to be less capital-intensive than technological innovations as a means of precipitating change (Allcott and Mullainathan, 2010). By its very nature, behavioral capital is centered on human behavior and can seem inconsistent with the non-anthropocentric ethics of the ecological economics paradigm. Nevertheless, considering human behavior as a powerful leverage to reach sustainable development goals does necessarily imply that we support nature as existing solely for the benefit of humans. Using behavioral capital is not inconsistent with considering the value of the environment per se, regardless of its human values. We contend that this perspective can contribute to adequate management of the environment for the environment's sake.

The remainder of this discussion is organized as follows. In Section 2, we explain why technological change alone is not effective enough when human behavior is at the root of an environmental issue. Section 3 proposes some solutions offered by behavioral innovations and illustrates them using several micro-case studies and anecdotal evidence. We introduce the dual interest theory which can serve as an integrative framework for behavioral innovations related to environmental issues (Czap et al., 2012). Section 4 makes justice to the on-going discussion between neoclassical economists and behavioral economists and emphasizes some challenges faced by behavioral interventions. The final section (Section 5) extends this discussion by considering policy implications and by developing general conclusions. Throughout the article, some generalizable lessons are drawn from various studies.

2. Why is Technological Change Likely to be Insufficient to Address Environmental Issues?

According to Ehrhardt-Martinez (2009), the first and most common response from policy makers and the public alike is to look to technology to provide answers to global climate change. Moreover, she argues that when these *technological* solutions are not adopted, the next step is to seek an *economic* explanation. Without negating the substantial contribution of this techno-economic model in addressing environmental issues, we contend that it only treats one part of the problem. The recommendations drawn from this model are based on rational actors who perfectly weight the costs and benefits of adopting certain behaviors. According to this model, well-crafted economic incentives and disincentives can guide people to adopt socially desirable technologies and behaviors. While traditional economists assume that economic actors are rational agents who are self-interested, fully-informed, outcome-oriented, and time-consistent, most social scientists believe that human behavior is often irrational, imperfect, uncontrolled, and time-inconsistent, yet predictable (Allcott and Mullainathan, 2010; see also Venkatachalam, 2008).

Clearly, the alleged performances that technological change can deliver are contingent upon the reliability of the incentives devised within the traditional (rational) model of economics. Consequently, the goals of the techno-economic model may be unrealistic because it neglects important psychological and emotional determinants of human behavior (Gowdy, 2008; Venkatachalam, 2008). For instance, the effectiveness of monetary incentives (disincentives) to encourage (discourage) socially (un)desirable behaviors can be significantly reduced because of motivational crowding-out, inadequate timing of payments or reactive devaluation (e.g., Duflo et al., 2011). In particular, recent research suggests that there are two distinct operational systems in the brain (see Table 1 below). The reflective system offers deep, rational analysis, despite its admittedly limited capabilities, while the automatic system is able to process many concepts simultaneously but in a more 'superficial' way by employing heuristics and biases (Thaler and Sunstein, 2009). This study indicates that some of our decisions are more influenced by the automatic system than was once thought, rendering the techno-economic model limited in scope, as it assumes perfectly rational choice. In sum, a growing literature reveals that our intuitions about the drivers of behavior can be flawed, notably because preferences, decision making, and resulting behaviors are largely context-dependent (Ariely, 2008; Cialdini, 2005). Sanfey et al. (2003), for example, use functional magnetic resonance imaging to demonstrate that unfair offers in an ultimatum game induce conflicting activity between the areas of the brain which represent "twin demands […], the emotional goal of resisting unfairness and the cognitive goal of accumulating money."

Table 1
Two cognitive systems (Kahneman, 2003; Thaler and Sunstein, 2009).

Automatic system	Reflective system
Uncontrolled	Controlled
Effortless	Effortful
Associative	Deductive
Fast	Slow
Unconscious	Self-aware
Skilled	Rule-following

Technological solutions which seem promising on paper can be disappointing when implemented in the real world. Among the counter-intuitive effects of technological improvements, let us mention rebound effects (Binswanger, 2001). In short, rebound effects occur when the lower cost of energy services resulting from increased efficiency 'pushes' individuals to consume more energy overall. While there remains some disagreement about the magnitude of rebound effects, the existence of these effects is not contested.

Additionally, technological change is frequently considered to be highly capital intensive. A panel of Nobel laureate economists ranked 'higher public funding and research and development of non-carbon energy, in order of $100 billion a year' as 'one of the most effective responses' to address climate change issues. However, in a context of economic crisis, financial constraints can force agents to seek innovative solutions which are less capital intensive. Behavioral interventions, in particular, are frequently less costly than interventions drawn from the techno-economic model, and they can deliver first order environmental results (Allcott and Mullainathan, 2010).

3. Human Behavior: A Potential Solution to Environmental Problems?

Many behaviors, especially day-to-day ones, are frequently determined by the automatic system, making conventional interventions (e.g. technological improvements, market incentives) less likely to deliver desired results. We contend that by taking these mental shortcuts and biases into account, it is possible to encourage particular types of behaviors. Well-crafted behavioral innovations can 'nudge' agents to make better choices and can therefore constitute powerful solutions to sustainability issues. Two fundamental behavioral findings are essential to understand why decision makers (Humans) diverge so systematically from those of standard economics (Econs). The first is 'construal' which captures the notion that decision makers need to construe a representation of the relevant situation in their mind and the second is the 'power of the situation', implying that such construal is heavily impacted by the context of the decision (Shafir, 2008). Humans with their so-called behavioral anomalies influence how the various "capitals" transform material and energy.

Most behavioral findings can be interpreted through the lens of the new *dual interest metaeconomics framework*. Rather than just enumerating a list of biases by presenting them as exceptions to mainstream economics, the dual interest theory and metaeconomics approach offer an integrative framework (Czap et al., 2012). This promising framework notably recognizes the co-existence of two human tendencies, a tendency to egoistic–hedonistic based self-interest which needs to be tempered by the human tendency to empathy–sympathy based other-interest. Self-interest is considered as a force rather than presuming it as the *only* motivating force and the dual interest theory acknowledges the