



Contributions of Behavior Analysis to Behavioral Economics

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Abstract This article discusses behavior analysis' contribution to behavioral economics. Nobel Laureate Award winner Herbert Simon described the science of economics in an evolutionary context in *A Behavioral Model of Rational Choice*. Without claiming any relation between the two publications, it was published two years after B.F. Skinner's *Science and Human Behavior*. While popular behavioral economics continues the critique of Homo Economicus, the eagerness to prove that man is not rational carries the risk of substituting one mentalistic explanation for another. Behavior analysis may contribute to developing knowledge about behavioral economics and consumer behavior. The selectionist perspective, the generic principle of reinforcement, and single-subject research are its main contributions. The conceptual framework of behavior analysis enables investigation of the selection of functional relations between human choice behavior and its environmental contingencies. The circumstance-specific research methods of behavior analysis and the possibility to extend them into large-scale analysis provide the means to explain the psychological underpinnings of behavior. Behavior economics offers good descriptions of important phenomena, and behavior analysis contributes with the technology to explain and influence them.

Keywords Behavioral economics · Consumer behavior · Behavior analysis · Selection perspective · Reinforcement · Single-subject research

Consumer behavior analysis uses behavior principles to interpret consumption behavior (Foxall, 2001). It is evident that behavior analysis has a bearing on consumer behavior research, and a productive collaboration between behavior analysis and other areas within behavioral economics is seen as beneficial for both fields (Foxall, 2015). In this

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paper, we will discuss features of behavior analysis that are particularly relevant for the development and further understanding of several areas within behavioral economics.

Behavioral economics refers to a research field sprung from microeconomic theory, which states that there are behavioral and psychological variables involved in economic decisions by individuals and countries (Wilkinson & Klaes, 2012). Behavioral economics is a young field, still in the making, and it is a broad field informed by economics, psychology, evolutionary biology and sociology. In this context, psychology typically refers to cognitive psychology. The contribution from behavior analysis has not yet fulfilled its potential. Where cognitivists investigate questions of behavioral structure, behavior analysts are concerned with questions of behavioral function, looking to past behavior to account for what we do (Catania, 1984). Behavior analysis refers to the scientific approach of studying the functional relations of behavior and environment by breaking down complex behavior into its components (Catania, 1984). Although the behavior analytic perspective is advocated and has successfully been integrated into behavioral economic issues (DiClemente & Hantula, 2003; Foxall, 2015; Green & Myerson, 2013), behavior analysis still lacks significant influence outside its own field. Economics and cognitive psychology remain the main influences on the broader field of behavioral economics.

This paper addresses similarities and differences between behavior analysis and behavioral economics, which are important for the further development of behavioral economic topics such as consumer behavior. Of common interest to the two fields are (i) human choice behaviors (ii) how proximity in time and space between behavior and environmental events influence behavior and (iii) why many species seem to behave in ways that cannot be explained by self-interest. Differences include (i) the selectionist perspective, ii) the generic principle of reinforcement, and (iii) single-subject research. While research questions are common to the two fields, the epistemological approaches diverge. The neoclassical economist's assumption is that humans are fundamentally rational; optimizing their self-interest. This approach differs from the selectionist perspective, where the consequences of behavior and not the intentions of the individual are responsible for an organism's behavior. The focus on the behavior – environment relation has great advantages in the study of behavioral economic issues such as consumer behavior.

The Selectionist Approach and Rationality

Most behavioral economic research is based on economic theory. Economics can be defined as the study of allocation of scarce resources (Nicholson, 1992). Microeconomics is concerned with how purchasers and producers manage their limited resources, and how these parties interact in a market economy, mostly on an aggregate level. Market economy means supply and demand act on each other. Thus, a demand curve will show the consumer-demand for a product at various points of quantity and price. Economics is a deductive science of systematic mathematical models. Models are used to understand economic relationships and to attempt predictions about the future. Economics is also normative, describing not only how we act, but how we *should* act, and according to economic theory the agent should be rational, also referred to as *homo economicus*, meaning the agent is well-informed, self-interested and utility-maximizing

(Wilkinson & Klaes, 2012). Utility is a numeric measure of value. This assumption that the agent is rational is necessary in order to approximate results (Nicholson, 1992).

The problem with using economic models to understand individual behavior is that people do not always maximize utility as assumed, and peoples' preferences do change across time and situations, severely limiting the predictive power of the theories. When the norm is maximum utility, choices that do not maximize utility are labeled non-rational or irrational. A number of situations may not fit into the dichotomy of rationality and irrationality. Elster (2007) points out that choice may be a matter of deciding on a truncated base - a short version of the "decision making machinery". Because of urgency or for other reasons, one does not "look around" to gather all available information before acting (Elster, 2007). Deciding in these cases may be neither rational nor irrational actions, according to the economic definition of rationality. Rationality/Irrationality are normative concepts, saying something about our intention. However, we will not be able to predict the outcome based on intention; we need lawful relationships between behavior and environment, and the outcome should refer to this lawfulness rather than the assumed intention of stable preferences over time.

In "A behavioral model of rational choice" Herbert Simon (1955) suggested drastic revisions to the homo economicus assumptions then prevalent in economics. He turned to psychology in order to understand the motivation behind the behavior of economic agents. While the traditional rational choice models only contained constraints that were environmental or external, Simon pointed to the fact that constraints also could be internal, physiological or psychological, such as limited computational capacity. The rational choice models required the individual to attach definite pay-offs to possible alternatives concerning maximization, probability and certainty. Simon argued that there was no evidence that individuals made or could make these complex computations. This is the basis for the term "bounded rationality", a concept that can add value to the analysis of choice. If the criterion is not to maximize but to exceed some given amount; several possible outcomes can be satisfying, rather than one unique solution. However, this does not restrict us from finding a near unique solution under certain circumstances. Simon mentions that the pay-off in one particular trial may depend on previous trials, and consequences that the organism experiences may change the actual function of the pay-off. These broader requirements provided a dynamic aspect of the model and the beginning of a theory on decision-making behavior in individuals and organizations. Simon (1959) emphasizes the distinction between descriptive and normative economics, and the necessity to study behavioral motivation and decision-making processes for a complete description and explanation.

Simon considers bounded rationality a behavioral model of human choice (Simon, 1983, p. 19), and connects choice behavior with evolutionary theory. Evolution needs variation and selection. Evolution in human thinking or decision-making requires varied ideas from which selection weeds out poorly adapted alternatives and selects the ideas that contribute to solving the problem. We cannot be striving for a stationary maximizing state; rather there is constant movement, local adaptations, and acceptable solutions to current environment (Simon, 1959), which means changing decisions over time is not acutely irrational behavior. Rationality is a dynamic process of situations of different premises affecting the particular decision at the time. The premises are related to the organism and are different from the environmental constraints included in the classical economic model. If irrationality in fact means changing one's behavior over

time, we are probably better off studying what affects the change in behavior over time, rather than trying to explain rationality. The selection perspective allows for such investigations.

Within behavior analysis, the selection perspective is refined. Although Behavior analysis recognizes the organism's biological and evolutionary history, this is regarded as part of the context of behavior. The selection happens in the interplay between the organism and the environment. Skinner introduced the term operant conditioning, and later compared it to Darwin's principle of selection. Responses are affected by their consequences within the organisms lifetime (Catania, 2001) - the ontogenic selection. Consequences are everywhere and their magnitude, frequency, immediacy and other properties determine how behavior is established, maintained, modified and extinguished. The three-term contingency, describing the contingent relations between the antecedent, the behavior, and its selecting consequences, is a fundamental unit for understanding the selection of behavior on an operant level of analysis. Motivation is a function of the interaction of biological conditions, learning history and current stimulus situations. The concept of motivational operations (Laraway, Snyderski, Michael, & Poling, 2003; Michael, 1993) contributes a refinement and an explanatory approach to the relations between the three terms, by offering a way to understand the variations in value of reinforcement and hence the variation on the effect on the behavior.

In, behavior analysis the lawfulness (irrespective of the normative value of the outcome) in the relations between the behavior and the environment is to be found in the *consequences* of the behavior. Economics normally emphasizes the behaving agent's *intentions* (rational or irrational, maximizing utility), independently of how these intentions came into existence. This may be the fundamental difference between behavior analysis and economics. Economics thus relies on a cognitive/mechanistic approach accepting a mentalistic account as explanatory (Catania, 1984). The *intention* is the cause of the behavior, and further inquiries about the origins of the intention are seen as unnecessary (Catania, 1984).

The origin of the differences in epistemology between behavior analysis and economics is an important one. Whether we take a conceptual, experimental or applied perspective, it makes a fundamental difference whether the independent variables are to be found in the intentions of the agents or in the environment of which it is a part. From a behavioral perspective it does not make any big difference whether the causal mode for choice behaviors are found in the *rationality* according to classical economic theory or in *irrationality* according to behavioral economics (Ariely, 2010). Frequently, these studies seem to aim at removing the Rational Man by substituting the Irrational Man. Showing how biased the choosing agents are instead of focusing on the functional relations between the agents and the environment keeps the normative perspective prevalent. Popular behavioral economics, however, could capitalize on earlier economic history, like Simon's elaboration on the concept of bounded rationality. Unlike many of today's behavioral economists, Simon is explicit about his evolutionary perspective on human choice behavior. If the scientific goal is precise description, correct prediction and demonstrable control, it is necessary to direct our attention toward environmental influences rather than cognitive structures. Behavioral Economics would benefit from including a selection perspective, in line with the Behavioral Perspective Model (Foxall, 2015) and the Behavioral Ecology model (DiClemente & Hantula, 2003), which are behavioral accounts of consumer behavior.

The Concepts of Reinforcement and Utility

The selection perspective offers a generic conceptual framework in which the concept of reinforcement is an important part when we discuss ontogenic selection. Reinforcement is the presentation or withdrawal of a certain stimulus contingent on an act that results in an increased likelihood that the act will occur in the future (Skinner, 1949, pp. 5–6). A reinforcer is different from a reward. A reward refers to an inherent property of a tangible or intangible event regardless of its effect on future behavior. Conversely, an act which is reinforced is selected among other acts. Reinforcement and selection involve more than instances of «learning how», as they have a maintaining, modifying and extinguishing effect on behavior (Skinner, 1949, pp. 5–6). Through Skinner and Ferster's extensive research on schedules of reinforcement (Pierce & Cheney, 2008), the lawful relationship between the dependent and independent variables in behavior science became apparent. A schedule of reinforcement describes the arrangement of consequences. Different ways of arranging this behavior-environment relation produce characteristic patterns of responses. Some schedules are efficient in establishing new behavior, while others make behaviors resistant to extinction. Operant behavior that is a result of direct contact with the environment is referred to as contingency shaped, and behavior that is a result of verbal interventions is referred to as rule-governed (Foxall, 2003), but all behavior may be described through reinforcement and the three-term contingency. Intentionality can be defined as a verbal description of future reinforcing contingencies controlling present behavior (Sandaker, 2009). Verbal behavior and rules work as discriminative stimuli, but the behavior is not rule-governed unless the behavior is in fact reinforced by it (Baum, 2005, p. 160).

What behaviorists define as reinforcement, economists define as the value of goods (Hursh & Roma, 2013). Value or utility is one of the main building blocks of economic theory. Utility is a measure of how we value an outcome, and the standard model assumes utility maximization. Experienced utility refers to our experience of pleasure and pain, and to how this experience guides us in what we should do and what we will do. Decision utility is defined as the weight assigned to an outcome in a decision, and is revealed by people's choices (Wilkinson & Klaes, 2012). The idea that we *assign weight* presumes deliberate or intentional consideration, in that sense, decision utility is not limited to hedonistic experiences, the way experienced utility is, and the concept of utility may, in fact, cover situations of overt and covert behavior. Both terms suggest that utility *affects* choice, either through behavioral or cognitive precursors. This also implies a mechanistic perspective, in that the different types of utility are the origins of specific behavior, which also implies that the concept is predefined and static. Further, utility being a measure means we attach definite pay-offs to alternatives, something we might not be able to do (Simon, 1955). Other refinements of the utility concept include anticipatory utility, which refers to our tendency to take pleasure in the expectation of an event; residual utility, which refers to the pleasure of reminiscing over past events, and diagnostic utility, which means we infer our utility on our own actions (Wilkinson & Klaes, 2012). The same event may then be “weighted” differently depending on at what point the event is considered, emphasizing the intentionality of the concept. People make decisions based on a range of objectives. Consequently, the concept of utility has many meanings and determinants. The fact that it is predefined and static requires different categories of the concept in order to describe different settings. The

concept of utility could relate to intentional as well as non-intentional behavior, but it is limited to a mechanistic explanation and does not take into account operant selection. The dynamic nature of choice requires a generic approach to investigate and explain choice behavior, and it may be better explained through reinforcement and the three-term contingency. Motivational operations (MOs) are events that change the reinforcer effectiveness of consequences and the frequency of behavior associated with these consequences. Establishing Operations (EO) are events that increase the effectiveness and Abolishing operations (AO) to events that decrease the effectiveness (Laraway et al., 2003). Food deprivation could be an EO, increasing the value of food and the momentary frequency of behavior that previously has had food as a consequence. An EO can also be verbal, in which case we have rule-governed behavior. Motivative augmental rules are rules that change the effectiveness of an already established reinforcer. Telling yourself that “I feel great when purchasing environmentally friendly products”, may increase the effectiveness of the reinforcing consequence related to purchasing environmentally friendly products. The motivative augmentals are conceptualizations of value (Plumb, Stewart, Dahl, & Lundgren, 2009). In behavior analysis, motivation is a function of learning history and biology (subsuming motivational operations of all categories) and current stimulus conditions, variables that are in principle, but not always in practice, subject to manipulation (Hayes & Brownstein, 1986). Being “highly motivated” is explained through operant terms, specifying the variables and the functional relations rather than relying on cognitive entities. Adopting a selectionist perspective allows us to search for the origins of the intentions in our experience with the world (Catania, 1984).

Preference and choice are other concepts that are defined differently within economics compared to how they are defined within a selection perspective. People are assumed to rank outcomes according to their desirability (Wilkinson & Klaes, 2012). Sometimes some outcomes are preferred over others; at other times, we are indifferent to outcomes. The standard model assumes that preferences are revealed in our choices. According to the standard model, preferences are different from choices; preferences *determine* choices. Preferences may very well be intentional considerations about the choices we are about to make. In that sense, preferences determine choices, assuming choice is the behavior, but as the concepts mentioned above, preference can be neither static nor uniform. Preferences may be a result of the consequence of previous choice behavior, and in that sense not intentional. Preferences indicate how we previously have chosen and how we probably will choose in the future, in which case preference equals choice. Some authors distinguish between judgment and choice (Camerer & Loewenstein, 2004), with judgment denoting the processes people use to estimate probabilities, and choice denoting processes people use to select an action. Again, this assumes that judgment and choice are cognitive entities that determining a subsequent behavior. The fact that we are *not* able to judge the probability of events is well documented in behavioral economic research. Cognitive psychologists suggest that we use cognitive “short-cut” mechanisms, called heuristics, which violate the probability estimating principles and may lead to biased (non-optimal) choices. While a whole range of situation-specific heuristics and biases have been described, categorizing our actions into increasingly nuanced types in order to describe the behavior with sufficient precision does not aid in a better *explanation* of our behavior.

“Value/utility” and “preference/choice” contain situation-specific premises, and thus the terms may change continuously. As with the concept of rational behavior, we are at risk of having an endless number of different concepts of utility, while the single term “value” cannot describe individual preferences. As long as we are describing profit-maximizing firms, “value” may have a common meaning. Indeed, in neoclassical economics value is regarded as synonymous with price (Nicholson, 1992). On the consumer side, “value” may obtain, via statistics, a common meaning for particular consumer groups, whereas “value” at an individual level cannot be static due to great differences in context, given a view of choice behavior as an adaptive system.

The concept of reinforcement is applicable to the selection perspective. Expected utility is an a-priori value judgment; reinforcement is non-teleological and functional. Reinforcement is functionally defined because it is only reinforcement if the placement after the behavior causes an increase in similar behavior in the future (Vargas, 1984). The concept of reinforcement can explain the adaptive system of the organism. It is generic enough to cover any situation-specific context.

Methodological Approaches

The emergence of behavioral economics as a sub-discipline of economics relies on development of the standard economic model into a decision-making model, and on the subsequent empirically based critique of that model.

The neoclassical revolution saw an increased emphasis on mathematical models. Psychology was regarded as insufficiently scientific, and excluded for that reason (Camerer & Loewenstein, 2004). The neoclassic economists were concerned with mathematical rigor, which lead to more precise predictions but not necessarily more accurate results (Wilkinson & Klaes, 2012). The degree of correctness of predictions depends on the input to the models, so *precise* and *accurate* are not the relevant concepts, unless they qualify something, and it cannot be *results*. Within many areas of economics, the objective is to predict or describe behavior on an aggregate level. The models depict multi-dimensional situations with a large number of variables possibly influencing variables of interest. This leads to difficulties in finding specific causal effects, but the models will be able to show common tendencies and general features on a large scale. Production economy is an example where there is no need for behavioral considerations and where standard economic models can generate precise predictions. (Kagel & Winkler, 1972). The decision-making model, on the other hand, is concerned with individual behavior, and the specific input, as well as its effects, may well be more important.

With respect to *explaining* behavior, both a cognitive perspective and a behaviorist perspective exist (Reed, Niileksela, & Kaplan, 2013). As a critique to the standard economic model, Herbert Simon (1955) pointed out the lack of realism in an assumption of rationality. Numerous experiments by Kahneman and Tversky; Thaler, and Loewenstein and Prelec, replicated results in support of Simon’s theory. One of the most influential papers in behavioral economics is Prospect theory (Kahneman & Tversky, 1979) where the violations of standard economic theories are explained through psychophysical principles, including heuristics, loss-aversion and reference point (Camerer & Loewenstein, 2004; Wilkinson & Klaes, 2012). Concurrently,

important single-subject experiments on related issues were conducted based on operant learning principles (Baum & Rachlin, 1969; Chung & Herrnstein, 1967; Rachlin & Green, 1972). Herrnstein had studied and worked at Harvard and probably discussed with Skinner the relationship between behavioral science and economics. Herrnstein found matching in pigeons (Herrnstein, 1961) and developed the matching law. The matching law describes the general tendency to distribute relative rate of behavior to relative rate of reinforcement (Pierce & Cheney, 2008), and thus is a description of a decision-making *pattern*. The matching law is also an early description of how context matters in choice behavior (Bickel, Green, & Vuchinich, 1995).

The aim of consumer behavior analysis is not to exclude the cognitive perspective, but rather to explore possible interactions between these accounts of consumer behavior (Foxall, 2001). Behavioral economics is often concerned with, not only describing behavior, but also explaining behavior on an individual level. In behavior analytic terms *explaining* behavior means treating behavior as the dependent variable, finding the cause of the behavior (Hayes & Brownstein, 1986), which is best obtained through single-subject research. Performing single-subject experiments enables us to investigate behavior as a natural science. Further, if the purpose is to modify behavior, whether it concerns consumption or other behavior, the operant procedures in a single-subject experiment are necessary to control the variables.

Experiments performed on an aggregate level, whether by group design or aggregating data from single-subject studies, have limits. Controlling important variables can be practically difficult, ethically problematic, or both. For example, experimenting with different tax levels for different groups would be problematic (Wilkinson & Klaes, 2012). Discounting experiments are typically presented as a discounting curve showing an average of the data from several individuals. Delay discounting describes our systematic devaluation of outcomes appearing in the future (Madden & Bickel, 2010). Behavior analysis has a strong record in discounting studies, and a potential for further development. Delay discounting has been thoroughly studied, and hyperbolic discounting of future events in various settings is a robust finding (Bickel & Marsch, 2001; Green & Estle, 2003; Green, Fristoe, & Myerson, 1994; Hantula & Bryant, 2005; Holt, Green, Myerson, & Estle, 2008; Kirby, 1997; Kirby & Herrnstein, 1995; Laibson, 1997; Madden, Francisco, Brewer, & Stein, 2011). Hyperbolic discounting is a discounting model that captures that we prefer things sooner rather than later, but it also captures the time-inconsistency and preference reversal. The discounting rate is not constant over time, people tend to be more impatient in the short run (higher discount rate), and more patient in the long run (lower discount rate) (Wilkinson & Klaes, 2012). These curves describe well how we generally tend to discount, and the hyperbolic discount function is a good predictor of aggregate human choice behavior. Some researchers do, however, suggest that we need to turn our attention to the *origins* of individual discounting (Foxall, Doyle, & Yani-de-Soriano, 2011; Green & Myerson, 2013), for which single-subject experiments are in order. A proper scientific investigation of the psychological underpinnings of behavioral economic phenomena might be better served by individual and situation-specific studies than by large-scale data analysis. A limitation to the single-subject methodology could be the lack of ecologically valid results. Because it is important to isolate and manipulate the variables, the experimental situation may become unrealistic, and the results will not tell us anything about real-life situations. On the other hand, in field

studies where one can observe real decisions in real-life situations, findings may be subject to confounding variables to a larger degree than in an experiment (Sidman, 1960, p. 26). A customer buys the cheaper but less efficient appliance (Smaller-Sooner) over the more efficient, cost-saving, but more expensive one (Larger-Later). This could be associated with delay discounting of the future cost saving. However, unless we can track the actual discounting (devaluation), his choice may simply be based on cash constraints, or lack of knowledge about the future cost savings (Wilkinson & Klaes, 2012).

Single-subject research is also relevant for the larger picture. Traditionally, behavior analysis has not been concerned with complex behavior such as the behavior of consumers, because these complex activities are not possible to control in an experiment (Foxall, 2001). However, the matching law implies that knowledge about behavioral tendencies on an individual level can be extended to plausible accounts of behavior on a societal level (Hursh & Roma, 2015). Experiments on addiction have shown how extended exposure to reinforcing properties of drugs lead to changes in demand (Hursh & Roma, 2013). Thus, rather than constructing hypothetical demand curves based on models, it is possible to form demand curves based on the history of choice behavior obtained through experimental data. Etzioni (2011) suggests that behavioral economics might be moving toward a new paradigm, and that the main feature distinguishing behavioral economics from neoclassical economics is in fact the use of experiments. Etzioni (2011) points to groundbreaking methodological accomplishments in the field through increased experimentation, findings that are replicated in new studies, and generalized to real-life situations. Economists have attempted to discredit behavioral economics findings, arguing that they are only applicable in marginal situations. The endowment effect refers to the phenomena that people tend to assign higher value to loss of a possession than to gain of the same item (Wilkinson & Klaes, 2012). This phenomenon has been criticized of being an experimental artifact, not applicable when behavior is repeated (Etzioni, 2011). Economists argue that in a natural consumer situation, with repeated purchasing and selling behavior, less endowment effect will occur. Etzioni (2011) points to other behaviors that are more difficult to dismiss; it is, for instance, still a major problem that individuals fail to save for retirement. This is clearly not an experimental artifact. While some behavior economic findings may have marginal predictive value for aggregate economic decision-making, experiments are required if the purpose is to explore the motivations or reasons for individual behavior. Experimental control is needed in behavioral explanations (Camerer & Loewenstein, 2004), and the classical economic model is too static to serve as a model for predicting individual behavior. Herbert Simon argues that it is also too static to predict the behavior of firms. For an adaptive organism, we need to know about the organism's mechanics of adaptation to environmental influences (Simon, 1959), and they can best (maybe only) be explored through experiments.

Economists have been concerned with *what* people do and have traditionally obtained empirical data through field studies, while psychologists have been concerned with *why* we act as we do and have relied on experiments (Wilkinson & Klaes, 2012). Consumer behavior is concerned with both the consumer and the producer, sometimes from the individual perspective and sometimes from a market perspective. Researchers within consumer behavior, and behavioral economics in general, should be able to

balance between using economic models, field studies and operant procedures, depending on the level of investigation.

Discussion

Behavioral economics is a booming research enterprise as indicated by the success of books like “Nudge” (Thaler & Sunstein, 2009) and “Thinking fast and slow” (Kahneman, 2011), and behavioral principles are being promoted also outside the behavior analytic field. Both books emphasize the necessity to arrange situations in terms of proximity. For instance, Thaler and Sunstein (2009) suggest raising tax on gasoline as one initiative to take better care of our environment. The incentives have to be properly aligned, and raising tax on gasoline will inflict a cost to the individual, which in turn probably will reduce driving. Thaler and Sunstein’s work has also led to behavioral economics being integrated into government regulations. A Behavioral Insight Team was established in the UK in 2010 (<http://www.behaviouralinsights.co.uk/>, 2015), applying *nudge* principles to improve government policy and services. *Nudge* refers to the friendly facilitation of conditions to increase the probability to make sensible choices (Thaler & Sunstein, 2009). In 2013, President Obama introduced a similar team in the USA. Both teams continue to influence policy and regulations in their respective countries. In September 2015, Obama published his Executive Order Using Behavioral Science Insights to Better Serve the American People (<https://www.whitehouse.gov/the-press-office/2015>). The press release from the White House on September 15 says, “A growing body of evidence demonstrates that behavioral science insights – research findings from fields such as behavioral economics and psychology about how people make decisions and act on them – can be used to design government policies to better serve the American people”. The 2015 World Development Report: Mind, Society, and Behavior (<http://www.worldbank.org/en/publication/wdr2015>) reports on establishing a behavioral Innovations Lab, and on how understanding choice and behavior can make development interventions more effective. Important insights from the study of human behavior may yield significant contributions to public policy (Amir et al., 2005). By applying economic methods to behavioral principles, empirically supported public policy interventions can be implemented (Hursh & Roma, 2013). Policy makers can be equipped with tools to improve policy-making in areas such as increasing savings for retirement, reducing drunk driving, increasing enrolment in health care plans, and paying income tax (Amir et al., 2005).

Nudging and behavioral insight team applications have come a long way with regard to circumstance-specific behavioral principles, shifting focus from dispositions; whether rational or irrational, and concentrating on environmental conditions relevant to behavior. However, the learning aspect also involves modification, extinction and maintenance of behavior over time, which must include reinforcement contingencies and thus the selection perspective. Consumer behavior studies have shown that classical conditioning may change consumption in some cases, but the results are mixed

(DiClemente & Hantula, 2003). Attention to the product might not be sufficient in order to change (purchasing) behavior. It is necessary to include the whole three-term contingency. When investigating causal effects or implementing interventions, explanations in terms of reinforcement contingencies are preferable to the concepts of utility, value, preference or choice, because reinforcement in the three-term contingencies explains the adaptive system of the organism and enables us to investigate the variables affecting our choices. Changing behaviors for lasting results and influencing cultural practices could capitalize on the substantial research on schedules of reinforcement. Behavior analysis has assembled an extensive body of knowledge about schedules of reinforcement and their effects on the duration of and robustness of behavior. This knowledge can add value to the behavioral perspective that is spreading on a global basis.

Behavior analysis has more to offer than sophisticated knowledge about single subject experiments, and integrating behavioral economics and behavior analysis may be advantageous. The fields are similar, and the behavioral approach has shown to be applicable to behavioral economic issues (Reed et al., 2013). The main contribution from behavior analysis is the individual and circumstance-specific research methods *and* the ability to extend this research into large-scale analysis and applied research, describing economic lawfulness based on individual behavior.

Summary

The development of behavioral economics has occasioned a shift in focus from assumptions of rationality to impulsive or irrational human behaviors. In spite of the important contributions of Herbert Simon, the heritage from classical economy still separates the behavior – environment relation. Behavioral economists look for stable intrinsic properties of the choosing agent, and see value or utility as intrinsic properties of elements in the environment. In contrast, the conceptual framework of behavior analysis enables investigation of the selection of functional relations between human choice behavior and the environmental contingencies of which it is a part.

Behavior analysts should exploit the momentum generated by the fantastic success of “Thinking fast and slow” (Kahneman, 2011) and “Nudge” (Thaler & Sunstein, 2009). Behavior economics provide good descriptions of important phenomena, and behavior analysis offers the technology to influence them.

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Compliance with Ethical Standards

Human and Animal Rights and Informed Consent This article does not contain any studies with human participants or animals performed by any of the authors.

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