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Behavioral Economics: Where Is It Heading?

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Abstract

The addition of "behavioral" to economics has given rise to a highly successful field of research. But, is it just a fashionable new trend or is it here to stay? More to the point, how does it differ from its close relative psychology? To answer these questions, the present article considers what behavioral economics is, and where it started, with the aim of trying to forecast what the status of it will be in the future. In forecasting where behavioral economics might be heading, the argument proposed here is that the best clues can be found in psychological research. If, as has been proposed here, behavioral economics partners research trends in psychology, then the futures of both will almost certainly be moving in the same direction. Both are beginning to, and will start to rely on online tools/mobile phone applications to collect richer data revealing dynamic tends over long time horizons, and as technology continues to facilitate ways of looking at group behaviour online, then larger scale studies examining interactions amongst multiple groups of people will become the norm rather than the exception. More specifically this article speculates on the future research focus of researchers in behavioral economics and the extent to which this will overlap with psychological research on judgment and decision-making.

1. How Long Will Behavioral Economics Last?

Curiously, in the first published article on behavioral economics entitled "The New Behavioral Economics" (Thimm, 1965) there was little discussion of behavior, and no mention of the application of, or insights from psychology to economics. Instead, the article was a reminder to economists that while they were sensitive to the impact of technological advances on the economy at that time, they neglected the fact that the very same ad-

vances also affected the way they themselves theorised about economic behavior. Thimm's (1965) article forecasts fifty years ahead, and sets out the direction behavioral economics was heading in. He predicted that simulations through computer modelling would be a better, more efficient, and a more popular substitute for the current interests in "Physical Experimentation" (Thimm, 1965: p. 30). In short, the aim of the present article is to do something similar by also predicting the future of BE 50 years from now, and along the way the article presents a commentary on the outlook of psychological research.

2. What Is Behavioral Economics?

To begin with, how is BE defined? "Behavioral economics is concerned primarily with the process of decision making regarding spending, saving, investing, borrowing, pricing, etc., and thus supplements the analysis of interrelationships among results of behavior (amounts spent or saved, business investments, prices) which has been the traditional domain of economics." (Katona, 1968: p. 147). "Behavioral Economics is the combination of psychology and economics that investigates what happens in markets in which agents display human limitations and complications." (Mullainathan & Thaler, 2001: p. 1094). "Having its origins in psychology and its primary focus on the critique of *homo economicus*, behavioral economics is now attempting to incorporate new behavioral assumptions into new models of human action" (Santos, 2011: p. 706). Clearly, the definitions of behavioral economics (hereafter BE) fly in the face of Thimm's (1965) forecast from 50 years ago since the most obvious consensus from the aforementioned definitions is that BE is concerned with physical experimentation. "It largely draws on laboratory and field experiments, and also on what is known from individual reports on subjective well-being in the happiness literature." (Heap, 2013: p. 985).

As these descriptions suggest, BE appears to some behavioral economists as rooted in empirical methods. While the treatment of what constitutes behavior may not be consistently the same across definitions, the implication is that psychological processes likely play a role in understanding an agent's economic behavior. Again, not all behavioral economists will agree with this summation, but clearly the definitions of the field as referred to here strongly suggest this. Perhaps a more conservative summary of what another flavour of Behavioral economist might take the discipline to be is that it is a field that is strongly motivated to be empirically grounded—not necessarily from work borrowed from psychology, but on work that relies heavily on causal claims based on the method of instrumental variables (e.g., regression modelling approaches initiated in the 1950s). Either way, the broad view is that BE puts empirical methods centre stage and might best be thought of as a service industry, providing models of behavior that allow behavioral economists to understand and interpret economic phenomena. A separate question can be asked as to whether this differs significantly from what researchers in psychology studying judgment and decision-making are motivated by. Is there a simple but critical difference based on the fact that psychology is concerned with understanding behavior in and of itself, while BE is focused on understanding behavior for the purposes of informing the understanding of economic phenomena?

In economics markets are treated as efficient and agents are by a matter of definition rational. The classical economics model is also prescriptive and assumes that people act (as if) they are strategically basing their decisions on the foreknowledge of the options available to them, and the evaluation of the potential outcomes of those options, according to the likelihood of their consequences. Is this a sustainable view? BE is somewhat of a departure from this classical view of economic behavior because it sets out to uncover explanations for the deviations from axioms typically relied upon in economics by reference to what is going on in the internal mind of the agent making the choices, rather than what is determined and characterised by the immediate choice environment they are in (Heap, 2013; Katona, 1968; Mullainathan & Thaler, 2001; Santos, 2011). More generally, it appears that economics has been transforming in a number of directions over the last 30 years and that these different mutations challenge the classical view of economics just described (BE, Econophysics, Evolutionary economics, Neuroeconomics, Physico-economics) (Davis, 2008; Mallard, 2012). The varying strands to economics include: Econophysics—involves the application of theoretical and methodological advancements from physics to economics. Evolutionary economics—involves the application of theoretical and methodological approaches developed in biology and ecology to examine micro and macro level behaviour in economics. Neuroeconomics—involves a combination of neuroscience, psychology and economics to understand basic judgment, decision-making and reasoning behaviours. Physico-economics—involves using physiological measures of behaviour to understand the mechanism that underpin economic behaviours. Given all these variants of economics, a separate question could be asked about whether the rational actor model can be sustained given the

many significant digressions from it that these variations on economics take, or whether these variants of economics are still too niche to sufficiently challenge the key axiom of classical economics.

The discussion concerning the issue of whether classical economics should still be preserved is best reserved for economists themselves, and there is plenty of work examining the current challenges it faces theoretically (Mallard, 2012), and even whether a rethink is needed of the curriculum that undergraduates of economics are currently taught in universities (Cooper & Ramey, 2014). However, the focus of this piece concerns BE rather than economics and the question of interest for this piece is: What is the future of BE? Furthermore, the rationale for asking such a question is, from the view of a psychologist—given that BE is connected on many levels to psychology, to predict 50 years on what BE is likely to inherent from psychology.

3. When Did BE Start?

The connections between psychology and economics have a long history which has been discussed by many (Backhouse & Fontaine, 2010; Camerer & Loewenstein, 2004; Canterbery, 2011; Colander, 2005; Davis, 2008; Earl, 2005; Friesen & Gangadharan, 2013; Heap, 2013; Heukelom, 2011; Kamenica, 2012; Katona, 1968; Lanteri & Carabelli, 2011; Mallard, 2012; Milonakis & Fine, 2013; Mullainathan & Thaler, 2001; Santos, 2011; Sent, 2004; Simon, 1965). In fact the earliest recognition of the value of psychology in economics, in its behaviorist guise, came from Knight (1925) (Lanteri & Carabelli, 2011). However, the critical turning point for economics in proactively fostering cross disciplinary connections with psychology, as well as sociology and political science was the Second World War. Many historians believe that this resulted from a more problem-orientated focus on social policy issues such as poverty and mental health (Backhouse & Fontaine, 2010; Canterbery, 2011; Hodgson, 2002; Milonakis & Fine, 2013; Sent, 2004). In fact, at the time, the Second World War lead to funding opportunities for research, particularly in the US (National Science Foundation, US Air Force and Navy), that prioritized cross-disciplinary links between the social sciences and economics (Backhouse & Fontaine, 2010; Canterbery, 2011; Hodgson, 2002; Milonakis & Fine, 2013).

However, the cross disciplinary links between economics and other social sciences may not only be the result of historical turning points such as the Second World War, but also from an emerging dissatisfaction with the way in which individual disciplines (i.e. psychology, economics, politics, sociology) tackled major issues (Backhouse & Fontaine, 2010; Canterbery, 2011; Hodgson, 2002; Milonakis & Fine, 2013). A case in point is economic crises. These extreme situations signal a breakdown of the rational actor model because agent's behavior in the real world appears to be anything but rational. In recent history, in recognition of this, the Prize in Economic Sciences in Memory of Alfred Nobel has been awarded to researchers such as Daniel Kahneman, George Akerloff, and Vernon Smith (Earl, 2005; Innocenti, 2010; Mallard, 2012; Santos, 2011). These academics have helped re-orientate models of rationality to taken into account what might be characterised as more *human* features (e.g., biases, cooperation, fairness, heuristics, reciprocity, social identity, social norms) which are used to explain the seeming irrationalities of real world economic behavior. Consequently, the high profile connections these theorists have made between economics and psychology has also helped secure BE's mark in academic bodies (e.g., conferences, journals and departmental chairs in universities), as well as the foundational connections between economics and psychology.

Before these recent Prize winning researchers, it also could be argued that the foundations of BE were established by Herbert Simon's work in the 50's (Simon, 1959). Simon confronted economists, such as Friedman (Friedman, 1962), that were resolute in maintaining the rational actor model. In response, Simon's work imported psychological insights (e.g. people aren't utility maximizers consistently, people depart from subjective expected utility theory) in order to understand economic behaviour (**Figure 1**). Utility here refers to an abstract measure quantifying the amount of personal satisfaction associated with a certain state of the world. Utility maximization is the idea that agents select the course of action that will lead to more personal satisfaction than any other available course of action. Simon's bounded rationality proposal asserts that the decision-maker is limited cognitively with respect to comprehensively representing the decision problem in terms of all choice alternatives, probability distributions, values, outcomes, as well as having a consistent utility function, from which they can maximize their expected utility. Therefore, decisions are made based on an incomplete or inaccurate representation of the decision problem from which the decision-maker tries to attain a satisfactory outcome (attain targets while satisfying constraints). Since Simon's pivotal work, the bounded rationality approach has been the back bone of the Adaptive Behavior and Cognition ABC research programme developed by Gigerenzer,

The goal of SEU theory is to give content to such preferences in the case of uncertainty. Agents are assumed to have preferences between actions, $a \in A$, from which the decision maker can choose. These preferences depend on outcomes and therefore indirectly on states (since outcomes depend on states), $s \in S$, which are beyond the agent's control, and "consequences" or outcomes she will eventually face.

Savage showed that, under some arguably reasonable conditions, agents would choose acts, *as if* they ascribed probabilities to states of the world, utilities u to consequences, and maximized the corresponding expected utility, given by:

$$SEU(a) = \sum_{s \in S} p(s)u(a(s)) \qquad (1)$$

Fundamental to this framework is the result that an act a is preferred to and act a' if and only if the expected utility of a is larger than that of a', i.e., $a > a'$ iff SEU(a) > SEU(a').

Figure 1. Subjective utility theory.

which translates Simon's work into understanding human judgement decision-making, particularly under situations of uncertainty (Gigerenzer, Hertwig, & Pachur, 2011).

The second wave of momentum in the recent history of BE research has seen two diverging paths. The first is, like Simon, the continuing path of transferring discoveries in psychology to economics (e.g. George Akerloff, Alvin Roth, Robert Shilling, Vernon Smith), and the second is importing economics into psychology (e.g. Daniel Kahneman). As it stands now, for some, BE expounds the theoretical principles of Simon's bounded rationality proposal, while also adopting the research tools that psychology uses.

In addition, BE also seems to, as the definitions presented earlier imply, utilize research tools that psychology implements, particularly the controlled experiment. And so, the origins of BE can largely be seen as the adoption of empirical methods that psychologists have been using to explore human behavior. The controlled experiment is a key method of experimentation that involves comparing the behavior of one group in which an experimental manipulation is introduced (experimental group) with another group in which everything is matched, but for the inclusion of the critical manipulation (control group). In fact currently BE holds the controlled experiment in such high regard and utilises so many psychological methods (Camerer & Loewenstein, 2004; Earl, 2005; Friesen & Gangadharan, 2013; Heap, 2013; Kamenica, 2012; Katona, 1968; Milonakis & Fine, 2013; Mullainathan & Thaler, 2001; Sent, 2004) that many psychologist are wondering if they shouldn't be rebranding themselves behavioral economists. More to the point, this has been a source of consternation amongst psychologists in the decision sciences. They see the rise of BE as a reinvention of a wheel that had been successfully turning in psychology for the last 40 years of research on judgment and decision-making (Kahneman, 2013). The insights gained in research on judgment and decision-making by psychologists has been seen to be hijacked by BE researchers and now relabelled as BE research. To consider why this source of consternation has arisen the next section discusses in more detail the overlaps between BE and psychology.

However, one significant point that should be made here is that while there is seeming overlap in the methods used in BE and psychology which will be discussed later, there are still considerable differences in the methods that behavioral economists employ and those that psychologists studying decision-making employ (Hertwig & Ortmann, 2001). Two critical differences can be found between the two disciplines and they are based on deception (real deception—i.e. presenting details of a task which are not the real focus of study of the researcher), and the introduction of monetary incentives. Psychologists tend to set up experiments that introduce real deception whereas BE experiments do not do this as a rule. Also, psychologists often provide participants with flat fee payments, or course credits for taking part in their experiments, whereas behavioral economists introduce payment schemes that are performance related in order to ensure that participants are sufficiently motivated to take part in the study. The rigors of experimentation in BE mean that there are imposed limits as to the way experiments are conducted in BE which do differ from psychological studies, and for some this might be seen as a fundamental difference between the two disciplines.

4. What Are the Similarities between BE and Psychology?

The historical evaluation of BE as proposed here suggests close ties with psychology, and therefore it is likely that BE's future will be guided by what goes on in psychology, though whether this is through further adoption

of empirical methods or theoretical insights will be the basis of speculation in the last section of this article. Therefore some discussion is need to begin with to establish the specific similarities between the two disciplines. Thus, before casting any predictions as to the future of BE, the next step is to consider what BE shares with psychology according to four criteria (formal descriptions, empirical methods, theoretical approaches, neurological correlates of behavior). To start with BE and Psychology share some formal descriptions of the behaviors that are studied (e.g., hyperbolic subjective discounting (Kirby & Herrnstein, 1995), status-quo bias (Samuelson & Zeckhauser, 1988), regret (Loomes & Sugden, 1982), reinforcement learning models (Camerer & Ho, 1999), preference reversals (Kahneman & Tversky, 1979; Lichtenstein & Slovic, 2006; Tversky, Sattath & Slovic, 1988) to name but a few. Second, as discussed earlier, some of the empirical approaches developed in psychology are used to examine personal (e.g., choice behaviour) and interpersonal behaviors (e.g., empathy, cooperation, deception) are used in BE (e.g., laboratory experiments (Ariely & Loewenstein, 2006; DeSteno, Bartlett, Baumann, Williams, & Dickens, 2010; DellaVigna & Malmendier, 2006; Lerner, Small, & Loewenstein, 2004; Mijović-Prelec & Prelec, 2010; Small & Loewenstein, 2003), surveys (Hitsch, Hortaçsu, & Ariely, 2010), simulated multi-player games (Janssen, Holahan, Allen, & Ostrom, 2010), and field studies (Henrich et al, 2005). Third, there are some theoretical frameworks that are shared by both BE and psychology, the most obvious of which is prospect theory (Kahneman & Tversky, 1979). With regards to Prospect theory, it proposes that people make decisions under risky situations in which they assign probabilities and values to their choices, and follow a value function, weighted in such a way that the impact of losses is greater than gains. In addition, research on reasoning, judgment and, decision-making have used dualist-based theoretical accounts to explain patterns of results that suggest an unconscious component to these processes, and this same theoretical account has been enthusiastically taken-up by BE (e.g., Loewenstein, & O'Donoghue, 2004; Weaver & Prelec, 2013).

Most specifically, dual-process theories are psychological theories that characterise the way in which we think, reason, decide and make judgments according to two fundamentally dissociable process, one of which is variously described as unconscious/implicit/intuitive/automatic/heuristic/experiential- and generates responses quickly based on prior stored experiences, the second is referred to as conscious/explicit/analytic/controlled and generates responses based on deliberation which often involves rule-based representations. Crucially, these two processes are qualitatively different and generate different types of behaviours which are found in work in BE as well as psychology.

Just as psychology has moved towards understanding the neuropsychological underpinning of behaviour, so too has BE, as observed by the incorporation of several different neuropsychological technologies to show that there are qualitatively different systems that support choice behavior. Such techniques include Electromyography (EMG) which is a technology that enables the recording of electrical brain activity produced by skeletal muscles. Functional magnetic resonance imaging (fMRI) is also a popular technology used to show the various interconnected regions of the brain that support economic behaviour; it records the blood flow in the brain which can be used to infer brain activity. Also, most recently TMS—Transcranial magnetic stimulation (TMS) has been used to demonstrate the same underlying difference between conscious and unconscious processing in both BE and Psychology. This type of technology uses an electrical current that can affect the activity of regions in the brain which can be used to infer functioning of those regions. Thus, EMG, fMRI, and TMS connect neural correlates to measurable behaviours in order to show that the underpinnings of choice behavior have different neuropsychologial routes (Hsu, Bhatt, Adolphs, Tranel, & Camerer, 2005; Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003). As mentioned earlier, while there are some differences in the way in which experimentation differs between BE and psychology, there are many overlaps. From the view of a psychologist these overlaps are based on formal descriptions, empirical methods, theoretical approaches, and examinations of neurological correlates of behaviour. Given that there are core similarities between BE and psychology, the next two sections now attempt to make some forecasts with respect to the future directions of BE by looking to trends in psychology.

5. BE in the Near Future

The first obvious prediction is that for the next 10 years BE is likely to continue its success, by which ismeant raising its academic and public profile; for which some might regard Thaler and Sustein's Nudge book as being an invaluable contribution to the cause (Thaler & Sunstein, 2008; Sunstein, 2014). The reason being that the authors have communicated the interplay between BE and psychology and have consolidated insights from both

research fields (though often without acknowledging explicitly that the research has predominately come from psychology) in such a way as to help provide practical tools for policy makers to help promote desirable behaviors (e.g., paying tax returns on time, increasing organ donations, sticking to weight-loss programmes, reducing home energy consumption, increasing pro-environmental behaviors such as recycling, making more prudent financial decisions).

Nudge refers to a method of generating conditions in which the decision maker is guided to make the best decision as judged by themselves. A related term is *Libertarian paternalism*, which refers to an economic policy decision making position that is sensitive to the view that people are not rational according to traditional economic models, and therefore policy makers are entrusted with arranging the choice architecture (decision-making environment) in which people make decisions appropriately for their own good. In particular, this approach, along with other similarly motivated proposals in BE often relegates problematic behaviour that doesn't align with classical economic models (i.e. biases) to the unconscious (Benhabib & Bisin, 2005; Brocas & Carrillo, 2008; Kahneman, 2003; Loewenstein & O'Donoghue, 2004). That is to say, when behaviours seem to be hard for people to justify, hard to articulate, speedily implemented, but malleable through the use of indirect methods such as priming (or nudging), then they are often described as based on intuitive (unconscious) processes (Benhabib & Bisin, 2005; Brocas & Carrillo, 2008; Kahneman, 2003; Loewenstein & O'Donoghue, 2004). In other words, the reasons why people err, and the best way to minimize errors, is to target unconscious mechanisms because they are the problem and the solution.

For BE this is potentially problematic for two reasons. First, by putting the unconscious into the mix, behaviour isn't being explained, but explained away, which is equivalent to BE closing the black box that their forefathers spent time arguing should be opened and explained (Gigerenzer, 2015; Simon, 1959). Here black box refers to an analogy used to describe theoretical approaches that explain how the decision-maker moves from problem to solution on the basis of the conditions under which decision-making takes place, these approaches black box approaches stop short of explaining behaviour along the lines of the actual internal mental processes that account for a decision-makers preferences/subjective utility functions that could explain choice behavior. Hence, the psychological processes that transform the decision-making problem into a solution remain opaque, like a black box. So, by deferring choice behavior to unconscious processes, BE theorists such as Thaler and Sunstein are introducing another black box.

Second, unconscious processing refers to encoding, retrieving, transforming and implementing information under the threshold of subjective awareness, which many in psychology and BE propose guide many of our day to day behaviours. There have been growing problems concerning the replicability and in turn the reliability of several demonstrations of commonly referred to psychological behaviors particularly those concerning the unconscious (e.g., priming, implicit biases/heuristics in decision-making, intuitive reasoning) (Kruglanski & Gigerenzer, 2011; Newell & Shanks, 2014; Osman, 2014). This has implications for theories in BE that refer to unconscious processing to explain choice behaviour (Osman, 2014). This means that for behavioural economists that adopt the dual-process framework, such as nudge theorists, the next decade will likely bring considerable theoretical upheaval in tackling the problems that have concerned psychology; assuming the BE researchers are concerned with addressing these core problems. This means that BE will be (or at least should be) rethinking the ways in which unconscious processes are demonstrated in choice behaviour, as psychologists are having to do, in order to avoid empirical, and theoretical lacunas. It also means that the theoretical conceptualization of our cognition into two distinct systems of thought will have to change which is foundational for some notable BE theorist. While the dual-process framework is currently enjoying its day in the sun, particularly because it has been so readily accepted beyond academia into the public domain, there are significant challenges to it (Newell & Shanks, 2014; Osman, 2004, 2013, 2014), and it cannot be sustained as a theoretical description of cognitive processes in its current forms. This means that more precise, accurate and formal descriptions that generate clear testable hypotheses will replace the currently popular dual-process framework, which means that both BE and psychology will be looking to another general cognitive framework to account for behaviour. This most certainly will be a preoccupation for researchers in BE that are concerned with establishing a sound conceptual framework of choice behavior.

6. BE in the Distant Future

Practices in psychology are beginning to change in light of the current replicability debate that has started

(Asendorpt et al., 2013; Gelman & O'Rourke, 2014; Mar, Spreng, & DeYoung, 2013; Pashler & Wagenmakers, 2012; Wagenmakers, Wetzels, Borsboom, & van der Maas, 2011). In response to this, there are attempts to develop methodologies that make use of large data sets (Bray, 2010; Klein et al. 2013; Stafford & Dewar, 2014). This trend will also likely change the tools that researchers use for examining behavior in the long term, and given that similar tools are also borrowed by those in BE, the future directions in research methods in psychology in the next 50 years are likely to extend to BE. Moreover, it means that practices in terms of the way in which data is made available in conjunction with published work, as well as the way in which research reports are published, and the call from journals for more meta-analytic studies in order to establish the reliability of a particular behavioral method, will require a substantial rethink of how data is treated and published. This will certainly change the landscape of psychological research and most likely extend to BE because psychology journals publish BE research (Samson, 2014).

Therefore, on this thesis then, it is probably fair to say that the way in which data collection is carried out is likely to change in BE. It is perhaps an obvious prediction to make, but there are two areas which will likely shape research in BE, as they are doing in psychology. The two most obvious areas that will likely be the mainstay of research for the next 50 years are big data and online gaming (Bray, 2010; Ducheneaut & Yee, 2013; Klein et al., 2013; Stafford & Dewar, 2014; Wolfe, 2013). As technologies advance in data mining and modelling, so that researchers can interrogate large data sets more efficiently and effectively, so too will the scope for tracking and predictingchoice behavior, beliefs, preferences, judgments and even emotions, across vast groups of people—and across time (Boyd & Crawford, 2012; Cambria, Rajagopal, Olsher, & Das, 2013; Wolfe, 2013). Not only will it be possible to track choice behaviour over large populations, crucially more efficient data mining of large data sets will in turn require ever more sophisticated models to explain the causal mechanisms for explaining dynamic choice behaviour, which will provide insights at the mirco- and macro-economic level (Einav & Levin, 2014; Taylor, Schroeder, & Meyer, 2014).

Similarly Massively Multiplayer Online Games and serious gaming initiatives provide a means of examining cognitive and social behavior across wide networks (Shim, Pathak, Ahmad, DeLong, Borbora, Mahapatra, & Srivastava, 2011; Stafford & Dewar, 2014). It is already becoming a valuable research methodology for setting up large scale social experiments and BE experiments cheaply to collect more detailed data on a variety of social behaviors (cooperation, coordination, competition, trust, punishment) and interactions between groups (organizational behavior, team dynamics).The limits at the moment are simply down to not knowing how to exploit the methodology, or the large data sets generated, because this requires significant advances in modelling techniques. This will most certainly change as analytical and computational challenges are surmounted (Cambria, Rajagopal, Olsher, & Das, 2013; Wolfe, 2013).

Also, again, motivated by technological advances, BE is likely to incorporate advances in techniques designed to measure the neuropsychological underpinnings of choice behaviour. Neuroscience and neuroeconomics already adopt the principle that a deeper understanding of any behavior requires consilience across neuroscience and psychology (Barrett, 2009), and across neuroscience and economics (Camerer & Loewenstein, 2004; Camerer & Loewenstein, & Prelec, 2005). This is likely to continue given the Human Brain Mapping project [a US project set to begin in 2014 involving the National Institutes of Health (NIH), the Defense Advanced Research Projects Agency (Darpa), and the National Science Foundation (NSF)]. By investigating how the functions of the brain are fundamentally associated with behaviour this project aims to do for psychology what the human genome project did for behavioral genetics. Therefore, it is likely to set a precedent for research trends in future work in psychology and possibly BE. In a similar vein, behavioral genetics is growing as an approach for uncovering the genetic underpinnings of behaviour in psychology. Although it too has its current problems (Berryessa & Cho, 2013), it is becoming much more integrated with psychological research and neuroscience as a way of understanding complex behaviors such as moral reasoning (Haidt, 2007, Marsh, Crowe, Yu, Gorodetsky, Goldman, & Blair, 2011), numeracy skills (Libertus, Feigenson, & Halberda, 2011), and even political voting behavior (Hatemi, Alford, Hibbing, Martin, & Eaves, 2008; Jost, Glaser, Kruglanski, & Sulloway, 2003). Again, the same potential extends to BE, and may be another avenue that is exploited in BE research in the near future.

7. The Shape of Research Interests in BE

The research focus of BE over the next 50 years is largely going to depend on whether it will create a clearer

distinction between itself and Psychology, and if it does, then it will most certainly depend on application. Given the fact that many of the methods, theories, and organizational structures (publishing outlets, conferences, workshops, funding streams) overlap between BE and psychology, the research agenda has to be much more clearly identifiably different from psychology for it to be uniquely seen as BE. So, for it to be seen as fundamentally different then BE may end up signalling itself more obviously as a discipline that is designed to investigate behavior for the purposes of understanding economic phenomena and informing economic institutions (De Martino, O'Doherty, Ray, Bossaerts, & Camerer, 2013). Given this, one of its current and sustained future concerns might well be how to better study and characterize social dynamics and apply this to understand market wide issues that can give rise to financial crises, or to understand household, corporate and financial behaviors (Bank of England, 2015; Chater, 2015). As a result, BE will have to address questions such as: How does individual choice behavior scale up to group decision-making behaviour? How does group decision-making behavior scale up to macro level economics? How can economic/financial institutions be regulated more effectively unless there is an accurate characterization of the financial system and the social dynamic processes that help to understand multiple agents interacts? For any application of the understanding of social dynamics to economic/ financial institutions, each question has to be successfully addressed in turn, and requires a formal characterization of dynamic decision-making that occurs at an individual, group and global economic level (Osman, 2014). Thus, answering these questions will involve innovations in empirical methods, possibly along the lines that have been discussed in this article, and also innovations in formal and theoretical frameworks that focus on detailing the mechanisms behind dynamic behavior (external to as well as internal to the agent(s)) (Osman, 2010).

8. Concluding Remarks

The argument proposed throughout this piece has been that BE is closely tied to psychology in theory and in practice, and that any developments in psychology will have a bearing on the way researchers operate in BE in the next 50 years. What is less easy to predict, is how psychology will change as a result of the developments in BE.

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