Infinite Regress Problems and the Methodologies of Behavioural Economics

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Abstract

This paper presents a case for viewing the use of heuristics in decision-making as necessary in order to avoid decision paralysis in the face of open-ended choice problems. Such choices are underlain by a variety of infinite regress problems so choice of necessity requires the use of rule-based systems that cut short these infinite regresses. This view of the role of heuristics differs from their usual portrayal in modern behavioural economics merely as a way of coping with finite cognitive capacity, with a gemeral presumption that it results in suboptimal decisions (relative to what a fully rational economic agent would do). The infinite regress-based perspective points towards a view of economics focused on 'Homo Heuristicus', a view that brings together old behavioural economics (where the emphasis is on personally-constructed or socially-acquired decision rules and routines that can be fast and frugal) and modern behavioural economics (where the emphasis is on dysfunctional heuristics that are part of Human Nature). Integrating these two approaches would provide the basis for a progressive alternative research programme to that of economic orthodoxy, taking modern behavioural economics out of the latter's protective belt.

Introduction

In a paper written as a tribute to the late Mark Blaug, Sheila Dow (2014) opted to go where Blaug had feared to tread, namely, into making a Lakatosian assessment of the methodology of the typical modern behavioural economist. During her exploration of this territory, she considers the legitimacy of interpretations of experiments that have been taken as implying the existence of systematic tendencies for behaviour to be biased away from optimal choice owing to the use of heuristics by decision-makers. Such an interpretation is problematic, she notes (p. 32), referring to Winter (1964) and Cohen and Dickens (2002), because optimization is logically impossible owing to a problem of infinite regress: the allocation of resources is a process that entails using some of the resources that the process is intended to allocate, begging the question of what is the optimal allocation of resources to the task of allocating resources, a question whose consideration will itself use some of the resources being allocated, and so on.

This logical objection to the notion of optimization strikes at the hard core of orthodox economics wherein all choices are viewed as acts of constrained optimization. Hence it is not surprising that it continues to be ignored within mainstream economics. It is also not surprising that those whose work was the focus of Dow's paper—namely, practitioners of what Sent (2004) has called New Behavioural Economics (NBE)—are also oblivious of it, for they tend not to have received training in what Sent calls Old Behavioural Economics (OBE) or in the modern evolutionary economics that morphed out of OBE via contributions such Winter's (1964) paper. Richard Thaler (1987) is the only big-league contributor to NBE to cite Winter's paper (out of the 1077 citations Google Scholar could find for it at the time of writing [September 2019]). Thaler made no reference to Winter's

logical objection to optimization and merely cited the paper as arguing, as Friedman (1953) argues, that competitive pressure will ensure that only that firms that 'get things right' (Thaler, 1987, p. 123) will survive in the long run. In doing so, he failed to acknowledge Winter's argument that firms which use fast and frugal decision rules may actually outperform firms that take up time trying to work out optimal responses to changed market conditions. Even Cohen and Dickens's (2002) paper, which is one of only a handful to cite Winter (1964) in a mainstream journal in the past quarter century, has pretty much failed to get economists concerned about the significance of the infinite regress problem for economics: Google Scholar recorded only 38 citations of it by the time of writing this paper.

Undaunted by this, I reconsider here the significance of the infinite regress problem for the methodology of behavioural economics. My focus is different from that of Cohen and Dickens (2002), who raised the infinite regress argument against optimization en route to making a case for building behavioural economics on foundations derived from evolutionary psychology. In essence, their message seems to be that if humans are by nature fallible as decision-makers this may be a result of how evolutionary selection processes worked during humanity's early hunter-gatherer period. This period is the only one in human history long enough for natural selection to have been able to shape the genetic make-up of humans in a way that enhanced their ability to survive and reproduce in a particular environment. Hence to the extent that our behaviour is driven by inherited heuristics that humans in general possess, these may have evolved because they were performance-enhancing in early hunter-gatherer environments, even if these inherited heuristics are prone to be dysfunctional today. In this paper, by contrast, my aims are, first, to show the Pandora's Box of infinite regress problems that underlies real-world open-ended choice problems, and

second, to explore what this implies for behavioural economists who want genuinely to address the human predicament rather than merely pretend to be doing so whilst restricting themselves to situations that they present, explicitly or implicitly, as closed-choice scenarios. The paper points towards a general rules-/heuristics-based view of human behaviour that could provide a basis for modern behavioural economics to join forces with those who continue to work in the OBE tradition.

Open-ended choices and the infinite regress problem

The decision cycle framework proposed by Dewey (1910) is useful for organizing thinking about the analytical and practical challenges that open-ended decision problems pose. In Dewey's framework, choice entails a loop with the following segments: problem recognition; search for alternatives; evaluation of the options that are discovered, in terms of the information that has been discovered about them; ranking of alternatives (choice); implementation (if this is not possible with plan A, is there a plan B?); and hindsight review (which may lead to the conclusion that the problem has or has not been solved, or that solving the problem has generated a different problem). Clearly, where decision-makers suffer from bounded rationality and deficient foresight, decision cycles may just keep looping forward in time, as in Bausor's (1982, 1984) helical analysis of choice, rather than ending in an equilibrium that is maintained until there is a shock to the system. But infinite regress problems lurk within a single decision-cycle loop.

The problem of problem recognition

Problem recognition that triggers a process of choice entails choices in its own right. With finite attentive capacity at their disposal, decision-makers have to choose

between attending to doing some things and monitoring others. As Berger (1989) has pointed out, this question cannot be answered optimally as it contains an infinite regress: merely to think about the allocation of attention is itself an act that consumes scarce attentive capacity, begging the question of how much attention we should devote to thinking about the allocation of our attention.

There is also the question of how we should specify whether we have a problem that is worth devoting our attention to solving. The performance of a product or an employee may not be as good as we anticipated but that fact does not of itself imply we should worry about how to get a better performance: it may be the case that what we are getting is as good as is possible. But performance that meets expectations may conceal scope for doing better, either because we had set our aspirations needlessly low at the time we selected the product or employee, or because things have moved on and we could now get better products or more capable employees. Is it worth looking to see if this is the case? Perhaps the problem is merely a temporary shortfall in performance, but that begs the question of how often we should be checking on performance.

People are also beset here by the Duhem–Quine Problem (Duhem, 1906; Quine, 1951) regarding the impossibility of testing one hypothesis without assuming the veracity of other hypotheses: unexpectedly poor performance may not be caused by the product or the worker in question, but by something else, such as complementary resources not performing as well as we had expected (for example, a ‘flat’ car battery may not reflect a failure of the battery but a problem with the car’s alternator or wiring), or perhaps the measuring device that we are using is defective. Insofar as someone else is supplying information pertinent to judging whether we have a problem, it is possible that we are being given misleading information due to the other

party's incompetence or opportunism. However, hiring a third party to audit the second party raises the question of whether we should trust the third party auditor. For example, in 1997, the New Zealand Government's former Auditor General, Jeff Chapman, was jailed for fraud and doubts about the integrity of that office resurfaced two decades later (see NBR, 2017); note also the collapse of accounting giant Arthur Andersen after its failure to spot what was going on inside Enron.

Many of the problems that should concern us lie in the future though they may be triggered by causal chains that are taking shape today or that are already underway. The problem here is to know how to try to peer over the horizon in order to detect potential for such problems and by which method, even if we accept that the future is inherently unpredictable: perhaps the kind of 'scenario planning' practised by corporations such as Shell is worth trying (see Jefferson, 1983, 2012); perhaps we should heed warnings from, or seek advice from others; but perhaps we should simply wait to see what happens, especially in respect of potential problems that are not of our own making.

Searching for the best search strategy

If we accept that we have a problem that requires attention, the set of potential solutions to it and information about them is something that we have to assemble; even if there are already potential courses of action 'kicking around', as per Cohen, March and Olsen's (1972) 'garbage can' model of organizational decision-making, we should not presume that these are the only ones to consider. But by which medium should we search (for example, should we search using our social networks, by visiting a store, via the Internet?), how should we specify what we are looking for (e.g., which search terms should we type into Google, if we opt to use Google as a

search engine?), and how far should we dig into the set of suggestions that our chosen search method throws up? If only a few result are elicited by our chosen search questions within our chosen search medium, does this imply that we should try a different search strategy?

Where there is scope for outsourcing search via market institutions such as product comparison sites there is also scope for those sites to mislead us due to their incompetence and incomplete coverage of options (see further Earl, Friesen and Shadforth, 2017) or because they succumb to conflicts of interest. To the extent that such sites differ in what they tell us, there is the question of which ones we should trust, and the same applies for comparison sites that claim to find us the best deals from within rival comparison sites (as with trivago.com if one is searching for best-priced hotel accommodation).

Uncertainty about uncertainty at the evaluation stage

In order that decision-makers can form expectations prior to being able rank rival courses of action they need to assess the information they have gathered about what is available and what consequences could arise as a result of selecting a particular option. Uncertainty is inherent here and it makes the notion of optimal search problematic: how do we know whether (or the probability that) we have missed possible options and relevant information about them, and how do we assess the significance of any piece of information? We use our powers of logic and capacities to imagine possibilities when building models of what could happen if we choose a particular option, but the limits to our imagination make it problematic to imagine what we have failed to imagine about what could happen as the sequel to a particular choice. Hence we should be uncertain about how uncertain we are (cf. Dow, 1995)

and any confidence that we feel may simply be the result of our ignorance (Loasby, 1976, p. 158), our lack of knowledge about what we do not know.

As is evident from Shackle's (1961) discussion of the problem of forming conjectures, the task of figuring out how seriously to take possibilities that are raised in the information we have gathered and/or by exercising our imagination itself takes the form of an infinite regress. For Shackle, a perfect possibility is something for which we can envisage no barrier to its eventuation (which does not mean we should treat it as certain to occur). However events that look potentially surprising because we can imagine barrier to their eventuation may nonetheless take place if other events block the eventuation of the events that we envisage as potential barriers to the outcomes in question—i.e., event *A* might be blocked by event *B*, but event *A* could occur if event *B* is blocked by event *C*, but event *C* might itself be blocked by event *D*, allowing event *A* to occur unless event *D* is blocked, and so on.

Preferences about preferences and other ways of ranking alternatives

In the rational choice model, rankings of rival courses of action are determined—given the expectations the decision-maker has formed about these options—with the aid of a preference system that is simply assumed to exist in the mind of the decision-maker (and is assumed to obey a particular set of axioms). This view of choice is problematic if we accept Loasby's (1976, p. 6) contention that 'choice is a normative activity': there is scope for the ranking process to be held up because the decision-maker reflects on which preference system or other ranking system (such as a rule or procedure) he or she should use. Such reflection may be concerned with the moral aspect of choice, the relative importance of the ends that are being pursued, or whether a particular system seems to be generating the 'right' ranking in some other

sense. The decision-maker's reflections may include 'whether it would be remiss of me not to cast a wider net in search of yet more potential ways of arriving at a ranking', for the set of potential preference system and/or other ranking systems may include not merely those that the decision-maker creates in his or her imagination but also those offered by others via the 'market for preferences' (Earl and Potts, 2004). However, to choose between these rival systems requires a preference system or other ranking system, which begs the same question, 'Have I got an appropriate system for choosing, given my expectations about the consequences of choosing each of the options I am considering in this context?'

How real-world decision-makers cope in a world of open-ended choices

The infinite regress problems identified in the previous section are circumvented via systems that are based on rules and/or the application of heuristic techniques. These rules/heuristics may be genetically hardwired, personally created or uploaded/assimilated from social sources. They may be employed unconsciously or consciously, and in many cases they are formally written down, as with constitutional documents or organizational policies and procedures. They may frequently seem highly arbitrary as they are path-dependent products of complex evolutionary processes and often are organized hierarchically. Hower, without them there to assist us, the infinite regress problems will render us unable to choose: they are means by which we replace unanswerable questions with questions that we can answer and which enable us to get through life (see Kahneman, 2011). (This question-switching process—which psychologist nowadays rather confusingly call 'attribute substitution' or the 'substitution heuristic'—was central to Keynes's analysis of action in the face of fundamental uncertainty: see Koutsobinas, 2015.) In some cases, such as legal

systems that allow multiple levels of appeal, rule based systems do not result in definitive verdicts being achieved rapidly, whereas in other cases they make it possible to take decisions instantly in the midst of complex and changing sets of stimuli.

As far as problem-recognition is concerned, these systems of rules include organizational review systems and rule-based alarm systems that are triggered when particular stimuli cross threshold levels on particular variables or are not congruent with other norms (for example, sirens seize our attention because they involve sounds that are at odds with the rules of tonality and musicality). We have context-specific 'ways' of searching for solutions to problems, and they rule out other ways of searching. We use cognitive rules for appraising the significance of information that we gather. In the face of fundamental uncertainty, we can avoid decision paralysis by having a policy of asking, say, 'What are experts or people like us doing in this situation?' and copying their behaviour, rather than trying to assemble probabilistic estimates of inherently dubious relevance. As with Lakatosian scientific research programmes, we have value systems that allow core constructs to rule out accepting some ideas about what is, will be, or is a potentially acceptable course of action. These constructs thus limit our ranges of choice: in some areas they will allow substitution but in others they will rule out particular options, deeming them to have 'deal-breaker' shortcomings regardless of what they allow to be acknowledged as their upside aspects. These rules can be changed, and with such changes, our preferences will seem to change, but only along channels deemed acceptable by existing rules that exert ultimate authority. Where we are indifferent between options, this is because choosing one way rather than another clashes with none of our rules.

There is a major implication here for the practice of economics: a key focus of economists should be on identifying the systems of rules that drive behaviour and shape responses to changed patterns of incentives in contexts of economic interest. In other words, economists should follow psychologists Gigerenzer and Brighton (2009), and study 'Homo Heuristicus', not rational choice theory's Homo Economicus.

The conventional economist's way of closing the open-ended choice problem

It is ironic that the rules by which orthodox economists operate prevent them from taking such a view of economising activities. Within conventional economic analysis, choices do not run into infinite regress problems because, one way or another, occasions for choice are set up so that they are closed. This has to be done on multiple fronts in order to presume that the decision-makers can find the optimal solution to the problem that he or she faces and verify it as such:

- The problem space in question must be closed, both in terms of the set of available options and information about them, and in the sense that the decision-maker is locked inside this space with no opportunity to consider options that lie outside it.
- If information-processing speeds are finite, there must be no limits on available time necessary for processing accurately the information that is available.
- The decision-maker must possess reliable knowledge about means–end relationships pertaining to what the available options have to offer and the probability distributions of any events that could affect these relationships (for example, the chances that the efficacy of an umbrella will be affected by wind

that accompanies rain) or affect the desirability of any of the options (for example, whether there will be rain on particular occasions).

- The decision-maker must have a well-defined objective function/preference ordering in terms of which the available options can be ranked.

If all of these requirements are met, the task of making a decision reduces to that of processing information to arrive at a ranking of rival products or bundles of products. Following this analytical heuristic ensures that the only place for a heuristic inside the model of choice is via the objective function/preference ordering that generates rankings, but this ranking device is axiom-driven, based on the rules of rational choice theory rather than based on what is actually known about ranking systems that real people use.

New behavioural economics

NBE comes to the aid of conventional economists in situations where they accept that empirical anomalies can be explained on the basis that decisions are driven by heuristics that conflict with those used in the construction of rational choice theory. Because neither the conventional economists nor those who practice NBE have been willing to grapple with the infinite regress problems that infest resource allocation processes, accepting that heuristic are generating anomalies requires them to see heuristics as being used as a means of dealing with a mismatch between available cognitive capacity and the cognitive capacity that would be necessary for rational choice. Heuristics do, of course, get deployed as means for dealing with inadequate cognitive capacity, but viewing their use solely in these terms misses the bigger point: heuristics *have* to be used for dealing with open-ended problems because no amount

of computing power can get to the bottom of problems that contain any infinite regresses. Failure to appreciate this has resulted in methodological incoherence within NBE. This is a result of the route by which NBE came about, a route whose wellsprings did not entail any substantial grounding in OBE on the part of leaders such as Thaler (as is evident in his 2015 intellectual autobiography).

The heuristics on which attention has been focused within NBE are those that people in general seem to use: the implicit presumption (that Cohen and Dickens, quite reasonably, want to see made explicit) appears to be that these heuristics have become genetically hard-wired as part of Human Nature via evolutionary selection processes. This permits analysis in terms of representative agents rather than leading to a need to follow the approach of marketers, who attempt to segment populations into groups characterized by similarities in their personal operating systems. This stands in sharp contrast to the focus within OBE on heuristics that people create for themselves or pick up in a social setting, heuristics that make them the individuals that they are but which also facilitate coordination within organizations and societies.

The process that resulted in this focus does not appear to have entailed any deep thinking about the philosophical challenges that the theory of choice poses given the nature of the human condition: the only methodological work that Thaler (2015) refers to in his account of how he got started in behavioural economics is Friedman's (1953) famous essay on positive economics. Thaler deployed this by highlighting the predictive shortcomings of the received wisdom and arguing that the established 'as if' theorizing therefore cannot be justified on the basis of its predictive success. The key ideas for how to deal with the anomalies that he noticed mainly came from experiments within psychology, particularly those conducted by Kahneman and Tversky, who used some of their findings as the basis for their (1979) Prospect

Theory. It is evident from Kahneman's (2011) account of his and Tverky's research programme that these experiments were set up essentially as simple, closed problems, as was the case, for example, with those that examined how the framing of hypothetical lottery choices affected the decisions that subjects made.

NBE may be said to have begun when Thaler (1980) offered the first application of Prospect Theory to everyday economic problems, having realized that the theory's S-shaped utility function could be employed in respect of choices in general that entailed gains and losses relative to a reference point, rather than merely as a better means than expected utility theory for understanding risk-taking behaviour. Thaler justified his use of the theory not merely in terms of its predictive superiority but also by arguing via Simon (1957, p. 198) that people use decision heuristics as a means of coping with choice problems that would otherwise cause cognitive overload, i.e., as a means for dealing with bounded rationality. However, Thaler's appeal to bounded rationality, like that of those who followed his lead, presented a very one-sided view of its significance.

In Simon's view (which had just earned him the 1978 Alfred Nobel Memorial Prize in Economic Sciences), the decision-maker facing cognitive constraints is trying to operate rationally within these limits by constructing a simple enough model of the choice problem for it to be solvable given these cognitive limits. Simon suggested that the choice procedure that is frequently employed entails taking a satisficing approach and initially searching locally for good-enough solutions. This may sound like a sloppy way of operating and hence consistent with the NBE focus on dysfunctional choices. However, it can actually entail some serious cognitive effort and investment of time if ambitious aspiration levels have been set. Thaler and those who have followed him did not pick up this point of view and go on to portray decision-makers

as actually trying to take good choices despite being cognitively challenged. Instead, as in the lottery-based experiments conducted by Kahneman and Tversky, the choices that they have analysed in terms of the 'heuristics and biases' perspective typically have been very simple. To practitioners of NBE, people seem as if they cannot be bothered to take the time to take good decisions even where they should be perfectly capable of finding the best choice or, at least, a better choice than the one they make. This way of viewing much of human action is in line with Kahneman's (2011) dual system analysis in which humans often tend to get choices out of the way by 'thinking fast' when they could be doing better in such contexts by 'thinking slow'. It was largely left to consumer researchers in marketing (e.g. Payne, Bettman and Johnson, 1996) to study how increases in cognitive load changed the ways that people chose.

This tendency to portray people as being slack and lazy in their choices has paved the way for the view that consumers could benefit from being 'nudged' (Thaler and Sunstein, 2008) in the right direction via policies that are informed by knowledge of the heuristics that are part of human nature. However, practitioners of NBE might have achieved more if they had acknowledged that the use of heuristics can also be an efficient way for time-poor decision-makers to disposing of problems and free up time for enjoying the fruits of their work. The crucial issue is which heuristics are employed, for the available set of heuristics includes not merely those that are part of Human Nature, but also those that are picked up socially (including via the processes of nurturing and education), along with those that we construct for ourselves and test for their reliability. As Winter (1964) and Gigerenzer (Gigerenzer and Goldstein, 1996; Gigerenzer *et al*., 1999; Gigerenzer and Brighton, 2009) have demonstrated, even in situations where we are prepared to take the time to try hard to avoid needless under-achievement, we should not necessarily engage in slow deliberation. Taking

time has opportunity costs. Heuristics save time and, indeed, they may result in better outcomes than would have resulted from detailed examination of alternatives because taking time can allow opportunities (even lives, if the context is that of a hospital emergency admissions department) to slip away. Moreover, as Heiner (1986) has emphasized, gathering more information can result in more information processing errors.

There is an irony in the focus of NBE on heuristics that 'bias' decisions away from the 'rational' choice: practitioners of NBE have not noticed that using the 'rational choice' reference point has been bias-inducing within economics. It has served to divert NBE from studying what Herbert Simon (1976) called 'procedural rationality', i.e., what would constitute 'appropriate deliberation' in the context of interest; instead the emphasis is on inappropriate deliberation, studied with the aid of what Rabin (2013) calls 'portable extensions' of existing models. Thus although Thaler presents himself as a Kuhnian scientific revolutionary, Sheila Dow is right to conclude that NBE is part of the 'protective belt' of the orthodox, rational choice-based economics research programme: its role is to make sense of, and anticipate, choices that are at odds with what the standard theory predicts. By embracing NBE, orthodox economics may give the impression that all bases are covered in the arena of choice. Meanwhile, practitioners of NBE adhere as far as they can to focusing on choices in closed problem spaces with a given set of information (which is viewed as prone to being predictably misused, for example when forming decision weights in the face of uncertainty).

An important aspect of the adherence of NBE to the analytical heuristics of mainstream economics is in its approach to time. Heuristics do not merely save us time that we might otherwise have had to spend thinking about the implications of the

information we have for how we rank our options; heuristics may also limit the time we spend gathering information, including the time it takes to receive information that we request from others. In typical NBE contributions, in contrast to those from OBE, the information gathering process is excluded from closed models: heuristics are applied to information that is already at hand. Typically, the closest NBE gets to the possibility of taking time to gather more information is to present a closed choice between taking the default option or some other specific option that could take the form of a specific strategy for gathering information about other options.

Moreover, practitioners of NBE pay little attention to the fact that, if we take decisions in a hurry in one context (for example, by not over-riding the default option for that context), what we are in effect doing is opting to unlock the door of that choice environment to enable us to move on to something else; we deal with life's problems one at a time, not by working out (as in the Arrow–Debreu general equilibrium framework) which is the best affordable bundle of available contingent commodities and without ever needing to make any economic transactions thereafter. Real-world decision-makers have to apply rules to determine which problem to address next and to choose whether to address it via fast and frugal heuristics or in a much more laboured and reflective way.

Conclusion

If we are prepared to take the infinite regress problem as a potential source of decision paralysis, a very different case for a heuristics-based view of human action emerges compared with the one found in NBE that is based on limiting cognitive load. Whether fast and frugal or in some sense dysfunctional, or employed consciously or unconsciously, heuristics are what humans have to use to avoid decision paralysis and

get on with living. To be sure, information overload can prevent us from choosing if we do not use heuristics when we are presented with a wide range of alternatives that differ across many dimensions. However, focusing on the need for heuristics in such situations neglects their necessary role in enabling us to get to that particular choice environment at that point in time, with a particular amount of time to spend there, rather than being paralysed by the infinite regress problems that lurk within the resource allocation problems that we face.

Unlike research subjects in laboratories, real-world decision-makers are mostly dealing with open-ended problems, with discretion regarding whether they even acknowledge they have a problem to solve as well as in respect of how much information they gather and how long they deliberate before reaching a verdict, and their choice sets are often in a state of flux due to new products continually being introduced. Accepting the necessity of heuristics is a vital step in avoiding misapprehensions that can come due to treating these open-ended problems 'as if' they are closed puzzles for which equilibrium outcomes must be found.

By recognizing the roles that heuristic play as stopping/closing/switching devices throughout decision cycles, we can seek to analyse such choices as they are, and acknowledge that what eventually gets chosen may not produce a state of rest. This was pretty much the practice of OBE and it does not preclude taking account of the particular heuristics that preoccupy practitioners of NBE and being primed to anticipate lazy or dysfunctional decision-making. So, now that NBE is well entrenched within the economics establishment, is it not time for its practitioners to abandon the rational choice reference point, take infinite regress problems seriously and embrace the wider perspectives of OBE in a genuinely progress research

programme instead of being satisfied with a subservient role within the protective belt of orthodoxy?

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