Shackle's Analysis of Choice Under Uncertainty: Its Strengths, Weaknesses and Potential Synergies with Rival Approaches

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Abstract

This paper offers a constructively critical examination of George Shackle's theory of expectations and decision-making under uncertainty, a theory that Shackle developed because he questioned the relevance of objective probabilities as foundations for expectations. His theory is cast in terms of degrees of possibility and potential for surprise associated with disbelief that comes from imagining things that could prevent outcomes from eventuating. His idea that there may be ranges of mutually exclusive "perfectly possible" events has posed a problem for blending his thinking with the subjective probability approach, but here it is argued that this idea is flawed. Shackle's theory of how expectations are deployed in making choices involves a reference-dependent theory of attention that results in focus on best-case and worst-case pairs of outcomes for each scheme. The paper identifies potential synergies with this idea and prospect theory and explores emotion- and satisficing-based perspectives as well as Shackle's formal analysis of how focus outcomes are used in ranking rival schemes of action.

Keywords: Potential surprise, Subjective probability, Scenario planning, Uncertainty, Prospect theory

JEL Classification Codes: D80, D81, D84

Introduction

George Shackle (1903–1992) is well-known within Post Keynesian economics as one of the leading proponents of what Coddington (1976) labelled the "fundamentalist" approach to Keynesian economics. He gave special emphasis to chapters 12 and 17 of Keynes's (1936) *General Theory* and Keynes's (1937 paper in the *Quarterly Journal of Economics*, highlighting the potential for changes in the "state of the news" to provoke sudden, major shifts in expectations, leading to "kaleidic" shifts in investment behavior (see, for example, Shackle, 1967, chapters 11–15, 1974). Shackle also wrote extensively on the nature of expectations, the processes by which they are formed, and how they are used in decision-making under uncertainty, but this area of his work has so far had much less impact in Post Keynesian economics. This paper aims to help Post Keynesian economists appreciate the strengths and weaknesses of Shackle's analysis of expectations and decision-making under uncertainty relative to mainstream probabilistic approaches and to the prospect theory approach that modern behavioral economists have picked up from Kahneman and Tversky (1979). At the risk of offending Shackle purists, I will sometimes seek to build bridges between Shackle's ideas and more mainstream thinking, as I think that constructive synthesis is more likely to help provide a way ahead in this area.

Shackle developed his non-probabilistic way of thinking as a sequel to his first doctorate (published as Shackle, 1938), a contribution to business cycle theory that he had begun working on at the LSE under the supervision of Hayek but drastically reworked in light of Keynes's *General Theory*. As is explained in detail in Earl and Littleboy (2014), Shackle's theory mostly came together via a series of papers that he produced during World War II, while he was working for Sir Winston Churchill's War Cabinet. After the war was over, he integrated his ideas in his 1949 book. *Expectation in Economics*. Initially, the book attracted a respectable amount of attention, but during the 1950s Shackle's theory failed to

gain long-term traction, in contrast to the subjective probability approach to risk-taking offered by von Neumann and Morgenstern (1944) and Savage (1954). Shackle therefore wrote a more extensive book, *Decision, Order and Time* (Shackle, 1961) as an attempt to clarify and extend his ideas, address his critics, and thereby rekindle interest in his theory. He produced a second edition of this book in 1969, with minor improvements, but again his analysis did not gain widespread traction, despite the book being quite extensively cited. His final main contribution in this area came via his 1979 book *Imagination and the Nature of Choice*, which has so far had the same fate.

This pattern of wide citations but few adoptions is unfortunate, for Shackle offered important lessons. Resistance to Shackle's approach is easy to understand. He largely failed to engage explicitly with the subjective probability approach that appeared around the same time as his own work. Moreover, in contrast to prospect theory, whose appeal has been enhanced by the fact that it grew out of empirical research, Shackle's analysis was based on introspection about the problem of choice under uncertainty, and he did not engage in systematic empirical work to explore how well it explained behavior relative to probabilistic approaches. Shackle presented his analysis both in words and as a formal model. The model was at the technical cutting edge at the time it was published, and its very orthodox formal aspects (such as the use of continuous functions) may have hindered its uptake within heterodox economics. Yet, as we shall see, the use of orthodox technical devices led to a view of choice with implications that were also guaranteed to offend orthodox theorists. His analysis does have some problematic areas, but they are not impossible to fix in ways that should appeal to heterodox economists.

The role of the imagination in the formation of expectations

Shackle's view of decision-making was offered as an alternative to viewing the problem of uncertainty as something that may be tackled as insurance actuaries tackle risk, i.e., as an exercise in induction via objective probabilities derived from statistics about the relative frequencies of different events in the past. In a stable environment, such knowledge enables actuaries to predict what will happen in the aggregate, and thereby attach prices to insurance risk categories, even though they cannot predict which individuals will actually experience particular classes of events.

Shackle viewed this way of thinking as inapplicable to individuals however well it predicts what happens in the aggregate, since events either happen or they do not at the level of the individual within a particular period. He also questioned the applicability of a statistical view of events that may arise for an individual through time. Some choices entail "crucial experiments" whose outcomes may preclude the decision-making from taking (if things go very badly) or needing to take (if things go spectacularly well) the same kind of risk ever again. But even where choice does not entail crucial experiments, replicating choices is often impossible because the decision environment keeps changing. Schumpeterian processes of "creative destruction" that drive technological and structural change in economies epitomize this, though Shackle did not persistently draw his readers' attention to Schumpeter's (1943) work. In other words, unlike modern behavioral economists who portray real-world decision-makers as inept users of statistics in making probability judgments and prone to use heuristics that "bias" their choices in predictable ways, Shackle questioned the very idea of basing personal choices on statistical inferences.

Instead, he presented a view of choice in which people form their expectations deductively by using their imagination to consider which events are possible and what could prevent these events from happening. He acknowledged both the remarkable creative

capacities and the shortcomings of the human imagination. The former can result in choices being affected by imagined possibilities that never happen, as well as by those that sometimes do, at least in the wider population. The latter leave potential for people to be surprised due to things happening that they have not imagined. Some of these surprises may pertain to things that they readily could have anticipated if they had exercised their imagination more carefully, but people may limit their attempts to think creatively and critically about what could happen because they do not even imagine themselves as capable of failing to think carefully enough about what they could be getting into if they select a particular option.

When people do recognize that they cannot think of everything that might happen, they should acknowledge that there is potential for them to experience surprises. Shackle contended that how surprised people expect they would be if an event occurred will be a function of their capacity to imagine the occurrence of things that could stop it from taking place. In other words, he views people as rating rival outcomes not in terms of differences in how likely they think them to be but, rather, with reference to differences in how unlikely the outcomes seem in prospect, i.e., how doubtful they are about them as possibilities. In his way of thinking, something that they imagine remains perfectly possible to them until we imagine another possibility that they imagine to have the capacity to stop it from taking place.

Here, Shackle's view seems empirically somewhat questionable: people commonly speak of how likely they think events are, and they commonly refer to things that they view as "drivers" of outcomes that they view as "likely." It is probably wise to view people as if they make their assessments of likelihood or doubtfulness based on how they view the relative strength of what they imagine as potential drivers and potential barriers to the occurrence of rival imagined outcomes.

For example, returns to an investment might seem to be at risk of being limited by a macroeconomic downturn that reduces demand, technical problems that limit output or sales,

the launch of a competing product that reduces demand for the scheme's output, and so on. How worrying thoughts of such barriers will be could also depend on how the extent to which we might be able to overcome them if they do indeed materialize. For example, a non-replicable product characteristic may limit how much of our market might be recaptured by new products from rivals, while a determined workforce with great capacity to give attention to detail and willingness to work overtime may limit the impact of factory breakdowns and quality lapses on sales.

The extent of potential surprise that we may assign to an imagined event cannot exceed the level of complete astonishment. This is what we will expect to experience if we witness an event that we currently view as being logically impossible or potentially blocked by all manner of credible and insuperable barriers that have very strong driving forces, against which it is hard to imagine any effective barriers materializing. By contrast, Shackle contends that decision-makers will expect not to be at all surprised by the occurrence of events that they cannot imagine being blocked by the occurrence of any other events. Potential events that seem to have no credible potential barriers will seem, in Shackle's terms, "perfectly possible."

When we are trying to understand how people arrive at inferences about what is possible and how much potential surprise to assign to events that they deem possible, we should give more attention than Shackle did to the psychological processes that shape expectations. Being unable to believe that something is possible to a particular degree, or not possible at all, may indeed require that we have the creative capacity to make connections that enable us to see why potential barriers to its eventuation could fail to materialize or could be overcome. However, what we can believe ultimately depends on the cognitive rules of the operating systems that we have built for making sense of the world. Having imagined a situation or a set of events that could lead to a particular outcome, we may then rule it to be

impossible or at least doubtful because its eventuation would completely or partially clash with the assumptive foundations on which we base our working model of the world in which we live. To take some possibilities seriously may be problematic for our cognitive systems because they would require us to make major changes to how we see the world. To avoid such changes, we are likely to give greater credence than we otherwise would have done to things that we can declare to be potential barriers to the cognitively inconvenient possibilities. This may entail turning a blind eye to possibilities that could block the possibilities that we need to take seriously as potential barriers to the things we find it cognitively taxing to accept as possibilities (see further, Earl, 2022, chapters 4 and 7; Steinbruner, 1974, chapter 4).

In other words, processes for inferring which possibilities to take seriously do not work purely by logic. Rather, they may be better viewed as operating like precedent-driven legal processes: in building cases about what to take seriously and what to dismiss, our minds are systematically constrained by judgments they arrived at previously and the expectational structures they based on those past judgments. It is possible that some of these past judgments are statistically based, contrary to the impression given by Shackle: for example, by using the rules of our judgmental system, we may take seriously a particular authority's view of what is possible based on that authority's track-record, despite the uniqueness of the situation at hand and the potential pitfalls of feeding induction-based ingredients into our assessment (cf. the role assigned to track-records of applicants and referees in the allocation of research grants to academics).

Normative implications of Shackle's view of expectations

Shackle's way of thinking about uncertainty presents normative challenges. On the one hand, it points to the potential benefits of thinking long and hard, before making a commitment in a particular context, about "What could possibly go wrong?", for such thinking may help

decision-makers avoid nasty surprises that result from unwarranted confidence. This is not a modus operandi that is fostered by statistical approaches to decision-making. However, training decision-makers to think creatively about problems that they may run into if they select a particular option may result in them becoming too fearful to be enterprising. Would-be entrepreneurs and policymakers need to be trained not merely to think of potential barriers to the outcomes that they hope to achieve but also about their capabilities for disposing of the imagined problems if they were to eventuate. In turn, they would be wise to consider what could make them less capable of dealing with the problems than they initially imagine they might be, and whether they could address such issues.

Implied in these normative challenges is a potential infinite regress problem that can stand in the way of getting to a decision if vigorous brainstorming is undertaken: event *A* may be acknowledge but be seen as capable of being blocked by event *B*, yet remain open to taking place if event *C* occurs and blocks event *B*, but the eventuation of event *C* might be prevented by event *D*, and so on, ad infinitum. Limited use of the imagination, limited capacity to spot potential connections, and limited capacity to keep complex chains of possibilities in mind and/or to be open to them usually calls a halt to the infinite regress problem and leaves decision-makers with a bounded view of what seems, to varying degrees, to be possible as the sequel to a decision.

Shackle called a graphical representation of such a set of rival possibilities, rated in terms of how surprising they seem in prospect, a "potential surprise curve" for the scheme in question. He normally drew potential surprise curves as if they were shaped rather like a vertical cross-section through a bowl, with a middle zone of outcomes that seem "perfectly possible" rated as totally unsurprising in prospect, and exterior zones on either side gradually rising to a level of maximum potential surprise for outcomes that would cause astonishment if they eventuated. However, with vigorous brainstorming, a team of decision-makers is at risk

of running into cognitive overload with long chains of blocking and unblocking possibilities and/or drivers for many outcomes and hence of being unable to form potential surprise curves for any of the schemes they are considering in relation to the outcome scale on which they are trying to focus.

To make it possible to form potential surprise curves for rival schemes of action while reducing tendencies to overlook things that could go wrong with these schemes, it may be wise to take a lesson from the Shell energy company. For over half a century, Shell has engaged in "scenario planning" as a means of considering best-case and worse-case boundaries for the possible trajectories of its external environment that they will take seriously when formulating the firm's strategy. Shell's scenario writers merge a Shackle-like deductive approach to thinking about what might happen, with an inductive approach that entails looking at what has happened previously in situations that appear somewhat similar to those that they have imagined in creating stories about what could prove challenging or provide opportunities for which the firm might be wise to prepare. The aim is not to use history to foretell the future but to help them get a sense of where their imagination may be generating misleading assessments of how seriously they should take particular possibilities. For example, prior to the 1973 OPEC oil price hike, deductive theorizing suggested that cartels with many members would be unlikely to stand firm, whereas, after finding that, historically, this prediction did not hold, Shell decided to take seriously the potential power of OPEC to maintain higher oil prices (see Jefferson, 1983; for further material on Shell's experience with scenario planning, see Jefferson, 2012, and for analysis of the relationship between Shell's scenario planning activities and Shackle's theoretical work, see Jefferson, 2014).

Aside from the normative issues that Shackle's view of expectation-formation raises, there is also the positive issue of the extent to which people in practice form expectations in

terms of possibilities rather than probabilities by exercising their imagination rather than by extrapolating based on their probabilistic knowledge. Little empirical work has been done to confront Shackle's perspective with probabilistic ways of thinking, with the pioneering work of Hey (1985) focusing, with mixed results, on the forms that expectations take rather than how they are arrived at. Certainly, the phrase "What could possibly go wrong?" has become much more commonly uttered in respect of bold decisions in recent years than it was in Shackle's lifetime, and many people may have learnt from events such as the COVID-19 pandemic and Russia's invasion of Ukraine how everyday life can be thrown into turmoil by major surprises that are not completely unprecedented. However, the news media promote probabilistic thinking much more than in past decades by reporting in probabilistic terms on the incidence of floods and hurricanes, and health issues that are driven by genetic factors or lifestyle choices.

Everyday parlance might be taken as implying that the terminology that decision theorists use is not well aligned with how lay decision-makers think. We commonly hear people speak of an event as, say, "possible, but not probable," with "probable" seeming to mean "likely" and/or "wouldn't be surprising," without any necessary statistic connotations of a "this quite often happens" kind. It therefore seems wise to consider the relationship between Shackle's ideas and the subjective view of probability. This is something that Shackle seemed reluctant to do, with his critical writing in relation to probability invariably being aimed at questioning the relevance of statistically based probabilities as a foundation for decisions. This relationship is the focus of the next section.

Mapping from potential surprise to probability

If decision-makers can say both that they think a potential future event "has a high (low) probability of happening" and that they "would not be very surprised (would be extremely surprised) if it actually happened," it would seem reasonable to consider whether potential surprise ratings can be mapped into subjective probabilities by inverting them and applying an appropriate scaling function. Lay decision-makers may not think about probability in the way that theorists do, so if we were trying to estimate such a mapping function from decision-makers' questionnaire responses about their probability and potential surprise ratings in relation to rival potential events, we might not find that the set of probability scores summed to unity. This seems increasingly likely as the size of the set of rival potential events increases, but it would not prevent the probability ratings from being useable in a decision-making process.

If we try to undertake such a mapping exercise, things seem to be very straightforward for events that people view as to some degree likely and for events that people view as potentially being blocked by all manner of other events: the latter may even seem to have a zero probability of taking place and their taking place would cause astonishment. At the other end of the scale, where people view a particular outcome as certain to take place, that event would not be a cause of any feelings of surprise and would have a probability of one. Anything else must then seem impossible. However, the mapping process seems to run into difficulties if, as in the potential surprise curves in Shackle's work, there is a range of outcomes that are mutually exclusive and yet are all viewed as perfectly possible: clearly, from Shackle's standpoint, they would all rate at zero for potential surprise, but from a probabilistic standpoint they cannot each be assigned a probability of one.

To consider how this issue might be resolved, let us first examine a case in which we view potential outcomes either as perfectly possible or completely unlikely. Here, we may be

certain that one outcome from the "perfectly possible" set is going to eventuate, but none of the members of the set seems to be more likely than any of the others to be the one that will happen. If so, is it reasonable to assign each of them a probability of $1/n$, where n is the number of outcomes in this set? This is, I think, how people in everyday life will arrive at subjective probability scores in this kind of situation, even if they view the situation as unique. For example, suppose we have applied for a job and have been told that we are on a shortlist of ten candidates, each of whom meets all the selection criteria. If so, we will view ourselves as having a one-in-ten probability of being offered the job. If we are then told that two of the shortlisted candidates have withdrawn, we will then say that our chances of getting an offer have risen to one-in-eight, even though, from Shackle's standpoint, we should not expect to be any less surprised if we are successful since we can see no reason why we might not get the job.

Introspection about the shortlist scenario leads me to doubt that this kind of situation is one where the shortlisted candidates would not expect to be at all surprised if they were offered the job, even if they told a researcher that they took the view that it was perfectly possible for anyone on the shortlist to get the job. They would probably expect to be somewhat surprised to be offered the job, but less so if some of the candidates withdrew, since they view the rival candidates as potential barriers to their success. If everyone on the shortlist meets the selection criteria, the selection committee will need to go through a tie-break process that refers to differences between the candidates in the extent to which they surpass the selection requirements, or in how they perform in other respects. The candidates may be uncertain about what their rivals can offer, and about which tie-break system will be used, but if they believe that the candidates differ and that the final choice will not be random, then it would be illogical for them to view themselves and their rivals as having no potential impediments to being offered the job. In the absence of knowledge about candidate

differences and the process for breaking the tie, it may be perfectly reasonable to think of their prospects in terms of a $1/n$ probability and to base their expected surprise if offered the job on the size of n.

Now consider the multiple perfect possibilities issue in the context where Shackle began his analysis of choice under uncertainty, namely the possible outcomes of alternative investment choices. We should consider whether it makes sense to imagine, as per a typical Shackle-style potential surprise curve, a scheme as having a range of perfectly possible outcomes bordered on either side by rival potential outcomes that would cause surprise if they eventuated. If the decision-maker is unable to dismiss, as completely blocked, the potential outcomes that are not deemed to be perfectly possible, there seems to be a contradiction: factors that could result in the eventuation of any of the potentially surprising outcomes constitute potential barriers to the eventuation of the supposedly "perfectly possible" outcomes, rather in the way that possibilities that particular uncertain factors will work in favor of rival candidates in the shortlist scenario will serve as barriers to one's success.

Consider, for example, a situation where an entrepreneur acknowledges that an investment project could incur major losses if there were teething troubles or ongoing unreliability problems with the new technology that the project entails. The entrepreneur may find it harder to believe that the eventuation of such issues could result in very large losses relative to small ones. Does it make sense for the entrepreneur then to assert that there is also a range of better outcomes that are "perfectly possible," beyond which there is a range of even better outcomes that look possible so long as particular issues (say, customers being somewhat more resistant to the product than seems implied by market research) do not arise?

Surely it does not, for the things that the entrepreneur thinks could cause big losses are potential barriers to better returns. The losses that these things could cause may seem

potentially surprising to the entrepreneur, based on his or her knowledge of the firm's past experience with new technologies in the same broad area: the firm's past experience poses a potential barrier to doing really badly, thereby opening up the possibility of doing better. But if the entrepreneur is not sure the firm's experience will be enough to stop things from going badly, the possibility of teething troubles or ongoing reliability problems remains a potential barrier to doing better. At the other end of the scale, even if the things that could produce spectacularly large profits are not certain to come into play, the possibility that they will eventuate stands as a potential barrier to making smaller profits.

According to this logic, Shackle was wrong to think that there could be a range of "perfectly possible," totally unsurprising potential outcomes in a situation of uncertainty. His mistake was the result of him thinking of mutually exclusive outcomes as if they are causally unconnected in terms of factors that have the potential to generate different outcomes after a particular choice has been made. The good news is that, once we rule out the perfect possibility concept, it no longer stands as a barrier to inverting a potential surprise scale and mapping measures of potential surprise into measures of subjective probability: things that we think would hardly (greatly) surprise us if they eventuated are things that we may wish to speak of as having a high (low) probability of taking place. We must cease to draw potential surprise curves as Shackle drew them, i.e., as if they include a portion that runs along the horizontal axis at zero potential surprise, for if we are uncertain, the rivalrous nature of outcomes means that we will always expect to be somewhat surprised that the chain of events that produced the outcome did not unfold differently.

This critique of Shackle's thinking begs the question of what lay decision-makers mean if, like Shackle, they speak of a range of outcomes as looking "perfectly possible." Perhaps they mean that *currently* they cannot see anything that could prevent the outcome from falling into this range, whereas currently they view outcomes either side of this range as

less than perfectly possible because of the current lack of impediments to achieving a result in the "perfectly possible" range. Currently, things that could facilitate doing better than somewhere in that range may not be happening, even though they have been imagined and not ruled out as possibilities. Likewise, things that could go wrong may not currently be happening. If people think like this, we may view them as if their working hypothesis is that an outcome somewhere within the "perfectly possible" range is what will eventuate. Operating on this basis is cognitively simpler than accepting a wider range of uncertainty that relates to things that may not happen. If others mention things that could go wrong, people who think like this will probably say, if a downside risk is mentioned, "I'll cross that bridge if and when I come to it." If others suggest that they should be prepared to take advantage of better outcomes than those in the perfectly possible range, they will probably reply in terms of "not counting one's chickens before they are hatched."

As an example of this kind of thinking, consider a pilot who have been cleared for take-off, with all his or her aircraft's dials displaying normal readings, a weather forecast that promises nothing unusual, and with no message from the destination about potential delays in being cleared to land. *Based on these indicators,* it may seem perfectly possible to the pilot that the passengers will be able to disembark within a particular range of times, even though it is not yet possible to say precisely where in that range the actual time will fall. Yet the pilot may recognize that, since weather forecasting is not an exact science, headwinds or tailwinds could be unexpectedly strong, outside the normal range of variation for the time of year; if so, the journey time might fall outside the "perfectly possible" range.

If we asked the pilot for his or her probability estimate of being able to let the passengers disembark within the range of timed that seems "perfectly possible', we might be told that it is, say, 95-percent. Even so, the pilot might say that he or she would not be at all surprised if the disembarkation time came within the range being described as "perfectly

possible." The pilot might know, statistically, that occasionally the journey will be abnormally fast or slow (hence the probability rating that we may be given) but operates "as if" outcomes *will* be in the normal range (hence the "not at all surprising" rating) unless and until he or she receives stimuli that they take as signifying that something abnormal has happened or is about to happen. This way, the pilot can concentrate better on the task of ensuring that the journey is a safe one, whose duration does indeed fall within the "perfectly possible" range.

This modified way of thinking about "perfect possibilities" was influenced by the work of Carter (1953) and Steinbruner (1974, chapter 4). The possibility that decision-makers think in terms of a range of "perfectly possible" outcomes that they treat as a block should be borne in mind when designing research questionnaires about expectations. The possibility that the mapping functions between ratings for potential surprise and subjective probability could be discontinuous close to the extremes of these scales should also be kept in mind when studying expectations: although, when pressed to do so, people may articulate fractional or percentage probability ratings that imply they can see reasons for not being certain that an outcome will fall in a particular range or take a particular form, they may otherwise tend to ignore hard-to-believe possibilities and treat perfectly possible ranges of outcomes as if they are certain.

From expectations to choices under uncertainty

Shackle's theory of how people choose after they have formed their expectations hangs together logically but its complexity detracts from the plausibility of the essence of his thinking and poses barriers to its empirical application. This section explores the logic of his formal theory, and the next section considers two simpler ways of expressing what he seems to have had in mind. First, however, it is important to note that Shackle's view of the process

by which decision-makers rank their options can be applied to expectations that are framed as probability distributions just as readily as he applied it to expectations that are framed as potential surprise curves. It simply requires the inversion of the vertical axis on the "ascendancy function" diagram that is central to Shackle's analysis. This inversion is made in the exposition that follows. For consistency with everyday parlance and the discussion in the previous section, we shall think of the vertical axis as ranging from "barely possible" to "highly probable" with boundary values of "does not seem possible" and "seems certain to happen'.

Shackle rejected the orthodox idea that people rank rival schemes in terms of overall expected value or utility scores that they compute for each scheme by weighing together rival outcome scores in terms of the respective likelihood scores. Instead, he posited that decisions are made in a non-additive way via a focusing process that yields a "focus gain" and a "focus loss" for each scheme. These focus points have the most attention-arresting combinations of outcome and level of possibility/probability of all the outcomes that the decision-maker imagines for that scheme. Shackle's key idea here is that the attention-arresting power of an imagined outcome is an increasing function of both its size relative to a neutral reference point and how unsurprising the decision maker expects it to be if it eventuates. Translated into lay terms, an imagined outcome will be more attention-grabbing, the bigger its size and the more probable/less unlikely it seems to be. Once the focus gain and focus loss points on a potential surprise curve have been identified, the decision-maker then ignores all the other points that had been deemed possible outcomes for the scheme of action.

In Shackle's formal model the focusing process is portrayed as entailing the maximization of attention in terms of a double-sided "ascendancy function," subject to the expectations that the decision-maker has formed for the scheme in question. As Figure 1 shows, the ascendancy function consists of a back-to-back pair of sets of "iso-ascendancy

curves," either side of the neutral outcome, *O*. Each iso-ascendancy curve shows a set of outcome and (un)likelihood combinations that have a particular capacity to hold the decision-maker's attention. The dashed line that runs from *A* to *F* on Figure 1 is a potential surprise curve that shows the set of outcomes that have been deemed possible for a single scheme and the potential surprise (or probability/possibility) ratings that the decision-maker has assigned to them. The scheme's focal points are where the dashed line is tangential to the iso-ascendancy curves that represent the scheme's highest achievable hold on the decision-maker's attention. Clearly, in formal terms, this is a very orthodox model that relies on continues conjectures and continuous iso-ascendancy curves to generate just a single focus gain and focus loss pair for each scheme under consideration. But we should be mindful of the simple, plausible idea that it is designed to represent.

The fact that Shackle's theory of focusing assumes that decision-makers use reference points when choosing makes his analysis a precursor to Kahneman and Tversky's (1979) prospect theory, whose famous *S*-shaped utility function's inflexion point is at a reference point that separates gains from losses. Both approaches stand in contrast to subjective expected utility theory, where outcomes are viewed in terms of the total amount of wealth they leave the decision-maker with, and hence how much utility the decision-maker will be able to enjoy. However, Shackle came to frame his theory in terms of gains and losses relative to a reference point simply because he viewed exercising liquidity preference by holding a safe asset as the alternative to taking a risk, whereas (as is explained in Kahneman, 2011) Kahneman and Tversky did so in their theory after recognizing that viewing prospects in terms of gains and losses is easier, as it does not require decision-makers to know their total wealth.

Shackle's idea that decision-makers focus on each scheme's most attention-grabbing gain and loss deserves to be woven into Kahneman and Tversky's prospect theory as an

aspect of human cognitive limitations that the latter theory has underplayed due to the experiments that inspired it having been framed in terms of very simple payoff matrices rather than complex probability distributions.

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The route by which Shackle goes from a set of focus gains and losses for rival schemes to a ranking of these schemes is more problematic, but it, too, can be aligned with prospect theory. Shackle wanted to depict the decision-maker as trading off focus gains against focus losses on an indifference surface that represents the decision-maker's "gambler preferences." To do this, he needs a means of collapsing the two-dimensional nature of these focal points (i.e., outcome size and likelihood) into one-dimensional scales. He therefore labels the initial two-dimensional focal points as "primary focus loss" and "primary focus gain" and then notes that they will share their attention-arresting capacity with the attention-arresting capacity of the points at which the highest attainable iso-ascendancy curves intersect with the horizontal axis on the zero potential surprise boundary. He calls these values the scheme's "standardized focus loss" and "standardized focus gain."

Shackle's "standardization" process is easier to spell out when we invert and adapt his analysis in the way shown in Figure 1 and cast it in terms of a possibility/probability scale with zero uncertainty as the no-surprise boundary and thereby exclude the idea that there might be a range of outcomes that seem "perfectly possible." Our alternative boundary then implies that the "standardized" focal points would be outcomes that, if they were viewed as certain to eventuate, would have the same attention-arresting power as the corresponding

primary focal outcomes. In the case of the scheme shown in Figure 1, these values are shown as *C* and *D*, respectively, for focus loss and focus gain certainty-equivalents.

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Having derived standardized focus losses and gains, Shackle then represents the ranking process via a "gambler preference map" like Figure 2, whose horizontal axis shows standardized focus losses and whose vertical axis shows standardized focus gains. Each scheme's pair of focal points thereby reduce to a single point on this diagram, with the one that is located on the highest attainable indifference curve (toward the top-left on Figure 2) being the one that is selected. (For analysis of how Shackle's theory applies to diversified asset portfolios, see Earl and Littleboy, 2014, chapter 7.) If the highest-ranking scheme reduces to a point on the indifference curve that cuts through the origin, or on an indifference curve to the right of it, then taking a risk is viewed as no better, or as worse, than exercising liquidity preference.

If the indifference curves on the gambler preference map have upward slopes of greater than 45 degrees, the decision-maker could be said to have loss aversion, just as in Kahneman and Tversky's prospect theory (see further Earl and Littleboy, 2014, pp. 170–1). Shackle's analysis can also represent decision-makers as having a "safety first" attitude to risk-taking (cf. Blatt, 1979): at some point along the horizontal axis. Shackle sometimes drew a perpendicular line signifying the decision-maker's maximum tolerable standardized focus loss. Figure 2 has been drawn in a way that illustrate both of these possibilities.

Post Keynesian and behavioral simplifications of the ranking process

From a Post Keynesian standpoint, we can offer a simpler view of how Shackle might have been wise to portray the ranking process in relation to an ascendancy function and focusing. When the "neutral outcome" reference point is viewed as where the decision-maker would expect to get by exercising liquidity preference and not taking a risk, the natural next step in Post Keynesian terms is to frame the ranking process in a way that aligns with Keynes's idea that "animal spirits" drive risk-taking behavior. To do this, it seems better to focus on the emotions that the decision-maker experiences when thinking about combinations of outcome levels and how likely they seem. Hence, instead of viewing the final ranking process in terms of a gambler preference map whose axes pertain to standardized/equivalent-certain gains and losses, we should view rankings as being arrived at via how the decision-maker trades off the excitement (i.e., the alluring feeling of hopeful anticipation) that arises from thinking about a possible gain to which a particular likelihood has been assigned, against the fear (or feeling of dread) that arises from thinking about a possible loss and how little seems potentially to stand in its way. Building the ranking process around the emotions associated with (primary) focus gains and losses seems to be a psychologically more plausible approach than one that involves "standardization" or finding certainty-equivalents.

It is odd that Shackle did not take this "excitement versus fear" approach, for around the time he conceived the ascendancy function, he was also taking serious account of the impact of excitement on decision-making. He argued that, in the case of the option that gets selected, the decision-maker will expect excitement about the possibility of major gains to persist until the outcome of the choice is known. Taking a risk thus permits what Shackle (1943, p. 103) called "enjoyment by anticipation." In other words, as in more recent behavioral analysis of dread and savoring by Lowenstein (1987) and Lowenstein and Thaler (1989), Shackle saw the prospective payoffs to a choice as entailing not merely the pecuniary

and/or non-pecuniary gains and losses that eventually happen, but also the prospective benefits of "enjoyment by anticipation" ahead of the hoped-for outcome. The negative side of this is the dread associated with fears of a poor outcome. Shackle (1949, pp. 123–4) even used this idea when applying his theory to choices that entail spending on lotteries and other gambles (such as "football pools" in the UK) where potential rewards are very large but where it is very unlikely that one will win. Yet he failed to see how the excitement versus fear trade-off could have been built into his theory.

Whether one takes the simpler "Post Keynesian" approach or sticks with Shackle's rather convoluted path to ranking rival schemes in conditions of uncertainty, the (primary) focal points for a scheme of action are in essence what the decision maker views as the "best case" and "worst case" possibilities at the time of doing the ranking, and all the other outcomes that were deemed possible are ignored in the ranking process. However, it is important to note that, according to the logic of Shackle's analysis, the sizes of imagined gains or losses that the focus points entail will be smaller than the biggest losses and gains that the decision-maker views to any degree as possible (contrast points *A* and *B*, and *E* and *F*, respectively, in Figure 1). This may mean that decision-makers end up ignoring possible outcomes that they initially viewed as potential catastrophes or as potential game-changing successes, for they view these extreme outcomes as events that have so much stacked against them that they would be almost astonishing if they occurred. This could be very unfortunate where a choice unexpectedly turns out to have been a "crucial experiment" because its outcome is indeed a catastrophe that barely seemed possible, or because a scheme viewed as being most unlikely to achieve huge returns is rejected and then becomes a spectacular success when selected by a less skeptical investor.

The focusing process that Shackle envisages seems guaranteed to make orthodox economists view his analysis as a theory of imperfectly rational behavior, despite Shackle

developing it to make sense of decision-making in situations where it is not possible to specify, in terms of orthodox thinking, what would constitute fully rational behavior. However, in making finite attentive capacity a key aspect of the process of choosing under uncertainty, as well as recognizing how limited imaginative capacities affect the formation of expectations, Shackle deserves to be viewed as a pioneer of behavioral economics who tried to model real people rather than idealized "econs'. Yet perhaps Shackle's formal model does not go far enough in taking account of limited human cognitive capacities.

An alternative way of dealing with mutually exclusive prospects of loss and gain, relative to a neutral outcome, is to take the cognitively simpler approach of rejecting schemes according to risk-related satisficing criteria, and then use some form of tie-break rule if more than one scheme is acceptable in terms of these criteria. Thus, we might reject any scheme that (a) seems insufficiently unlikely to generate losses less than a particular amount, and (b) seems insufficiently likely to meet or exceed a particular target for gain. A tie-breaker rule could refer to the loss/gain dimension in question (for example, which of the tied schemes seems to have the smallest loss, or largest gain, that seems to any degree possible), or it might refer to another dimension (for example, which scheme is most appealing as a "pet project" or in terms of corporate social responsibility). As is shown in Earl and Littleboy (2014, pp. 91–5, 164–6), Shackle's own thinking ran rather along these lines in his early papers, until he developed his ascendancy function concept, and he returned (without noting any switch) to writing in these terms toward the end of his life. He also came close to presenting his views in this way in his de Vries lectures on time in economics (see Shackle, 1958, p. 66).

Conclusion

Shackle's theory of expectations and decision-making under uncertainty deserves more attention from Post Keynesian economists than it has hitherto received. It provides a way of

addressing the question that Keynes (1937) raised about decision-making in situations where probabilities cannot be estimated from past statistics with any confidence due to scope for structural and institutional change in the economic system. When "we simply do not know" how well past distributions of events can inform us about the chances of the future unfolding in any particular way, we may nonetheless be able to differentiate between the rival events that we can imagine based on differences that we can imagine about how prone they might be to being blocked by other events that we can imagine. To the extent that we can imagine credible barriers applying to different outcomes to different degrees, we have the basis for forming potential surprise curves, instead of probability distributions, for each of our options.

If we can form expectations in this way, we do not need to resort to using the simple heuristics that Keynes (1937) suggested people use for dealing with situations whose uncertainties cannot be reduced to statistical probabilities. But if our uncertainty is so great that we cannot differentiate between our options in terms of the extent to which they have credible barriers to producing particular outcomes, then the use of simple heuristics that do not refer to differences in likelihood may indeed be our only way forward unless we opt to exercise liquidity preference until the future becomes clearer.

Shackle's view of expectations differs from the subjective probability approach by focusing on degrees of disbelief rather than on degrees of likelihood, and in asserting that, when assessing what could result from a choice, people may include in their expectations ranges of possible outcomes that seem perfectly possible, as well as those that they belief they have reasons to doubt. It is this idea of a range of perfectly possible outcomes that stands in the way of bringing together Shackle's ideas and subjective probability notions. However, in this paper, I have questioned the logic of viewing mutually exclusive outcomes as "perfectly possible." If my objection is correct, we may be wise to start framing uncertainty in terms of a 0–10 scale that ranges from "impossible" to "certain to occur." From a hybrid

Shackle/subjective probability perspective, we might expect that, if we invited subjects to rate imagined outcomes on this scale, they would do so according to the relative capacities they assigned to imagined barriers (as bases for disbelief) and imagined drivers (as bases for belief). They would assign low scores to outcomes that they saw as "barely possible" or "very unlikely" because they saw barriers as predominating, and they would therefore expect to be very surprised by the occurrence of these outcomes. They would give high scores to outcomes that they viewed as "highly probable" because they viewed them as benefiting from drivers that seemed likely to be able to overcome barriers to their eventuation.

To make such assessments, economic agents and economic policy analysts would be wise to borrow techniques from strategic management. In this paper, I have drawn attention to the Shackle-related methods of scenario planning that also dare to look at evidence from the past when gauging how seriously to take ideas about how the future might unfold. But there also seems much merit in trying to integrate the barrier-and-drivers way of assessing possibilities with situational analysis techniques such as "SWOT analysis," whereby one examines proposed strategies in terms of their strengths and weaknesses, and the opportunities and threats that could be present in the external environment.

As far as the question of how expectations are used in decision-making is concerned, it appears that Shackle's focusing-based approach complements prospect theory very well by recognizing how the human mind may work to avoid cognitive overload that would come from trying to take account of wide ranges of possible outcomes with differing degrees of likelihood. It would be worth studying empirically how well one can map to choices in terms of an *S*-shaped prospect theory utility function from the simplified excitement-versus-fear version of Shackle's view of how rival schemes are ranked based on their focus outcomes. However, before attempting to align Shackle's analysis closely with prospect theory, it would be wise to examine whether people actually engage in a focusing process when dealing with

ranges of possible outcomes for rival schemes and, if they do, whether they seem to do this in the manner that Shackle envisaged via his ascendancy function or via the simpler, satisficing-style process that he also sometimes envisaged.

References

Blatt, J. M. 1979. "The utility of being hanged on the gallows." *Journal of Post Keynesian Economics* 2 (2):231–239. DOI: 10.1080/01603477.

Carter, C. F. 1953. "A revised theory of expectations." *Economic Journal* 63 (252):811–820. DOI: 10.2307/2226641.

Coddington, A. 1976. "Keynesian economics: The search for first principles." *Journal of Economic Literature* 14 (4):1258–1273. DOI: Not available.

Earl, P. E. 2022. *Principles of Behavioral Economics: Bringing Together Old, New and Evolutionary Approaches*. Cambridge: Cambridge University Press.

Earl, P. E., and B. Littleboy. 2014. *G. L. S. Shackle (Great Thinkers in Economics Series)*. Basingstoke, Palgrave.

Hey, J. D. 1985. "The possibility of possibility." *Journal of Economic Studies* 12 (1/2):70–88. DOI: 10.1108/eb002595.

Jefferson, M. 1983. "Economic uncertainty and business decision-making." In *Beyond Positive Economics? Proceedings of Section F (Economics) of the British Association for the Advancement of Science, York 1981*, edited by J. Wiseman, 132–159). London: Macmillan.

Jefferson, M. 2012. "Shell scenarios: What really happened in the 1970s and what may be learned for current world prospects." *Technological Forecasting and Social Change* 79 (1):186–197. DOI: 10.1016/j.techfore.2011.08.007.

Jefferson, M. 2014. “The passage of time: Shackle, Shell and scenarios.” In *G. L. S. Shackle (Great Thinkers in Economics Series),* by P. E. Earl and B. Littleboy, 198–214. Basingstoke: Palgrave.

Kahneman, D. 2011. *Thinking, Fast and Slow*. New York, NY: Farrar, Strauss and Giroux.

Kahneman, D., and A. Tversky 1979. Prospect theory: An analysis of decision under risk. *Econometrica* 47 (2):263–291. DOI: 10.2307/1914185.

Keynes, J. M. 1936. *The General Theory of Employment, Interest and Money*. London: Macmillan.

Keynes, J. M. 1937. “The general theory of employment.” *Quarterly Journal of Economics* 51 (2):209–223. DOI: 10.2307/1882087.

Lowenstein, G. 1987. “Anticipation and the valuation of delayed consumption.” *Economic Journal* 97 (387):666–684. DOI: 10.2307/2232929.

Lowenstein, G., and R. H. Thaler 1989. “Anomalies: Intertemporal choice.” *Journal of Economic Perspectives* 3 (4):181–193. DOI: 10.1257/jep.3.4.181.

von Neumann, J. and O. Morgenstern. 1944. *Theory of Games and Economic Behavior* Princeton, NJ: Princeton University Press.

Savage, L.J. 1954. *The Foundations of Statistics.* New York, NY: Wiley.

Schumpeter, J. A. 1943. *Capitalism, Socialism and Democracy*. London: George Allen & Unwin (new edition, 1992, London and New York, NY: Routledge).

Shackle, G. L. S. 1938. *Expectations, Investment and Income*. Oxford: Oxford University Press.

Shackle, G. L. S. 1943. “The expectational dynamics of the individual.” *Economica* 10 (38):99–129. DOI: 10.2307/2549459.

Shackle, G. L. S. 1949. *Expectation in Economics*. Cambridge: Cambridge University Press.

Shackle, G. L. S. 1958. *Time in Economics*. Amsterdam: North-Holland.

Shackle, G. L. S. 1961. *Decision, Order and Time in Human Affairs*. Cambridge: Cambridge University Press.

Shackle, G. L. S. 1967. *The Years of High Theory: Invention and Tradition in Economic Thought 1926–1939*. Cambridge: Cambridge University Press.

Shackle, G. L. S. 1974. *Keynesian Kaleidics*. Edinburgh: Edinburgh University Press.

Shackle, G. L. S. 1979. *Imagination and the Nature of Choice*. Edinburgh: Edinburgh University Press.

Steinbruner, J. D. 1974. *The Cybernetic Theory of Decision: New Dimensions of Political Analysis*. Princeton, NJ: Princeton University Press.

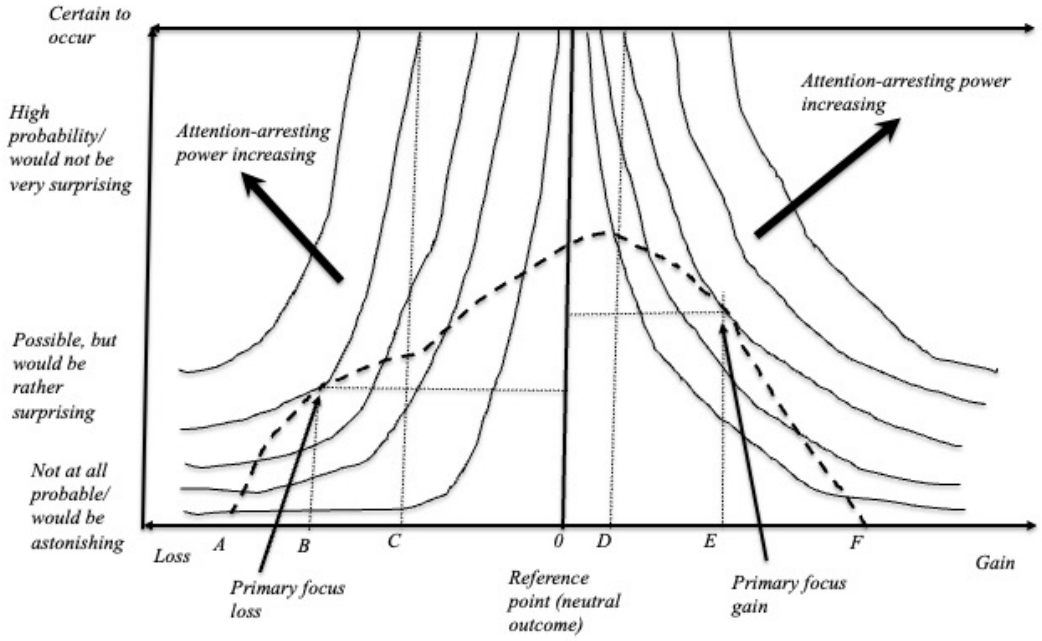

Figure 1: Focus outcomes for a single scheme of action

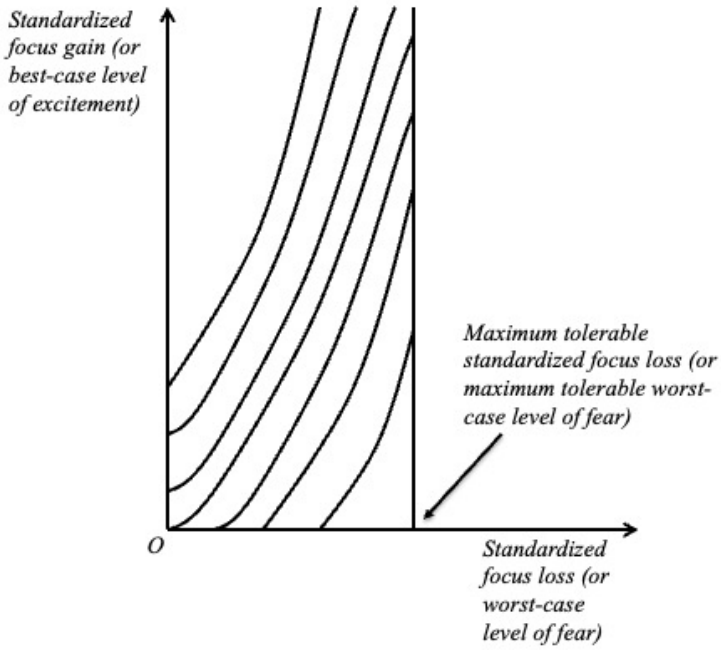

Figure 2: Gambler preference map for a decision-maker with loss aversion