

George Lennox Sharman Shackle 1903–1992

GEORGE SHACKLE was born in Cambridge on 14 July 1903. His father was a Wrangler, and a teacher of mathematics, whose pupils had included John Maynard Keynes, then preparing for the Eton scholarship examination. Like his father, George attended Perse School and was accepted by St. Catherine's College; but though the teaching in his earlier years at Perse developed the love of language that enriched his life as well as his writing, war-induced teaching deficiencies, which failed to evoke any compensating determination to succeed, denied him the scholarship without which his family could not afford to support him at university, and so in 1920 he took a job in a bank. This seems to have been the only episode in his life that left him with a permanent sense of undeserved failure, deeply felt although rarely expressed even in private (Perlman, personal communication). It also turned out to be a crucial instance of the non-repeatable experiment about which he was so frequently to write, for at St. Catherine's he would almost certainly have read either Latin or Modern Languages, whereas his entry into banking suggested to him that it might be appropriate to study economics.

Despite the encouragement of his bank manager, he did not manage during almost four years in the bank to achieve his objective of a London External Degree in Commerce; but when, after an unhappy year with a tobacco company, he became a schoolmaster, he had more time for study. So he changed his mix of subjects to Latin, French, and Economics, and obtained his degree in 1931. His increasing fascination

with economics now impelled him to try to work towards a career in the subject while, for the present, remaining a schoolteacher. It is perhaps necessary to point out how slender were the chances of entering the tiny enclosed world of academic economics at that time, especially for someone who never developed the outgoing manner which suggests social ease. He made another crucial choice by beginning his private graduate study with Keynes' *Treatise on Money* (1930); and his first original work was the construction of a diagram to illustrate Keynes' brief account of Austrian capital theory. He then turned to Hayek's *Prices and Production* (1931) — and found his diagram in print. This unexpected confirmation of his aptitude for economics gave him the confidence in his intellectual, if not social, ability that was needed to join in the debate stimulated by these two books.

As he observed thirty years later, there was no antithesis between the two, 'for Keynes was discussing deflation and Hayek was describing inflation' (Shackle, 1966a, p. 55); but in the 1930s there certainly seemed to be. Shackle (1933) examined the two approaches in the very first issue of the *Review of Economic Studies*, which was created by and for the young economists of the time. As a result of his contacts with some of these, he learnt of a research studentship at the London School of Economics, applied, and was awarded it. Hayek was to be his supervisor, and he decided to apply Hayek's model to the problem of unemployment.

At this point Shackle showed his unfailing consideration by delaying his arrival at the LSE from October 1934 until January 1935, in order not to inconvenience his headmaster. His reward was to experience a superb induction into academic life, from Hicks lecturing on economic dynamics, as part of his preparation for *Value and Capital* (1939), and from Brinley Thomas, who had just returned from Sweden to present the first account in English of Swedish sequence analysis. Hicks was constructing a planning equilibrium, whereas the Swedes envisaged a series of plans, each of which was necessarily constructed in uncertainty and revised in the light of its outcome. The new Swedish ideas were closer to Hayek's evolving thought than either Hayek or Shackle realised at the time; but when Shackle attended the first meeting of the London, Oxford and Cambridge research students' joint seminar, which was held at Cambridge in October 1935, he was enthralled by the accounts which were given by Joan Robinson and Richard Kahn of Keynes' forthcoming *General Theory* (1936); and so it was

Keynes' theoretical scheme, and not Hayek's, to which Shackle wanted to apply Swedish ideas.

That meant abandoning his original plan for a thesis on Hayekian lines, which was not progressing well; and Hayek, in Shackle's (1990, p. 194) words, 'proved himself the most magnanimous man that I ever met' in readily agreeing to this switch. The thesis was completed in little more than a year, and developed into Shackle's first book, *Expectations, Investment and Income*, which was published in 1938. In 1937 he moved to Oxford as Henry Phelps Brown's research assistant, and there wrote a series of papers which gained him an Oxford D. Phil. in 1940. By then he had married, spent the summer of 1939 as a Lecturer at St. Andrews University, and been summoned by Roy Harrod, soon after the outbreak of war, to the Admiralty, where he worked under Lindemann in Churchill's S Branch, which subsequently widened its range of interests when Churchill became Prime Minister.

When S Branch disappeared after the 1945 general election, Shackle moved to the Economics Section of the Cabinet Secretariat, where he remained until he was offered a Readership at the University of Leeds in 1950. Four terms later he moved to the Brunner Chair of Economic Science at the University of Liverpool, where he remained until his retirement in 1969, apart from his time as Visiting Professor at Columbia in 1957–8 and at Pittsburgh in 1967.

He continued to develop his ideas while working as a civil servant; in addition to fourteen articles published during the ten years 1940–9, it was over this period that he developed and published his major theoretical innovation: a non-probabilistic theory of decision-making. Inspired by Keynes' summary statement of his new theory of employment in 1937, by Myrdal's recognition of the shifting foundations of decision, and by such episodes as the collapse of Dalton's cheap money policy in 1947 as investors changed their views about future prospects, he attempted to construct a more plausible model of choice. In his *Treatise on Probability* (1921), Keynes had tried to develop a non-demonstrative logic, in which probability was defined as the degree of rational belief that could logically be ascribed to a proposition, given the evidence that was currently available. Shackle turned Keynes' concept upside down, by asking how strongly the available evidence suggests that a proposition should be rejected (as Popper had replaced verification with falsification), and applied it to propositions about future events. What are the obstacles to the occurrence of any particular future state? Do we find it easy, hard, or impossible to disbelieve

in the emergence of that state — or, equivalently in Shackle's model, would we be greatly, mildly, or not at all surprised if it materialised?

Keynes (1936, 1937) had dismissed the possibility of any general theory of long-run expectations; and so it is not surprising, though it is significant, that Shackle (1949, p. 1) has 'only incidental suggestions to offer' about the materials out of which expectations are constructed, and the ways in which assessments of possibility are derived from these materials. As in other economic models, what is indispensable is a scale of measurement. Shackle's proposed scale, which measures degrees of disbelief, or of potential surprise at the occurrence of a particular outcome, has the double advantage over probability measures of not requiring us to treat non-repeatable events as if they were trials of a serial experiment nor to distribute a fixed total of belief over a closed set of outcomes.

Shackle exploits this advantage by treating potential gains and losses from a proposed action-scheme separately, constructing a potential surprise function for each, in which, outside a middle range of totally unsurprising outcomes, the degree of potential surprise rises with the magnitude of the possible loss or gain being contemplated by the decision-maker. By postulating that the power of any imagined outcome to seize the attention of the decision-maker depends on both magnitude and likelihood, he then constructs what he later came to call an ascendancy function, in which magnitude and likelihood are traded off along indifference curves. This function is then applied to the potential surprise curve, in the style of Hicks-Allen consumer theory, and selects for attention a pair of credible outcomes, positive and negative, which are labelled focus gain and focus loss. After a little further manipulation, the application of another form of indifference curve, the gambler's preference map, reveals whether the prospects associated with the proposed action-scheme are acceptable to the decision-maker.

This is a highly subjective model. It introduces two new kinds of preference function, the subjectivity of which might be readily accepted by many economists; but the possible consequences of action and the likelihood of their occurrence are also subjective. Even the action-schemes themselves are thought up by the decision-maker. It was as clear to Shackle as to anyone else that these ideas and expectations are not conceived in a void; but since he had little to say about how they were conceived, his theory appeared to many to be lacking an

anchor. It certainly did not suggest how the decisions of many individuals might be co-ordinated.

In the 1930s, of course, it had appeared obvious that decisions were not being well co-ordinated, and Keynes had sought to demonstrate that co-ordination was inherently problematic. So the theoretical challenge that Shackle was trying to meet was to construct a theory of intelligent decision-making in a disorderly world. This is a challenge which is still being avoided in almost all economic models of choice. As might therefore be expected, the attention paid by economists to Shackle's theory, which for a few years was substantial, then dwindled, with the notable exceptions of Sir Charles Carter (most recently in Carter, 1993) and, especially in the last decade, of Professor J. L. Ford (1983, 1987).

One should not overlook the interest which the theory aroused outside economics; this led to a symposium on the logic, philosophy and psychology of business decision-making under uncertainty at the 1953 British Association meeting in Liverpool (Carter, Meredith and Shackle, 1954, 1957). George Shackle was particularly pleased with the response from non-economists; but these responses failed to develop into a research programme. Inter-disciplinary research is an alien graft that the body of economics speedily rejects; and though Shackle was an eager correspondent he was not suited to the organisation or execution of collaborative research.

However, in the developing field of environmental economics, where inter-disciplinary co-operation is indispensable to good policy advice, and the inadequacy of knowledge is hard to evade, Shackle's theory may experience a revival. Indeed, a revival may already have been signalled by a proposal to use focus losses — worst credible cases — as a criterion for deciding whether to apply a 'precautionary principle' (Perrings, 1991). Analytically, this proposal may be interpreted as an extension, to incorporate externalities, of a more detailed scheme for the use of focus losses as a guide to the management of industrial research, which was developed in the mid-sixties by a chemical engineer and used inside ICI (Allen, 1968). Both schemes are devised for settings in which there are no good bases for probability distributions, but in which time may be expected to bring fresh knowledge, and allows such knowledge to be sought; in such settings what is required is not the selection of an optimal plan but the choice of the next step in a continuing sequence. These are special cases of a very general class of management decisions.

Shackle continued to defend his theory, but increasingly turned to broader investigations of fundamental issues of time and imperfect knowledge, and of the ways in which economists had sought to tackle or evade them. His most comprehensive treatment is in *Epistemics and Economics* (1972); its subtitle is *A Critique of Economic Doctrines*, and it pursues relentlessly the question which is avoided by all theorists who assume 'that men pursue their interest by applying reason to their circumstances', and by all theories of equilibria which depend on that assumption: it asks '*how they know* what those circumstances are' (1972, Preface, p. 2). It may thus be regarded as a counterpoint to the theme pursued by Hayek over the last half of his life: since men do *not* know what their circumstances are, how is social and economic order possible? Denis O'Brien (1974, p. 188) observed that 'the economics profession, if it does not succeed in ignoring this book, will find its contents very disturbing'; his prediction that 'many, probably most, will try to ignore it' has so far, not surprisingly, proved true; but the pursuit of perfect rationality, especially in game theory, is driving economists onto the reefs that Shackle has charted.

After his retirement, George Shackle moved to Aldeburgh, where he settled into a rarely varied daily routine of writing. That he never produced more than 500 words of finished text in a day is a mark of the care that he took to clarify his thought and to perfect its expression, and also of the simple courtesy which ensured that, by diligent use of pencil and rubber, his typist was always presented with clean copy. His professional life was devoted to thinking and writing. He was sometimes unconscious of his surroundings, as is illustrated by Professor Ford's (1993) stories of his time in Liverpool, and he was not a natural team worker. He needed to think things out for himself. But he was keen to communicate his ideas, and eager to encourage the ideas of others, whether they were students or fellow-economists. He made no attempt to found a school; he combined humility with an inner strength, and so he did not need the reassurance of followers, nor would he have felt it right to impose any constraints on the thoughts of others. His reward was to become, in the last dozen years of his life, a focus for a somewhat diverse collection of economists who were attempting in various ways to grapple with the issues to which he had devoted his intellectual energies.

He was elected to the British Academy in 1967, was presented with a *Festschrift* in 1972 (Carter and Ford, 1972), was awarded honorary degrees by the New University of Ulster (1974), Birmingham (1978)

and Strathclyde (1988), and had a conference organised in his honour in 1984 (Frowen, 1990). His first wife, Susan, with whom he had two daughters (one of whom died) and two sons, died in 1978; the following year he married again, and Catherine proved the perfect companion for his years of declining health and strength, which were also years of increasing serenity. They enjoyed reading English literature and economics aloud to each other; but as his eyesight deteriorated, the reading became more and more exclusively Catherine's part. In this she was joined by a neighbour, Vivian Dyter, a skilled librarian, who also sorted out his books and papers. It was characteristic of George Shackle to claim that when he was no longer able to read for himself, he gained a deeper understanding by listening to the reading of others; and it was entirely fitting that his last minutes passed in listening.

Commitment, scholarship, enjoyment: these characteristics pervade Shackle's work as an economist. The subject-matter of economics combined great practical importance with profound intellectual challenge; it therefore demanded an active engagement with ideas and the human situation, careful thought, and a clear understanding of what any analytical method could achieve, which it repaid with pleasure in the achievements of others — and, occasionally, one's own. Shackle was deeply appreciative of his predecessors and contemporaries; he valued economic theory, and sought to communicate its value, and its fascination, in much of his writing. (We should not forget his 'non-textbook', *Economics For Pleasure* (1959), which was translated into seven languages — or indeed *Mathematics at the Fireside* (1952), which was originally written for his children.) He knew that theorists must simplify, exclude, and distort; he objected only when they sought to apply their results without regard to their range of applicability.

In an article first published in 1964, Shackle (1966a, p. 30) adopted Sir Isaiah Berlin's distinction between two kinds of scientist and his illustration of that distinction by a line from Archilochus — 'The fox knows many things, but the hedgehog knows one big thing'. He argued, there and in other places, that the time for hedgehog economists, who could expound a single core of economic principles, was past: the best that could now be hoped for was to arrange our partial theories according to the assumptions on which they depended, 'some assuming perfect knowledge, some acknowledging uncertainty, some concerned with progressive, irreversible evolution, some with mechanical, insulated, deterministic repetition: an outfit of tools, not an ultimate philosophy' (Shackle, 1966a, p. 32). Yet Shackle himself knew one big thing: that

the behaviour of an economy depends on the interactions of people who are all trying to act sensibly on the basis of their limited knowledge and in the face of an unknowable future.

Had Shackle entered Cambridge in 1920, and had he chosen to study economics there — which, as was observed earlier, is highly unlikely — then his name might have become at least as closely associated with that of Alfred Marshall as it is with that of John Maynard Keynes. There could hardly be a more perceptive account of Marshall's endeavour to use the notion of equilibrium to provide a theory of economic evolution than is provided in sixteen pages of *A Scheme of Economic Theory*. 'Equilibrium is a state of adjustment to circumstances, but it is a fiction, Marshall's own and declared fiction, for it is an adjustment that *would* be attained if the very endeavour to reach it did not reveal fresh possibilities, give fresh command of resources, and prepare the way for inevitable, natural, organic further change': thus in a single sentence Shackle (1965, p. 36) recognises the scope of Marshall's ambitions, displays the ingenuity and daring of the means by which he endeavoured to realise them, and suggests how easily his successors could misunderstand both.

The ready identification of Shackle as a post-Keynesian has diverted attention from his fundamental affinity with Marshall. Both were deeply concerned with everything which might contribute to human progress, and with the obstacles to human progress that might arise from overconfidence in human rationality (against which Adam Smith also warned). Having defined economics as 'a study of mankind in the ordinary business of life', Marshall (1920, p. 1) elaborated that definition in the following words. 'Thus it is on the one side a study of wealth; and on the other, and more important side, a part of the study of man. For man's character has been moulded by his everyday work, and the material resources which he thereby procures, more than by any other influence unless it be that of his religious ideals'. The moulding of character is not much discussed in modern economics; people are construed as economic agents, who do not have character — just a consistent set of preferences (which rarely incorporate social values). But Shackle, like Marshall, insisted on a more comprehensive view of human motivation. The guiding principle of his professional life was that economics should be true to the human condition.

Both Marshall and Shackle were particularly impressed with the importance of business as the prime source of material improvement, through the scope which it afforded for the generation, exploration,

and testing of new ideas; nor did they neglect the effect of enterprise on human character. Both were keen observers of business practice, but without any desire to participate in specifically business education. Though Shackle (1966a, p. 287) once asked 'what... is economics about, if it is not about business psychology', his active research into management did not extend beyond a minor part in the Oxford studies of business behaviour in the 1930s, and a miniature inquiry conducted at a meeting of business men in Liverpool (Shackle, 1966a, p. 144). But in 1966 he chose business success as the theme of Section F of the British Association — and delivered his Presidential Address on 'Policy, Poetry and Success'; for what British business needed was 'attack, system and ambition' (Shackle, 1968, p. ix). So there was no incongruity in Charles Carter's selection of Shackle to inaugurate a series of specialist textbooks by writing on the theory of the firm, under the title of *Expectation, Enterprise and Profit* (1970).

Shackle recognised the importance of *Industry and Trade* (1919) in Marshall's life's work, and applauded his refusal to exclude the passage of time and the changes that it brings in perceptions and opportunities from his technical analysis. The consequences of that refusal have seriously damaged Marshall's reputation among professional economists; but Shackle shared Marshall's view — clearly expressed, but rarely acknowledged — that the problems of time and change would eventually prove fatal to the dominant position of mechanical equilibria in economics.

Marshall did not believe that the threat to mechanical models of economic co-ordination implied a threat to co-ordination itself; for he had another co-ordinating principle in reserve, in the multiple forms taken by the organisation of knowledge, which allowed increasing specialisation to be matched by closer integration. This principle of organisation, with its reliance on trade connections and continuing relationships of many kinds, implies that any model of atomistic competition is orthogonal to the proper explanation of co-ordination; but this devastating implication was never fully exploited by Shackle, probably because his experience of economic and political disorder in the 1930s had left him far less confident than Marshall had been before 1914 that disorder would be confined to temporary depressions, marked by a loss of business confidence, rather than becoming endemic.

Shackle seemed to have fewer reservations about Marshall than about Keynes; his criticisms of Keynes' failure to appreciate the value of sequence analysis contrast with his praise for Marshall's handling of

expectations and the effects of time. He seemed particularly pleased to hear of new work on Marshall. All in all, it therefore was especially fitting that Shackle's last meeting with many of the senior members of the profession in Britain took place at the Marshall Centenary Conference organised by the Royal Economic Society in St. John's College, Cambridge, in 1990.

Shackle followed Marshall (and Adam Smith) in refusing to accept the central importance in economic theory of the equilibria of purely self-interested economic agents. Selfish calculation was an inadequate basis for the study of man. But it was calculation rather than selfishness that provided the central theme of his criticism of orthodox economics; for the calculations which were required by the theories of rational choice were too often neither feasible nor reasonable. Since he was a practising Christian, it seems appropriate to consider this issue in religious terms.

Mark Perlman (1993), a close friend of George Shackle, has recently commented on the implications for economics of two interpretations of the Fall of Man. The more usual interpretation emphasises the necessity to work for subsistence, and is well represented by the conventional focus of attention on the allocative efficiency of alternative economic arrangements. The other tradition, which emphasises the consciousness of imperfect knowledge, and the consequent recognition that human beings are often pushed beyond the limits of reason is, by contrast, almost entirely ignored by economists; and it has to be ignored in order to reach clear analytical conclusions on allocative efficiency. The logic of rational choice, and the formal specification of the equilibria which such choices support, requires the closure of every model; uncertainty is corralled within well-specified probability distributions, which may be subjective, but are always presumed to be complete, and there is no place for the unknown, still less for the unknowable. In his later years, Shackle often replaced 'uncertainty' with 'unknowledge', perhaps using this uncharacteristic inelegance to rebuke economists for their evasions.

Now the irony — and perhaps the tragedy — of economic development is that the triumphs of rationality (in its broader sense) that have provided the potential for alleviating scarcity through the development of ever-more complex forms of the division of labour, have faced us with ever-more complex problems of co-ordination if this potential is to be realised rather than being dissipated in unemployment; and since these are problems of imperfect knowledge, they do indeed appear to

lie beyond the limits of reason — as that is interpreted in most economic theory.

There has been no shortage of technical skill and virtuosity among macroeconomic and monetary theorists in the past twenty years; yet it has produced very little useful advice on how to reduce unemployment. Indeed, the insistence on fully-specified rationality has made it difficult to interpret unemployment as anything other than voluntarily-chosen leisure; in some models that choice may be mistaken, but it is necessarily a rational choice, given the chooser's information set. Therefore the cure for unemployment must lie in better information; hence the recommendation to reduce, and preferably abolish inflation, which, it is claimed, causes people to confuse general and relative price changes.

Shackle agreed that unemployment occurred because people did not have the knowledge that is required in order to ensure the effective co-ordination of economic activities. But he eloquently and repeatedly defended and developed Keynes' argument that this lack of knowledge was not simply a design defect which might, in principle, be remediable, but an inherent characteristic of a world in which complete knowledge of the consequences of one's actions, even in the attenuated form of a closed set of contingencies, was unattainable.

Keynes (1937, p. 214) was notably scornful of the 'pretty, polite techniques' by which we attempt to conceal our ignorance — from ourselves even more than from each other — as individuals, business men, and as professional economists. Shackle was never scornful; instead we find the care and completeness of argument and the courtesy of expression which he naturally accorded to all those who had struggled with the major issues of economics, and an understanding of the reasons which had led them to use the methods and assumptions which had shaped their conclusions. Only on the few occasions when he discusses the work of people who clearly have seized upon a technique without thinking about what they are doing does his manner become a little brisker. There can be few better guides both to the profound difficulties of the enterprise of economics and to the good manners in debate which spring from a deep respect for the person with whom one is debating than George Shackle's critical essays.

A more comprehensive guide to the problems of developing a corpus of economic understanding was provided in Shackle's *Years of High Theory: Invention and Tradition in Economic Thought 1926–1939* (1967). This is surely the best book on the history of economic thought to give to any young economist who believes that the study of such

history is of very little value; and one can enjoy most of its benefits (as well as some of the finest prose that even George Shackle ever produced) without subscribing to his central beliefs, although they are embodied in his treatment. To provide a unifying theme for an apparently diverse range of theoretical innovations, Shackle unconsciously reinvented Adam Smith's 'Principles which Lead and Direct Philosophical Enquiries' (1980) — a remarkable case of multiple discovery two centuries apart. Theories are patterns that we impose on phenomena in order to protect us from surprises and to give comfort — which is no less real for being illusory — in the presence of a threatening unknown. When surprises nevertheless come (for theories are human inventions, not disclosures of final truth) we are pushed beyond the bounds of reason, which is where we do not like to be, and therefore struggle to extend these bounds by inventing better patterns.

Smith's account of cosmology culminates — though Smith was careful to warn us not to believe that it had concluded — in the unprecedented scope of Newton's connecting principles; Shackle provides an ironic counterpoint by showing how the search for a better set of unifying principles in economics led to the disintegration of economic theory, and to a situation in which the fox's kind of knowledge was the only kind available. The attempt to construct a new synthesis by the integration of a more elaborate model of general equilibrium and a more rigorous definition of rational choice, which attracted the most determined efforts of most leading economists for most of the post-war period, appears to lend considerable weight to Smith's and Shackle's theory of scientific development; nor was Shackle surprised by increasing signs of a second disintegration.

The neoclassical endeavour to impose order, and to extend that order into new areas (some of them outside the traditional boundaries of economics, such as the law and the family) is entirely true to Shackle's view of the human condition; but much of the content of neoclassical theory is not. How can we develop a good theory of the consequences of not knowing by assuming that we do know? Closed models of rational choice, leading to well-defined equilibria of optimising agents, may meet the criteria of rigour which their candidates extol; but the resort to game theory in order to eradicate what Herbert Simon called the 'scandal' of oligopoly, in which rationality seemed unable to guarantee a rigorous answer, has raised doubts about the very meaning of that apparently precise term 'rationality'. Perhaps

mainstream theorists will come to join Shackle in echoing Keynes' (1937, p. 214) protest: 'we simply do not know'.

Critics of Shackle's insistence on the insufficiency of knowledge have accused him of nihilism: if we have no recognised procedure for closing our models, then how can we reach any conclusions which will allow us either to make reliable predictions of the consequences of our actions or to make sensible decisions? One might respond to such criticisms by observing that such critics appear neither to understand David Hume's demonstration that there is no way of establishing the truth of anything that we usually call knowledge nor to accept Popper's warning against trying to assign a numerical probability to the truth of any hypothesis, as we are required to do by subjective expected utility theory. Is there not a certain lack of rigour in attempting to build an elaborate structure, either for forecasting or for decision, upon a falsehood? It is not only macroeconomic forecasters who are thereby exposed to the laughter of the gods.

But this charge of nihilism needs a more extensive investigation if we are properly to understand, and benefit from, Shackle's arguments. It is appropriate to begin by drawing attention to their practical relevance. Peter Drucker, who was trained as an economist, and has an unparalleled reputation as a perceptive analyst of management, argued in 1969 that 'the economic understanding and policy we need' required a microeconomic theory which would recognise 'the concept of knowledge as the central factor in productivity'. As the pioneer of such a theory Drucker identified Shackle, who 'attempts to base a comprehensive theory of economics on the expectations of businessmen and entrepreneurs. . . . His is the first true economics of a moving goal, the first economics based on teleological dynamics' (Drucker, 1969, pp. 207, 210).

The role of management in maintaining a 'teleological dynamics' was elaborated in a number of papers written by Henry Boettinger, who was Director of Corporate Planning at AT&T in the 1970s. Boettinger (personal communication) had been advised to read Shackle by Ronald Coase, and cited him in an article in *Harvard Business Review* (1967), which evoked a letter from Shackle; this led to an enduring friendship, including a series of conversations in which Boettinger appeared to the delighted Shackle like 'walking chapters from *Industry and Trade*'. Speaking at the Oxford Centre for Management Studies (now Templeton College) in 1973, Boettinger quoted Shackle's words to the 1966 meeting of the British Association: 'There are those who

believe that life consists of a series of imposed situations to each of which there is one right response, and there are those who think that we impose upon the material chaos a psychic order of our own invention, not seeking to solve a problem but to conceive a work of art' (Shackle, 1966b, p. 755). Boettinger commented that 'management sciences necessarily adopt the first of these approaches, but the management arts can be comfortable only with the second'. The reason is simply that the future is unknowable; therefore the only way in which we can address what Drucker called 'the futurity of present decisions' is through imaginative constructions. To generate imaginative reconstructions, to explore their implications, and thereby to improve the quality of present decisions, was, for Boettinger, the function of a planning department.

The relevance of Shackle's work for business practice was also recognised by Charles Suckling, of ICI and, more recently, the Royal Commission on Environmental Pollution. He found *Epistemics and Economics* (1972) a valuable aid in the management of innovation. (Boettinger recommended it to some of his business colleagues.) Those who have regarded that work as the supreme embodiment of Shackle's nihilism may find this hard to understand; but the issues explored by Shackle are fundamental to the intelligent use of knowledge. 'When the compass of potential knowledge as a whole has been split up into superficially convenient sectors, there is no knowing whether each sector has a natural self-sufficiency . . . Whatever theory is then devised will exist by sufferance of the things which it has excluded' (Shackle, 1972, pp. 353–4). Suckling (personal communication) comments that '*ceteris paribus* is a linking, essential theme in all types of modelling, in science and in design, in effect in all prediction'. The neglect of this theme can tempt us to assume the self-sufficiency of the model which we are using; its acknowledgement can warn us, as Suckling argues, to explore the robustness of our conclusions to influences which have been consciously or unwittingly excluded from that model, and thus enjoy the benefit of foresight, rather than the hindsight which may be provided by judicial inquiry after a disaster.

Thus '*the ground for supposing knowledge insufficient is a part of knowledge*' (Shackle, 1969, p. 281). The exploration and improvement of any new business idea is not dependent on a probabilistic assessment of what will happen; what is required is the frankest possible appraisal of what can happen. Moreover, the attempt to capture all relevant aspects of a decision in a single measure, whether this be

subjective expected utility or anything else, conceals the patterns of detail which are necessary for effective incremental management. It does not allow for the investigation of the unquantifiable and the unknown, the discovery of unsuspected difficulties and opportunities, and the process of shaping an innovation in response to such discoveries. Shackle's denial that any objectively correct single measure is possible — which is quite explicitly not equivalent to the claim that any subjective measure is as valid as any other — is therefore not fatal to reason. It is, on the contrary, the beginning of managerial wisdom, and was so treated a good many years ago by Drucker (1955) and Ansoff (1965).

Shackle's (1969, p. 277) assertion that 'policy must legislate for uncertainty' is also exemplified in the development of managerial practice within Shell, in which the preparation of central forecasts has been replaced by the creation of a range of scenarios which describe possible futures. This development was not directly stimulated by Shackle's work, but one of those involved, Michael Jefferson, examined the relationship between Shackle's theory and Shell's practice at the British Association meeting in 1981. Jefferson (1983, p. 125) declared that 'the skein of his thoughts and words weave a manner of thinking and basis for decisions which the businessman will understand'; by contrast an exposition of Shell's use of scenarios a few years later baffled a group of economists who had attended a meeting in order to hear the latest forecasts for North Sea oil, and could not understand Shell's refusal to assign probabilities to their scenarios. But, as Jefferson (1983, p. 123) follows Shackle in arguing, with non-seriable problems 'the probabilistic approach... is tantamount to attaching probabilities to *unknowledge*'.

What few economists have yet realised, but many in business have long known, is that the purpose of the planning process is to change behaviour. Thus, having begun by attempting to move beyond conventional methods of forecasting, Shell gradually came to use scenarios as a way of giving greater freedom to its managers. 'Those who foretell the future lie, even when they foretell the truth' (an Arab saying quoted by Jefferson, 1983, p. 136); the significance of this message is that managers should explore alternative actions and their various possible consequences, and should do so by liberating their imaginations from the constraints that are built into forecasting models, and from other sources of rigidity. Is that not precisely what Shackle would recommend?

The charge of nihilism is easy to rebut at a personal level. There was nothing nihilistic about George Shackle's faith, his personal relationships, and his attitudes. Like Hayek, he was opposed to the pretence of knowledge; why should we wish to be deceived? But we should certainly not give up trying to learn. He encouraged everyone to persevere — as he persevered, right to the end — with the development of economics: there was so much to do, and so much pleasure to be obtained by the doing of it. ('It is time I started my education', he wrote in 1978; and most of the essays published in *Business, Time and Thought* (1988) were written between the ages of seventy-eight and eighty-four.) And what could be more nihilistic than the standard doctrine which proclaimed as its theoretically ideal economy an equilibrium in which every future time and every future contingency was already known and provided for?

To be born into such a world would be to find oneself a prisoner of time and circumstance, with no decisions to take, no schemes to plan, and the certainty of never having a single fresh idea. Can one imagine a more bleak and barren prospect? 'Conventional economics is not about choice, but about acting according to necessity. Economic man obeys the *dictates* of reason, follows the *logic of choice*' (Shackle, 1969, p. 272). 'For the view of the "all is solvable and foreseeable" school is fatalism; the reverse of hope, the opposite of freedom' (Shackle, 1966a, p. 133). 'When is life boring, insipid, unstimulating and lack-lustre? When it offers neither hope nor threat, when there is nothing either of positive good to be attained or of positive bad to be avoided, that seems worthy of exertion, sacrifice and risk' (Shackle, 1969, p. 125). 'When all life's questions are answered for any one of us, life will surely have ceased to hold for him any interest or purpose' (Shackle, 1953, p. 1).

We do not, and cannot, have the knowledge that has to be assumed by economists to construct their theories of rational choice, or their models of equilibrium. But it is precisely this double impossibility which constitutes the good news which was repeatedly proclaimed by George Shackle: the uncertainty which many economists seem to regard as a threat to economic analysis, and even to the possibility of rational behaviour, provides room for imagination, and the hope of discovering new knowledge. If the world could be accurately represented by a rational expectations general equilibrium, then economists could not possibly do what they claim to do — develop better theories. Shackle's life never ceased to be full of interest and purpose.

Mark Perlman (1990, p. 17) has drawn attention to Shackle's 'important, and virtually novel, emphasis on the role and uses of imagination'. He suggests that this emphasis takes us deeper into the foundations of choice than does its conventional resolution by economists into preferences, opportunities, and calculable consequences; for when there are many gaps, both recognised and unrecognised, in our knowledge then imagination is inevitably engaged, not only in the act of choosing, but even in the formulation of the options between which we are to choose. If economists really wish to understand human choice (and it is not clear that most of them do) then much more attention needs to be paid to human imagination.

We may start by rescuing the concept of opportunity cost from the context of opportunity sets which are as readily available as goods on supermarket shelves, and restore it to the context of possibilities which are never realised because we choose not to pursue them — and which, therefore, we cannot know would have produced the results ascribed to them. This is the context once explored at the LSE (see Buchanan and Thirlby, 1973) and which is familiar to business men; much contemporary writing on management may easily be regarded as variations on Shackle's (1969, p. 16) theme that 'the future is not there to be discovered, but must be created'.

How is this process to be analysed? The clue is to be found as a section heading in Shackle's (1979) last monograph: 'The imagined, deemed possible'. The question to be investigated, in any particular situation, and in many classes of situations, is: what is deemed possible by those who are making the decisions? It is because Shackle does not impose the conventional limits on agents' expectations that some economists call his argument nihilistic. Their particular expertise lies in the constraints which are imposed by markets (or rather by their models of markets); but we might remember that earlier economists have ranged more widely. Adam Smith was particularly concerned with the constraints imposed by moral sentiments; and Marshall believed that social pressures might inhibit action, even among profit-seeking business men.

'The boundedness of uncertainty is essential to the possibility of decision' (Shackle, 1969, p. 224). Shackle discussed in various places and at various times many of the factors involved, such as the state of scientific knowledge, economic pressures, and social conventions; but none of these discussions, it seems fair to say, take us very far. One observation — that too many new entrants may spoil a market, and

that this possibility may prevent any entry (Shackle, 1969, p. 174) — has been explored by G. B. Richardson (1960, 1990), and Shackle's (1963, pp. 1, 18) discussion of stereotypes — 'countless repetitions of a great number of diverse kinds of skill', which help to provide 'an orderliness in our surroundings that we rely on' — seems to point to, and in part beyond, the work of Nelson and Winter (1982); but, despite his interest in business, Shackle paid little attention to the constraints which may facilitate co-ordination within a group. He left much to be done.

The aspect to which he did give particular attention is the effect of time. Many constraints decay with time; therefore the longer the time-horizon the fewer the possibilities that can be confidently excluded. This is the core of the macroeconomic problem, as Shackle saw it — and as, he insisted, Keynes had seen it. Consumers find it impossible to make sensible decisions about many future purchases and therefore seek to preserve their freedom of action by accumulating financial assets; but by solving their own problems they accentuate the problems of business men who are seeking to decide what provision, by way of investment, they should make against future demands.

If these business men can find no good reason to exclude the possibility of severe losses from any investment that they can imagine, then they may reasonably decide not to make any investment. Moreover, since the range of uncertainty expands quite rapidly as one looks further into the future, it may seem sensible to disregard any consequences which are more than three or four years ahead; and Shackle demonstrated on several occasions that investment projects which are assessed over such a period are very unlikely to be sensitive even to quite large changes in the rate of interest. Recent history supports the view that where interest rate changes do appear to influence investment decisions, they work not by shifting well-defined projects across the margin of profitability but by changing business men's expectations about the possible outcomes of the projects themselves.

The interaction between imagination and constraints is an appropriate focus for study by those who are interested in the problems of economic development and co-ordination. Shackle's position, that human beings flourish best in conditions where there is an intermediate degree of structure, and where imagination has a framework — but a roomy framework — in which to operate, is remarkably similar to that of Herbert Simon; bounded imagination has many of the same implications as bounded rationality. The two met once, in Pittsburgh;

Shackle 'expected to be remorselessly crunched up, but found him delightful' (personal correspondence). But there seems to have been no thought of collaboration — which is a pity, but not at all surprising, for that was not George Shackle's style.

The co-ordination of economic activities does not primarily depend on the pre-reconciled choice of a general equilibrium or the pre-calculated Nash equilibria of fully specified games; it depends primarily on constraints, on the limits of what individuals deem possible. Many of these constraints are embodied in institutions; and Shackle and Simon both point the way to a study of institutions as a response to incomplete knowledge. (Simon has proceeded much further than Shackle, as indeed has Hayek.) Because institutions are a response to incomplete knowledge, they cannot be rationally chosen (in the technical sense used by economists); they may have unexpected consequences, both beneficial and harmful, and are likely to change over time. Thus institutional economics must be evolutionary economics; and evolutionary economics must be institutional economics, for in a world of imperfect knowledge and of bounded rationality processes must be structured by institutions.

If institutions grip tightly, then life becomes a pattern of routine. Nothing novel that can be imagined is deemed possible. That is why Schumpeter's entrepreneur must be an outsider, whose new combination is 'a figment of the imagination' (Schumpeter, 1934, p. 85). In Schumpeter's model, entrepreneurs can act on their imagination only in a world of order; but the enactment of their imagined futures destroys the Walrasian equilibrium which is Schumpeter's stable economy and pushes those who are capable only of practising their routines beyond the limits of reason; new knowledge destroys old knowledge, as Shackle (1970, p. 21) observed, and creates a real business cycle.

Shackle did not seem to appreciate that unemployment in Keynes' and Schumpeter's theories had the same proximate cause: uncertainty had escaped the bounds within which people were capable of choosing. Perhaps this was because he emphasised the kaleidic quality of Keynes' analysis: there was no adequate basis for long run expectations, and so the commitment to long-lived capital projects depended on the vagaries of animal spirits. In Schumpeter's model, by contrast, it was the entrepreneur's imagination which inspired the sequence of events, and since this imagination was the prime source of economic development, unemployment was a price well worth paying. Schumpeter gives us a stark choice: we can preserve coherence only by excluding imagination

and with it the possibility of improvement. Schumpeter's vision is much closer to Shackle's than is generally recognised; and Schumpeter has not been accused of nihilism. The interplay of imagination, uncertainty, knowledge, and institutions offers scope for an understanding of macro-economic problems that lies outside the range of models which insist on rational choice equilibria.

Great economists always fail. As Shackle (1976, p. 516) observed, 'if all problems are to be soluble, we must be very careful what we admit to the category of problems'; and the problems created by the human condition are too complex to be soluble. The models, whether verbal, mathematical, or in the form of computer simulations, always omit or distort parts of the reality which turn out to be important; every attempt at improvement reveals a new difficulty. Yet in the process of failing, great economists have many successes, which give them pleasure and give us knowledge; and their failures provide the base from which their successors start. It is not difficult to see missed connections and unexploited opportunities in the work of George Shackle: since he raised fundamental issues, the possible connections were many and the opportunities diverse, sometimes obscure, and rarely easy to exploit. The ways in which economic systems attempt to improve knowledge and cope with uncertainty are of fundamental and pressing importance; they are the chief practical economic issues in present-day Britain and in many other countries. George Shackle's life as an economist was devoted to trying to understand them, and to explain them to others. No one has performed either task better.

George Shackle was a scrupulous and indefatigable scholar; he was also a gentle man, courteous, patient, generous, and enthusiastic about the work of others. He set himself the highest standards, yet had the lowest expectations for his own life; as a result he was continually delighted with his own good fortune. At the dinner in his honour in 1984 he put this down to luck (Shackle, 1990, p. 192); but if some people make their own luck, George Shackle commanded it by his refusal to seek it. He had the unconscious power to make other people behave better than they believed themselves capable of. He was a humble man of unshakable integrity, whose convictions were finely reasoned and rigorously tested; without this inner certainty, could he have probed so deeply into the implications of the deficiencies of human knowledge? Henry Boettinger called his life a pilgrim's progress; and it was this progress, and the many benefits which it bestowed on family, friends, colleagues, and the discipline of economics, which

was commemorated at the thanksgiving service held in Aldeburgh Parish Church on 16 September 1992. (The addresses, and other tributes, are included in the G. L. S. Shackle Memorial Issue of the *Review of Political Economy*, 5, 2, 1993.) We have much to be thankful for.

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