

Claims to expert knowledge and the subversion of democracy: the triumph of risk over uncertainty

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Abstract

We live increasingly in a 'risk society', characterized by the multiplication and increasing unpredictability of risks, as well as by our enhanced consciousness of them. Claims on the part of 'expert' bureaucracies to possess superior abilities to anticipate and manage risks are increasingly suspect in public perceptions. This suspicion is legitimate.

The history of economics is revealing in this respect. The triumph within economics of the notion of 'risk' (as defined by Frank Knight), or a vision of the future as subject to probabilistic analysis, over 'uncertainty', or a vision of the future as so fundamentally and radically indeterminate as to preclude such an analysis, has been instrumental in the legitimization of expert bureaucracies. Anthropological literature on risk also reveals, in enlightening but rather perverse fashion, many allied modern presumptions.

The enhancement of the degree of both democratic legitimacy and consequential efficacy of social decision-making procedures to confront indeterminacy requires that 'uncertainty' should take the place of 'risk' as the governing motif of risk analysis, with corresponding implications for the enlargement of the field of political contention.

Keywords: risk; uncertainty; expert knowledge; reflexive modernity; democracy.

Over all things stand the heaven accident, the heaven innocence, the heaven chance, the heaven prankishness.

'By chance' – that is the most ancient nobility of the world, and this I restored to all things: I delivered them from their bondage under purpose.

Friedrich Nietzsche, *Thus Spake Zarathustra* (Hacking 1990)

Introduction

In his recent and final work, *The Revolt of the Elites and the Betrayal of Democracy*, the American social critic Christopher Lasch wrote:

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Those wonderful machines that science has enabled us to construct have not eliminated drudgery, as Oscar Wilde and other false prophets so confidently predicted, but they have made it possible to imagine ourselves as masters of our fate. In an age that fancies itself as disillusioned, this is the one illusion – the illusion of mastery – that remains as tenacious as ever. But now that we are beginning to grasp the limits of our control over the natural world, it is an illusion . . . the future of which is very much in doubt.

(Lasch 1995: 246)

This essay is about the past, present and future of this illusion, in the particular form of claims to be able to manage the uncertain future. The rise of bureaucracies and 'expert' authorities which claim to possess special qualities or technologies of judgement in relation to the uncertain future, and its implication for the circumscribing of democratic discussion, will be examined. It will be suggested that important structural developments in the character of contemporary societies, as well as our commitment to democratic values, should steer us in another direction, which draws with more catholicity from diverse social wellsprings of knowledge and understanding. As a means of making the argument, the history of depictions of uncertainty in two arenas of social studies – economics and social anthropology – will first be explored.

A large degree of uncertainty is immanent in nature, but uncertainty is also rooted in the unpredictability of social life, or, in short, in human agency. Peasants, a textbook on agricultural economics tells us, for example, are beset by uncertainty in the form of natural hazards, market fluctuations, intracommunity interdependence and state actions and wars (Ellis 1988). They attempt to deal with this uncertainty by measures such as mixed cropping, sharecropping and customary exchange relations. When customary insurance mechanisms are seriously compromised, peasants may be driven to revolt (Scott 1976; Wolf 1969). For non-industrial societies, the analysis of the means by which risk is understood, confronted and distributed has been found to be a profound and central lens with which to approach social understanding. This is no less so in the advanced industrial economy, and indeed in the modern world system as a whole. The risks faced by contemporary advanced capitalist societies take the form, *inter alia*, of the potential for ecological disruption, for war and social dislocation, and for economic depression and demise. There is reason to believe that such risks have reached a new level of significance, or at any rate that collective consciousness of these risks has reached an unprecedented pitch (Perrow 1984; Douglas 1986; Beck 1992; Giddens 1994). Risks, no doubt, are in large part in the eye of the beholder. They are a matter of social construction. This is not only in the sense that what risks individuals and societies choose to pay attention to is a culturally determined affair (as asserted, for example, by Douglas [1975, 1986], Douglas and Wildavsky [1982], Johnson and Covello [1987]), but more profoundly that our conceptualization of what uncertainty is is itself so (a central argument of this essay).

Our representations of risk and uncertainty, formulated to account for our observations of, and to deal with, indeterminacy in social life and in the natural world, have evolved in tandem with the historical course of modernization. A calculative and rationalist conception of uncertainty has become dominant, as have similar approaches in other domains over alternative conceptions. This rise to dominance reflects the administrative imperatives of modern states, the need of dominant status groups within modern societies to provide 'knowledge-based' justifications for their precedence, as well as, perhaps more deeply and generally, modern individuals' deep psychological need to escape from indeterminacy.

The essay utilizes throughout a landmark distinction from the history of the debate on uncertainty in economics – that of the economist Frank Knight between 'risk' and 'uncertainty' – as a critical touchstone, arguing that one of these terms, 'risk', has come, as a result of the hegemony of a certain modality of rationalism, to marginalize the other, 'uncertainty' (Marglin 1990: 241).

The intent will be to tie this intellectual history to the political concerns and comparative social theory applicable to our time. Recent developments in social theory have made concepts of the sharing and distribution of risk¹ the very core of an understanding of contemporary advanced societies. Giddens (1990, 1991, 1994), Beck (1992, 1995), Beck, Giddens and Lash (1994) and Luhmann (1979, 1993), in particular, have independently built ambitious social theories around this question. Risk is perceived as the dominant material and epistemological reality of the contemporary world. We live, increasingly, it is argued, in a 'risk society'. This new situation (which reflects a radical and qualitatively different form of modernity from that to which we have become accustomed) calls for new ways to conceive of risk and uncertainty which do not call exclusively upon our existing scientific models of risk but which come to terms with the new exigencies of interdependent social 'reflexivity'. It is this historical transformation, which reflects a new phase in the 'modernization of modernity', that makes the question of how we will conceive of uncertainty a central political question of our times, and not only a matter for arid intellectual debate. To recover alternative and more humane conceptions of indeterminacy to substitute for the dominant scientific approach to uncertainty – which works to delude contemporary managerial bureaucracies as to their power over nature and contemporary societies at large as to the legitimacy of the power of allegedly 'expert' and 'scientific' managerial bureaucracies (and thereby to undermine democratic practice) – is a task of both intellectual *and* political importance.

From Menger to Keynes and back again: risk and uncertainty in the history of economics

The characteristic prevalence of claims of calculative reason to primacy and generality, among modernist views of the world (Banuri 1990b; Feyerabend 1988;

Marglin 1990; Weber 1958, 1968, 1981) has been widely observed. This may be nowhere more evident than in the discourses of contemporary economics (Banuri 1990a; Godelier 1972; Hart 1988; Hutchison 1977; Mirowski 1989; Apffel-Marglin and Marglin 1990). Mainstream economics may also constitute the foremost rationalizing discourse and intellectual tool for social justification in our time. The importance of economic rhetoric in shaping public discourse at every level of contemporary societies is difficult to overestimate (Hart 1986, 1988; Marglin 1992). Of most importance for the purposes of this essay is that economics has provided by far the most central and influential realm for intellectual debate about the concepts of risk and uncertainty within the human sciences. On the level of 'policy' and practical engagement, this has meant that the approaches of dominant actors and institutions to managing uncertainty in the world, whether economic, political or ecological, have been imbued with the conceptions which have dominated economics. As such, a thorough consideration of the utilization of, and dramatic internal debate over, these terms within the historical record of economics is essential and indispensable to any understanding of their modern social meaning.

Although discussion of risk and uncertainty has a long history in economics, risk and uncertainty have become central preoccupations of the subject only in the twentieth century, however, and it is here, therefore, that we will have to focus most of our attention. Developments in economics parallel (although somewhat later in time) those in social statistics, sociology, biology and the physical sciences, in each of which eighteenth-century largely deterministic Enlightenment scientific conceptions gave way to the increasing intellectual influence of statistical laws during the course of the nineteenth century (viewed initially, however, not as laws valid in themselves but as generalizing shorthand summaries of distributed patterns of phenomena which had ultimately deterministic underlying behaviour),² and finally by the early twentieth century to genuine stochasticism (i.e. an acceptance of chance as an ultimately explanatory force in itself). This epistemological trajectory has been charted convincingly by a number of distinguished historians and philosophers of science (Gigerenzer *et al.* 1989; Hacking 1990; Sylla 1990; Porter 1990; Bork 1967), and this need not therefore be repeated here.

Considerations of uncertainty appear to have played a relatively limited role in early (eighteenth- and nineteenth-century) explorations in economics.³ To take just a few examples, as diverse and separated economic thinkers as the Physiocrats, Malthus, Ricardo and Walras seem to take no interest in the question of uncertainty and its implications for economic theory. Strikingly, Marx also appears not to pay attention to uncertainty, despite its potential importance in his theory of capitalist crises. Smith and Marshall give it some attention, albeit very brief. The historian of economics Marc Blaug writes of Smith's efforts to explain some individuals' choice of risky over safe professions, that 'these pages in Smith and a few pages in Marshall's *Principles* exhausted the content of the economic analysis of choices among unsure prospects' (Blaug 1988: 48). Neither Marshall nor Smith makes any attempt, however, to systematically theorize the nature of choice under uncertainty or

even to conceptualize what uncertainty means. Similarly, W. Stanley Jevons and Francis Ysidro Edgeworth, who both made seminal contributions to nineteenth-century statistical theory and independently to economic theory, did not anywhere significantly apply statistical reasoning to their work in economics.

One of the first systematic attempts to understand uncertainty (albeit also limited)⁴ appears to be that of Carl Menger, the foremost Austrian exponent of individualist and 'formalist' economics, in his *Principles of Economics*, of 1871. Menger's view of uncertainty is one which is designed to fit within an otherwise entirely deterministic *Weltanschauung*. Menger's concern is with the uncertainty faced by a producer in the process leading up to the creation of any final consumption good. He views this uncertainty as arising entirely from our lack of full knowledge as to all of the distinct factors which affect the production process, and from our lack of ability entirely to control such factors, rather than as arising from their intrinsically stochastic nature. He writes, for example,

Although weather, like all other natural forces, makes itself felt in accordance with inexorable causal laws, it appears to economizing men as a series of accidents, since it is outside their sphere of control. . . . Human uncertainty about the quantity and quality of the product . . . of the whole causal process is greater the larger the number of elements involved in any way in the production of consumption goods which we either do not understand or over which, even understanding them, we have no control.

(Menger 1981: 71)

Menger's determinism is entirely in keeping with the broad nineteenth-century tendency, referred to above, to conceive of statistical law as consisting in observable generalizations distilled from underlying but as yet unknown deterministic laws, as opposed to having their origins in genuine stochasticism (e.g. Hacking 1990). More importantly, it is clear that, while Menger himself did not travel further along that route, his conception of uncertainty unmistakably lays the ground for the reduction of problems of uncertainty to problems of the rational determination of calculable probabilities. For if the universe is perceived to be fully built upon underlying deterministic laws, then to calculate probabilities of occurrence of events becomes not only possible (in view of the stable structure of laws which is perceived to give rise to them) but necessary as a second-best solution (in the temporary absence of the first-best, which is to know the laws in their full detail themselves). Indeed, the groundwork laid by Menger would be exactly that which would be resolutely returned to, though under cover of an ostensibly distinct conceptual basis, by mainstream economics in the second half of the twentieth century.

The most important subsequent development in the economic theory of indeterminacy, which, as will be argued, has implications far beyond economics, is that between 'risk' and 'uncertainty'. Though usually attributed to the American economist Frank Knight's *Risk, Uncertainty and Profit* (1921),

the distinction appears to have been first formulated within economic theory by the mid-nineteenth-century economist, J. H. von Thunen. The distinction develops, in both Knight and von Thunen, out of explorations in the theory of entrepreneurship. Mark Blaug, once again, succinctly summarizes Thunen's ideas as presented in *The Isolated State* (1850):

Thunen defined the gains of the entrepreneur as the income which is left over from the gross profits of a business operation after the payment of (1) interest on invested capital, (2) the wages of management, and (3) insurance premium against the calculable risk of losses. The rewards of the entrepreneur, Thunen went on to say, are therefore the returns for incurring those risks which no insurance company will cover because they are *unpredictable*. Since novel action is precisely the condition under which it is *impossible to predict the probability of gain or loss*, the entrepreneur is necessarily an 'inventor and explorer in his field'.

(Blaug 1988: 461, emphasis added)

Knight, similarly, distinguishes between predictable and unpredictable, or, more correctly, probabilizable and non-probabilizable (or calculable and non-calculable) forms of indeterminacy. The former he refers to as 'risk' and the latter as 'uncertainty' (Knight 1971). Knight means this distinction to provide the basis of a theory of entrepreneurship and of the nature of profit. Knight writes in this regard that 'The only "risk" which leads to profit is a unique uncertainty resulting from an exercise of ultimate responsibility which in its very nature cannot be insured nor capitalized nor salaried'. Knight's distinction, pre-figured by von Thunen, was, despite its prosaic origins, potentially a truly radical one, and, as we shall see, continues to have radical potential. Knight's distinction is often caricatured (for example, see Hausmann [1992: 22]) as one between 'situations of *risk* when outcomes have known probabilities and of situations of *uncertainty* when the probabilities of the outcomes or even the range of the outcomes of actions are not known'.

One could go further than this to add that Knightian uncertainty includes situations in which probabilities are not known not only because there are barriers to their calculation but because the context is such that it is not meaningful to speak in terms of the assigning of probabilities, real or hypothetical, to the potential event-alternatives. The key characteristic of the Knightian concept of uncertainty is that it is that form of indeterminacy which is by its very nature not subject to rational calculation of the likelihood of various alternative possibilities. Knight does not deny that there are *some* forms of indeterminacy which may be more subject to such calculation and control. These forms of indeterminacy are what he refers to as 'risk'. An assertion is made, however, of the limits of probability calculus, and of the irreducible resistance of some dimensions of the future to structural mapping or regularizable understanding. Knight is, put more drastically, asserting the existence of a 'surplus' of volatility in the world, which cannot, by its very nature, be brought under the reins of rational expectation or control. This

'surplus' can potentially be taken to be either epistemological (i.e. a deep limitation on our knowledge of the world) or ontological (i.e. as inhering in the fabric of the world) in nature. It may already be evident that acceptance of the possibility of uncertainty in Knight's radical sense may be expected to work to destabilize claims as to the possession of reliable differential ability to anticipate, regulate or control the future. It will be argued below that it does so by creating enlarged room for social and political contestation as to the meaning, importance and likelihood of various contending interpretations of the indeterminate future. It enables the indeterminate future to be transformed into an open political domain, rather than existing as an undemocratically and scientifically defined and 'mapped out' horizon of alternatives. It is in this sense that the Knightian distinction between risk and uncertainty may be viewed as potentially radical.

For risk rather than uncertainty to be a meaningful conceptual category in a given situation requires some form of regularity in its underlying structure, so as to enable probabilities to be assigned in a stable fashion to event-alternatives. It requires, moreover, that these regularities should be either experienced or understood by the relevant agent. It is the contention of proponents of the concept of uncertainty that there are innumerable situations in which such stability cannot be said to exist, because of either the rapidity of change of 'structure', difficulties which apply to taking cognizance of 'structure', or the very inapplicability of the idea of 'structure' (Shackle 1967, 1968).

The most profound application of ideas of radical uncertainty in economics has undoubtedly been that of John Maynard Keynes in the *General Theory of Employment, Interest and Money* (1936). A close study of Keynes's writings demonstrates beyond a doubt that he held an appreciation of radical uncertainty (that is, uncertainty in Knight's sense) to be fundamental and indispensable to an understanding of the economic world. It testifies to the strength of the rationalist orthodoxy in economics and in the world of its application that this central tenet of Keynes was so cleanly and completely excised from almost all future interpretations of Keynesianism.⁵ The eminent and unorthodox economist G. L. S. Shackle, a proponent of the now marginalized Knightian distinction between risk and uncertainty, goes so far as to write, of the contribution of Keynes and a few like-minded contemporaries:

Uncertainty was the new strand placed gleamingly in the skein of economic ideas in the 1930s. . . . Until the 1930s, economics was the science of coping with basic scarcity. After the 1930s, it was the account of how men cope with scarcity and uncertainty. This was far the greatest of the achievements of the 1930s in economic theory.

(Shackle 1967: 6-7)

Investors' behaviour was at the centre of Keynes's theory of the aggregate economy. Keynes's goal was stabilization of the economy at a level of full

employment. However, Keynes held firmly that any approach to stabilization would have to come to terms with the fact that investors' behaviour is essentially radically indeterminate and indeterminable. Investors, he held, (and businessmen in general) were driven by 'animal spirits', essentially and irreducibly psychological predilections for confidence or pessimism in the prospects for business. These 'animal spirits' were by their very nature not subject to probabilistic or 'risk' analysis. They could be rightly viewed only from the perspective of 'uncertainty', or radical and truly uncharacterizable indeterminacy.⁶ Keynes wrote in a famous article in the *Quarterly Journal of Economics* (February 1937):

[For the classical economists] facts and expectations were supposed to be given in a definite and calculable form; and risks, of which, though admitted, not much notice was taken, were supposed to be capable of an exact actuarial computation. The calculus of probability, though mention of it was kept in the background, was supposed to be capable of reducing uncertainty to the same calculable status as that of certainty itself. Actually, however, we have, as a rule, only the vaguest idea of any but the most direct consequences of our acts. . . . By 'uncertain' knowledge, let me explain, I do not mean merely to distinguish what is known from what is merely probable. The game of roulette is not subject, in this sense, to uncertainty. Or again, the expectation of life is only slightly uncertain. The sense in which I am using the term is that in which the price of copper and the rate of interest twenty years hence, or the obsolescence of a new invention are uncertain. About these matters there is no scientific basis on which to form any calculable probability whatever. We simply do not know. . . . Now a practical theory of the future based on these principles [for dealing with uncertainty despite its incalculable character] has certain marked characteristics. In particular, being based on so flimsy a foundation, it is subject to sudden and violent changes. The practice of calmness and immobility, of certainty and security, suddenly breaks down. New fears and hopes will, without warning, take charge of human conduct. All these pretty, polite techniques, made for a well-panelled board room and a nicely regulated market, are liable to collapse. At all times, the vague panic fears and equally vague and unreasoned hopes are not really lulled and lie but a little way below the surface.

(Shackle 1967)

Keynes, it is clear from this passage, gave central importance to the 'Knightian' notion of uncertainty, and fully rejected attempts systematically to view the future or other individuals' (in this case, investors') perceptions of it in terms of rational calculability, even through the device of assigning probabilities to event-alternatives. However, as also noted above, this aspect of Keynes' message was entirely neglected in the subsequent development of economics. Mainstream economics (including mainstream Keynesian economics) has relied upon notions of 'risk' rather than 'uncertainty'. It has treated

the future as being subject to calculable probability analysis, if only in the form of 'subjective' (probability as perceived by a specific agent on the basis of his or her past experiences) rather than 'objective' probability. The subjective-probability-based re-formulation by Von Neumann and Morgenstern of 'expected utility theory' (1944) gave rise to an entirely new range of risk-analysis problems and solutions in economics and represents the reigning accommodation to this day. Blaug writes, for example, in relation to Knight's theory of profit, 'Unfortunately, he failed to persuade orthodox economists that the uncertainty theory of profit was anything more than a footnote to mainstream analysis, tying together some loose ends that had been left lying around ever since Adam Smith' (1988: 463). Today, mainstream economists use the terms risk and uncertainty interchangeably.⁷ In other words, they do not appear to be concerned with more than the technicalities of actuarial problem solving, i.e. with problems of reducing or managing known or unknown but well-defined risks and of spreading them in an 'optimal' manner across persons. The practical consequences of the dominance of conceptions of calculable 'risk' in mainstream economics is that practical policy analysis of health, ecological and economic risks, entrusted to abstract governmental and other institutions, has in turn been dominated by this calculus, as have public debate and discourse in regard to associated social questions. It has been noted (Douglas 1986), for example, that contemporary public debate on ecological questions has tended often to focus, rather than upon issues of underlying differences in interpretation as to the social importance of various risks, upon divergent and competing estimates of the probabilities of various negative occurrences. This is only one example of the many ways, examined further below, in which the imputation of calculability distorts debate over the social management of risks.

Risk, uncertainty and anthropology: the people without history and the people without chance

There has been a not insignificant amount of work in social and cultural anthropology on problems concerning risk and uncertainty, which it is useful as a comparative exercise to examine, as this provides us with a further lens (in addition to that of the history of economic theory which we began to develop in the last section) with which to clarify the historical and cultural specificity of the conceptions of risk which today enjoy institutional favour and dominance.

In much of the more naive and derivative anthropological literature, risk is largely perceived as being simply 'objectively' given (the risk, for example, of crop loss due to pestilence, of collapse in the price of a cash crop, or of attack by one's neighbours), and the relevant questions are perceived to concern how it is that communities adapt to and live with these risks (e.g. Barlett 1980; de Garine and Harrison 1988; LeClair and Schneider 1968). Most of this

literature has unreflectively and uninterestingly adopted economists' conceptions to arrive at a picture of peasants and tribals undertaking probabilistic 'risk' calculations as a means of arriving at key decisions. Some of this literature is, however, for our purposes illuminating in that it is suggestive of the conclusion that many peasants and tribals do not in fact consciously utilize expressly calculating approaches to the varied risks which they face, and that theories which describe their behaviour *as if* this is in fact what they do are necessarily wrongheaded.⁸

One of the most prominent examples of an anthropological attempt to come to terms with behaviour under uncertainty is Sutti Ortiz's *Uncertainties in Peasant Farming: A Colombian Case* (1973). Ortiz's stance is reflected in the following declaration which she includes in the opening paragraph of her book:

The peasant's goals and aspirations are not altogether different from our own; his behaviour can be explained without having resort to a different logical framework; his uncertainties are phrased differently, perhaps, but his response to them is similar to ours. Peasants are not endowed with a different soul or a different perception of the world from ours. If they behave differently, if they shy away from recommended policies it is because they are either less informed about certain events, or perhaps better informed about the realities of their physical, social and economic world than we are.

The thrust of Ortiz's book, which considers the responses of the peasants of Paez in Colombia to environmental and economic (exchange related) risks, is to argue that economists' models of rational decision making are essentially correct and applicable to the case of peasants. However, despite her anxious desire to corroborate the usefulness of mainstream economic analysis, Ortiz unwittingly lets slip much which is damaging to its credibility, and ultimately substantiates the descriptive and predictive importance of 'uncertainty' over 'risk'. Ortiz quotes approvingly from G. L. S. Shackle, one of the foremost (and hence marginal within economics) exponents of a Knightian concept of uncertainty. Ortiz defends the economist's concept of rational behaviour in the sense that 'an actor is faced with a number of choices of courses of action and that he will select one course of action because that particular choice will bring him greater satisfaction' (p. 11).

However, Ortiz asserts that peasant decision making must be understood as decision making under uncertainty rather than risk (though she does not explicitly utilize the latter term). In a quintessential restatement of the Knightian concept of uncertainty, Ortiz writes:

Not only do weather conditions vary to an extent that makes it impossible to determine the chances of crop failure, but farmers lack the technical knowledge to enable them to evaluate the chances with sufficient accuracy. As Shackle has pointed out, for decisions to be made with certainty⁹ four conditions must be met: 1, that frequency ratios must be obtained from

numerous and uniform sets of performance; 2, that performances can be repeated; 3, that the experiments from which the frequency ratios are derived do not destroy the circumstances in which they were performed, hence that it does not become a unique act, and that the system remains stable; 4, that we consider only the total result of a large number of trials and not each trial separately. A Paez farmer cannot determine frequency ratios. His economic environment is changing; his assets are so limited that he can invest them in a venture once and never again if that venture fails; his technological knowledge of production limits the number of possible decisions – for example, coffee is planted once in a lifetime when he is a young and an inexperienced farmer.

(Ortiz 1973: 13)

Ortiz desires to assert that peasants are above all self-determining, strategy-selecting, interest-maximizing agents. But she also points out in effect that the conditions under which peasants are often forced to make decisions are ones to which the concept that is most applicable is one of uncertainty rather than of risk. This ought presumably to place under suspicion any general algorithm or stratagem of calculation claimed to deliver 'optimal' decisions, or in fact to describe satisfactorily what peasants actually do factually decide, even under an assumption of rationality in the narrow sense of self-interest maximization.

This is the source of some internal tension within Ortiz's work, as it appears that she is otherwise keen to ally herself with a cybernetic model of peasant decision making *à la* neoclassical economics. Any theory of economic behaviour which recognizes the importance of radical uncertainty is liable after all, as Keynes wrote, to the realization that 'being based on so flimsy a foundation, it is subject to sudden and violent changes. The practice of calmness and immobility, of certainty and security, suddenly breaks down. New fears and hopes will, without warning, take charge of human conduct', or, in short, that economic behaviour is bound to be ruled as much by the 'passions' as by the 'interests' (to use A. O. Hirschman's turn of phrase). Ortiz's assertion of peasant rationality is forced ultimately to stand on the fairly narrow foundation of 'rational behaviour as self-interest maximization', and to be able to derive from theory (as opposed to ethnography) no substantive understanding as to how peasants actually do go about making decisions when confronted with uncertainty.

Ortiz does enhance our substantive understanding of the workings of a peasant economy beset by uncertainty through her ethnographic observations, such as that, for example, the methods of adaptation to uncertainty undertaken by the peasants she writes of include careful expansion of coffee plantations so as not to affect subsistence production, attempts to 'retain control over their own labour during critical productive periods by avoiding credit relationships', and investing and saving in the form of cattle and diversification of enterprises. Ortiz writes, quite tellingly, 'The question remains whether these measures are the result of careful and systematic

evaluation and of rational decisions, or whether they are due to chance' (1973: 240). She concludes, of course, the former.

This is a false opposition: 'Careful and systematic evaluation' need not of course be inconsistent with the presence of radical uncertainty, as evaluation of one form or another will inevitably be required by agents if they are to formulate and build institutions with which to deal with the uncertainty that surrounds them. A world of uncertainty, as opposed to one of risk, is however also one in which, as strongly asserted by Keynes, instability and inconsistency of responses due to psychology and emotion must also, inevitably, play a part. This is true of a subsistence economy as much as it is in the Bourses of the advanced capitalist world. Ortiz does the notable service of bringing out the pervasive quality of radical uncertainty in the economy of the Colombian peasant. She does not, however, confront the implications of the fact of radical uncertainty in regard to the calculating model of peasant economic life which she otherwise wishes to purvey.¹⁰

Much of Ortiz's work subsequent to *Uncertainties in Peasant Farming* (1973) (for example, 1980, 1983) is concerned with specifying the simplified heuristics, decision rules and 'rules of thumb' used by peasants in making agricultural decisions. These efforts stop short, however, of producing an ethnographically based understanding of the nature of peasants' own concepts of indeterminacy. Ortiz's works have the flavour of the imputation from above of formal structures and conceptual distinctions (whether they be that of the decision tree or of the concept of radical 'uncertainty') to peasants' behaviour, with little effort having been made to draw out the nature of peasants' own conceptualizations of their decision problems (at the deeper level of determining the indigenous epistemological construction of uncertainty, as opposed to simply uncovering in indigenous language, and relating in our own practical rules of thumb with which people approach uncertainty). In this respect, Ortiz does no better and no worse than the rest of economic anthropology.

Another notable contribution to the literature on risk and uncertainty in economic anthropology, in terms of attempting creatively and usefully to deal explicitly with the Knightian distinction between these two terms, is that of Frank Cancian. Cancian (1972, 1980) makes striking use of the risk/uncertainty distinction as the central means of motivating an argument on the differential speed of diffusion of new agricultural practices across various classes of peasants in Chiapas, Mexico. Cancian argues that this phenomenon cannot be made intelligible outside this distinction.

Cancian argues that, whereas the likelihood of rainfall or other factors impinging on the success of traditional agriculture might most realistically be viewed as 'risk', in view of the repeated and structurally regular context of such contingencies, the likely consequences of the adoption of new agricultural technique could only be viewed plausibly in terms of 'uncertainty', in view of the complete lack of prior experience on the part of local farmers of these methods.¹¹ Cancian argues that, as experience of the new techniques was

gained by some members of the rural population, these techniques could come to be characterized in terms of 'risk', as the profile of possible outcomes came, through experience and example, to be better known. Thus, the very nature of the indeterminacy attached to the new techniques in the eyes of the peasants of Zinacantan, in Chiapas, changed, as their characteristics became better known, from being of the conceptual character of uncertainty to being of that of risk. This fact, combined with the stratified social hierarchy of Zinacantan, explains, Cancian argues, (based on additional considerations) the relative propensity of different sectors of the community to adopt the new technique at different times.

Cancian asserts that a lesson we should draw from this work is that we must be insistent on disentangling the descriptive and the prescriptive or normative ambitions of economists. Theorization in terms of risk, and subjective probability estimation, is arguably, Cancian argues, appropriate to normative considerations of optimal 'rational' decision making, but utterly inappropriate to accurate description of the real decisions which ordinary individuals make. These can often be understood only in terms of the presence of radical and irreducible 'uncertainty' (Cancian 1972, 1980). Cancian's work demonstrates the concrete and practical utility for the resolution of a particular empirical problem of such an understanding, which is substantiated by ethnographic interaction. It suggests further that 'economic man' (for it appears that mainstream economics today urges us to view economic man not only as a self-interest maximizer but as a subjective probability utilizer) does not exist anywhere – neither in the Mayan community of Zinacantan nor at the core of the contemporary advanced capitalist world.

Both Ortiz and Cancian, among numerous other writers on peasant societies and their approaches to managing indeterminacy, recognize not only that it is 'objectively' a presence in their ethnographic subjects' lives, but that it is also a presence within their 'subjective' understandings of the world.

In striking contrast, many anthropological observers have asserted that 'primitive' peoples in general, and tribal peoples in particular, have *no* concept of chance. It will be argued that this is more an outcome of anthropologists' own peculiarly modern orientation towards indeterminacy, and their imputation to 'primitives', in a rather perverse fashion, of concepts analogous to their own than a result of any genuine absence of this kind. It is suggested further that this attitude of anthropologists significantly illuminates the larger modern construction and elevation of 'risk' over and against 'uncertainty'.

For example, one anthropological observer (Aubert 1959), commenting on the 'hunting-magic' of the Naskapi of Labrador ('When heated, the bone cracks. It is then fitted into a wooden handle, and while held in specified ways, the cracks of the bone are read so as to give directions for the hunt', p. 75) writes:

The Naskapi are, however, quite unaware of the randomness resulting from these decisions. They believe that they are seeking, and getting, guidance

from the supernatural, i.e. that the decision is 'systematic'. This seems to be generally true for all similar practices among primitive people. The conscious notion of chance appears to be a late comer among the basic conceptual tools by which man gains mastery over his world of action and perception. Sigerist states categorically that primitive men always deny chance or randomness in the occurrence of disease. Illness is always precipitated either by natural causes or by the sick or somebody else's actions. Similarly, death is usually not explained as due to chance.

(Aubert 1959: 75)

This position appears to be (surprisingly considering its crudeness) an orthodox one. A few of the many figures who have enunciated it, in greater or lesser degree, are Levy-Bruhl, Piaget, Evans-Pritchard, Needham, Radcliffe-Brown, R. Horton, Max Gluckman, Mary Douglas and Victor Turner. Lawrence Goldman's (1993) recent scathing attack on this position, which will be referred to shortly, is the first systematic attempt to disestablish it. The point of view of these observers is that 'witchcraft', 'sorcery' and 'divine' intervention are uniformly inducted in 'primitive' societies as explanations for 'chance' events so that 'it is evident that to minds so constituted the theory of an accident would be the last that would present itself, or rather that it would never present itself' (Levy-Bruhl 1923/1978, quoted in Goldman 1993: 75). Evans-Pritchard writes, for example, that 'witchcraft participates in all misfortunes and is the idiom in which Azande speak about them and in which they explain them. Witchcraft is a classification of misfortunes' (1937).

Not all of these observers went so far as to suggest that a concept of chance was utterly lacking in the societies under consideration. For example, Evans-Pritchard wrote, 'nor did he [Azande] suggest that whenever anybody knocks his foot against a stump it is necessarily due to witchcraft' (1973) and Gluckman (quoted in Goldman 1993: 56), 'they [Lozi] also recognize some actions as purely accidental'. However, the overwhelming emphasis of all of these observers is that the place of chance is, in the case of any event of non-trivial significance, taken up by 'religio-cosmological' beliefs.

Goldman (1993) argues that this anthropological orthodoxy is thoroughly misconceived. Goldman's interest is in legal anthropology and in the commonplace assumption that, as a partial result of the alleged lack in tribal societies of indigenous concepts of pure accident or coincidence, there is absolute legal liability for deaths. In this connection, Goldman writes, 'Within the specific subdiscipline of legal anthropology, it is contended that, at the level of forensic reasoning that seeks to distinguish the general categories of coincidental and non-coincidental accidents, we may perceive an isomorphism in Western and Non-Western legal systems' (1993: 77). In other words, concepts of chance are as alive and well in primitive societies as in the modern West, even in relation to as significant a misfortune as death, and indigenous legal systems, in recognition of this, do not necessarily demand absolute liability in the event of 'accidental' death. Goldman's case is based on

a painstaking and thoroughly convincing semantic and sociolinguistic analysis of the transcript of a trial among the Huli people of highland Papua New Guinea in which one elderly woman was accused by the victim's step-daughters of engineering the 'accidental' death in a house fire of an elderly woman companion. The transcript clearly reveals that a concept of accident is very present among the Huli.

It would seem that those anthropologists who have been anxious to demonstrate the nonexistence or nonsignificance of concepts of chance in 'primitive' societies have confused the fact that *many* events which would be considered 'accidental' by 'moderns' are viewed as motivated by human or spiritual agency by 'primitives' with the notion that *all* such events are considered in 'primitive' societies to be so.

In any event, the conceptualization of the problem seems to have been a deeply confused one. The distinction between the 'accidental' or 'chance' event and the 'motivated' or 'intentional' one is not so objectively evident as it may have appeared to the jaundiced and unselfconscious 'modern' anthropologist. Various conceptual resolutions, it should be evident, are possible which would enable these categories to coexist. A more thorough acquaintance with the intellectual history of their own societies now available to us would have demonstrated this to the anthropologists in question. As remarked earlier, evidence exists that the reigning conception of uncertainty through the nineteenth century was ultimately deterministic in character, in that it generally saw probabilistic and statistical laws as being nothing more than shorthand summaries of a complex of underlying determinate events (Gigerenzer *et al.* 1989; Hacking 1990). The debate over the consistency of 'free will' and statistical law raged across the nineteenth century, and had its correlate in debates over the true nature of probability, in the natural as well as the social sciences (Porter 1990; Hacking 1990). Various resolutions were possible, ranging from those of Quetelet, Maxwell and Boltzmann (see Hacking 1990) to that of Menger (noted earlier). Most of these resolutions retained the conception of an ultimately determinate universe. In Menger's view, as in that of Boltzmann, the uncertainty faced by human observers was nothing more than the result of the limitations of human knowledge.¹²

Chance, then, in nineteenth-century scientific perspectives, was predominantly nothing more than the proximate expression or appearance of an ultimately determinate universe. Was this the apprehension of chance in the anthropologists' 'true' sense? Would it in other words have satisfied the anthropologists who went in search of, and deemed that they had failed to find, an indigenous conception of chance? Was the Einstein who declared (having refused to accept the 'Copenhagen interpretation' of quantum mechanical observations and results), that 'God does not play dice' a primitive or a modern?

If we take into account religious world views within the West which remain influential to this day we find the situation all the more problematic. Religious

positions which hold that every event (including in some instances human actions) must be understood as a product of divine will are entirely consistent with the deterministic nineteenth-century 'probabilistic' orthodoxy related above. If the two positions were to be combined, as well they might, there would emerge a conception of 'chance' (interpreted as an outcome of human ignorance or error) which would be 'ultimately' deterministic, in a world view in which this determinism would be viewed as being an expression of divine will. Is this position, which would in fact appear to be at the Judaeo-Christian historical roots of twentieth-century stochasticism, more akin to the anthropologically declared 'mentality' of the 'primitive' or the 'modern', in so far as it calls ultimately upon the motivated action of divine agents as an explanation for 'chance' phenomena? It would appear that nineteenth-century determinism shares more with 'primitives' alleged divinity-centred rationalizations of chance than might be imagined. This confusion should lead to a retreat from simple-minded suggestions that 'primitives', because of their concern with motivated and intentional action, lacked, for that reason alone, a concept of chance. As we have seen, it may sometimes be hard to assert that the two are mutually exclusive.

Need these two interpretations be artificially extricated and separated if the notion of chance is to be made intelligible? It appears so to most moderns. But this may be a consequence of their captivation by the idea of probability, an aspect of which is captivation with the pervasiveness of the principle of irreducible (but simultaneously calculable) chance, of indeterminacy intrinsic to the fabric of the universe and yet domesticated by quantifiability (Bork 1967; Hacking 1990). It is in this context that the propensity of positivist anthropologists in the first flush of modernism to deny chance to the primitives may be understood: they had appropriated it, against the facts of their own early modern heritage (in which probability coexisted with deterministic faith), as uniquely their own.

There is another level at which we might read anthropologists as interpreting 'primitive' experience not in contrast with, but rather analogously to, that of the moderns. Moderns had eliminated genuine indeterminacy, or 'uncertainty', by inventing 'risk'. They had learnt to transform a radically indeterminate cosmos into a manageable one, through the myth of calculability, to reduce 'uncertainty to the same calculable status as that of certainty itself' in the already cited words of J. M. Keynes. It was natural in consequence for moderns to assume that all other peoples in all other times must have found their own analogous means of eradicating or 'managing' radical indeterminacy. In the case of primitive societies, anthropologists assumed that this must take the form of the interpretation of all 'chance' events as being the outcome of the interventions of divinities or spirits. However, we may as a result have learnt less about the divinities, the spirits, indeed the faith, of the so-called 'primitives', than about ourselves, social interpreters and moderns.

Our contemporary condition: 'expert knowledge', risk, reflexivity and the subversion of democracy

This last section attempts to tie together the argument to this point with recent anthropological and sociological studies of the nature and role of risk and uncertainty in contemporary advanced societies, in the hope that this will cast light on the political dynamics and consequences of risk analysis today. In turn this will suggest that the political position of technical and technocratic discussions of 'risk assessment' in bureaucratic discourse is far from innocent.

At least two varieties of questions can be asked about the social role of contemporary risk assessment and management practices, whether applied to ecological, economic, political or other forms of risk. The first variety of questions concern the *democratic legitimacy* of current risk assessment and management practices. This set of questions is essentially normative in character, although it presupposes certain empirical possibilities in the way that 'ought' is generally taken to presuppose 'can'. The second variety of questions concern the *consequential efficacy* of current risk assessment and management practices. It will ultimately be suggested that current risk assessment practices are *neither* as democratically legitimate nor as consequentially efficacious as they might be, although it will not be possible for reasons of space to argue either of these positions comprehensively.

The most prominent anthropologist (who however advertises herself in this context as a 'cultural theorist') to address the question of modes of conceptualizing risk in the contemporary advanced societies is Mary Douglas (1975, 1986, 1992, 1982 with A. Wildavsky). Her work, despite the very significant impact it has clearly had on the specialist literature on risk analysis (for example, Rayner 1990; Johnson and Covello 1987), is more remarkable for the questions it fails to address than for those which it does. Douglas's main concern is to demonstrate that our determination of what risks to focus upon and to view as threatening to the fabric of our shared social life is a matter of social choice and social construction.¹³ Different societies, Douglas demonstrates, make these choices differently. Invariably, Douglas argues, our decisions to settle upon particular risks as being dangerous or threatening is accompanied by a rhetoric of pollution and purity, which works to hypostatize risks and to develop modes of social definition and exclusion of individual polluters. She argues, moreover, that the explosion in the number and intensity of environmental movements in the United States demonstrates these propositions, which are further affirmed by the characteristic modes of organization and sect-like qualities of environmental organizations (she compares them to Anabaptist groups in the United States). Douglas and Wildavsky write:

Our argument is that a complex historical pattern of social changes has led to values that we identify as sectarian being more widely espoused. The sectarian outlook has three positive commitments: to human goodness, to

equality, to purity of heart and mind. The dangers to the sectarian ideal are worldliness and conspiracy. Put into secular terms, worldliness appears in big organization, big money, and market values – all deny equality and attack goodness and purity; conspiracy includes factions plotting secret attack, transporting evil into an essentially good world. Infiltration from the evil world appears as Satanism, witchcraft, or their modern equivalent – hidden technological contamination that invades the body of nature and man. . . . Nature in the wild, uncorrupted by social artifice, equivalent to a society without social distinction, is their preferred emblem of godliness and symbol of unworldliness.

(Douglas and Wildavsky 1982: 11)

Whatever one thinks of this particular proposition, Douglas and Wildavsky do draw some critical lessons about the conceptualization and confrontation of risk in advanced industrial societies. They write in the same work:

Once the idea is accepted that people select their awareness of certain dangers to conform with a specific way of life, it follows that people who adhere to different forms of social organization are disposed to take (and to avoid) different kinds of risk. To alter risk selection and risk perception, then, would depend on changing the social organization. Questions about acceptable levels of risk can never be answered just by understanding how nature and technology interact. What needs to be explored is how people agree to ignore most of the potential dangers that surround them and interact so as to concentrate only on selected aspects.

(Douglas and Wildavsky 1982: 9)

Moreover, in a chapter entitled 'Assessment is biased', they write:

Risk analysis was produced as a tool for engineers and statesmen who need more facts. They asked for objective facts. . . . There is the delusion that assigning probabilities is a value-free exercise. Far from being objective, the figures about probabilities that are put into the calculation reflect the assigner's confidence that the events are likely to occur.

(Douglas and Wildavsky 1982: 71)¹⁴

Douglas takes the positive step of demonstrating that risk perception and risk awareness is a cultural and political domain, potentially fraught with conflict between points of view, and requiring a cultural and political resolution. There can be little doubt, however, but that Douglas's ultimate interest is in smoothing the path of bureaucratic organization. Her interest is in enabling planners and bureaucrats to understand better the sources of social discord and division in relation to risk-generating activities and to incorporate this understanding into social planning and management (see, for example, Douglas 1986: 18, 32–4). As if planners occupied a position of political neutrality, Douglas has also failed to recognize the political significance of the distinction between risk and uncertainty. Rather than seeing calculating and probabilizing conceptions of risk as intrinsically

aligned with certain social imperatives, or at any rate with certain social fictions, she views the desirable goal as one of enlarging the scope of probabilism.¹⁵

Probability theory will eventually transform the assumptions about rational behaviour that currently guide research about risk perception. The probabilities at issue will include the expectations of the rational agent about the probable reactions of his fellow rational agents and also the probability of such expectations being transformed into steady conventions with agreed forms of signalling. In other words, a systematic cultural dimension will emerge from the probabilizing of attitudes and the probabilizing of the hierarchy of moral values adopted by different social agents according to the different social environments they are working to build. This is a more fundamental way of posing the problem of democracy than to treat it as merely one of differences of opinion or of tastes which might arise from personal happenstance.

(Douglas 1986: 17)

The notion that this is a 'fundamental' way of 'posing the problem of democracy' will be challenged subsequently.

Douglas's work, despite the inadequacies suggested above, has had the virtue of spurring the undertaking or the bringing together of a number of valuable empirical studies on differences in risk perception and anxiety within contemporary economically advanced societies. It is clear that much of this work was motivated by the vision of improving the possibilities for social control, rather than of increasing the scope for the participation of diverse sources and forms of social knowledge in the project of collective choice. None the less, much of it is instructive. It has long been known that the poor and other marginal social groups risk much greater exposure to certain risks, such as those of chronic ill health due to environmental toxicity (Douglas 1986: 6). More interestingly, these studies also empirically demonstrate the unequivocally divergent perceptions of social risks on the part of different social groups. Rayner (1990), for example, describes a study conducted by the US Oak Ridge National Laboratory on the divergent perceptions of the risks of nuclear power of the three categories of system planners of electric utilities, staff and members of public utility commissions which regulate utilities and members of public interest groups which oppose nuclear power. While the first group are primarily concerned about the risks of investment recovery, the second group are concerned with the risks of having an inaccurate forecast of energy demand and hence a gap between generating capacity and needs and with ensuring that the utility is managed with cost efficiency, while the third group tend to be concerned with securing the consent of the population affected by the plant and ensuring the 'just' distribution of costs, benefits and safety risks associated with the plant. Because of the nature of the regulatory process, the public interest groups are often forced to operate on the linguistic terrain of the first two groups. Whereas 'prudent management' of nuclear facilities is approached by the regulators as a problem of ensuring the

technical expertise of plant personnel, public interest groups are equally concerned with the competence of regulators, and with the trustworthiness of all groups concerned (about which they are doubtful) in terms of their commitment to social goals. The groups differ in their fundamental perception of the level of danger associated with nuclear power, as well as in their perception of how these dangers are likely to be spread. They are also concerned with very different time scales in their evaluation of salient risks (public interest groups, for example, may be likely to be concerned with problems concerning disposal of long-term nuclear waste which regulators and system planners are comparatively unconcerned with at present).

Fowlkes and Miller (1987) provide another fascinating and important example in their study of local perceptions concerning the infamous hazardous waste dump at Love Canal, in New York State. The neighbourhood, which was not closely knit prior to the discovery of toxic wastes, became upon their discovery bifurcated into two discernible groups: "minimalists" – people who either denied that there was a problem at all or believed that any problem which did exist was only minor in significance – and "maximalists" – people who believed that the risks were substantial and that chemical contamination might be more widespread than officially acknowledged' (1987: 28). It was found that these groups had systematically identifiable social characteristics:

minimalists generally (a) were older and without children at home; (b) had links with the local chemical industry, (c) were relatively isolated from neighbourhood social networks, despite having lived there for many years, (d) adopted a *laissez-faire* attitude toward risks generally, and (e) were strongly attached to their homes, which they viewed as their principal economic resource in old age. Maximalists, by contrast, had close links with others in the community. Many maximalists were young parents who shared interests and made frequent contact with other young parents in the area. Concerns about the welfare of their children led many of these parents to place less weight on property issues and more weight on health issues. Compared to minimalists, maximalists were also more active in seeking out risk information and gave greater credence to what they learned from others – particularly from nonofficial sources.

(Fowlkes and Miller 1987: 29)

The examples can be multiplied, from the differential perceptions of different producers, consumers and regulators of a pesticide's risk during a 'panic' episode in the United States (Johnson and Covello 1987: 179), to the differential perceptions of politicians and officials regarding the risks of a Seattle, USA, gasification plant (Gale 1987). The methodological and substantive preferences and perceptions of 'professional' experts and scientists charged with the assessment of environmental, health and safety risks themselves have been found to tend to vary among themselves profoundly according to organizational affiliation and background (Lynn 1987; Jasanoff

1987; Johnson and Covello 1987: 299; Schrader-Frechette 1991: 96). Moreover, both Douglas (1986: 32–3) and Johnson and Covello (1987: xi) note that both psychological studies and social observation suggest that lay people (and to a lesser extent even ‘experts’) have great difficulty absorbing and consistently applying probabilistic information, ‘especially when the probabilities are small and the risks are unfamiliar’ (Johnson and Covello: ix).

As a result, probabilistic analysis seems hardly to offer a means by which to overcome the social or intellectual divisions which surround risk perception and interpretation. On the contrary, it seems to affirm them, and to suggest strongly that conceptions of uncertainty in terms of ‘risk’ or potentially calculable probabilities, divert attention from the truly radical and irreducible nature of our ignorance about the future world, which makes of it in turn an irreducibly political space.

It has been suggested by some that we are more beset by more potentially catastrophic risks today than ever before (for example, Perrow 1984; Beck 1992). It has been suggested by others that we are simply more conscious of risks than we ever have been.¹⁶ It is useful in either case to try to seek some institutional foundations for these claims.

It has been widely argued in recent social theory that modernity, marked in the present sphere of analysis by the rise to dominance of ‘risk’ over ‘uncertainty’, is today being replaced or reconstituted through new social forms and modes of lived experience, referred to variously as high modern or reflexively modern (Giddens 1991, 1994; Beck 1992, 1995; Beck, Giddens and Lash 1994). These new social forms highlight the importance of shared risks as a social challenge and a social force. Moreover, because of their nature, it will be argued here, they open the way for a rehabilitation in contemporary culture and political discourse of the concept of ‘uncertainty’ as distinguished from ‘risk’.

Anthony Giddens is one of those who in his recent work (1984, 1990, 1991, 1994) has endeavoured centrally to interpret contemporary experience in terms of the proliferation of risks, their qualitative transformation and the rise of newly intense imperatives for the social management of risks. Among the keywords of Giddens’s social theory are ‘risk’ and ‘trust’. Modernity, Giddens asserts, is unique and qualitatively different from all forms of society which have preceded it. Modernity is characterized as a lived experience by the ‘emptying of time’ and the ‘dislocation of space from place’. A consequence of these phenomena is the ‘disembedding of social systems’ by which is meant the “‘lifting out” of social relations [in the sense of felt experience] from local contexts of interaction and their restructuring across indefinite spans of time-space”. The ‘disembedding’ of social systems is facilitated by the creation of ‘symbolic tokens’ such as money and the emergence of ‘expert systems’ such as bureaucratic authorities which are charged with licensing, maintenance of standards and, in general, with accumulating specialized information.

Following Luhmann (1979) and Beck (1992), Giddens perceives that this

disembedding entails the emergence and acceptance of new levels of trust in social relations. Individuals are required by modern societies, to a greater degree than in any previous form of society, to place an inordinate degree of ‘trust’ in ‘abstract’ social institutions, which are charged with the mediation of social relations and relations with nature across space and time. This increased requirement that individuals should repose trust in abstract institutions has been, according to Giddens, accompanied by the heightening of shared risks (or at any rate of the perception of these risks as risks – or forms of indeterminacy amenable to human manipulation and adjustment, as opposed to *fortuna*, or divine providence). Indeed, one of the foremost tasks with which these institutions are charged is the management and reduction of such risks. At the same time, these abstract institutions (at the broadest level, nation-states themselves), and the unprecedented simultaneous concentration of power and diffusion of responsibility they represent, are one of the primary sources of risk – ecological, political and economic – in the modern world.

The most recent phase in the development of modernity (understood by Giddens as ‘high modernity’) is characterized by the ‘reflexivity’ of social institutions, and by their globalization and intensification. The ‘reflexivity’ of social life refers to the fact that, increasingly, the very interpretation of social life is itself a consequence-laden social practice. At the concrete institutional level, there is ‘reflexivity’ in that the institutions in which trust is reposed by citizens in order that they may use their expert knowledge to contend with shared risks become in turn a new source of risks. The sheer complexity of the interrelationships between institutions and individuals in high modern society as well as their ‘reflexive’ or self-referential nature are such as to subvert any attempt at prediction or calculation of risks.

The implication of this perspective for the interpretation of social risks is that no ‘objective’ or external calculation of large-scale social risks is possible. Furthermore, any consensus on what such risks are can only be the outcome of a ‘double hermeneutic’ (Giddens’s term) or social dialogue between affected and involved social groups. Giddens observes that the development of ‘reflexive’ modernity (i.e. of the institutional conditions under which such a dialogue becomes a necessity) may severely compromise the credibility of trust-demanding institutions and their ‘experts’, because of the reliance of the latter upon the myths of ‘objectivity’ and of technical ‘expertise’ external to social relations (1990: 88–92, 124–30).

The most important risks we face are likely today to stem from an unprecedented and unpredictable complex of contingent events. This is itself a consequence of the ‘disembedding’ of social systems (i.e. the unprecedented development of social interconnections which are not visible to any single social participant). There is at the same time current a new ‘awareness of risk as risk’ and of the ‘limitations of expertise’. These circumstances combine to make risks both increasingly unpredictable and unmanageable. Giddens writes, for example:

Widespread lay knowledge of modern risk environments leads to awareness of the limits of expertise and forms one of the 'public relations' problems that has to be faced by those who seek to sustain lay trust in expert systems. The faith that supports lay trust in expert systems involves blocking off the ignorance of the lay person when faced with the claims of expertise; but realization of the areas of ignorance which confront the experts themselves, as individual practitioners and in terms of overall fields of knowledge, may weaken or undermine that faith on the part of lay individuals. Experts often take risks 'on behalf' of lay clients while concealing, or fudging over, the true nature of those risks or even the fact that there are risks at all. More damaging than the lay discovery of this kind of concealment is the circumstance where the full extent of a particular set of dangers and the risks associated with them is not realized by the experts. For in this case what is in question is not only the limits of, or the gaps in, expert knowledge, but an inadequacy which compromises the very idea of expertise.

(Giddens 1990: 130)

In short, the conditions of reflexive modernity, in which risk is a product of innumerable contingent, uncircumscribable and therefore fundamentally and radically unpredictable events, and in which expert opinion is itself a scrutinized input into the social perception of risks,¹⁷ are at the root of the increasing inefficacy of experts and expertise. Calculating views of the future (views, in our terminology, which interpret it in terms of risk rather than uncertainty), because of their inherently objectifying and externalizing nature, are bound, in this emergent social world, to lack in both efficacy and credibility. Our task is to find new ways of, in Giddens's words, 'riding the juggernaut' of modernity which do not depend on positivistic or cybernetic conceptions of social relations, but rather come to terms with the irreducible uncertainty entailed by our new forms of complex organic interdependence. The image of the 'juggernaut' underlines that the fantasy of prediction and 'control', on which modernist conceptions of the world, and risk science in particular, are based, is bound to give way in the conditions under which we currently live to an increasing realization of the irrepressible ubiquity of radical uncertainty in the modern world.

Ulrich Beck's striking and widely influential work (1992, 1995), which has considerably influenced Giddens's work, reinforces these points. The term 'reflexive modernity' is due to Beck, as is the emphasis on the management and distribution of risks as being the central problem of the new phase of modernity, which is, if anything, more strongly and centrally articulated by Beck than by Giddens.

Beck argues that today a new modernity is being born from within the bowels of the old modernity. This modernity is that of the 'risk society', which stands for the time being in disjuncture and confrontation with conventional industrial society. The new (risk) society, while also industrial, will inevitably be characterized by new forms of (reflexive) political and cultural relations.

Beck declares in his *Risk Society*, 'The thesis of this book is: we are witnessing not the end but the *beginning* of modernity – that is, of a modernity beyond its classical industrial design' (1992: 10); and that 'while in classical industrial society the "logic" of wealth production dominates the "logic" of risk production, in the risk society this relationship is reversed' (1992: 11). Beck argues that, while the central political problem of the early stages of modernity was the distribution of 'goods', that of its emergent phase is the distribution of 'bads', in the form of risks. These risks, while they could for some time be understood as latent and controllable 'side-effects' are now coming to be understood as intrinsic, irreversible and uncontrollable. This applies in particular to the ecological and health risks helplessly secreted by modern modes of production. 'Unlike the factory related or occupational hazards of the first half of the twentieth century, these can no longer be limited to certain localities or groups, but rather exhibit a tendency to globalization which spans production and reproduction as much as national borders, and in this sense brings into being *supra-national* and *non-class-specific global hazards* with a new type of social and political dynamism' (e.g. Chernobyl) (Beck 1992: 13). The new 'reflexive' phase of modernity will be characterized, Beck believes, by the further extension of the methodological scepticism first symbolized by science to science itself, which will become thus 'both generalized and demystified'. Political claims will, in this context, be bound to extend beyond the boundaries of parliamentary democracy to the jurisdiction of 'business, science, and technology', which have been otherwise resistant to such procedures. The mechanisms of risk-management may potentially in turn be invigorated and rejuvenated by this newfound political and institutional complexity.¹⁸ Beck clearly implies that conceptions of risk which insist upon their calculability will be inappropriate to and inconsistent with reflexive modernity:

By their nature they [ecological and high-tech risks] endanger all forms of life on this planet. The normative bases of their calculation – the concept of accident and insurance, medical precautions, and so on – do not fit the basic dimensions of these modern threats. Atomic plants, for example, are not privately insured or insurable. . . . They outlast generations. . . . This means the calculation of risk as it has been established so far *collapses*. Dealing with these consequences in the normal terms of risk is a false but nevertheless very effective way of legitimizing them. . . . Indeed, if you distinguish between calculable and non-calculable threats, under the surface of risk calculation new kinds of *industrialized, decision-produced incalculabilities and threats* are spreading within the globalization of high-risk industries, whether for warfare or welfare purposes. . . . *Along with the growing incalculability of technical options [Zweckrationalität] grows the incalculability of their consequences.* . . . To put it differently, in the risk society the unknown and unintended consequences come to be a dominant force in history and society.

(Beck 1992: 22)

We can no longer delude ourselves, Beck tells us, into believing that we are able to calculate the consequences of our actions, or even to assign probabilities to the likelihood of future alternatives, in a situation in which those alternatives are themselves so unsure, if not unknown. The features of the new world demand that we come to terms with the irreducible content of radical uncertainty in our shared lives.

Conclusion: risk and reason

A view of uncertainty as calculable and probabilizable, in short as 'risk', gained favour in this century, as a result of the influence of the scientific promise of calculation and control. The reasons for the success of this promise were many, but encompass its provision of knowledge-based justifications for the authority of secular institutions and élites and the satisfaction it provided to individuals in search of ontological security (Giddens 1984, 1990), or a myth of control (Fromm 1942, 1969, 1991). As a result, alternative conceptions of uncertainty as radically irreducible and uncalculable were marginalized in intellectual life, and more importantly in the management of uncertainty by bureaucratic and managerial institutions, which, through claiming to hold unique and necessary technical capacities in this regard, have secured and maintained their legitimacy.¹⁹ The marginalization in mainstream economics of the notion of radical uncertainty propounded by Frank Knight and articulated most forcefully and usefully by Keynes can be understood in this way.

Some anthropological work, such as that of Sutti Ortiz or of Frank Cancian, irrespective of its other shortcomings, has brought out forcefully the indispensable nature of an appreciation of the existence of radical uncertainty for an understanding of certain dimensions of peasant lives. Although concerned with peasant lives, these works suggest that we should question conceptions of calculable risk wherever they appear. Much earlier anthropological work, which was keen to deny that notions of chance played any important role in 'primitive' lives at all, appears likely to have been mistaken, both in terms of empirical observation and in that it appears to have been based on a motivated and suspect conceptual premise. That mistaken conceptual premise was the result of the false appropriation by moderns of a rationalist high ground for themselves. They identified this high ground with their own imaginedly unique understanding of the irreducible role of chance in the universe. In doing so, anthropologists were strangely complicit with the forward march of scientific probabilism. Probabilism was associated with rationality because of its promise of producing a calculable mapping of the future world. Perspectives which upheld the presence of radical and irreducible uncertainty were thus viewed by many moderns as being irrationalist in nature. It is no accident then that even in Keynesian theory the presence of radical uncertainty was described as leading to the flourishing of

investors' 'animal spirits'. And 'animal spirits' were precisely what the anthropologists found among their allegedly comprehensively totemistic 'primitives', as alternative explanations for what moderns would view as the play of 'chance'. The probabilistic world view of the scientific 'modern' (and what good anthropologist did not aspire to be scientific?), or the world of probabilizable 'risk', could certainly not be identified with the 'primitive'. If a calculating, rationalistic conception of chance, akin to the anthropologist's own, could not be associated with the 'primitive', then it was beyond imagination that 'primitives' had any conception of chance at all (except in the sense that they believed in the existence of 'animal spirits' which served more or less as a whole substitute). If animal spirits in Keynes's sense of the term (namely as the consequence of radical 'uncertainty') were irrational, then so were they in the anthropologists' sense of the same, in that they were what demarcated the 'primitive' consciousness of the world from the modern, which was in contrast ostensibly imbued with an understanding of the presence of chance.

At the same time, contradictorily, the mysticism of the 'primitives' was also an analogue to our science. In this conception, radical uncertainty had no place at all. If moderns had probabilism as a means of in effect charting and explaining the unexpected and the future, then the primitives had their mysterious spirits and agencies. Both, it was comfortably held, sought explanation. The denial of a concept of chance to the primitives was strangely consistent with the banishment by moderns of radical uncertainty in favour of a 'risk'-based conception of the world, which made of it a fabric which was essentially knowable. It was *not seeking* explanation, or accepting the inexplicability of the world (which is to say accepting the presence of radical 'uncertainty'), that could not be conceived of, in any society, primitive or modern.

The work of Mary Douglas and others (Rayner 1990; Johnson and Covello 1987) has demonstrated the importance of the cultural construction of risk, the intensity of our contemporary consciousness of it and the deep divergences across social groups in regard to perceptions of and tolerances for various kinds of risk. Ulrich Beck and Anthony Giddens, among others, identify the emergence of an acute consciousness of complexity generated by shared risks as a central social characteristic of our time, alongside an incipient decline in the prestige of science in its earlier externalizing and objectifying social form.

Probabilism and the image of the calculability of risks by experts has served as an important buttress to the authority and legitimacy of the abstract institutions²⁰ in which individuals have been asked to repose their trust in conditions of modernity. These institutions claimed to be in a special position, as a result of their capacity for and expertise in calculation, to anticipate and manage the future. This 'special position' accorded these social institutions authority, and that authority in turn legitimacy.

In contrast, the new scientific modes which are required to deal with the

risks we face today (given their diffuse and manifold sources, and hence their resistance to calculability) will involve a rejection of scientific pretensions to authoritative calculation and the insertion at the very centre of the scientific enterprise of a more accessible and democratic discourse concerning human needs and divergent human perceptions of an acknowledgedly unknowable and ultimately positionally and subjectively perceived future – to a more dramatic degree than calculating ('risk'-based) approaches to knowing the future have been intended to permit. When the emperor ('risk') has been more clearly acknowledged to have no clothes we may witness the emergence of a new and more democratic science having some of the following features described by Beck:

Risk determinations are an unrecognized, still undeveloped symbiosis of the natural and the human sciences, of everyday and expert rationality, of interest and fact. They are simultaneously neither simply the one nor only the other. They can no longer be isolated from one another through specialization, and developed and set down according to their own standard rationality. They require a cooperation across the trenches of disciplines, citizens' groups, factories, administration and politics.

(Beck 1992:28)

This will in turn further the democratic legitimacy of the institutions through which we identify and manage the risks which face us, and, through broadening the social bases of their rationality, likely enhance their consequential efficacy.

The rehabilitation of the idea of 'uncertainty', of radical, irreducible indeterminacy, not amenable to authoritative or authoritarian 'expert' definition and measurement, is a necessary step with which to open to contestation this new and necessary public domain.

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Notes

1 Giddens and Beck use the word 'risk' in the general sense of referring to socially perceived and humanly created potential danger, and not in the more specialized sense, distinguished from 'uncertainty', in which we will largely use it.

2 As Bork (1967) puts it, a revolution occurred across the breadth of Western intellectual life so that whereas it was 'at the end of the last century generally assumed that one was dealing with areas that could not be treated exactly, but where exact laws did exist, a subtle change of view has come about, so that now random elements are seen as having a validity of their own' (p. 72). Exemplifying the former view, W. S. Jevons wrote in 1874, 'Number is but another name for diversity' (Gigerenzer *et al.* 1989).

3 Important late eighteenth- and early nineteenth-century exceptions to this general statement are Turgot and Condorcet, who showed a decided interest in the role of uncertainty (the latter in the context of his theory of the design of judicial tribunals). A minor, but famous, episode involving uncertainty, which is an important part of the history of economics because of its contribution to the theory of diminishing marginal utility, is that of the Bernoullis' St Petersburg Paradox. The controversies surrounding this and other games of chance, however, more properly belong within the history of the theory of probability itself.

4 Obviously neglected by Blaug. I am indebted to Emma Rothschild for this reference.

5 This corruption may be traced in the first instance to J. R. Hicks's famous popularizing article, 'Mr. Keynes and the "classics"', which presents a comfortable analytic Keynesianism *sans* 'uncertainty' in the Knightian sense (1937).

6 Keynes did not himself use the Knightian terminology but some of those of his intellectual descendants who have remained true to his conception of indeterminacy have: for example, see Marglin and Bhadhuri (1990).

7 For example, Philips (1990), or Hirschleifer and Shapiro (1977), quoted in Cancian (1980), who 'refer to a tradition that "attempts to formulate a distinction between risk and uncertainty based on ability to express the possible variability of outcomes in terms of a probability distribution" but reject it: "This distinction has proved to be sterile. Indeed, we cannot in practice act rationally without summarizing our information (or its converse, our uncertainty) in the form of a probability distribution".' Ellis (1988) writes, in relation to peasant economies, 'The distinction, while not entirely redundant for some purposes, has been superseded in the economic literature' (p. 83).

8 Of course, even this need not be an embarrassment to a staunch neoclassical economist ('formalist' in anthropological parlance), for whom an 'accurate prediction generating theory', regardless of the realism of its assumptions, may be considered scientifically valid. The classic statement of this position, which is designed to enable perpetual stonewalling on the question of what is 'accurate prediction', is by Milton Friedman (1953).

9 By 'certainty', Ortiz clearly means 'under conditions of risk' (as distinguished from uncertainty). This slip, or failure of understanding, is telling. It is suggestive of the small distance between probabilistic conceptions of the world and deterministic ones, and of the ease with which a probabilistic calculus can be viewed as in an ulterior sense a deterministic calculus.

10 Ortiz has generalized her findings on the presence of radical uncertainty in peasant life elsewhere. She writes, for example, in regard to formal 'decision tree' representations of peasant decision making, which she otherwise advocates as an illustrative tool: 'Farmers do not think in terms of probabilities, and their preferences are so complex that it takes more than one Tangled Tale to turn them into neat mathematical problems' and the decision maker 'is unlikely to evaluate a return with high uncertainty, as he will not be able to conceptualize it clearly enough to use it as a decision element' (1983:279–80). In other later work, Ortiz's appreciation of the importance of 'uncertainty' in peasant life leads her to step back from her advocacy of the 'rationality' of the peasant (Ortiz 1980:194–6). This move ironically seems to betray that Ortiz has, over time, retrogressed into accepting the mainstream economist's conflation of 'rationality' and probabilistic reasoning.

11 The decision in question concerned whether farmers should 'abandon mule transport and retail marketing in favour of motor transport and wholesaling to the new receiving centres' established by the government.

12 Ernst Cassirer (1961) associated the earliest statement of this view with Laplace.

13 Douglas and Wildavsky, for example, write: 'This book is about how particular kinds of dangers come to be selected for attention' (1982: 8). In this work, the Ugandan Hima people's fear of pollution and danger through contact between their women and cattle, among other examples, is compared with twentieth-century American environmentalist preoccupations.

14 Douglas, surprisingly, seems here not to have understood that mainstream risk analysis does not ultimately claim that probabilities rationally assigned to future alternatives are 'objective'. This is the importance, indeed, of the theory of subjective probability (which does, however, make room for giving greater weight to 'expert' opinion. See, for example, Cooke [1991]). Mainstream probabilistic analysis does not deny that perceptions of probabilities are likely to be 'positional'. It does, however, assert that there are more and less rational ways of going about the formation of our 'subjective' perceptions as to what probabilities are. It is in this sense that 'subjective' probability is 'objective'. Douglas's contribution is not, then, that she introduces 'subjectivity' into the analysis, but that she insists that individuals' and social groups' variant perceptions as to the importance of various risks be taken into account. As described below, Douglas is too wedded to probabilistic or 'risk' analysis to develop from her recognition of 'subjectivity' a more profound questioning of risk 'estimation' itself.

15 By probabilism we mean the 'risk'-based (in the Knightian sense) view that uncertain situations can be understood in terms of calculable probabilities.

16 Giddens (1994) suggests both that this is the case and that, distinguishing between 'manufactured uncertainty' (which derives from human intervention in nature and the transformation of stable social practices) and 'external uncertainty' (associated with natural sources and stable social practices), we are today assailed with an intensification of 'manufactured uncertainty'.

17 For example, the degree of expertise of analysts of the risks of nuclear power is, in view of the impact of the views of such analysts on the design of nuclear plants as well as the decision as to whether or not in the first place to build them, itself one of the factors to be evaluated in judging the acceptability of nuclear power.

18 The following is an instructive example of what the 'democratization' of scientific procedures might involve or, rather, of what it stands opposed to:

Reflexivity is excluded from the social and political interactions between experts and social groups over modern risks, because of the systematic assumption of realism in science. Contemporary examples abound. When farm workers claimed that herbicides were causing unacceptable health effects, the British government asked its Pesticides Advisory Committee to investigate. The PAC, composed largely of toxicologists, turned automatically to scientific literature on laboratory toxicology of the chemicals in question. They concluded unequivocally that there was no risk. When the farm workers returned with an even thicker dossier of cases of medical harm, the PAC dismissed this as merely anecdotal, non-knowledge. When they were forced by further public objections to return to the question, the PAC again asserted that there was no danger, but this time added an apparently minor, but actually crucial qualification. This was that there was no risk according to the scientific literature, so long as the herbicide was produced under the correct conditions (dioxins could be produced as contaminants by small variations in production process parameters) and used under the correct conditions. On this latter question the farm workers were the experts. They knew from experience that 'the correct conditions of use' were a scientist's fantasy - 'cloud-cuckoo-land from behind the laboratory bench' as one farmers' representative put it.

(Scott Lash and Brian Wynne, in their introduction to Beck 1992)

19 A number of critical issues remain to be explored at the interface of knowledge systems, institutional authority, individual psychology and discourses concerning risk and uncertainty. One research direction, for example, might be to examine the rise of the welfare state as a response to and reflection of the modern need to eliminate uncertainty. It is obvious how state legitimacy was enhanced by this development. It would be interesting to further explore the involvement of the state in the discourses which sustained it. The French phrase '*état providence*' is instructive in this regard. Some useful ideas in this area are intimated in Burchell *et al.* (1991).

20 Ranging from Food and Drug Administrations, to Environmental Protection Agencies, to National Security Councils.

References

- Amariglio, J. and Ruccio, D. F. (1994) 'Keynes, postmodernism, uncertainty', paper presented to the Annual Meeting of the American Economic Association, January.
- Apffel-Marglin, F. and Marglin, S. A. (eds) (1990) *Dominating Knowledge*, Oxford: Clarendon Press.
- Aubert, V. (1959) 'Chance in social affairs', in Dowie and Lefrere (1980).
- Banuri, T. (1990a) 'Development and the politics of knowledge', in Apffel-Marglin and Marglin (1990).
- (1990b) 'Modernization and its discontents', in Apffel-Marglin and Marglin (1990).
- Bartlett, P. F. (1980) *Agricultural Decision Making: Anthropological Contributions to Rural Development*, London: Academic Press.
- Beck, Ulrich (1992) *Risk Society*, London: Sage.
- (1995) *Ecological Enlightenment*, Atlantic Highlands, NJ: Humanities Press.
- Beck, Ulrich, Giddens, A. and Lash, S. (1994) *Reflexive Modernization*, Stanford, CA: Stanford University Press.
- Berry, W. (1987) 'Letter to Wes Jackson', in *Home Economics*, San Francisco: North Point Press.
- Blaug, M. (1988) *Economic Theory in Retrospect*, Cambridge: Cambridge University Press.
- Bonatti, L. (1984) *Uncertainty: Studies in Philosophy, Economics and Socio-Political Theory*, Amsterdam: Verlag B. R. Gruner.
- Bork, A. M. (1967) 'Randomness and the twentieth century', in Dowie and Lefrere (1980).
- Burchell, G. *et al.* (1991) *The Foucault Effect: Studies in Governmentality*, Chicago: University of Chicago Press.
- Caldwell, B. (1982) *Beyond Positivism: Economic Methodology in the Twentieth Century*, London: Unwin Hyman.
- Cancian, Frank M. (1972) *Change and Uncertainty in a Peasant Economy: The Maya Corn Farmers of Zinacantan*, Stanford, CA: Stanford University Press.
- (1980) 'Risk and uncertainty in agricultural decision making', in Barlett (1980).
- Cassirer, E. (1961) *Indeterminism and Modern Physics*, Chicago.
- Castel, R. (1991) 'From dangerousness to risk', in Burchell *et al.* (1991).
- Cooke, R. M. (1991) *Experts in Uncertainty: Opinion and Subjective Probability in Science*, Oxford: Oxford University Press.
- Dahrendorf, R. (1968) 'Uncertainty, science, and democracy', in *Essays in the Theory of Society*, Stanford, CA: Stanford University Press.
- Defert, D. (1991) '"Popular life" and insurance technology', in Burchell *et al.* (1991).
- Douglas, M. (1975) 'Environments at risk', in Dowie and Lefrere (1980).
- (1986) *Risk Acceptability According to the Social Sciences*, London: Routledge & Kegan Paul.
- (1992) *Risk and Blame*, New York: Routledge.
- Douglas, M. and Wildavsky, A.

- (1982) *Risk and Culture*, London: University of California Press.
- Dowie, J. and Lefrere, P. (1980) *Risk and Chance: Selected Readings*, Milton Keynes: Open University Press.
- Ellis, Frank (1988) *Peasant Economics*, Cambridge: Cambridge University Press.
- Evans-Pritchard, E. E. (1937) *Witchcraft, Oracles and Magic Among the Azande*, Oxford: Clarendon Press.
- Ewald, F. (1991) 'Insurance and risk', in Burchell *et al.* (1991).
- Feyerabend, P. (1988) *Against Method*, London: Verso.
- Fowlkes, M. R. and Miller, P. Y. (1987) 'Chemicals and community at Love Canal', in Johnson and Covello (1987).
- Friedman, M. (1953) 'The methodology of positive economics', in Hausman (1984).
- Fromm, Erich (1942) *Fear of Freedom*, London: Kegan Paul, Trench, Trubner.
- (1969) *Escape From Freedom*, New York: Avon Books.
- (1991) *The Sane Society*, New York: Routledge.
- Gale, R. P. (1987) 'The environmental movement comes to town: a case study of an urban hazardous waste controversy', in Johnson and Covello (1987).
- Gambetta, D. (ed.) (1988) *Trust: Making and Breaking Cooperative Relations*, Oxford: Blackwell.
- de Garine, I. and Harrison, G. A. (eds) (1988) *Coping with Uncertainty in Food Supply*, Oxford: Clarendon Press.
- Giddens, A. (1971) *Capitalism and Social Theory*, Cambridge: Cambridge University Press.
- (1984) *The Constitution of Society*, Cambridge: Polity Press.
- (1990) *The Consequences of Modernity*, Stanford, CA: Stanford University Press.
- (1991) *Modernity and Self Identity*, Stanford, CA: Stanford University Press.
- (1994) *Beyond Left and Right*, Stanford, CA: Stanford University Press.
- Gigerenzer, G. *et al.* (1989) *The Empire*

- of Chance*, Cambridge: Cambridge University Press.
- Godelier, M. (1972) *Rationality and Irrationality in Economics*, New York: Monthly Review Press.
- Goffman, E. (1969) *Where the Action Is*, London: Allen Lane.
- Goldman, L. (1993) *The Culture of Coincidence: Accident and Absolute Liability in Huli*, Oxford: Clarendon Press.
- Goody, J. R. (1976) *Production and Reproduction*, Cambridge: Cambridge University Press.
- Gudeman, S. (1990) *Conversations in Colombia*, Cambridge: Cambridge University Press.
- (1986) *Economics as Culture: Models and Metaphors of Livelihood*, London: Routledge & Kegan Paul.
- Hacking, Ian (1990) *The Taming of Chance*, Cambridge: Cambridge University Press.
- Hales, M. (1986) *Science or Society*, London: Free Association Books.
- Hart, Keith (1986) 'Heads or tails? Two sides of the coin', *Man* 21: 637-56.
- (1988) 'The idea of economy: six modern dissenters', in M. Friedlander and A. F. Robertson (eds) *Beyond the Marketplace*, Chicago: Aldine.
- Hausman, Daniel M. (ed.) (1984) *The Philosophy of Economics*, Cambridge: Cambridge University Press.
- (1992) *The Inexact and Separate Science of Economics*, Cambridge: Cambridge University Press.
- Heap, S. H. (1989) *Rationality in Economics*, Oxford: Blackwell.
- Hirshleifer, J. and Shapiro, D. L. (1977) 'The treatment of risk and uncertainty', in R. H. Haveman and J. Margolis (eds) *Public Expenditure and Policy Analysis*, Chicago: Rand McNally.
- Hutchison, T. W. (1977) *Knowledge and Ignorance in Economics*, Chicago: University of Chicago Press.
- Jasanoff, S. (1987) 'Cultural aspects of risk assessment in Britain and the United States', in Johnson and Covello (1987).
- (1990) *The Fifth Branch: Science Advisers as Policymakers*, Cambridge, MA: Harvard University Press.
- Johnson, B. B. and Covello, V. T.

- (1987) *The Social and Cultural Construction of Risk*, Dordrecht: D. Reidel.
- Keynes, J. M. (1936) *The General Theory of Employment, Interest and Money*, London: Macmillan.
- Knight, F. H. (1956) *On the History and Method of Economics*, Chicago: University of Chicago Press.
- (1921/1971) *Risk, Uncertainty and Profit*, Chicago: University of Chicago Press.
- Krimsky, S. and Golding, D. (eds) (1992) *Social Theories of Risk*, London: Praeger.
- Kuper, A. (1991) *The Invention of Primitive Society*, London: Routledge.
- Lasch, C. (1995) *The Revolt of the Elites and the Betrayal of Democracy*, New York: Norton.
- Leclair, E. and Schneider, H. (eds) (1968) *Economic Anthropology*, New York: Holt, Rinehart & Winston.
- Levy-Bruhl, L. (1923/1978) *Primitive Mentality*, trans. L. A. Clare, London: Allen & Unwin.
- Lipton, M. (1968) 'The theory of the optimizing peasant', *Journal of Development Studies* 4: 327-51.
- Luce, R. and Raiffa, H. (1957) *Games and Decisions*, New York: Wiley.
- Luhmann, N. (1979) *Trust and Power*, Chichester: Wiley.
- (1993) *Risk: A Sociological Theory*, Berlin: Walter de Gruyter.
- Lynn, F. M. (1987) 'OSHA's carcinogens standard: round one on risk assessment models and assumptions', in Johnson and Covello (1987).
- McCloskey, D. N. (1986) *The Rhetoric of Economics*, Brighton: Harvester Press.
- (1992) *If You're So Smart: The Narrative of Economic Expertise*, Chicago: University of Chicago Press.
- MacIntyre, A. (1981) *After Virtue*, Notre Dame: University of Notre Dame Press.
- de Marchi, N. and Gilbert, C. (eds) (1989) *History and Methodology of Econometrics*, Oxford: Oxford University Press.
- Marglin, S. A. (1990) 'Losing touch: the cultural conditions of worker accommodation and resistance', in Appfel-Marglin and Marglin (1990).
- (1992) 'Economics as a system of knowledge', mimeograph, Harvard University.
- Marglin, S. A. and Bhaduri, A. (1990) 'Profit squeeze and Keynesian theory', in Marglin and Schor (1990).
- Marglin, S. A. and Schor, J. B. (eds) (1990) *The Golden Age of Capitalism*, Oxford: Clarendon Press.
- Menger, C. (1981) *Principles of Economics*, New York: New York University Press.
- Milberg, W. (1993) 'Natural order and postmodernism in economic thought', *Social Research* 60(2).
- Mirowski, P. (1989) *More Heat than Light*, Cambridge: Cambridge University Press.
- Molland, A. George (1990) 'Coping with uncertainty in natural science: 1200-1700', in Von Furstenberg (1990).
- Ortiz, S. (1973) *Uncertainties in Peasant Farming: A Colombian Case*, London: Athlone Press.
- (1980) 'Forecasts, decisions, and the farmer's response to uncertain environments', in Barlett (1980).
- (1983) 'What is decision analysis about? The problems of formal representations', in *Economic Anthropology: Topics and Theories*, London: University Press of America.
- Perrow, C. (1984) *Normal Accidents: Living with High-Risk Technologies*, New York: Basic Books.
- Philips, L. (1990) *The Economics of Imperfect Information*, Cambridge: Cambridge University Press.
- Porter, T. M. (1990) 'The quantification of uncertainty after 1700: statistics socially constructed?', in Von Furstenberg (1990).
- (1994) 'Making things quantitative', *Science in Context*, 7(3).
- Rayner, S. (1990) 'Risk in cultural perspective', in Von Furstenberg (1990).
- Rogers, E. M. (1982) *Diffusion of Innovation*, New York: Free Press.
- Roll, E. (1973) *A History of Economic Thought*, London: Faber.
- Schrader-Frechette, K. S. (1991) *Risk and Rationality*, Berkeley: University of California Press.
- Scott, James C. (1976) *The Moral*

- Economy of the Peasant: Subsistence and Rebellion in South-East Asia*, New Haven, CT: Yale University Press.
- Shackle, G. L. S. (1967) *The Years of High Theory: Invention and Tradition in Economic Thought, 1926-1939*, Cambridge: Cambridge University Press.
- (1968) *Uncertainty in Economics and Other Reflections*, Cambridge: Cambridge University Press.
- Sharlin, H. I. (1987) 'Macro-risks, micro-risks and the media: the EDB case', in Johnson and Covello (1987).
- Stigler, S. M. (1986) *The History of Statistics*, Cambridge, MA: Harvard University Press.
- Sylla, E. (1990) 'Political, moral, and economic decisions and the origins of the mathematical theory of probability', in Von Furstenberg (1990).
- Teuber, A. (1990) 'Justifying risk', *Daedalus* 119(4), special issue on risk.
- Tribe, Keith (1991) 'The economic metric', *Economy and Society* 20(4).
- Tribe, Laurence H. (1972) 'Policy science: analysis or ideology', *Philosophy and Public Affairs* 2(1): 66-110.
- von Furstenberg, George M. (1990) *Acting Under Uncertainty: Multidisciplinary Conceptions*, Boston, MA: Kluwer Academic Publishers.
- von Neumann, J. and Morgenstern, O. (1944) *The Theory of Games and Economic Behavior*, Princeton, NJ: Princeton University Press.
- Weber, Max (1958) *The Protestant Ethic and the Spirit of Capitalism*, New York: Charles Scribner's Sons.
- (1968) *Economy and Society*, New York: Charles Scribner's Sons.
- (1981) *General Economic History*, New Brunswick, NJ: Transaction.
- Wolf, Eric (1969) *Peasant Wars of the Twentieth Century*, New York: Harper & Row.