



Daniel Kahneman (1934–2024)

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Daniel Kahneman, who passed away on March 27th, 2024, was one of the best-known psychologists of his time, not only in the academy but also among the wider public. His fame was based on a body of work that has changed the cognitive sciences, the social sciences, and has stimulated profound philosophical reflections as well.

Born in Tel Aviv in 1934, Kahneman spent most of his childhood in France, where his family resided. Having survived the tragic years of World War II, he emigrated to Israel after the loss of his father. Trained at Hebrew University, Kahneman worked as a psychologist for the army and obtained a PhD at the University of California, Berkeley, in 1961. The first part of his career was spent in Jerusalem at Hebrew University (1961–1978) and was mainly devoted to research on visual perception. This early work was important in shaping Kahneman's methodological approach, especially concerning the measurement of cognitive errors.

The key event during these formative years was the encounter with Amos Tversky (1937–1996) at the University of Michigan in 1968. Michigan was one of the thriving centres for mathematical psychology at the time. Tversky, who had received his PhD there, was versed in the theory of expected utility developed by John von Neumann and Leonard Savage, and under the supervision of Clyde Coombs and Ward Edwards had come to appreciate the profound relationship between problems of psychological measurement and the economic theory of decision-making (see Moscati 2019). By the time of his encounter with Kahneman, Tversky had already published papers on the empirical measurement of utility, had attempted an alternative theoretical description of the psychological processes underlying decisions, and was deeply engaged in an ambitious interdisciplinary project on measurement theory.

The two young psychologists found a common interest in the empirical testing of expected utility theory, and

Kahneman played a role in focussing Tversky's research on decision errors (Heukelom 2014). The very notion of error had to be defined for this purpose: while experimenters working on vision can use an objective benchmark to evaluate the accuracy of perception, no such benchmark exists in the case of decisions. If an experimenter briefly shows a stimulus (a card with the letter 'R', say), and some subjects report 'R' while others report 'B', there is an objective way to compute the frequency and variation of error. In contrast, when the stimulus takes the form of gambles (e.g. Amazon stock vs. government bonds), the fact that I prefer government bonds while my wife prefers to invest in the stock market does not allow an observer to pass judgment on the 'correctness' of either's decision. (Whether she ends up making more money, or eventually loses everything, does not matter either.)

Decisions of this sort are based on preferences and beliefs about risky prospects, that is, *subjective* states which may (and often do) differ across individuals. The theory of expected utility is faithful to the principle that *de gustibus non est disputandum*, and only imposes mild consistency requirements on the structure of subjective beliefs and preferences. It says, for example, that one cannot simultaneously believe that the rate of interest will go up next month with 0.8 probability and go down with 0.5 probability. Or simultaneously prefer unemployment to work, work to retirement, and retirement to unemployment. But provided such consistency requirements are satisfied, it does not impose restrictions on the *content* of preferences and beliefs.

In spite of their intuitive appeal, the formal principles of expected utility are often violated by real decision-makers. By the end of the nineteen-sixties various inconsistencies or 'anomalies' had been documented empirically, and under the influence of Savage expected utility had been reinterpreted as primarily a *normative* theory of decision. Kahneman and Tversky thus realised that a benchmark for the measurement of errors could be provided, if not by an objective standard, by a model—expected utility theory—specifying the way people should reason. The errors then could be used to construct better descriptive models, which would accurately

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explain and predict people's behaviour. Their 'heuristics and biases' programme exploited this simple insight and used it to deliver a revolutionary message to economists and behavioural scientists in general.

Kahneman and Tversky's collaboration took off in Jerusalem and produced its most important results in the nineteen-seventies. Among their many articles—signed Kahneman & Tversky or Tversky & Kahneman, alternating the order of surnames—two stand out as all-time classics. 'Judgment Under Uncertainty: Heuristics and Biases', published in *Science* in 1974, outlined a list of 'heuristics' (simple rules of thumb) that people use in making decisions, which in specific contexts lead people to systematically violate expected utility theory. 'Prospect Theory: An Analysis of Decision Under Risk', published in 1979 in *Econometrica*, featured a purely descriptive theory accounting for the way in which real people make decisions. Both papers were built on laboratory experiments that methodically investigated when, how, and how often people commit errors of judgment or display preference inconsistencies among risky prospects (gambles). During the following decade, Kahneman, Tversky, and their collaborators extended this research to choices among risk-less options, questioning the very idea that a single, consistent preference ranking guides behaviour in different contexts.

Tversky and Kahneman's experimental settings (like the 'Linda' and the 'Asian Disease' problem) and the empirical patterns they generate (the 'conjunction fallacy', the 'framing effect') have been replicated and modified thousands of times. Together with other anomalies of rational choice theory, they constitute the hard core of 'Behavioural Economics', the sub-field of contemporary social science that sprang from the 'heuristics and biases' programme.

In spite of its influence, the programme was for a long time controversial. The most obvious reason is the threat—perceived or real—it posed for so-called 'mainstream' economic theory. Most economists in the nineteen-fifties saw expected utility as an extension of the theory of consumers' preferences that lies at the core of the marginalist or Neoclassical analysis of markets. For the first time, the domain of economics could be extended to situations where people make choices based on imperfect or partial information. Kahneman and Tversky's empirical evidence seemed to challenge this programme, suggesting that a theory built on these premises would be predictively poor.

But economists were not alone in finding Kahneman and Tversky's message unpalatable. The view of human beings as essentially rational creatures has been deeply rooted in western culture since Plato and Aristotle. Philosophers, psychologists, and evolutionary theorists levelled an array of critiques towards the implied message of the heuristics and biases programme, both in academic and popular outlets. The 'Rationality Wars'—as they were labelled with

belligerent rhetoric—played a central role in the 'Science' and 'Culture Wars' that raged in the academy during the nineteen-eighties and nineties.

With the benefit of hindsight, we can say that the disagreement concerned not the *fact* of human irrationality (examples of it are all too common) but its frequency and extent. Evolutionary-minded scientists argued that human psychology must be largely adequate for the tasks that we face in everyday life—or we wouldn't be here to tell it in the first place. When our 'mental modules' misfire, they do it in unusual situations that were non-existent or rare in ancestral environments. But in such situations, arguably, technology and culture now provide 'cognitive scaffoldings' that help us to cope remarkably well. Market institutions, for example, create informationally-rich environments where traders receive enough feedback and guidance to allocate their resources in an optimal or quasi-optimal way.

The empirical evidence produced by Kahneman and Tversky, according to this perspective, appears highly selective. It is collected precisely in those situations where economic choices are most likely to depart from rationality. Kahneman describes this methodology succinctly in the preface of *Choices, Values and Frames*:

Our method of research in those early Jerusalem days was pure fun. We [Tversky and I] would meet every afternoon for several hours, which we spent inventing interesting pairs of gambles and observing our own intuitive preferences. If we agreed on the same choice, we provisionally assumed that it was characteristic of humankind and went on to investigate its theoretical implications, leaving serious verification for later.

The gambles that Kahneman and Tversky found interesting were, of course, those that were likely to elicit anomalous behaviour. Serious verification consisted in designing experimental tasks that would generate the strongest possible deviations from rationality. It's part of the common lore of experimental economics that one's data are rarely as neat, and the effects as strong as those reported in the original papers. But they are usually strong enough to count as replications, and to encourage a search for factors that might mitigate or enhance the anomalous results.

Following Tversky and Kahneman, two generations of psychologists and economists have explored systematically the environmental and psychological mechanisms that sustain or impede rational decision-making. As a result, our knowledge of the way in which people make choices is now incomparably greater and more sophisticated than half a century ago. Although some critics of mainstream economics welcomed the results of the heuristics and biases programme as finally refuting the Neoclassical approach based on optimisation, their hopes have been largely disappointed. The heuristics and biases programme has not caused the

demise of expected utility theory. Simple rational choice models are still the gold standard for economic explanation, but heuristics and biases explanations have replaced convoluted rationalisations of recalcitrant behaviour and are generally considered valuable, fruitful alternatives that cannot be dismissed a priori.

Generalising expected utility, Prospect Theory is able to account for a broader range of behaviours than its predecessor. It is now one of the most widely used descriptive models of decision under uncertainty, and is even taught in introductory textbooks. Part of its success, paradoxically, is that its fundamental architecture resembles closely that of the model it was intended to replace. Individual choices are derived from a context-dependent value function and a ‘distorted’ belief function. The shapes of these functions are meant to capture the systematic biases observed in experiments. But the psychological processes governing decisions are relegated to the theory’s background. The so-called editing phase of decision, for example, with its ‘coding’, ‘combination’, ‘segregation’, and ‘cancellation’ procedures, is described only informally and is not incorporated in the mathematical framework.

Theoretical continuity certainly favoured the integration of Kahneman and Tversky’s work within the paradigm of economics. The rumour had it that Tversky had been repeatedly considered for the Nobel Prize, when he died prematurely in 1996. In 2002 the Nobel Committee decided to recognize the rise of experimental and behavioural economics awarding the prize to Vernon Smith and Daniel Kahneman. To some, the Committee’s decision appeared paradoxical. Smith was famous not only for his methodological innovations, but also for his studies of the convergence of competitive markets towards efficient equilibria—a view that the discoveries of behavioural economists seemed to challenge.

But the paradox was only apparent: the Committee’s decision reflected a conception of progress that is widely shared among economists. The knowledge produced by behavioural economists has contributed to the toolbox of economic science in a *cumulative* rather than superseding manner. It has provided a ‘library of phenomena’ that helps economist to better understand and predict human behaviour. Experiments in this sense play a similar role to theoretical models—stylised, simplified settings that more or less closely resemble situations that occur in real life (Guala 2005). But the application of this knowledge is highly sensitive to the context and cannot be deduced from an overarching theory of human

behaviour. As a consequence, economics is now more similar to the other natural and social sciences (including psychology) than it ever was. Once heavily based on theoretical principles, it has achieved a healthier balance between abstract reasoning and empirical insight. And, arguably, it has also improved its efficacy at the level of policy-making.

Kahneman, who had been teaching at Princeton University since 1993, devoted his post-Nobel years mostly to dissemination. His 2011 popular science book, *Thinking, Fast and Slow*, has become a familiar sighting in bookshops all over the world. The book’s narrative is centred on a conception of human behaviour as governed by two psychological ‘systems’, devoted respectively to quick (intuitive, automatic) and slow (deliberate, analytical) reasoning. The theory is candidly presented as an unrealistic representation, perhaps a metaphor, that does not correspond to anything real in the hardware or software of the human mind. And yet, its allure has been irresistible. References to ‘two-systems’ theory have risen exponentially not only in the popular media, but also in scientific articles and monographs. It is the last legacy of a scientist who was able to perceive deeper patterns underlying people’s behaviour, and to couch them in stories and models that have become part of our shared scientific imagery.

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