

A Conversation with Daniel Kahneman

Catherine Herfeld

Forthcoming in *Conversations on Rational Choice*, Cambridge: Cambridge University Press.

I met Daniel Kahneman (1934-2024) in New York City during one of those snowstorms in early February that paralyzes the city in such a way that people do not want to leave their homes for several days. Kahneman was one of them. So, after postponing the interviews a couple of times, he ultimately invited me to visit him at his spacious apartment in downtown Manhattan, interrupting his busy schedule for an hour, and sat down to talk with me. His contributions to better understand the role of heuristics and biases in human judgement and decision-making, in large part made with the psychologist and decision theorist Amos Tversky, earned Kahneman the Nobel Memorial Prize in Economic Sciences in 2002. (Tversky might have been awarded the prize jointly with Kahneman, but he died in 1996.) The Nobel committee recognized Kahneman for “having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty.”¹ Yet, as a psychologist not only by training but also by heart, Kahneman began the interview by forcefully pointing out that he was not an expert in economics. His attitude towards economics was reserved and he was obviously reluctant to talk too much about what he believed others would know much more about.

Kahneman and Tversky’s contributions that are relevant for an appraisal of traditional rational choice approaches have been three-fold. The first has been their research on the role of heuristics and biases in people’s intuitive judgements of uncertain decision situations, asking questions such as how people assess probabilities of uncertain future events or of an uncertain outcome. To answer those questions empirically, Kahneman and Tversky depart from the two concepts of ‘heuristics’ and ‘bounded rationality’ that Herbert Simon first introduced. Simon argued that people are not fully rational but have limited cognitive capacities and access to information, given the environment they are part of. This is why people do not optimize but rather follow the strategy of satisficing in their decisions (e.g., Simon 1955). Kahneman and Tversky connect the concept of a heuristic with that of cognitive biases, which can influence our judgements, to show how heuristics help agents reduce the complexity of the decision situation, yet can at the same time lead to substantial and systematic errors in people’s judgement. Kahneman and Tversky initiated this research by first identifying three heuristics underlying people’s intuitive judgments that were later complemented by many more: 1) the representativeness heuristic, in which people judge the probability that A will occur by the degree to which A is representative of or resembles B; 2) the availability heuristic, in which people judge the frequency of a class or the probability of an event by the ease with which they can recall such events; and finally, 3) the anchoring heuristic, in which people adjust their judgements in light of some starting point, such as the formulation of some problem, such that distinct starting points lead to different probability estimates of the same event and an estimate is biased towards the starting point (e.g., Tversky/Kahneman 1974). Those findings had fundamental implications for traditional decision theory, such as questioning, for example, the criterion of internal consistency as the sole rationality condition that subjective probability as a measure of the beliefs of an ideal agent has to satisfy.

¹ "Daniel Kahneman - Facts". Nobelprize.org. Nobel Media AB 2014. Web. 1 Sep 2016.
http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/2002/kahneman-facts.html.

Second, Kahneman and Tversky studied what they called ‘framing effects’ and their implications for traditional rational choice models (Kahneman/Tversky 1981). Framing effects refer to cognitive biases in our decisions that influence the way we perceive the decision problem and evaluate the options presented to us. A major result of this research is that preferences can be systematically reversed, depending on the way the problem and the set of options are presented to a decision-maker. The existence of such preference reversals questions the predictive power of expected utility theory, which assumes that preferences are stable and should not change with a shift in framing the decision problem (Tversky/Kahneman 1981).

The third major contribution was the development of prospect theory, a formal-axiomatic theory of decision-making under risk and as such a viable alternative to expected utility theory for economics. Kahneman and Tversky published their first paper on prospect theory in 1979 in *Econometrica*, one of the top economics journals, which quickly drew economists’ attention to the theory. One major motivation for prospect theory had been their empirical interest in how human beings actually arrive at their probability judgments, a question that standard expected utility theory does not address. This interest was nourished by an existing criticism of the Bayes rule used in expected utility theory, pointing out that the rule did not represent how human agents actually form their judgments. Prospect theory, an equally mathematical but empirically apparently more accurate theory of decision-making under risk than traditional expected utility theory, is based on the general idea of perceptual adaptation. When it comes to probability judgments, Kahneman and Tversky considered them to be analogous to the judgments of decision outcomes. The idea is that such judgements are reference-dependent, that is, people represent the anticipated choice outcomes in terms of losses and gains and choose on the basis of those losses and gains with reference to an imagined baseline. Kahneman and Tversky assumed that people evaluate their losses and gains differently and arrive at their probability judgments by using heuristics that differ according to whether the expected outcome entails a loss or a gain. In a series of experiments, they found that people were generally risk-averse regarding gains. In the case of losses, people were generally risk-seeking or risk lovers. This was in stark contrast with the assumption underlying expected utility theory, namely, that rational agents judge losses and gains equally.²

Catherine Herfeld: What do you take rational choice theory to be?

Daniel Kahneman: I take rational choice theory to be a body of thoughts that provides an axiomatic treatment of logically consistent beliefs and preferences.

Catherine Herfeld: What do you take to be the concept of rationality underlying rational choice theory?

Daniel Kahneman: The underlying concept of rationality is coherence.

Catherine Herfeld: Coherence or consistency?

Daniel Kahneman: To me, it seems to be entirely coherence. And I think this is a big problem.

Catherine Herfeld: What is the problem?

² The interview was conducted in February 2014.

Daniel Kahneman: I think that there are two problems. The first problem is that rational choice theory is too demanding and the second problem is that it is too permissive. On the one side, rational choice theory is too demanding in the sense that coherence is psychologically completely impossible. To put it differently, it is too demanding in that having a definition that people cannot possibly satisfy with a finite mind is questionable for a theory. On the other side, rational choice theory is far too permissive because it does not allow for regret on the part of the decision-maker.

Catherine Herfeld: Could you further specify this a little?

Daniel Kahneman: For example, rational addiction is an interesting problem. One aspect of rational choice theory is that the analysis is entirely from the perspective of the present decision. The possibility that you will regret your decision later cannot be considered. Take as an example Gary Becker's *Economic Approach to Human Behavior* when applied to the problem of addiction. His theory cannot take seriously the idea that an addict later will regret his choice. In his theory, somebody who gets addicted and later regrets that he consumed drugs is compared to somebody who goes to a restaurant and has a large meal and then it turns out that he does not have money to pay for the meal. One has very little sympathy for the person who went to the restaurant but one might have sympathy for the addict, just because we consider that he or she might, in the future, regret his decision to consume drugs. I think that the sort of hyper rational choice theories cannot acknowledge that we might have sympathies for people, such as drug addicts, who make a decision that they can regret later.

Catherine Herfeld: You are often considered to be the founding father of behavioral economics. Interestingly, Gary Becker frequently considered himself to be a behavioral economist as well. In his analysis of addiction, for example, he meant to take psychological findings about addictive behavior into account. What do you take to be the difference between your and Becker's work?

Daniel Kahneman: First of all, let me stress that I do not consider myself as the originator of behavioral economics. If anybody is the founding father, then it is Richard Thaler. I do not even consider myself to be an economist at all. But those details aside, let me say that the main difference between Gary Becker and other behavioral economists is a methodological difference. Gary Becker begins with a set of assumptions that are given, such as for example the assumption of rationality. Then, when something appears to deviate from the assumption of rationality, he uses the assumption as a tool for discovery. The methodology is that you assume rationality and when you see a deviation, you have made a discovery about the utility function.

Catherine Herfeld: You say that rational choice theory is, on the one hand, too demanding, and on the other hand, too permissive. Indeed, it has been objected to Becker for example that his approach is too permissive. When one acknowledges the difference between people and their motives, as he does, but rationalizes those motives in his general framework, the theory becomes almost tautological. Is that what you have in mind?

Daniel Kahneman: No. What I mean is that it is not within the framework of the theory. You make discoveries when the world diverges from your theory. I think there is something quite deep going on here, in that it is true that if you have that assumption and you are not going to give it up, then you are making discoveries. More specifically, when things appear to violate this assumption, then you make discoveries. But it is exactly the same as when there was a geocentric theory of the universe and the planets didn't behave the way they were supposed to behave, then you see that there are epicycles and thereby you felt that you had discovered something.

Catherine Herfeld: Oftentimes economists argue that idea behind rational choice theory is that you make the discoveries by seeing how people deviate from the standard or ideal behavior. The next step would then be to consider those deviations in your theory, to de-idealize the theory. However, there seems to be a tradeoff between how much psychological diversity in motives economists should acknowledge and which motives they should just ignore because acknowledging too much can make a theory, albeit making it very detailed, weak in the sense that it loses explanatory power. Because it explains everything, i.e. any kind of behavior, it doesn't really explain anything anymore. Is that what you meant by permissible?

Daniel Kahneman: No. By permissive I meant that rational choice theory allows people to be rational while behaving foolishly. So, Amartya Sen has that paper entitled *Rational Fools*. Somebody with a rational addiction, is a fool; that's rational foolish. That is what I meant by overly permissive. I am not a decision theorist and I am certainly not a rational influence theorist. So, I don't have very much to say about how they should deal with rational choice theory, or what its problems are. I know that when you give up rationality, you get into very many problems in trying to develop a theory of human behavior because there is no limit. Rationality at least gives you a fairly simple answer, in principle. But a psychologically informed theory is not simple even in principle. And so, and the question about rational choice theory, which I'm not going to answer, but which I would be curious about getting an answer to is whether behavioral economists can build a cumulative theory where they make discoveries and the discoveries become part of the theory and the theory advances then. I asked that

question to Matthew Rabin and he said he believes it's possible and I don't have an opinion on that but I'm very curious.

Catherine Herfeld: Is that not what behavioral economists have done in the last 20 years or so?

Daniel Kahneman: Well I mean that's exactly my problem. My problem is that in most of the papers that I see, they study one anomaly at a time, and it's not that out of all the anomalies that they have studied, behavioral economists have a model of the human being and then they add something to it. They always start with complete rationality and with one exception and then one follows that exception. Rationality plays an essential role in modern behavioral economics, so far as I can see, in the theory. The question is whether it is actually possible to replace it, within this framework. Apparently not; that's my impression. For example, Matthew Rabin assumes rationality in his work, except for some thing or other.

Catherine Herfeld: One criticism of alternative theories of choice and at the same time a justification for keeping expected utility theory is that it is very simple and general and there is no alternative theory that would equally satisfy those criteria. Having suggested prospect theory, do you consider it equally challenging to arrive at a general psychological theory, which is more realistic than rational choice theory?

Daniel Kahneman: I think it's not impossible. There's never going to be anything that is as simple as utility theory. But you know, it's very easy to have a simple theory, if it is completely false. It's not that the theory can be replaced by something a little more complicated and is true. Prospect theory was a little more complicated than utility theory but prospect theory is also not true. And it's very easy to find counterexamples to prospect theory. It's not complicated enough. And nothing is complicated enough. But whether the glory of a theory that is false is that it is simple, I don't know. We talk about physical theory but they are true, approximately true, close to being true. But about utility theory, I'm not sure. The great virtue that you can keep the theory by denying the relevance of counterexamples, strikes me as funny.

Catherine Herfeld: One challenge that economics as a policy science seems confront is that, although your theory are not yet satisfactory, you have to do something, you have to be pragmatic. In order to get scientific status, economics has to have some account of individual behavior. The question is what kind of individual behavior would be appropriate for the kinds of problems that economists address. Here again this idea of a trade-off is relevant because different problems might require distinct accounts with different level of detail and different degree of theoretical status. You suggest that psychology can offer economics a set of “integrative concepts and mid-level generalization, which gain credibility from the ability to

explain ostensibly different phenomena in diverse domains” (Kahneman 2003, 1449). How exactly can economics benefit from those contributions from psychology?

Daniel Kahneman: I'm not an economist so I don't really even want to try to answer this question. Economist should answer this question. I can tell you that, as a psychologist, I would have no use for a very simple theory that is false, you know. It's not necessarily true that science is defined by theory, for me and for psychologists in general, and for some behavioral economists whom I know, science is about making discoveries, it is not about having a theory, it is about facts. It is about things that are observable and true. And theory is, in a way, secondary as an objective. It's beautiful to have a theory, but if you don't and you're making discoveries then you're making progress.

Catherine Herfeld: In your early work, when you began to collaborate with Amos Tversky in developing prospect theory, a person to whom you responded was Maurice Allais and his experiments, which questioned the usefulness of rational choice theory as empirical and as normative approach. However, in your work you considered normative expected utility theory useful as offering a standard. Is that something you would still argue for?

Daniel Kahneman: I mean we never changed our mind, really, about the normative appeal of utility theory. It's an ideal and, as a normative theory we never saw the point of changing it, because what Allais and many other people did was, they changed the theory to incorporate the deviation from the theory and still keep it rational so Amos would call that, that they were acting like lawyers for people, they would find justifications for things that people had done. But if there are so many deviations, then finding a solution to the Allais Paradox is not enough. So we didn't change. I was, I've never been terribly interested in normative theory, I am not a decision theorist. Of the two of us, Amos Tversky was the decision theorist. But we never saw any point in changing the traditional theory. It looks perfectly sensible and the requirements of consistency appear quite sensible, well, it's completely impossible psychologically, but it's better if it's satisfied, we never questioned that.

Catherine Herfeld: You argue in various places that human agents, when shown to be wrong, do not actually want to change their behavior, i.e., they don't aim for striving towards better decisions. Rather they feel uncomfortable and want go on with their business. You also mention that the implementation even of institutional structures that lead us to rational decisions is more often than not highly difficult, although organizations might benefit from such a reformulation. One of the reasons you state is that people do not like to be told that they are irrational and especially that they do not want to be predictable. Other people have argued that people behave

rational from their point of view. Given this difficulty, how useful is a normative theory of rationality then after all?

Daniel Kahneman: I mean here it becomes tautological when you allow everybody to behave rationally from their point of view. That seems to be empty. I think it's true that when you confront people with the fact that they're not consistent, they're not horrified. Ok so we're inconsistent. People, in effect, know that they're not consistent. So the achievement of rationality, the achievement of coherence and consistency is not the highest value that people have, I think.

Catherine Herfeld: Is it something that we should nevertheless strive for in our society?

Daniel Kahneman: No. I think rationality as defined in terms of coherence is very largely irrelevant to human affairs, because it doesn't incorporate any conception of human interests, of what in people's best self-interests. There is no conception of anything that is good or bad within the theory, so there's freedom, it's a very libertarian theory and that's a permissive aspect. However, I think that rationality theory it is irrelevant to human affairs to a very large extent for the two reasons I mentioned earlier. It is too demanding, which makes it impossible, and because it allows unreasonable behavior to be called rational, so the real criterion for human behavior is something like reasonableness, not rationality. And there is really very little direct contact between rationality and reasonableness.

Catherine Herfeld: And what do you consider reasonableness to be?

Daniel Kahneman: That is very poorly defined, but it incorporates the norms of society about, you know, what is in people's best interests and, to some extent, incorporates people's idea of what is in their best interests. But it's an incompletely defined concept because you know that reasonableness is not consistent, you know, otherwise it would be identical with rationality. It is something else. But it does incorporate criteria that are not incorporated in the coherence theory. It incorporates, in particular, a respect for regret, i.e., respect for my future self that the perspective of my future self on the present is quite important. And indeed, in the real world, this is how people think a reasonable person behaves. People think that a reasonable person behaves in a way now that later they will consider good. So it is not that you behave now and then that implies that you have considered the future and that you have accepted all the consequences of what you are doing. That's the difference.

Catherine Herfeld: In your last book, you introduce an approach to distinguish between intuition and reason as two types of cognitive processes, which are labeled System 1 and System 2. The operations of System 1 are fast, automatic, associative, and hard to control while the operations of System 2 are slow, involve effort, and are deliberately controlled (Kahneman

2011, 2003). System 1 thus involves intuition while System 2 involves judgment. On the basis of this approach, you consider the rational agent of economic theory to be “endowed with a single cognitive system that has the logical ability of a flawless System 2 and the low computing costs of System 1” (Kahneman 2003, 1469). Could you elaborate further on the difference between your theory and traditional economic theories of rational choice?

Daniel Kahneman: Reasonableness has a different perspective than rationality the traditional approach. Reasonableness is not for the moment of decision. The reasonableness of a decision is defined a view of the future, by a view of externalities.

Catherine Herfeld: What are the implications of your approach for understanding a phenomenon like for example addiction, as opposed to for example Gary Becker’s *Economic Approach to Human Behavior*, which takes addiction to be rational?

Daniel Kahneman: With a theory of reasonableness, you don't have reasonable addiction, except for people who are about to die or something, it's reasonable for them to be addicted to morphine. But otherwise, while you might be able to have rational addiction, it cannot be reasonable.

Catherine Herfeld: How do factors, such as regret, figure in your theory?

Daniel Kahneman: What I say is that a theory of reasonableness takes the remembering self very seriously. That's what I meant. So it's the retrospective view of behavior, which is the perspective that defines whether behavior is reasonable or not. It's not reasonable to do something that you will regret later.

Catherine Herfeld: How can your approach, and the concept of reasonableness upon which it is based, deal with the objection that, given our uncertainty about the future, we cannot really make reasonable decisions?

Daniel Kahneman: You can evaluate the decision now as reasonable or not, if it takes into account, in a sensible way, the perspective of the future. And by that I mean that the future is probabilistic and uncertain and so on. But the focus on the future and on regret, I think, is really quite important in defining reasonableness, because that's where the more permanent interest of the individuals come in. That's where the future comes in and the relevance of the future selves. The moment that you abandon consistency, then you allow the self at different times to have different feelings and emotions and so on. The dominant perspective, the perspective of rational choice theory, is exclusively the point of decision. And it's not that there's an alternative to rationality. In everyday language, the perspective in evaluating decisions extends all the time.

Catherine Herfeld: Before von Neumann and Morgenstern introduced the axiomatic method into economics to formally represent human behavior, economists relied on a notion of

rationality that was a different from notion of rationality understood as consistent choice. Since the enlightenment, the idea of judgment and deliberation, especially moral judgments, had been considered important for behavior to be considered rational. Thus, with the introduction of the axiomatic method, this idea of rationality changed radically and became much narrower and its basic principles were inspired by rules of logic, such as transitivity or consistency. Are the axioms of prospect theory different and how important is it for an axiomatic theory that the axioms are influenced by actual science?

Daniel Kahneman: No. I mean the axioms of prospect theory have a different character. They are not normative, as they're not axioms of rationality. More generally put, the question that you're asking me is about the importance of theory in the empirical work, and here there are different tastes and different opinions. Think about Peter Wakker's work. It's interesting because Wakker, as Matthew Rabin, also has been making prospect theory, as he defines it. But his is completely different from my prospect theory. They are not the same theory at all because his is much more rational, only with a few twists, and it doesn't allow framing. So in behavioral economics we have the same debate about how important it is to have theory. Even within behavioral economics, Peter would be at the extreme of scholars who are trying to do theory. But at the same time, he tries to link theory to measurement. He measures utilities and values especially in the health domain. But he is not particularly interested in discoveries.

Catherine Herfeld: Some people have argued that conceptually, behavioral economics still remains in the traditional domain of rational choice theory instead of having lead to a scientific revolution, or at least to something that is conceptually different. Would you agree?

Daniel Kahneman: I think it is conceptually different. It is conceptually different because it doesn't accept coherence as a descriptive axiom. What they have felt impossible to do is to put many deviations from rationality into a single model. For mathematical tractability, if you're going to do theory, I think people are forced to assume rationality except for one exception at the time. And whether that leads to cumulative science is a question that, I don't know the answer to.

Catherine Herfeld: Could you elaborate further on what you meant by rational choice theory being too demanding?

Daniel Kahneman: I mean that the idea of consistency of beliefs and preferences is psychologically absurd; I mean it's completely absurd because it assumes a kind of context-independence that is violated all the time. But very characteristic of the way the mind works is that it's highly sensitive to the current context and meanings change and that is not represented

within the theory of consistency. A theory that denies framing is psychologically impossible and it is psychologically not interesting.

Catherine Herfeld: Yet, at the same time you acknowledge the value of expected utility theory as a normative model.

Daniel Kahneman: If you're going to have the normative theory, then I don't know of anything better than expected utility theory. What is the role of a normative theory? It is logic. It is the logic of judgments, of beliefs, and inferences. It is to be respected as logic. But it is a completely different enterprise from the descriptive enterprise, from the study of human beings. And if economics, as I understand it, is an empirical discipline, then the idea that logic can propose a theory for empirical behavior is difficult. It is a methodological assumption that helps economists work and it helps them work to the extent that they are very interested in theory, more than in discoveries.

Catherine Herfeld: Max Weber gave an evolutionary argument for the usefulness of the instrumentally rational agent. In a capitalist system, only the instrumentally rational agent will survive in the long run because once an agent deviates, she will be driven out of the market and thus not survive. The idea type on an instrumentally rational agent is useful in this light, because as people's behavior becomes shaped in a way towards the appropriate idea type, it eventually becomes a real type, useful as an empirical theory.

Daniel Kahneman: The theory that everybody must behave rationally in the market because otherwise they won't survive, or put it differently, that only the rational will survive assumes that we're in equilibrium. It makes so many assumptions that are so obviously incorrect. Evolution works very slowly, and evolution of the markets works very slowly and people get paid for making mistakes. They get paid very well for making mistakes, because the mistakes are not discovered immediately. So I think it's just not true that only the rational survive.

Catherine Herfeld: You are a psychologist and Amos Tversky was a decision theorist. At the time, there was a large interest in studying decision-making; decision sciences became more important. Did you develop prospect theory in this context of decision sciences? And what was the actual contribution you wanted to make?

Daniel Kahneman: There was a field of empirical decision science, and we were working in that field. That field was very strongly influenced by utility theory. The background hypothesis was always utility theory, everything was always in relation to utility theory, and that was true of what we did as well. So utility theory was a sort of scaffold, because everything that you did, every hypothesis that you had, was how does it violate utility theory. So it played a very important role in that sense. And we played by the rules of what it took to write a good theory

within that field. But one argument that I have been making is that what made prospect theory important and what made prospect theory acceptable are two completely different things. What made it acceptable was that it was a pretty good theory in a very limited domain. But that's not why it was important. It was important because of another few ideas, mainly the reference point in loss aversion and those ideas that we used. So it is an almost amusing thing that we had to pass a test of competence, that is, that we had to have a theory that was theoretically sound and empirically. It took a long time before people found counterexamples to prospect theory and by the time they found counterexamples, the theory was already viable, in the same way that Maurice Allais thought he would destroy utility, and people just didn't pay very much attention to it. But we had to have a theory that looked like a good theory and was empirically valid, for choice of the most non-zero outcomes and stated probabilities. Those were the rules of the game, and we played the game by the rules.

Catherine Herfeld: Given that the economics discipline is sometimes characterized as rather closed and rigid, did you think they would accept prospect theory?

Daniel Kahneman: I think that's just not true that the discipline is rigid. I think that the speed at which behavioral economics was accepted is remarkable. Around 30 years ago, it wasn't guaranteed that Richard Thaler would get tenure, and now he is the president of the American Economic Association. And there have been several John Bates Clark medalists who consider themselves behavioral economists in the meanwhile. So I think anybody who says economics is very rigid is just wrong. The movement has been very rapid. Now, this doesn't have very much to do with us and with prospect theory. It has to do much more with Richard Thaler and with the sociological thing that happened. The most important thing in the history of behavioral economics was an accident, to some extent. Joseph Stiglitz was the editor of the *Journal of Economic Perspectives*. He invited Richard Thaler to write a regular column that was called 'anomalies.' And Richard Thaler took advantage of this, and so for several years, in every issue of the *Journal of Economic Perspectives*, there was an article showing an area where economic theory failed. It was always right, because he had a co-author who was an expert. And he is very funny, he writes beautifully and with humor. So every columnist read those. That is what, I think, is really what made prospect theory and behavioral economics vibrant and vital; it was reading all those anomaly columns. Now, Thaler got the benefit of prospect theory. It was a respectable theory. It was mathematical, it got published in *Econometrica*. People had to take it seriously. Given that background, prospect theory helped Richard Thaler. But behavioral economics is what Richard Thaler did.

Catherine Herfeld: Well, he introduced your result into economics ...

Daniel Kahneman: Well yes, that's true. Absolutely.

Catherine Herfeld: So you made the discovery, he developed it further.

Daniel Kahneman: Both perspectives are right. Because what happened was that Richard Thaler also made discoveries, such as the endowment effect, bounded self-control, and many others. What happened was that Thaler was given an early version of prospect theory and he discovered that the value function and the reference point were what he needed to explain several things. So, both was needed, his discoveries and the theories as well as his ability to see that the theory was relevant and would help him to make sense of certain observations. That is the real beginning of behavioral economics, Richard Thaler's work 1980 and I'm happy to say that.

Catherine Herfeld: Did you intentionally target the economics profession by choosing its mathematical formulation and the journal?

Daniel Kahneman: No. We didn't have the economists in mind. *Econometrica* just happened to be the most prestigious journal where you published theory. As it was a theory, we chose it. We chose the name 'prospect theory' because we felt maybe it was going to be successful. And if it is successful, it's better for it to have a name that is completely distinctive. But, we weren't sure about its success.

Catherine Herfeld: Those factors – the mathematical formulation, the journal, the name – might have been factors that contributed to its success.

Daniel Kahneman: That could be something, yes. And it was different, because most of the theories up to that time had tried to be normative.

Catherine Herfeld: The focus on the individual agent was equally novel.

Daniel Kahneman: That's true. The focus on individual behavior really had started only with John von Neumann and Oskar Morgenstern's contribution. If you followed their tradition, you would learn to work with individuals.

Catherine Herfeld: Although their focus was primarily on social interaction.

Daniel Kahneman: That's right. But the utility theory that they developed had to do with individual choice. Its connection with game theory is a separate thing but the part that influenced decision theorists was not the game-theoretical part but it was the theory of choice.

Catherine Herfeld: In your work, you are concerned with empirical research, not primarily with theory building. How important did you consider formal decision theory to be at the time?

Daniel Kahneman: Amos was a decision theorist. He had been doing formal theory; that was what he was doing. So for him, that came completely natural. For me, it didn't. And so, that was very useful, because Amos had just an enormous respect for utility theory, much more than me.

On the one hand, that I did not have this immense respect was very helpful, because I could see problems that he couldn't see. So that's the way we were a very good combination. On the other hand, I could not do the theory, so I had nothing to do with the axioms. The axioms Amos did with David Krantz, a friend of ours. I just remember that the only thing that I noticed about the axioms were that one of them wasn't true, empirically. Because the funny thing is, in prospect theory, there's one critical assumption, which is that the decision weights remain the same when you have two outcomes or three outcomes. That assumption is false. But without that assumption, the theory doesn't work. There were many ironies in that. I'm an outsider when it comes to theory.

Catherine Herfeld: Is the irony here that there is also a false assumption?

Daniel Kahneman: Yes, I'd say so.

Catherine Herfeld: I mean as you said at the beginning, every theory has certainly false assumptions that it has to make.

Daniel Kahneman: You know, I've talked about theory-induced blindness and I can see that prospect theory is having the same effect, that people are finding it difficult to see obvious violations of prospect theory.

Catherine Herfeld: Would you consider regret theory as a follow up on prospect theory, capturing those violations?

Daniel Kahneman: Yes, although, I am not fully sure. What happened was that prospect theory came out from regret. That's a big deal and regret is important. But the interesting thing is that when you move from utility theory to prospect theory, you gain a lot of new predictions that were interesting. When you move from prospect theory to regret theory, you gain almost nothing. So it's not that prospect theory is true because the difference between prospect theory and regret theory is about as big as the difference between utility theory and prospect theory. It's just that you don't gain much. This is because in regret theory you're going to need an asymmetry between regret aversion and loss aversion does most of the work for that. So the two theories become very hard to distinguish. Nobody has come up with interesting, dramatic predictions from regret theory that make a difference but that was a complete accident, at least in my view.

Catherine Herfeld: You identify yourself very strongly with psychology, where the primary goal might not be arriving at a general theory of human behavior. What were your motivations to work on such a theory?

Daniel Kahneman: Prospect theory was, for me, a departure, because I hadn't done theory before. I've done theory once since of that kind. I did the theory of experience utility with Peter

Wakker. That was a theoretical exercise. It was very much the same. We said: “Well, let's find what the axioms are that will provide us with a possible way” and I thought that was very interesting work. I loved doing it. And there, I suggested the direction to Peter and then Peter did all of the mathematics. But I had an idea of what is involved in having a theory of experience utility, which is in part a normative theory. That's the only time I've done that after prospect theory, and that was very interesting, but again, I couldn't do it myself. I had to work with Peter.

Catherine Herfeld: In your early work with Amos Tversky you mainly reacted to the work undertaken by Leonard Savage and Maurice Allais. In your Nobel lecture, however, you also mention Herbert Simon and his early work on bounded rationality. Do you consider Herbert Simon's work as having had any direct influence on you at all in these early years?

Daniel Kahneman: No, not at all. Simon went in a completely different direction from the direction that we went. And his psychological assumptions were very different. We did bounded rationality and in that sense we were within the Simon paradigm, but there was really no influence. He liked our work. In a sense, he was very instrumental. He nominated us for the Nobel Prize for many years, and he wanted us to succeed, but there was no direct influence.

Catherine Herfeld: What do you think are the future questions of behavioral economics and neuroeconomics?

Daniel Kahneman: I cannot make reliable predictions about the future of behavioral economics. But there is one thing that one could say with certainty. Over the next 20 years, it's going to be a very active field. And the reason for that is because top graduate students at Harvard and Berkeley and in other places are going to do research in neuroeconomics and behavioral economics and come out with a degree. This guarantees the future of behavioral economics for another 15-20 years. The same is true for neuroeconomics. I do not know where they will go but there is no question that some interesting things will happen.

Catherine Herfeld: Do you think they should search for an alternative theory, or do you think they should go on to make discoveries?

Daniel Kahneman: I don't know what they should do. They are all highly intelligent people. It would be completely silly for me to say what people in another field should do in ten years. There are going to be very intelligent and they are going to do the best thing at that time, and it is really impossible to see from now, from here, and having preferences about it is even sillier. It's going to change, that's the only thing we can be sure of.

Catherine Herfeld: Are you after truth?

Daniel Kahneman: I am after small truths, not after truth with a capital T.

References for further reading

- Tversky, Amos, Kahneman, Daniel (1974): Judgment under Uncertainty: Heuristic and Biases, *Science*, 185 (4157), 1124-1131.
- Kahneman, Daniel, Tversky, Amos (1979): Prospect Theory: An Analysis of Decision under Risk, *Econometrics*, 47 (2), 263-292.
- Tversky, Amos, Kahneman, Daniel (1981): The Framing of Decisions and the Psychology of Choice, *Science*, 211, 453-458.