Paul Thies: Winner of the 2002 Nobel prize in Economic Sciences. Dr. Daniel Kahneman is Professor of Psychology and Public Affairs Emeritus at the Princeton School of Public and International Affairs, the Eugene Higgins Professor of Psychology Emeritus at Princeton University, and a fellow of the Center [00:00:30] for Rationality at the Hebrew University in Jerusalem, widely considered one of the leading voices in Behavioral Economics and Cognitive psychology. Dr. Kahneman earlier this year, coauthored a book called Noise: A Flaw in Human Judgment in which he helps explain what noise is in the context of judgements and how it differs from bias.

Hello, I'm your host Paul Thies. And in this episode of If/When, I sat down with Dr. Kahneman to learn more about how to recognize cognitive noise and decrease [00:01:00] its negative effects, as well as to get his insights on where emerging technologies such as artificial intelligence will potentially factor into human decision making. Well, thank you so much, Dr. Kahneman for joining me today. Want to talk a little bit about your new book that came out this year, and then also just talk about noise and bias and decision making. And so to start us off, one concept in behavioral science, and I understand it's getting more and more attention these days [00:01:30] is the concept of noise and the process of making judgments. And as I'm just mentioned, you coauthored a book, it's called Noise: A Flaw in Human Judgment this year. And so for our listeners, can you do describe what is meant by noise and how is it different from bias?

Dr. Kahneman: Sure. Well, I'll start at the intellectual beginning. I'll start at the origin idea. And the origin ideas is a particular view of what judgment is. [00:02:00] And we think of judgment as an operation of measure and where the measuring instrument in the human mind. So you're applying your judgment to a problem, and you're going to come up with a judgment, which is the equivalent of a value that your scale or your rule returns when you're applying measure. That's important because it brings the theory of measurement to bear as relevant to the theory of judgment. And in the [00:02:30] theory of measurement, there are two types of errors, not only one, and there are two sources of errors. So one of them, and you can think of your bathroom scale as an example. So your bathroom scale can be biased, which means that on average, the errors of measurement have one sign rather than the other.

So if most of the time, if you have a very friendly scale that underestimates weights, that's one thing, an unfriendly [00:03:00] bathroom scale has the opposite bias. So bias is the average error, but now think of a scale that has no bias. All it has is variability. That is when you step on the scale, on and off my is like that. When you step on and off, you don't get the same number, that variability is noise. And you can see that a good measuring instrument [00:03:30] would have no bias and no noise, that is it would return exactly the same value. So variability noise is found in any measuring instrument to a larger or greater extent. Scientific instruments reduce both variability, both noise and bias to the extent possible. The same is true for human judgment. There is bias,

which is average error. And there is [00:04:00] noise, which is variability, and the variability can be across judges, across individuals.

So for example, you have judges in the judicial system and to the extent that they would give different sentence, assign different sentences to the same crime. This is noise. You have underwriters in insurance system, if they would assign different premiums to the same complicated risk, that's [00:04:30] noise. If physicians disagree, that's noise and so on and so on. So noise is a separate source of error. It's just variability among judgments that in principle should be equal. And the important thing is that in the theory of error, noise and bias have equivalent status. That is, if you reduce noise by 50% and you reduce bias by 50%, you have increased [00:05:00] accuracy to the same extent. This is very non-intuitive because mostly people tend to think that bias is much more salient and more important. And that the job of improving accuracy is reducing bias, but actually an equally important part of the job of reducing accuracy is to reduce noise. And that's why we wrote that book.

Paul Thies: And it sounds like maybe that people [00:05:30] conflate bias and noise and that if I understand the analogy correctly, so let's use the bathroom scale, you have a bathroom scale that tends to be friendly and it tends to knock... It tends to show you way less than you normally do, whereas, and that's bias, whereas noise is I get on and it tells me I'm 0.7 grams, less than I am. I step off, I get back on then it says 0.3 grams less. It's still, the [00:06:00] bias is still that I weigh less than I really do, but the noise is the variability. And I actually have that... Is that correct?

Dr. Kahneman: That is absolutely correct. And there are several crucial differences between bias and noise that deserves to be pointed out. The first one is that you can, and that's why bias is so much easier to understand, is that you can recognize bias in a single measurement or in a single decision. [00:06:30] Bias is an error, is a type of error and you can recognize an error and say, oh, this, this error seems to be produced by a bias, by a specific bias. Noise, you never find noise in a single error. So noise is defined by the fact that there are many measurements and that those measurements do not agree. So noise is the statistical concept [00:07:00] and our mind has a lot of difficulty with statistical concept. So that's one very important difference. And the other one is, what did the effect of taking multiple measurements?

So suppose you want to get the best measurement possible with your bathroom scales. Then stepping on it and off it 10 times and taking the average will reduce noise. It will do nothing to bias. [00:07:30] There will be an average error, but it will reduce noise. You can eliminate noise completely by taking the average of a sufficient number of observations. So there is really, there are important differences in noise, between noise and bias, but both are sources of error and both should be reduced in order to get good judgements or good measurements.

Paul Thies: So my next question is how can people recognize [00:08:00] noise? And I think, I suspect part of it, part of the challenge is bias seems readily evident based on kind of what you're saying, whereas noise takes work. And our minds are already kind of overwhelmed with sensory input all the time. And so there's a certain level of patience that needs to be applied to detecting noise. But how can people recognize noise, particularly in their decision making? I think.

Dr. Kahneman: Well, [00:08:30] actually the way it works, it's almost the opposite of, I think, of what you were implying. We can have the feeling of recognizing bias, but that's not evidence. We see bias because we see errors, [inaudible 00:08:46]. Noise is actually quite easy to measure, but you have to make the effort of measuring it. People don't have intuitions about noise. We call a measurement, a [00:09:00] noise audit. So what would a noise audit be like if you have multiple employees in your organization who make decisions like they can prioritize clients, which client should they call first? You can present the same problem of prioritizing clients, present the identical problem to many employees And to the extent that they disagree, [00:09:30] that's noisy and that noise is not a good thing for the organization.

Clearly it is to the advantage of the organization for employees who make those decisions to make them in a particular way. Similarly, the justice system is not well served if different judges would give different sentences to the same defendant, but they do by the way. There's an awful lot of noise [00:10:00] in the judicial system. Similarly, an insurance company would not want a premium that it demands to be determined by the lottery that actually sends one into in, underwriter to deal with a particular client. And it's that lottery that is noise, and it's which individual employee does a client or a customer face. And there's [00:10:30] also a little lottery, what kind of a mood that individual in, what's the state? Is it good mood, bad mood, before lunch, late in the day, early in the day? Those are lotteries and organizations are better off if they minimize the role of those lotteries, both for justice and for efficiency.

Paul Thies: So it sounds like there's a need, and this is probably overstating things a bit, but there's a need to decrease [00:11:00] some of the subjectivity in certain areas of decision making and kind of operationalize greater rigor, so that you can maybe, I'm tired today or it's hot, or I've got a lot of phone calls, something that's bothering me. But it's like as long as I stay the course and follow certain steps in decision making, it will help decrease negative subjectivity that may have a negative outcome.

Dr. Kahneman: In general. I think [00:11:30] we talk about discipline thinking as the answer to noise and we talk about decision hygiene as steps that decision makers or an organization can take to reduce noise. And those are procedures of general procedures for decision making that are, can we hope, improve the quality of decision.

Paul Thies: So my next [00:12:00] question is kind of a bit on intuition and a bit on that creative thinking. And I know you've talked about this before, but how might one determine what is truly unwanted variability versus what is novelty of thought?

Dr. Kahneman: Well, variability is actually desirable in many situations. So if you're looking for a creative solution to a [00:12:30] problem, you certainly don't want people to think alike. You want as much diversity as possible. In general, you want diversity because it's interesting. So you don't want your film critics all to say the same thing and, or you want diversity because of selection. So that when there are many proposals on the table, you can pick the best. And in that case, if there is selection, then diversity is good. [00:13:00] In fact, noise or variability, the engine of evolution. And it's in exactly that way, that there is a lot of variability and the fit is survive.

There is a process of selection, but when you have different underwriters, individual underwriters making judgements on behalf of the company, there is no advantage to their being different from each other. Yet nobody learns anything from [00:13:30] those differences because there is no selection mechanism. There is no feedback mechanism.So it's very important to distinguish situations in which variability is undesirable from situations in which it's tolerable or even desirable. And we call noise undesirable variability. So that's the way we define it.

Paul Thies: So, and as a follow up, and maybe this is [00:14:00] the answer is already embedded in the previous question. But as a follow up, what strategies might be employed to keep judgment noise from unduly influencing how one evaluates their experiments?

Dr. Kahneman: Well, one general principle is that averaging independent observations reduces noise. And this is just statistical fact, that is if you take [00:14:30] a hundred measurements and you average them, you have reduced noise by 90%. It's just a statistical fact. Now this is quite impractical. You can't have a hundred patent offices, or a hundred judges, or a hundred underwriters, but that's the idea. That's what we're aiming for. We're aiming to make the underwriters or the judges as similar to each other as possible [00:15:00] in the decision that they make. And for that, you want to reduce the role of chance.

And so for example, the role of chance in meetings, who speaks first as a disproportionate influence, and in order to reduce that influence, it's good for opinion, for people to think about what they want to say or have their opinions said before the meeting [00:15:30] starts. And to have a sort of silent vote and it can be collected and then start the discussion, so that you don't have the accident of who speaks first or who speaks more loudly influencing all the rest. We strongly recommend breaking up problems and structuring the decision making. That is planning, what are the aspects of the problem that you want to evaluate, how you're [00:16:00] going to do it, and then evaluate them

independently of each other. And independence is really the crucial factor here. It's like independence between judges, it's independence between people in a conversation and it's independence between the aspects of a decision problem that you're looking at.

Paul Thies: So picking up on the idea of a hundred judges or a hundred underwriters, or whatnot, in our current setup it's impractical [00:16:30] for instance-

Dr. Kahneman: Of course.

Paul Thies: ... for someone to go before a hundred judges. So my next set of questions kind of brings in artificial intelligence and other emerging technologies. And how we're using technology to kind of come up with a new way to approach that. There's a thing called generative design, for instance, where say an architect wants to build a building, they can run it through an algorithm. And whereas a human architect may come up with [00:17:00] 12 design ideas, computer could come up with hundreds or even thousands. This next set of questions is about our push for technology such as AI and data science. And do you see that it's humanity's attempt to farm out its decision making obligations to a perceived infallible entity? And then I have a couple follows on that, but what are your general thoughts there, on the push for AI?

Dr. Kahneman: The AI, and it's not only [00:17:30] AI, but any rule govern thinking has a huge advantage over human intuition. And the advantage is that it's noise free. And indeed when human judgment has been compared to rule govern decision making or algorithms, one of the main advantages of algorithms over people is that they are noise free. And as noise reduces accuracy so much, as to make human [00:18:00] judgment far inferior to what it ought to be. And it's sort of unfortunate that what feels to us like subtle thinking turns out statistically, to add more noise than it gives value. That's an unfortunate fact. And so there are many situations in which AI demonstrably does better than people.

So we've all admitted that with [00:18:30] respect to chess, with respect to go, but it's also true. There is compelling evidence, I think, that the decision of whether individuals should be granted bail or not, if it were made according to rule or by an algorithm, it would have better results. And in this case, there is a criteria, we want as few people as possible to be in prison. And you want those who are released to commit as few crimes as possible. So [00:19:00] you know what you want, and you can measure. And on hundreds of thousands of millions of cases, whether a rule would've done better than judges do. And the answer is yes, in this case. And there are many other domains like detection of breast cancer, detection of retina problems in the retina where AI is already coming close. [00:19:30] And this is going to increase, clearly. There's going to be more and more of this, recognition of legal precedence, what are applicable laws.

We can see that coming, and of course we can see self-driving cars coming slowly. And in those contexts, what you see is not only that noise reduction

among other things. And a huge database, that's the main advantage of those systems, that they can learn [00:20:00] from data that are far beyond what the experience of any individual can be. And for example, all the cars on the road, all the autonomous cars on the road, they are as one car in terms of what they learn. So anything that one of them learns is communicated instantly to all others.

Paul Thies: Yeah.

Dr. Kahneman: That accumulates wisdom very rapidly. So as you can see, I think there's a lot of AI [00:20:30] already. There's going to be more, it's happening at an exponential rate and there are going to be huge problems when it becomes more threatening and more dominant. And that could be within a few decades it could become a problem. In the meantime, most decisions are still made by humans and the most important decisions. And it's critical to improve the quality of judgment. That's what [00:21:00] we try to do in our book, Noise.

Paul Thies: Yeah. I like to joke when it comes to autonomous vehicles, we seem to get skittish about the idea of an AI driving a car, but we don't seem to have any problem letting our teenagers run rampant on the roadways. It's like, but it's interesting because Vernor Vinge and other authors, they talk about the technological singularity. The idea where AI will at some point gets so smart that it outpaces [crosstalk 00:21:30] our [00:21:30] ability to control it. So what do you see are maybe some pitfalls for this reliance on the perceived infallibility of an AI technology, like where are the pitfalls? And then, what's an appropriate use of such technology, so it doesn't become a crutch or something that lacks accountability?

Dr. Kahneman: Some of the best minds in the world I think are worrying about this problem right now. And there are short [00:22:00] term problems and long term problems when we're talking of AI, taking over, this is relatively long term. And by relatively long term, we might mean 40 years. That's not at the rate that things are developing. It could be happening in a few decades. And then there are short term problems and the short term problems, how do people calibrate with algorithms? Who should have the last [00:22:30] word? Is a particularly important question.

Paul Thies: Yeah.

Dr. Kahneman: But as we seem to take it as obvious that when there is an individual and a computer, the individual should have the last word and that is true under certain circumstances. It's true when you know something that the algorithm doesn't. So my example is, if an algorithm has approved a loan for someone and you happen to read in the paper that [00:23:00] that person has been arrested for fraud, then you will override that decision, obviously. Because you know something the algorithm didn't know. But when it's just a matter that you don't agree with the algorithm, then typically the algorithm should have the last

word, because we are talking about algorithm that on average statistically, are more accurate than people.

[00:23:30] If you start picking and choosing among the decision that the algorithm proposes, which of those you agree with and which of those you don't, that means you imposing your own judgement. And in many situations it's demonstrable that AI is superior. So that's how to organize this and how people can live with AI that is in some sense better than they are. [00:24:00] That's a problem that I think some people are facing already and many more people going to face within the next couple of decades, physicians, for example.

Paul Thies: Yeah. And I can see that, going back to the judge metaphor, maybe there's a judge who, say jaywalking will throw the book at jaywalkers. In the morning, they may be lenient and in the afternoon after lunch, they may be a little more aggressive [00:24:30] in their sentencing. And they're not even aware that they have that noise, but the AI would pick that up and...

Dr. Kahneman: The AI would just not have that problem.

Paul Thies: Mm-hmm (affirmative). Right.

Dr. Kahneman: And it's a big problem.

Paul Thies: Well, Dr. Kahneman, think you so much for your time today and for sharing your insights, this was really fascinating. And I know your Noise, is it's just out this year and there's a lot of work to be done to unpack [00:25:00] that.

Dr. Kahneman: Yeah.

Paul Thies: And I know you and your colleagues are still researching that, but just wanted to thank you so much again for making yourself available for this. So thank you.

Dr. Kahneman: My pleasure.