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

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

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

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:

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