

Module 6: Heuristics - Representativeness

Many of the probabilistic questions with which people are concerned belong to one of the following types: What is the probability that object A belongs to class B? What is the probability that event A originates from process B? What is the probability that process R will generate event A? In answering such questions, people typically rely on the representativeness heuristic, in which probabilities are evaluated by the degree to which A is representative of B, that is, by the degree to which A resembles B. For example, when A is highly representative of B, the probability that A originates from B is judged to be high. On the other hand, if A is not similar to B, the probability that A originates from B is judged to be low.

For an illustration of such judgment by representativeness, I'd like you to imagine a hypothetical situation. Here I want you to imagine that I have conducted 100 interviews with 70 engineers and 30 lawyers and what I'm going to do is I'm going to mix up all of these assessments and I'm going to randomly pull out a profile and read this person's profile to you. Your job is to guess what are the odds you think this person is a lawyer or an engineer. Ok, so we'll start with, let's imagine I pull out the profile of a man named Raj and I tell you that Raj seemed to be outgoing, he was interested in politics, and he displayed particular skill in argument. So what do you think about Raj? What are the odds Raj is a lawyer or an engineer? Ok, let's look at another profile. Let's imagine I pull out a profile of Ravi here. It says Ravi is a thirty year old man. He's married with no children, he's shown high ability and motivation, and has been quite successful in his field, and he's well-liked by his colleagues. So what do you think about Ravi? What are the odds Ravi is a lawyer or an engineer? So if you were thinking about these people here and you thought Raj was probably a lawyer and you thought Ravi was a little harder, you might have said, you know, "I couldn't really tell, 50/50 chance. I mean he could be a lawyer, he could be an engineer, I really don't know". Well if you thought this way, which is how most of the participants in Tversky and Kahneman's study thought, then you've demonstrated this representativeness heuristic. So why is that? Well what you're doing if you thought this way is you're comparing to your prototypes of what you think an engineer or a lawyer is, right? You're trying to decide which category to put this person in and so you compare them to sort of a mental prototype of what is a lawyer or what is an engineer. If you were thinking this way when trying to figure out whether Raj or Ravi was a lawyer or an engineer, you were doing it wrong. So there's a much better way to determine this because what you were ignoring is the base rate information. All right, I actually told you at the start the odds that either one of them is a lawyer or an engineer, right? I told you there were 70 engineers and 30 lawyers I wrote it down right here. You probably didn't include that in your analysis of each profile right? If you include that, you would just say engineer every time, right? 70 to 30 odds. You certainly wouldn't say for Ravi, "well 50/50 chance" and that's actually what many participants said. It's an equal chance of lawyer or engineer. Well, no 70/30, I mean he's probably an engineer and even with the case for Raj, you know, I told you he's interested in politics and skilled in argument. That was to sort of prime your prototype of what you might associate with lawyers. But of course there are engineers who are interested in politics and there are engineers who are good at argument and so, you know, the odds are still very much in favor of engineer even though he sounds like a lawyer.

Ok, so what's happening here? In the availability heuristic, remember, we said that our mind substituted. We're not good at estimating frequency and so what we do is we just see how easily does it come to mind, right? And we answer that question instead. So what's the question here that triggers this representativeness heuristic and what question do we replace it with? Well the idea is we're not good at calculating odds. So whenever we ask this question, as I was doing here, which is "what are the odds of something, what are the odds of X?", you know, in this case it was "what are the odds this person is a lawyer?". Well as soon as we start thinking about this our mind says, "you know what I'm not doing odds. That's going to take a long time and, you know, I don't have the time to do that. Instead let's take a shortcut. Let's answer a different question." So the shortcut is to say "how well does this match my prototype?". Now here's a question that we can answer. How well does this match my prototype of that. So instead of "what are the odds of this, this person is a lawyer" say well "how well does this person match my prototype of a lawyer?". There's a question that we can answer. We can say "Oh Raj, he sounds like a lawyer, you know, he fits my profile, my prototype fits, my sort of stereotypes about what a lawyer is or what an engineer is". So the idea is well if it matches my prototype then I'll say that the odds are high and if it doesn't match my prototype I'll say that the odds are low.

A number of years ago I was talking to a friend from graduate school about how successful our fellow graduate students had been in their research careers. As we thought about these people we began to realize that we were awfully surprised about a lot of them. Some of them did much better than we thought, some did much worse. So we began to say, well, what were we basing our predictions on here? And it became clear that the basis was how representative our friends were of our stereotype of a good researcher, knowledgeable, good quantitative skills, top performer in graduate courses. And then we began to think, what could we have based our judgment on? Could we have done better? And then we realized, yes, we could. We should have looked at the base rate for the person. The more good research they did in graduate school, the more good research later in life. And this reminds me of one of the most useful things psychologists say. The best predictor of future behavior is past behavior. You're not going to do better than that. No other information you can get is likely to be a better predictor. No amount of interviewing, no psychological test you can give, no promises on the part of the person that they're turning over a new leaf. It's past behavior that you want to pay attention to. These examples illustrate that judgment of probability by representativeness leads to serious errors because representativeness is not influenced by prior probability or the base rate frequency of outcomes that should have a major effect on probability but has no effect on representativeness whatsoever. It is worthwhile to keep in mind that there are several other such factors that influence probabilities but have no effect on representativeness, thereby, plaguing judgment by representativeness. These include insensitivity to sample size, misconceptions of chance, insensitivity to predictability, the illusion of validity, and misconceptions of regression. At the end of this module, I've provided several questions for you to answer that illustrate these problems with representativeness.

Reflect on organizational situations where judgment by representativeness may be a real problem. Where you don't want to just be making decisions based on how well things match your prototype. I offer here one example but clearly, there are many others that will come to your mind.

Joelle Emerson, diversity consultant for organizations, articulates an interesting exercise that she conducts in organizations. Picture this. She first has everybody practice raising his or her right hand and saying "right," then raising his or her left hand and saying "left." "I know it feels condescending that I make you practice, but the goal here is to be as quick as you can," she says winningly. The audience obeys, and there is clapping and laughter. Then she gives the test, flashing a series of words on a screen and having the audience members raise their left hand if the word referred to a male—son, say, or uncle—and their right if it referred to a female. She then flashes words pertaining to science (right hand) or liberal arts (left hand). Next she ups the ante: They have to raise their right hand if the word pertains to a male or to science, and their left hand if it is female- or liberal-arts-related. The audience accomplishes this without much trouble. But then comes the revelatory moment. "This time we're going to swap the categories," Emerson says, instructing the group to raise their left hand if a word is male- or liberal-arts-oriented, and their right hand for a female- or science-leaning term. A series of words flashes on the screen—chemistry, history, sister, son, English, grandpa, math, girl, physics, niece, boy—and the room devolves into chaos and chagrined laughter: People's brains just won't go there. They simply can't keep up. Emerson explains that regardless of what order the tasks are presented in, about three-quarters of the people who take the test are slower to respond when asked to link women with science and men with liberal arts. We implicitly associate women with innate talent in liberal arts and men with innate talent in science. These biases may be particularly rife and perpetuated in sectors depending on their foundational beliefs. A 2015 study published in *Science* confirmed that computer science and certain other fields, including physics, math, and philosophy, fetishize "brilliance," cultivating the idea that potential is inborn. The report concluded that these fields tend to be problematic for women, owing to a stubborn assumption that genius is a male trait. The study authors considered several alternative explanations for the low numbers of women in those fields—including that women might not want to work long hours and that there might be more men at the high end of the aptitude spectrum, an idea notoriously put forward in 2005 by then-Harvard President Larry Summers. But the data did not support these other theories. "The more a field valued giftedness, the fewer the female PhDs," the study found, pointing out that the same pattern held for African Americans. Because both groups still tend to be "stereotyped as lacking innate intellectual talent," the study concluded, "the extent to which practitioners of a discipline believe that success depends on sheer brilliance is a strong predictor of women's and African Americans' representation."

You obviously see that this is a problem in recruitment. You run the risk of a hiring manager looking at a résumé, seeing a conventionally male name, a certain alma mater that is overwhelmingly male, discovering the candidate lived in the same hostel as he or a similar caste, and bang—thanks to the unconscious brain making shortcuts and judgment by representativeness, that person gets an interview.

More generally, if you were interviewing a candidate for a job, maybe what's really happening is just a matter of seeing how well he or she matches your prototype for this particular position. You convert the information you're getting from them into a stereotype of some kind, a category or set of categories. Go-getter, good sense of humor, solid judgement probably. The base rate information, the information about their history of achievement is pale in comparison to your vivid image of a person that you can classify so easily by using the representativeness heuristic. Well what's my prototype of this position and does this person match? Ok, they seem to match, give them the job, right? We don't want that sort of thing happening.

It's even worse if you think about situations other than business. I mean, what are the odds this person is a criminal? What are the odds this person is a terrorist? Here we can see why things like racial profiling occur because what happens is that's a really hard question to answer. What are the odds that this person is a terrorist? How do we go about doing that? How well does this person match my prototype of a terrorist, in other words, how well do they match the stereotypes that I have about what, you know, who terrorists are? Similarly, people follow a medical principle that diseases can be treated by something that resembles the disease or something that resembles the opposite of the disease. The lungs of a fox, which has great respiratory powers, can be used for respiratory illness. Colds are caught in cold conditions and cured by hot substances. The representativeness heuristic is the basis for many home remedies that are still in use. In addition to suboptimal hiring practices and misdiagnosis in healthcare, the representativeness heuristic may be implicated on lapses in the criminal justice system, the halo effect, and stereotyping and discrimination, more generally.

In brief, there are profound risks to making judgments using the representativeness heuristic - it can lead us to make significant errors that can have important consequences. Being aware of this bias and actively trying to avoid it can help. The next time you are trying to make a decision, do consider the way in which the representative heuristic might play a role in your thinking.