Probability is the math of uncertainty, chance, risk. It's taking those loose ideas of, we don't know exactly what's going to happen, but we have some idea, and putting mathematical boundaries around that, so you can add and subtract and do all those nice things with it. It shows up everywhere, right, I mean life is uncertain and so anywhere you're not sure of the outcome, probability shows up. So that like, the classic examples are coin flips and drawing cards from decks and rolling dice. Am I going to be late to work today? Is the train going to be late? That's a probability thing, right? The train's late about one day a week, so what are the odds I'm going to be late today? Businesses care a lot about risk, what are the odds that any given sales call on a lead, actually converts into a new sale? Or if you're an airline company, then you really care about your customers getting to where they want, on time, but if you have mechanical failures, there's a chance that that will happen. If you have delays due to weather, there's a chance that that could happen, right? Strikes, right, there are a lot of things that might mess up your service and you can talk about each of those as a probabilistic thing and start to model that in and start to build risk models. On any given day, some people aren't going to show up for their flights, right? And so, airline companies know that and because of that, they can overbook their flights by just a little bit. You sell more than just enough to fill the plane, probability can tell you how many more should you sell. So, conditional probability lets you bring some more information in, when you're thinking about probability. Straight up probability might be something like, what are the odds that the freeway is going to be backed up today? And you know, there is some percentage for that. Conditional probability would be something like, what are the odds that the freeway is going to be backed up today, given that it's a Tuesday? And very likely, the conditional probability of backups on the freeway, is different on different days of the week. Weekday versus weekend, for example, so conditional probability lets you bring in that other information and make your probabilities more sensitive to it. Maybe you're a company and you're worried about your hardware company, hypothetically, you're worried about returns of your product. So, sometimes it gets damaged, sometimes people just don't like it and so they put it back in the box, send it back to you and ask for a refund. Those numbers might be different based on, say demographics, right? Men might be more likely to return the product than women, or people in a certain age bracket might be more likely than others. If you know those probabilities and know those things about your customers, then you can forecast what the likely return rate is going to be. You need to know all of the categories, all of the possible outputs, so you might know that there's a product and let's say it's an Xbox. So, you're selling a new version of an old product, some people are going to trade up for the new one and as a company, you want them to do that to make the sale. Maybe they'll do it on their own, but maybe if you offer them a rebate, then the conditional probability goes up and you can convert more customers that way. A lot of the time, when you do a new release, like that thing has to work on its own, you can't test it out of time. Most marketing teams have somebody who is thinking very hard about it. Customer service, also, because they have lots of transactions with the customers, they have to think about supply chain returns, they tend to be pretty good in statistics. Operations research, it shows up in lots of places. What I find in practical business life, is that once you go through the exercise of running the numbers, you're not likely to make a whole lot of mistakes. The biggest mistake is just not bothering. For any new product, there's uncertainty, this is especially big with start ups where everything about the company is still uncertain. But, if you're careful and smart about it, you can frame that up as a series of questions that need to be answered. Do people really want this thing? How much will they pay for it? How long will they stick around as customers? What will it cost to build? All of those things are things that you can frame as a question and many of them are things where the answer isn't going to be a black and white thing. It's going to be a matter of degree, and when you get to the point where you need to answer that question, it's really good if you can frame it up in terms of a statistical
hypothesis test. The initial question might be something like, will people buy our product? And the answer is well, sure, some people will buy it. Will enough people buy our product? Will more than a million people buy our product? And you can work up to that in stages, using statistics. Here is our expected addressable market, now we can say, go and do a survey of those people and see how many of them seem interested, see how many of them look good on paper and then you can go back to a sample of that and actually try and sell them the product and if enough people buy, you can back that back out to the larger addressable market. You could figure out with pretty good accuracy, how many people are likely to buy this thing. Simple, unconditional probability, that's like wax on and wax off, it's like the basic things you have to be able to think about. For any given decision, you're going to use a lot of those tools, many times. If you come away with results that you're really confident in, and can also convey clearly, that often does shift the decision one way or the other.