Can't Make Decisions_ Prof. El...ch Can Help You Understand Why

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SPEAKERS

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E Eva Dale 00:00

From the heart of the Ohio State University on the Oval, this is Voices of Excellence from the College of Arts and Sciences with your host, David Staley. Voices focuses on the innovative work being done by faculty and staff in the College of Arts and Sciences at The Ohio State University. From departments as wide ranging as art, astronomy, chemistry and biochemistry, physics, emergent materials, mathematics, and languages, among many others, the college always has something great happening. Join us to find out what's new now.

D David Staley 00:32

Ellen Peters is a Distinguished Professor of Psychology and Director of the Decision Sciences Collaborative at the Ohio State University College of the Arts and Sciences. She is also Professor of Internal Medicine by courtesy and Professor of Marketing and Logistics, also by courtesy. She conducts basic and applied research in judgment and decision-making, and she has worked extensively with the U.S. National Cancer Institute and the Food and Drug Administration to advance the science of human decision-making as it applies to health and health policy. She is the former President of the Society for Judgment and Decision-Making, former chair and member of the FDA's Risk Communication Advisory Committee, and was a member of the National Academies Committee on the Science of Science Communication. She has held fellowships with numerous prestigious organizations and has had her research funded continuously since 1999 by federal agencies, including the National Science Foundation and the National Institutes of Health. Welcome to Voices, Dr. Peters.

E Ellen Peters 01:30

Thank you, it is a pleasure to be here.

D David Staley 01:33

So you study judgment and decision-making, and I wonder if you might first begin by telling us a definition. What do we mean by judgment, what do we mean by decision-making, and how does a psychologist study these phenomena?

E Ellen Peters 01:46

Yeah, so judgment and decision making, how do we think about that? A decision is something when you have a choice between two or more options, and so you might be choosing, for example, for breakfast between eggs versus cereal, and you make a choice between them, that's a decision. A judgment is something when you're making an evaluation. So you're evaluating, well, what is it that I like and dislike about eggs? You know, maybe they're... I don't like the yellow color, I don't know, but I liked the way that they taste. I don't like them scrambled, but I do like them over-easy. Those are judgments that we make, and we use those judgments or evaluations as we try to come up with a summary overall, how much do I like this thing, that we then use to try to figure out am I going to choose it, or am I going to choose something else?

D David Staley 02:32

So how does psychologists study these phenomena, judgment, for instance?

E Ellen Peters 02:38

So psychologists look at it usually in terms of information processing. So, we think about, when we're judging and deciding, we think about all the different sources of information that we have around us, some of which we're paying attention to and some of which we're not. And that's one of the things that psychologists are actually interested in, there's all this information, are you paying attention to it or not, because there's actually too much information out there to pay attention to all of it. Then, of the information that you're paying attention to, how much do you understand it? How much do you weigh it in a judgement or in a choice? So we look at it in terms of information processing. Some people, for example, really pay attention to numeric information, and they weight it quite heavily in decisions. Other people might really trust and rely more on their intuitions and emotions, and they use that information more in their judgments and decisions.

D David Staley 03:27

Is one a subset of the other? That is to say, is judgment a subset of decision-making or vice versa, or are these sorts of different cognitive processes?

E Ellen Peters 03:35

Yeah, so the way that I think about it is that judgments are a subset of decisions, you have to make these evaluations or judgments first before you can come up with, what is it that I want

make these evaluations or judgments first before you can come up with, what is it that I want to choose. Not everybody thinks about it that way. Some people simply think that well, as you're judging, you actually are making a decision about what that evaluation is. And in the literature, people sometimes just use the term synonymously to be honest. I tend though to think about judgments as a subset of decisions.

D David Staley 04:00

Some 40-odd years ago or more, the computer scientist Joseph Weizenbaum wrote the book Computer Power and Human Reason. He drew a distinction between decision-making, or decisions, and judgments, and said that computers might be programmed to make decisions, but only human beings can, and should, make judgments. I'm interested in your reaction to that sort of line of thinking.

E Ellen Peters 04:25

Yeah, so I think what he's talking about is the idea that in order to evaluate something, you're evaluating its goodness, and its badness oftentimes, and there's not necessarily a correct answer when it comes to goodness or badness. What you think is very good, I might think as, eh, you know, I don't care. And so in judgments, we're bringing to bear our past experiences, we're bringing to bear our abilities, we're bringing to bear all kinds of things that are kind of who we are as humans; our emotional reactions, our intuitions, are being brought to bear on those judgments. And then in choices, you actually can think about choices the same way, that we're still bringing those emotions, those intuitions to bear, but you can think about choices in a very algorithmic way. When it comes to choice, you've got, let's say, two things in front of you, and then you have information about each of those options. And that's what computers are for, they're for taking all of this information and summing it up in nice, beautiful ways to come up with ah, this is the right choice. In fact, when you look at researchers who have looked at the ability of computers to make decisions about interview candidates, for example, as opposed to having us humans make decisions between candidates for a job, what the research suggests is that the computer is actually better at making those decisions once humans input the judgments or evaluations about those candidates, you know, pieces of information about each of the options.

D David Staley 05:47

Tell us a little more about the Decision Sciences Collaborative here at Ohio State.

E Ellen Peters 05:52

Yeah, so the Decision Sciences Collaborative is a terrific group here on campus. It is a collection, a very interdisciplinary collection of faculty and graduate students and other people from around the university who come together on these topics of interest around what is it that people do to judge and decide. How is it that we choose medications? How do we make decisions about policies? What do governments decide, and why did they do what they do? And so it's a group of people from within primarily Arts and Sciences, psychology, political science, and economics, but we actually very much reach across colleges as well, over into marketing,

into medicine, into public health, into the John Glenn School of Public Affairs. Because when the rubber hits the road, it's the human beings who are making decisions about all of the consumer goods and policies and whatnot that we do every day.

D David Staley 06:46

I first encountered your work in a 2012 article you co-authored on choice architecture. First of all, can you define for us what choice architecture is, and then what were some of the main conclusions of this article?

E Ellen Peters 07:00

Yeah, so choice architecture, you have to first start with the idea that, while most social sciences think about there often being something that people prefer, that when you are choosing, again, we can go back to the kind of dumb breakfast example, between eggs and cereal, that inside your head, you have a firm preference about eggs, and you have a firm preference about the breakfast cereal, and it's not changeable. Psychology and the people behind all of the choice architecture work come in instead with the assumption that our preferences are what's called labile, or malleable, or changeable, and it all depends on the context, and that oftentimes, we really don't know what our preference is and we have to construct it, or we have to be an architect on the spot to try to figure out what it is that we prefer, and we use part of the context to help us figure that out. And so, in choice architecture, one of the primary choice architecture techniques that are used has to do with the default options. And so if you think about retirement choices, when you ask people, everybody wants to save more for retirement, but very few people do. So what's been done in the literature, and in the end, it's been done in companies and by the IRS and it's gone across the country and across the world, for that matter, in a variety of ways, is to change what the default option is. When you come in to be hired, it used to be that the default was, well, if you want, you can choose to save more into this 401k plan. What's been happening is that more and more people are changing that default option, and it's now allowed by the IRS. So the default is now you are enrolled, and if you want, you don't have to be, just sign this form. And so in that simple, very weird little tiny, it seems, change in what the default option is, it makes a vast difference to the proportion of people who end up saving for retirement.

D David Staley 08:44

I want to be clear, in that instance, the choice architect is someone else, in a sense, the decision is being... what, the context has been established by someone else other than me?

E Ellen Peters 08:55

Yep, but that's often the case. If you think about going to the doctor, a doctor is often telling you. Let's say you're choosing between these two treatment options for some condition that you have, and you ask, well, what's going to happen, what are the pros and the cons of that? And the doctor is going to tell you something, let's say he's talking about the side effects, and she's going to tell you the proportion of people who are going to suffer that side effect, or she's

going to tell you about the proportion of people who do not have that side effect. She is choosing a choice architecture for you, and that may make a difference to how you understand the information, how you feel about it, and ultimately what you decide to do. People are often choosing the choice architecture for us simply in how they frame information.

D David Staley 09:33

So you have a forthcoming book, Innumeracy in the Wild: Misunderstanding and Misusing Numbers. First of all, tell us what you mean by innumeracy.

E Ellen Peters 09:33

So innumeracy is just about people's ability with math, essentially. So someone who is innumerate is less able to understand mathematical concepts and less able to use those mathematical concepts. Someone who is numerate, on the other hand, is someone who's very good with numbers, who can understand them, who can use them. And the way that I study it, they're people who can actually use them as they judge and decide in their everyday lives.

D David Staley 10:08

So give us an example of the way in which we're using numbers. We're not talking algebra and calculus here, we're talking more basic sort of use of numbers?

E Ellen Peters 10:17

Oh, sure. We're talking about understanding how to get to the doctors on time, you live downtown and you have to go north of downtown in order to get to the doctor, there's a certain time you have to hit. It takes some amount of time to get ready, to get out the door, to go down the steps, to drive, to get to the office, and up the steps to her office, and being numerate helps us to understand better how to estimate those numbers and how to use those numbers to get there on time. Now, we have lots of tools we can use to help us with that, so for example, you were talking about nudges before, you can actually think about a GPS, for example, as being a nudge because...

D David Staley 10:56

It's a kind of choice architecture.

E Ellen Peters 10:57

It's a kind of choice, excuse me, yes, a kind of choice architecture, that's a better way of putting it, it's the kind of choice architecture that provides us with some support for our decisions. It gives us a context that gives us information that we can then use to make, in this case, better decisions about when do I have to leave to get there on time. But the choices we

make that involve numbers can be anything from, as a patient, understanding the risks and benefits of a medication, knowing when to reorder your medication so that your pills don't run out before you've actually gotten a new supply. It can be understanding which mortgage to pick based on interest rates and different fees that might be charged. It's all kinds of things that we do every day, it's even going to the grocery store to figure out well, what's my best deal, where's the sale, what do I want to choose based on the numbers?

D David Staley 11:45

So I take it from the title of the book and what you just stated here, that innumeracy is a problem, a challenge in the United States? What is the scope of innumeracy, what's the magnitude of the problem?

E Ellen Peters 11:57

So innumeracy is absolutely a problem in the U.S., also around the world, for that matter. But if we think about just the United States, about 29% of our population, that's about 72 million people, and those are all adults, about 72 million adults, can do only very simple operations with numbers. And it's something that people in universities often don't understand, because they haven't had access to this, but about 72 million American adults can count, they can sort, they can do simple arithmetic, they can use simple percentages, like 50%, for example, and they can only do that if there's not much distracting other information around it. And so we have a very, almost a third of our population, who likely cannot manage effectively in health and financial environments without significant support around the numeric information that's involved.

D David Staley 12:45

So innumeracy in that sense, is like illiteracy. What's the...

E Ellen Peters 12:49

Yeah, so innumeracy is like literacy, but it's with numbers. That's exactly right.

D David Staley 12:54

So what are the causes, I suppose, of innumeracy? Does your research explore this in any way, the causes or the remedies, maybe?

E Ellen Peters 13:01

Yeah, so in terms of the causes, this isn't something that we personally study, I cover it somewhat in my book. You know, innumeracy can come from a variety of different places. You can have a series of bad math teachers way back when, you might have had a single bad

negative stressful experience that then caused this math anxiety that just prevents you from even trying anymore. And if you don't try, when you're in the middle of math courses, you learn less. Unfortunately, that can have this sort of cascading negative effect where you, you knew less, you tried less hard, you end up falling further behind, and it just cascades. And so you can get some of those kinds of effects. There is some genetic involvement actually, with math as well as with math anxiety, it's a small, a relatively small component, but there is some genetic involvement. But there are also ways that we can improve people's numeric ability, we can improve them in children, certainly. So with children, you get the biggest bang for your buck, when you're trying to teach them to be better with numbers and to be more numerically confident, but there are things that we can do with adults as well. So for example, we did a study not too long ago - inside the psychology department, we have a required statistics course for undergraduate students. And what we did inside the classroom, we knew that they were all going to get math training, but we also knew that quite a few of them were kind of afraid of the math class, we hear that a lot from our students. And you always want to support your students, and so one of the things that we tried to do was to do a psychological intervention inside the class. So it's an experiment, so we have to randomly assign people to the intervention, and then randomly assign the other half of the people to a control condition, and that's how we can tell if the intervention works. So in our experiment, what we did in our intervention condition, is we gave them a list of values that are often important to other people, things like family and friends, science, politics, there's all kinds of things that are important to people. They rank ordered them from, this is the most important to me, and this is the least important to me, and we then had them take their most important value, and just simply write about why it's important. Why is it meaningful to you, how does it make you feel good? And by going through that exercise, it gets them to kind of abstract away from the little detail stuff of the moment that's causing them anxiety, in this case, the statistics classroom, and the thought of trying to learn more math. And what happens compared to the control condition, that intervention condition, by the end of the semester, they became better at objective numeracy. They were more numerically confident, they became more financially literate, and they adopted more healthy behaviors. And so you can do these relatively small interventions - now I have to say, this particular experiment had a small effect, it was our very, very first experiment, so we can show that it works, but what we're working on now as we're trying to ramp up that effect size and see if we can get bigger effects among our students, and then among other adults in the community.

J Janet Box-Steffensmeier 15:42

I'm Janet Box-Steffensmeier, Interim Executive Dean and Vice Provost for The Ohio State University College of Arts and Sciences. Did you know that 23 of our programs are nationally ranked as top 25 programs, with more than ten of them in the top ten? That's why we say the College of Arts and Sciences is the intellectual and academic core of The Ohio State University. Learn more about the college at artsandsciences.osu.edu.

D David Staley 16:07

There seems to be so much attention on math right now, especially in the K-12 grades. Why does this problem persist? Is it that we've, we've not been very effective in math education, not in the ways that you just described in this experiment?

E Ellen Peters 16:21

You know, I really don't know. It's not my area of research, like that kind of mathematical pedagogy is not my personal area of research. What I'm really interested in is, do we have anything to offer from psychology and from the decision sciences, do we have anything to offer that can help make things better, either for younger students or older students or adult students, in ways that will help their math ability? But to me, that's a symptom. What I'm really interested in is everyday decisions, I'm interested in, can I help make the quality of people's lives better.

D David Staley 16:53

What explains math anxiety? In other words, we don't talk about reading anxiety, for instance, or literacy anxiety, what is it about math in particular that provokes that sort of reaction?

E Ellen Peters 17:04

Yeah, you know, numbers are weird. Numbers, they are, they're like, they're super... they're abstract, it might be three degrees, or 3 dollars, or three something else, and it's always the same number three, but it's like, what the heck is a three? It's just this abstract symbol that, on its own, is meaningless, and it only gets meaning from a context. And then when we're teaching math, we're asking people to do things that are cognitively difficult. So three is bigger than five - excuse me, I'm sorry, that would be the other way - five is bigger than three, but 1/3 is bigger than 1/5. And so you have to deal with these difficult abstract concepts that everybody makes mistakes with, note mine, but also that they're just difficult for students to wrap their minds around.

D David Staley 17:52

So what are the social or cultural implications and consequences of innumeracy?

E Ellen Peters 17:57

Oh, gosh, they're pretty vast, actually. So we, in my lab, we study more health implications than anything. And if you go in and look at studies that have looked at how is numeracy related to different health outcomes, we can see that people who are less numerate adopt fewer healthy behaviors, they're less likely to exercise. We did a study in a very rural area of Ghana in Africa, and found that they were less likely to use condoms to protect against HIV. So it's associated with fewer protective health behaviors, but then it also...people who are less numerate are 20% less likely to have at least one chronic disease, but they also take 40% more prescription drugs at the same time, as they're less able to follow complex medication regimens that come with things like HIV, or stroke risk, or other kinds of complex medications that you have to take. At the same time, people who are less numerate end up in hospitals and emergency rooms more often than the highly numerate. So you see a variety of different negative health consequences that the less numerate suffer, and that we think are associated with this idea that they understand information, numeric information, less well, and they make

decisions that involve numbers less well. And any one of those probably doesn't matter, if you don't understand something once, unless it's a really important decision, it probably doesn't matter that much. If you make one bad decision or have one - or form one bad judgment, again, one probably doesn't matter that much. But what we think happens is that there is a cumulative risk factor that happens for the less numerate where it's not just that they don't understand once, they don't again and again. And it's not that they'd make just one bad decision, they do it again and again. And we think that, as a risk factor, that lower numeracy accumulates into less healthy outcomes.

D David Staley 19:45

Given your background in decision sciences, what drew you to the subject of innumeracy?

E Ellen Peters 19:49

You know, I was originally an engineer.

D David Staley 19:49

Oh, no kidding.

E Ellen Peters 19:52

Yeah, so way back when I was an engineer, I studied systems engineering, and I had just always loved math. I just thought it was fun to play with, you know, we had math class and we... my friends and I would have little contest to see who could do it faster and get fewer wrong. I just thought it was fun, honestly. Some people think math is even beautiful, if you talk to mathematicians, math is beautiful to them. I'm not sure I've ever gotten quite that far with math and thinking it's beautiful, but I always thought that was very fun to play with. And as I switched my career and became a decision scientist, I started thinking about the idea that so many of the decisions that we make involve numbers in some way. And so I got interested in this idea, you know, is it possible that people who differ in math ability might actually process information in ways that are different, and that end up mattering?

D David Staley 20:40

So tell us more about your lab, and especially how it functions. Oftentimes, when I have scientists on this program, I asked them about the functions of their lab - tell us about your lab.

E Ellen Peters 20:51

When people think about labs, they often think about a physical environment and all the cool equipment that people have. We study the mysteries of the human mind, it is all inside. And so oftentimes, what we are doing is we are designing questionnaires, we're designing

experiments. So we have people do... we don't use that much fancy equipment, per se. Instead, what I have is this amazing lab of fantastic creative undergraduates and graduate students and postdocs and research associates, who come together with me and just, honestly, we get to play with fun ideas and try to make a difference out in the world.

D David Staley 21:27

Tell us about the role of the undergraduates play in your lab, I have a particular interest in what we're doing with our students here at Ohio State.

E Ellen Peters 21:34

Yeah, so we have a series of probably about half a dozen undergraduate students right now in the lab, and they do a whole variety of things. We have one amazing undergrad student who recently was helping us to program an experiment. We've been having a problem with, being able to ask questions appropriately, and she happened to know this one unique computer programming language, and she just came in and just changed everything, made it work better, she was just awesome. We have other students who help us, one of the things that we always have to do, because we study objective numeracy, so we actually have to test people's math ability, so we actually give them a math test. One of the problems that we have, and it's might seem like a small problem, but it's actually a huge problem for our research, is that our numeracy problems become well known, and so we have to change them so that people can't quickly find the answers if they Google them. And so we have a couple of undergraduates who've been helping us, well, how can we ask that in a slightly different way? So we try to keep it about the same difficulty level, but we creatively come up with, and they definitely creatively came up with, just a bunch of different ways of asking math questions so that it would keep people's attention, but it'd be different from what we'd asked before.

D David Staley 22:44

So tell us what's next for your research.

E Ellen Peters 22:46

So we are interested in two things right now in my lab, we're interested in how do we help people get better with numbers? And so can we design interventions that can occur in a classroom or even outside of a classroom setting, in order to help people learn math better, and in the end, hopefully become healthier, and even maybe financially wealthier? That's the idea, that's ideally what we'd like to do. And so we're working on some of the first steps to that right now, we have a couple of studies that have worked, so we kind of have a path forward about how we want to study it, and now we're just looking at how can we get bigger effects. The other thing that we're looking at is this really... what I find a really interesting idea that people can be better and worse at math. But I have had friends who are pretty good at math, and I know that because I've interacted with them on a daily basis, but they have no confidence in their math ability. And so there's this interesting separation of actual ability, objective ability and numeric confidence, how confident are you in that ability. And so we're starting to do

studies now where we're looking at, how do they both matter? Because it turns out, they both do, and they seem to interact in some interesting ways. Numeric confidence is associated with how much do you persist, and if you think about health, we often have to persist in our healthy behaviors. It's not that you just exercise today, it's not that you just eat well today, you've got to do it tomorrow and the next day and the next day. And people who have more numeric confidence are more likely to persist in tasks that involve numeric information in some way, and that could make them healthier over time. But you also have to have ability, and so what we're interested in is that interaction between numeric confidence and people's persistence. But also, do you actually have the ability to run the numbers, do you actually have the ability to get the right answers, or do you get wrong answers because you're persisting and you just keep going anyway?

D David Staley 24:41

Ellen Peters, thank you.

E Ellen Peters 24:43

Thank you. It's been a pleasure.

E Eva Dale 24:44

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