Episode 70: Stephan Lewandowsky

# KL: Katie Linder SL: Stephan Lewandowsky

# KL: You’re listening to “Research in Action”: episode seventy.

# [intro music]

# Segment 1:

# KL: Welcome to “Research in Action,” a weekly podcast where you can hear about topics and issues related to research in higher education from experts across a range of disciplines. I’m your host, Dr. Katie Linder, director of research at Oregon State University Ecampus. Along with every episode, we post show notes with links to resources mentioned in the episode, full transcript, and an instructor guide for incorporating the episode into your courses. Check out the shows website at ecampus.oregonstate.edu/podcast to find all of these resources.

On this episode, I’m joined by Dr. Steve Lewandowsky, a cognitive scientists at the University of Bristol. He was an Australian Professorial Fellow from 2007 to 2012, and was awarded a Discovery Outstanding Researcher award from the Australian Research Council in 2011. He received a Wolfson Research Fellowship from the Royal Society upon moving to the UK in 2013. In 2016 he was appointed a Fellow of the Center for Skeptical Inquiry for his commitment to science, rational inquiry and public education. He was appointed a Fellow of the Academy of Social Science in 2017. His most recent research interest examine the potential conflict between human cognition and the physics of the global climate, which has lead him to research in climate science and climate modeling. He has published over 150 scholarly articles, chapters and books. Including numerous papers about how people respond to corrections of misinformation, and what variables determine people’s acceptance of scientific findings. He has also contributed around 50 opinion pieces to the global media on issues related to climate change skepticism and the coverage of science in the media. He is currently serving as a Digital Content Editor for the Psychonomic Society and blogs routinely on cognitive research at psychonomic.org.

**KL:** Thanks so much for joining me today, Steve!

**SL:** Thank you, it’s a pleasure to be here.

**KL:** So I’m really interested in these components of your work of memory and misinformation. I know that much of your work is learning how the mind works. What lead you to focus in this area? What really peaked your interest?

**SL:** Well my interest in misinformation started in 2003 with the invasion of Iraq, because at the time I was following the news and there seemed to be a lot of reports about these weapons of mass destruction, preliminary suggestions that they had been found by allied troops, and then a couple hours later that turned out to be false, and there’s repeated kind of hinting at “Oh we’ve found something. Oh no we haven’t. Uh maybe we found something? No we haven’t.” It was just too and fro, back and forth for weeks at a time, and I became fascinated with asking what effect that might have on people’s memory of those events. So I checked into this and we ran a study while the war was ongoing, we were sort of racing the Marines to Baghdad trying to get our data in before the war was over. What we found was that most people were unable to disbelieve items that they knew to be false. At least in our American sample that was the case. We ran this study in three different countries, and among Americans we found this fascinating phenomenon that would know an event that would have presumed to have occurred, but didn’t really. People wouldn’t know that this event never happened, but they still believed in its existence, and we found that to be very fascinating because assume that if I knew something didn’t happen that I no longer believe in it. That pattern we found in our Australian and German participants. And the we thought “Gee, what’s going on here? Why do people differ between countries?” because you know typically they don’t, everybody in my research, you know I’ve been doing this for 30 years, everybody thinks the same. Roughly speaking. Regardless of their culture and where they are, pretty much. So we check this out a little further and then what we discover is that there is this underlying variable that explained everything across countries and both aspects of this behavior, and that underlying variable was skepticism. People were skeptical or suspicious of the reasons underlying the war. People who didn’t think it was about weapons of mass destruction, they were better able to differentiate between the information that was true and that was false, and that was the case regardless of what country the people were living in. The reason we found those differences at a national level was because in America there were fewer people who were skeptical of the war than there were in these other two countries, and that ultimately explained the difference. So that’s what got me fascinated into this idea of how do people process misinformation, why does it occur, and how skepticism such an important element and people being able to misbelieve things they know are false.

**KL:** So I’m curious, and you immediately make me think about when you talk about skepticism, I think immediately about students and how we’re trying to train them in critical thinking, and I’m wondering if you can kind of compare those two things? Are those the same? When you say skepticism are you thinking about critical thinking? What’s the relationship between those two things, because that’s kind of a common element we have, and a lot of our curriculum for our students is trying to train them in that way. How is that the same or different from what you’re talking about?

**SL:** Well I think the context are closely related. So yes, you know people who are good at critical thinking will be able to question what they are encountering and then they may decide to disbelieve certain things upon careful analysis. Now one important thing about skepticism that people often overlook is that skeptics actually, and in our study and I think generally, believe things that are well supported by evidence. Skepticism is not Nihilism. It’s not the rejection of everything. It’s not rejecting the fact that the earth is round. That is not skepticism. To say the earth is flat is ignorant, or it’s in denial of basic scientific facts, but it’s not skepticism. Because what our data shows is that skeptics, as we define them in the Iraq, study were actually better at identifying and believing things that were true, than people who were anti-skeptical. So skepticism is, oh let’s call it a scalpel that sort of cuts truth from falsehood, but it isn’t a sledgehammer that completely gets rid of anything and you end up believing nothing. That’s not skepticism. I think that’s a very important point to make, because sometimes people say “Skepticism is good thing therefor I no longer believe that the earth is round” or “I don’t believe that vaccinations are going to save my children’s lives because I’m a skeptic.” And that’s just an over extension of the concept.

**KL:** So one of the areas of your work is writing computer simulations of memory decision making processes, and this sounds fascinating to me. I’m wondering if you can share a little bit more about this part of your research and how this kind of connects to some of the questions you’re asking in these areas.

**SL:** Yeah I’ve been doing this for a long time, in fact I just finished another book on this, thank God. That took a year out of my life at least. But the basic idea is that if you write a computer simulation of how the mind works, so if you start out with a model of how the memory might work – computer simulation of that model, then you’re forced to specify every single assumption in your model explicitly, because the computer isn’t going to do any hand waving for you. The computer will just do as it is told, and that means you have to specify everything. Every single little assumption, you have to specify. And it turns out that that is a challenging and nontrivial task, because a verbal model which used to be the conventional standard in cognitive science decades ago. Verbal model is always necessarily fuzzy and even though you may have specified it all by just talking about how the mind works, in actual fact I can almost guarantee you that you’ve overlooked something and you’ll never find that out until after you implement your model in a computer program, and once it works and deliver results in a computer program then at least you’ll know that you’ve specified it correctly. It may still be a bad model, but that’s a totally different question. At least you have specified the model correctly so that you can now start and test it by trying to explain existing data or ideally by um predicting new findings.

**KL:** Steve, I know we’re just getting started, so we’re going to take a brief break. When we come back we’ll hear a little more from Steve about distrust of science. Back in a moment.

# Segment 2:

**KL:** Steve, I know that one area of your research on memory and misinformation has started to transition into looking at distrust of science, and I’m wondering if you can just start by talking about when people distrust science, where is that stemming from. What are some of the factors or variables that you found to be involved with that?

**SL:** Yeah that’s an interesting question. Basically people reject well established science when it is threatening to them in same way, and very often that threat is to people’s world view. So let me give you an example, probably the strongest case and the most important example at the moment, and the is climate change. Now I do a lot of work in climate science and you know I go to geophysical conferences, and I can absolutely assure you that in the scientific community no one is debating that the earth is warming because of greenhouse gas emissions. I mean we’ve known this for 150 years. There’s really no mystery there about that basic fact at all, and yet there’s a lot of public debate. People are denying it. I mean, Donald Trump has thought that climate change is a Chinese hoax, uh for example in one of his Tweets. So the question is where does that come from? This sort of opposition, this rejection of well-established scientific fact, and in the case of climate change it is actually very easy. If we take the science seriously and we want to deal with a problem, then we’re going to have to change the way we do business. It’s as simple as that. We’re going to have to cut carbon emissions. How do you cut carbon emissions? Well you either put a price on carbon, or you introduce a tax on carbon, or you introduce regulations. All of which is possible. All of which would be successful, some more than others, we can debate the policies. We know that that would work, however those ideas are incredibly threatening to people who think that free market economics are the best way to run a society, and some people hold that belief very dearly, very deeply, very emotionally. They’re committed to that idea of free enterprise, and so when they recognize “Woah, whoa, whoa, whoa. Hang on. If this is true then that means my preferred way of doing business is no longer the way to go.” The moment that happens people just protect um their identity by rejecting the evidence. So instead of saying “Oh we got to deal with this problem” they say “Oh, there isn’t a problem.” And I know this because there is some blog out there on the internet that tells me “Oh this is all a hoax...” or whatever. People then engage in what we call motivated cognition which means they start out knowing what the outcome will be because that’s what their worldview is mandating, and then they’ll do whatever it takes to justify that belief. So they’ll make the evidence fit the belief, rather than the other way around. That is what we find with climate change very strongly, this has been, this finding has been replicated countless times on American samples, the American market, and I have four or five questions about the free market that I can ask people and their answers will tell me with amazing confidence or certainty what their attitudes are toward climate change. Even though economics has nothing to do with the laws of physics. So it’s sort of paradoxical until you think about what the implications are of climate change, and of course they are serious, and they are serious and they’re serious in that we need to change the way we do business and for some people that is extremely challenging and so they just deny that there is a problem.

**KL:** So you mentioned earlier was it motivated cognition? Is that the term that you used? [Yes]. Is that the same thing as confirmation bias? Which is I think is something we hear about more frequently, or is it connected in some way?

**SL:** Oh it’s connected. I think motivated cognition is an overarching term for you know anything it takes to get the outcome you want. Right? Basically. In a nutshell. You know motivated cognition means you know, “I’m going to explain a way the problem of climate change. It doesn’t matter how, I’ll just do it.” And then you know you can apply all sorts of things. You can imply confirmation bias, or you can find a you know cherry picked arguments that somehow seem to be strong enough to counter the science, when in actual fact they’re not or else the scientist would have taken them on board. But still, for the public that may be sufficient to deny that there is a problem, and in the extreme case you can engage in conspiratorial cognition, you can just say, “Oh there’s no problem. The scientist are just all liberals who made this up, and by the way Al Gore is fat.” Or whatever. There is a lot of talk out there on twitter and in the blogs and even the media suggesting that climate scientist have made this up um to support the world government or whatever. It gets to be very conspiratorial very quickly when you scratch the surface. Um and for very good reason which is, you know, if you do accept that there is a huge amount of evidence and all the scientist agree. Well then how can you explain that in a way other than saying, “Oh they conspired to come up with that result” and “It’s a conspiracy.” Then of course you have your get out of jail free card, all you have to do is accuse scientists of a conspiracy, and off you go. You don’t have to believe in anything they say.

**KL:** So I think that leads to a really hot question right now which is, is there a way to improve a level of trust in science? Or convince people who tend to distrust? You’ve kind of implied, or not implied but stated the relationship between ideology and belief and skepticism and how these people are kind of engaging with these ideas. Have you found things that are helpful for people who are saying, “How can we change this? How can be bring more trust in science?”

**SL:** Yeah well, first of all there’s a couple of things. First of all, notwithstanding the decline in trust. It is still – by and large in most counties, by far the most trusted profession in society. University, independent university scientist enjoy a great deal of public trust, even now. Um so that is sort of the good news. The bad news is, is that you’re absolutely right, trust has been declining. Um but interestingly the decline has been lopsided, and if you look at the trends, if you look at the data over time, over the last 30 or 40 years, then you’ll find that trust has declined primarily among republicans and to a lesser extent among independents, but not among democrats. So here again we have this sort of partisan polarization that started out in the 1970’s, about 1975, um and again I think incidentally that that was probably the time when science started to discover that technology have nasty consequences such as pollution, you know? And I think there was a shift of science being always supportive of more technology, more industry, more whatever. Um away from that toward also noticing or noting that there are bad sides to this. That development sometimes results in terrible consequences. You know, TDT killing the birds and entering the food chain and all that kind of stuff, which we wouldn’t have known without scientific evidence, and tobacco causing lung cancer. So again I think there’s a lot of um economic implications there that have led to this asymmetric decline in trust. Now what to do about it. Well that’s the million dollar question. There’s a number of things you can do. One of the things that has been found to be successful, usually but not always, is to underscore the strength of a scientific consensus. Now more often than not, that will let people believe that “Aha” we have to take this problem seriously if all the scientist are to agree on it. Now it sometimes doesn’t work with people who are free market, strong believers in the free market or republicans but it does frequently work that’s what our data shows, and it also works when you tell people about the scientific consensus underlying vaccinations. That all medical researchers agree on that being the most profound positive development in public health in the last 100 years, you know, which it is. When people are reminded of that that does make a difference. Um now it also is uh helpful to side step a polarizing issue such as climate change. So for example there are some evidence to suggest that if you don’t talk about climate change, but you talk about the health benefits of moving to clean energy that’s something that more people can agree with across the partisan divide, and um so, there’s no easy answer.

**KL:** Well it’s certainly a complicated issue. We are going to take another brief break. When we come back we’ll hear from Steve about some of his most recent work on what he calls the “Post truth era”. Back in a moment!

# Segment 3:

**KL:** So, Steve I know some of your most recent work focuses on what you call the post truth era, and why don’t we start by just defining that. When you’re using that terminology what do you mean?

**SL:** Well what I mean is what everyone else seems to mean by it. Um and what I mean by that is that if you look at the media coverage over the last decade or so, and I’ve done this using a media search engine called Factiva, which looks at all the world’s media and keeps track of everything that happens. Um if you put in the terms “post truth” or “post fact” what you will find is that until the end of 2015 no one used those words. Those words are completely new, and if you then look at the trajectory of the last 18 months or so you will find that there has been a skyrocket in concern and usage of this word post truth or post fact, and it has gone from zero to hundreds and hundreds mentions in the world’s media in just no time at all. In fact the word “post truth” was coined or nominated word of the year by Oxford Dictionaries for 2016. So, something is happening out there. People are very concerned about post truth and post fact. So what does it mean? Well that’s where things start to get a little hazy because of course not everybody agrees on that, but what I think is going on is we just had a presidential election in the U.S. last year where independent fact checkers have identified one candidate that spoke the truth about 2/3 of the time and another candidate who spoke the truth at best a quarter of the time, and guess who won the election. It was the candidate who three quarters of the time, according to independent fact checkers did not speak the truth, and that person is now in The White House and the mainstream media are continuing to compile lists of misleading or false statements by Donald Trump, and so I think that was a major contributor to this concern about post truth. That there seems to be just, you know, this phenomenon that facts no longer mattered. Evidence no longer seemed to matter.

We had another incident here in the U.K. about a year ago, the Brexit Referendum, where the British public narrowly voted to leave the European Union and there was a famous line by one of the campaigners for leaving the EU who said “The British public is fed up with experts.” As though experts, you know, who needs experts? You know that was the way it was reported, and that was the way it seemed to be because evidence didn’t get any traction in the public debate. Now it turns out a Ph.D. student of mine and my colleague, Ullrich Ecker, we published a paper a couple of months ago where we looked at this in greater detail, um running an experiment on Trump supporters and others in the U.S. about a year ago during the primaries, and what we did was the following. We presented people with claims that were made by Donald Trump on the campaign trail, um half of which were false the other half was correct we just chose an equal number of true and false statements. We asked people to tell us how much they believed those statements, and then we told them which ones were true and which ones were false, and what we found was quite interesting. First of all when we told people that something was false, they reduced their belief in those statements at least initially, and it was even Trump supporters who did that. It wasn’t just democrats it was also people who supported Trump who reduced their belief in statements that we told them were false. However what we also found was that that change in belief had absolutely no association with peoples voting intentions or their feelings about Donald Trump. So basically it suggested to us that “Yeah okay, people will recognize when something is false, but it doesn’t matter. It doesn’t affect how I feel about the person or whether I will vote for that person.” And precisely that same finding was obtained with a different methodology by other researchers since then, so I’m pretty sure that that is an element of what is going on. That we have a plethora of information out there, a lot of which is false, um but that in some sense, in some way it no longer matters. People are not swayed by a politician that isn’t telling the truth. They aren’t going to say “Oh wow, this isn’t so good.” Um and so I think that’s what I mean by post truth. That there’s just that sense, that evidence and facts that no longer matter, that people have their alternative facts. That will probably be the word of the year for 2017 I think. Alternative facts, what a wonderful phrase! Except there are no alternative facts. There are either, it’s a fact or it’s not. So that is what I think is happening right now and it obviously to my mind has to be deeply concerning, because if in a public debate about politics or society, if you cannot agree on what’s true and what isn’t then you can’t have a debate. Then all it is a screaming match and the most power people with the loudest voices will win. It’s as simple as that. So it’s the end of democracy asically, because it turns it into a head kicking competition. Um so we have to do something about it I think with great urgency.

**KL:** So um this is pretty huge, Steve. In terms of what you’re describing here. The end of democracy um that’s a pretty big deal.

**SL:** Let me tell you, it’s a big deal, and a lot of people share that view and a lot of people are out there working on possible solutions.

**KL:** Yeah well and I want to get to one area that you’re kind of proposing and it’s an interdisciplinary approach to this issue, and you’ve called it techno cognition. I’m wondering if you can describe that and how are you seeing it as connected to this issue, and possibly, you know, solution might be too broad of a word, too optimistic of a word, but certainly a response to the post truth era. So can you talk a little bit about techno cognition?

**SL:** Yeah so it’s a combination of technology with cognition that its intent would be to design our technology to take into account what people think. Um and I think that’s a very promising avenue because the problem we’re having now in part is due to the technology that we have. Post truth could emerge because of the internet, and because of the availability for pretty much anyone to say anything on the internet, and conversely for anyone no matter how absurd their belief is to have that belief confirmed on the internet. I mean I would challenge anyone to think of a belief absurd enough that you couldn’t find anyone on the internet who’s going to share it with you. Okay? So um I think the technology was in part responsible for what is happening now, I mean we know that on Facebook for example, the number of incorrect stories being shared is at least as great as the number of correct stories. So to not differentiate between things that are false and things that are true as judged again by independent fact checkers. So that made me think, well not just me a lot of us, that if the problem was caused by technology then surely the technology can also uh make a difference in solving it, and so what does that mean? What does it mean to do techno cognition? Well that’s obviously an active area of research, but I can give you a few examples of how it might work. Um bearing in mind of course that the whole time we want to avoid censorship, we want to avoid telling people what they have to do, and you know we want to keep this as open as possible, but we want to create an information architecture that encourages people to um you know be more concerned with facts than things that support their beliefs but are false. So, here’s a couple of things; one thing that I absolutely love and this is being piolet tested by a newspaper in Norway um where you can’t leave a comment on an article unless you pass a quiz first that tests your comprehension of that article. So you’re given three multiple choice questions or whatever and you got to get those right. I don’t speak Norwegian, so I can look at it and I can get a sense of what’s going on but I can’t actually leave a comment because I couldn’t pass the test. But the point is, what that does is to ensure that whoever is leaving comments is first of all not a robot, secondly has read the article and has some idea of what is in it and hence there comment should be better informed, and moreover taking the quiz means you got to cool off a little bit and think about you know what’s going on instead of getting so outraged that you sit down and you go “Ra ra ra ra ra… these terrible people…” or whatever it is people say you know that degenerates the level of discourse. So that’s one small example. I think it’s a wonderful thing. I mean no one can complain about that censorship or anything, but it probably would have an effect on the level of discourse.

Um, another thing you can do is, um, remind people, or tell people or alert people to the fact that some piece of information that they’re about to share, or Tweet or whatever has been challenged or has been found to be false by fact checkers, and then perhaps some people would be less likely to share that. It turns out that Facebook and Google are taking steps in that direction because they are as concerned as are many academics about what is going on there in terms of spreading false information. So that’s another example, and then another thing you can do is change the algorithms that are suggesting things to people. At the moment, one of the problems that we are having is that all of the software giants are so keen to make people feel good and to make them happy that they will suggest things to you that are close to what you like. So a prime example is that if you go to Amazon and you order a book, um then it will suggest some other books to you either at the bottom or the top and they’ll say “Hey, if you bought this you might also like that.” Now those recommendations are terrific, there amazing good actually because I always feel like buying these other books. Um because Amazon knows from my history of purchases, and preferences and what I’m looking at here, they can figure out what else I might like, and so we end of in these filter bubble. That’s what they’re called. These echo chambers, these sort of bubbles that are created by software for our comfort, and on one hard that’s terrific, but on the other hand it makes it all the more difficult for people to recognize, or interact or engage with dissenting opinions. Now telling people, suggesting a completely different view point to somebody who’s let’s say extremely left wing, suggesting something to them that’s totally the opposite is not, there’s no way they would buy that if they saw it on Amazon, but we do know that you can nudge people toward the outside of their comfort zone. I mean that’s, I mean we know that from argumentation persuasion research. You’re better off just gradually leading people away from their current position, so there’s no reason why Amazon, but also other software giants couldn’t suggest things to you that they know are not exactly what you want, but close enough that you may not need to just throw it out instantly but to kind of think “Well actually you know.. Gee I’m quite like that, but actually that sounds sort of sounds interesting.” So maybe you can nudge people into a broader uh consumption pattern to break down the personalization and the filter bubbles that every one of us lives in. Those are just examples. That’s what I mean by techno cognition, that you may use technology to uh expose people to a broader variety of information on the one hand, but also give them a chance to reject things that are false.

**KL:** Well Steve, this has been so interesting. I want to thank you for joining me from halfway around the world to share about your work and your most recent research you’re working on. Thanks so much for coming on the show!

**SL:** Well it’s been my pleasure. Thanks for having me!

**KL:** Thanks also to our listeners for joining us for this week’s episode of Research in Action. I’m Katie Linder, and we’ll be back next week with another episode.

# Show notes with links to resources mentioned in the episode, a full transcript, and an instructor’s guide for incorporating the episode into your courses, can be found at the show’s website at [ecampus.oregonstate.edu/podcast](http://www.ecampus.oregonstate.edu/podcast).

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# Bonus Clip #1:

**KL:** In this bonus clip for Episode 70 of the “Research in Action” podcast, Dr. Stephan Lewandowsky shares some examples that illustrate the relationship between knowledge and belief – take a listen.

**SL:** On the one hand people tell us something that they know that we told them, but when we then measure their beliefs indirectly by their behavior or how they respond to inference test, that’s when the old information comes through. That is what makes it so tricky, because um people will say that they’re not using this information but then in fact they do. Let me give you another example that I find particularly concerning and is quite striking. If you do this in the context of juries, in the Judicial context, there’s been a number of theories showing that if you present yours with information that is bias toward the defendant you then tell them, “Oh, you can’t use that information because it’s tainted evidence. Disregard that when you make your judgement.” It then turns out that what jurors will say is “oh we’re not using that tainted information. We didn’t consider that. It didn’t affect our judgment at all.” And yet their behavior shows that they did because in comparison to a condition where they never heard of that prejudicial information, they’re conviction rates go up by like 30 or 40 percent. You know? They go from about 40% guilty to about 80% guilty, so a massive affect, and that’s despite people telling us that they’re disregarding this information. So to me that’s a huge problem because you know, it often happens that juries are instructed to disregard information by the judge and yet the data show that that rarely has an effect on that people continue to rely on that information even though they’re to disregard, but our cognitive apparatus is constructed in a way that makes it insanely difficult for us to disregard information once we’ve heard it.

**KL:** So I want to dig into this a little more. What are the logistics of specifying this model? I mean what does that even look like? Can you describe kind of what that process is for people you may just not be aware of this at all, that you can even do this?

**SL:** Well, yes. It’s a tough one to explain without actually showing people the computer code and without assuming that people know how to program, but basically let me give you an example of our misinformation work which is that there’s one little model that I wrote a number of years ago to explain why it is the case that when you repeat information that then turns out to be false and you’re trying to correct people, why is it the case that on the one hand when repeat that misinformation multiple times, people rely on that more and more? But on the other hand if you then repeat the correction equally often, then people go reduce their reliance on the misinformation?

In other words, if I tell you something that turns out to be false three times over, you’re going to believe that a lot more to begin with, but then if I tell you three times over that that was actually false, then you will reduce your belief. In a nutshell that’s what we were trying to explain with this model because there were some other nuances in the details that were sort of puzzling and challenging to explain. So I’ll skip over those because that’s a little too complicated, but the basis idea was this; we said, “Okay. Every time you hear something, some piece of information. You encode that in memory as a distinct episode or distinct trace.” In other words what we said was um “Rather than you remembering one thing that gets to be stronger and stronger, what you’re actually remembering are multiple copies of the information as I repeated.” Okay? There’s slightly different ways of explaining what’s going on. So in our computer model, what we would do is every time information was presented we would just you know encode that in what’s known as an array of computer lingo but it’s basically we kind of just ticked the box and said “uh huh, here’s a piece of information the person is now remembering that.” Every time they heard something they heard something we would tick this box and say “here’s another thing, there’s another thing, there’s another thing,” and then when the correction came along we said, well what happens now isn’t that people just get rid of this information that they’ve learned, but instead what they do is they take the information that’s in their memory, but they attach to that what we call a tag; a hypothetical little flag or a stick on notice that says “Oh hang on, this is actually false.” This is one of the interesting things about studying information is that you have to explain why people know that something can be false but they’re still using it in their day to day decision making, and to explain that people have come up with this idea of a tag that identifies information as false, but doesn’t get rid of it as a memory.

So, in our computer program we would then say “oh hey here’s a correction, so let’s try to attach this Post-it Note, this yellow sticky note that says it’s false to the information and memory” and then you know you have to specify how that happens, how successful that attempt is and what happens when you have multiple corrections. Well then you attach multiple tags but you can only attach tags that something is false to an item that hasn’t already been identified, and you know, on and on it goes. So make a number of assumptions and specify how everything is done, and then in the end in our case it turned out that we were able to model our data including some of the nuances that I have to skip over, there were some detail patterns that were challenging, but ultimately the model handled all that, on this assumption that there are multiple traces in memory when information is repeated and that a correction means that you tag that information. So that maybe gives you an idea of how that works.

**KL:** It does!

**KL:** You just heard a bonus clip for Episode 70 of the “Research in Action” podcast with Dr. Steven Lewandowsky sharing some of the examples that illustrate the relationship between knowledge and belief. Thanks for listening!

# Bonus Clip #2:

**KL:** In this second bonus clip for Episode 70 of the “Research in Action” podcast, Dr. Steven Lewandowsky explains building a computational model. Take a listen:

**KL:** So I want to dig into this a little more. What are the logistics of specifying this model? I mean what does that even look like? Can you describe kind of what that process is for people you may just not be aware of this at all, that you can even do this?

**SL:** Well, yes. It’s a tough one to explain without actually showing people the computer code and without assuming that people know how to program, but basically let me give you an example of our misinformation work which is that there’s one little model that I wrote a number of years ago to explain why it is the case that when you repeat information that then turns out to be false and you’re trying to correct people, why is it the case that on the one hand when repeat that misinformation multiple times, people rely on that more and more? But on the other hand if you then repeat the correction equally often, then people go reduce their reliance on the misinformation?

In other words, if I tell you something that turns out to be false three times over, you’re going to believe that a lot more to begin with, but then if I tell you three times over that that was actually false, then you will reduce your belief. In a nutshell that’s what we were trying to explain with this model because there were some other nuances in the details that were sort of puzzling and challenging to explain. So I’ll skip over those because that’s a little too complicated, but the basis idea was this; we said, “Okay. Every time you hear something, some piece of information. You encode that in memory as a distinct episode or distinct trace.” In other words what we said was um “Rather than you remembering one thing that gets to be stronger and stronger, what you’re actually remembering are multiple copies of the information as I repeated.” Okay? There’s slightly different ways of explaining what’s going on. So in our computer model, what we would do is every time information was presented we would just you know encode that in what’s known as an array of computer lingo but it’s basically we kind of just ticked the box and said “uh huh, here’s a piece of information the person is now remembering that.” Every time they heard something they heard something we would tick this box and say “here’s another thing, there’s another thing, there’s another thing,” and then when the correction came along we said, well what happens now isn’t that people just get rid of this information that they’ve learned, but instead what they do is they take the information that’s in their memory, but they attach to that what we call a tag; a hypothetical little flag or a stick on notice that says “Oh hang on, this is actually false.” This is one of the interesting things about studying information is that you have to explain why people know that something can be false but they’re still using it in their day to day decision making, and to explain that people have come up with this idea of a tag that identifies information as false, but doesn’t get rid of it as a memory.

So, in our computer program we would then say “oh hey here’s a correction, so let’s try to attach this Post-it Note, this yellow sticky note that says it’s false to the information and memory” and then you know you have to specify how that happens, how successful that attempt is and what happens when you have multiple corrections. Well then you attach multiple tags but you can only attach tags that something is false to an item that hasn’t already been identified, and you know, on and on it goes. So make a number of assumptions and specify how everything is done, and then in the end in our case it turned out that we were able to model our data including some of the nuances that I have to skip over, there were some detail patterns that were challenging, but ultimately the model handled all that, on this assumption that there are multiple traces in memory when information is repeated and that a correction means that you tag that information. So that maybe gives you an idea of how that works.

**KL:** It does!

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