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Speaker 1:

Research is really important because by definition it's the only way to get new knowledge. There's so much that isn't yet known that it's just a cool time to be in science.

Speaker 2:

Well, I think at the end of the day, what really gets us out of bed in the morning, it's just a curiosity, trying to understand things we didn't understand that day before.

Cole Cullen:

Welcome to Reach the podcast that tells the stories of researchers their studies and how their work impacts you and the world you live in. I'm Cole Cullen.

Beth Bamford:

And I'm Beth Bamford. Today we're going to tell you about technology. More specifically, some of the research being done at Penn State about technology.

Fake news is something you see a lot about in the news or on the internet, but what is it really? What is fake news? What makes it fake and how do you know if it's fake?

Cole Cullen:

I talked to dr Shyam Sundar of the College of Communications about the research he and his team are doing around fake news.

Shyam Sundar:

I'm Shyam Sundar. I'm a professor of media studies at Penn State. I study media effects and I co-director a research laboratory on campus called the Media Effects Research Laboratory.

Cole Cullen:

Fake news. What is it? It's easy to think, "Oh, fake news, it's a joke. It's a punchline." But it's much more than that.

Shyam Sundar:

Yeah. Fake news is a very real phenomenon. Fake news is not just a false information. Fake news is a conglomeration of different kinds of news information that ranges from completely false fabricated news to polarized content, to satire, to misreporting, to commentary, persuasive information like native advertising. And even citizen journalism sometimes can be wrong and that can also be categorized to fake news. So there are different aspects to fake news.

I've always kind of celebrated the ability of newer media to enable users to serve as sources of communication. And so in some ways the receivers of communication are now becoming sources of communication. So I really liked when blogs came on the scene and was happy to see some positive effects of empowerment that this kind of technology brings forth.

But around the time of the 2016 election when BuzzFeed reported that the engagement online social media engagement with false stories surpassed for the very first time compared to the engagement with real stories, that's when I think the fake news phenomenon kind of exploded into being. And so our interest with fake news has been to kind of see if there are any ways in which we can understand why

people fall for fake news. And over the last decade or so, a lot of our studies have shown that when people receive information through online means the source signal kind of gets lost in the mix.

Because imagine if you get to see a link to a story on your Facebook wall and that's been posted by a friend who picked it up from a tweet made by a politician who picked it up from the New York Times reporting on an AP story. There are so many sources. AP, New York Times, Twitter, the politician, your friend, Facebook. So you have so many... it's a chain of sources, what we call source layering in my work. And we found that in general, people lose track of who or what the real source is. And as a result they are less attentive to the credibility or the lack thereof of the sources that really are the cause for that particular story.

We also find that in general, people over trust their social media contact. So when they say, "Oh my friend sent me the story on Facebook," they tend to attribute that to their friend, and they don't pause the thing that the friend is not trained in journalism, does not know how to check facts, and so they don't stop to think that these are not trained professionals. Instead they go by the kind of warmth that friends generate and say, "They must've only posted it because I should be interested or it's to my benefit."

Another issue that happens with the sourcing is that increasingly a lot of our media are customized by us. So we in general customize what kind of information come into our portal, so to speak. So we say, "I want only scores from Penn State football, I don't want Ohio State. I want whether only for State College." So we create all these gates and these technologies have allowed us to create these gates for us. So much so that the news environment, it looks very familiar to you in your smartphone or on your computer. And as a result, our research shows that people are lulled into a false sense of security because they see the daily newspaper is kind of the daily me and they identify so strongly with it that they don't process the information as systematically as they should.

Instead they kind of process it much more superficially and let their antenna down. And so they don't watch out for credibility cues to check if in fact this is legitimate story and whatnot. So in general, I've been kind of finding that on the one hand people are less attentive to source signal. They are overtrusting of their social media contacts and they let the antenna down when a story comes to them through a very familiar environment like their customized portal or a smartphone. These are some reasons why we've let fake news kind of affect us or we become vulnerable to fake news

My next interest then turn to what can we do about it? And so we've been now involved with a project that has been funded by the National Science Foundation where we are trying to come up with ways for users to be alerted to this kind of content. And so we've been working on this project where we've tried to map out this territory to a point where we can write machine learning algorithms that can automatically detect and look for these different kinds of fake news and be able to tag them as this is plain false, or this is misreporting, or this is commentary, or this is satire with a certain level of probability.

And we we want to write an algorithm that looks at a number of different factors. So it's not just the fact that it comes from on verified source. It could also be the fact that it is only circulated in social media and has never entered mainstream media, which means no journalist has touched that story. It looks at linguistic features. There are all kinds of giveaways in a fake story. The dateline is not quite correct. The way it's written often doesn't follow a professional AP style. And there are other structural features like the URL doesn't look normal. So we want an algorithm that would scour all these details about a particular story as it's coming into somebody's feed and be able to kind of alert users to the possibility that this might be false in one way or another.

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And this kind of undertaking, it's a big engineering undertaking. And so we are just getting started with mapping out the territory and writing the algorithm at this point. And then we want to fine tune the algorithm to a point where it's fairly accurate. We can never be 100% sure, but we can be certainly sure enough to alert users to take action or to take a closer look at a story and that's what our goal is with this project.

Cole Cullen:

When you say alert, what does that look like?

Shyam Sundar:

Well, we don't know how different platforms at different devices will implement our algorithm because what our algorithm ultimately would do is give you a certain probability score. That's kind of our goal to say this particular incoming story could be, "it's 90% chance that it's commentary, it's 10% chance that's real news," that kind of stuff. And then different media outlets can decide how they're going to convert that to a flag or an alert or something like that. Our goal is to design an algorithm which then people can use however they want and the companies can use however they want.

Cole Cullen:

Is the prevalence of fake news affecting what we call real news?

Shyam Sundar:

Definitely. I think it's definitely affecting... that's a great question. One of the things that we study in our fake news project is also the effect of clickbaits because there's this economy that drives fake news. One of the main reasons why a bunch of Macedonian teenagers started engaging in fake news during the 2016 presidential election is because they would make money out of driving fake stories. So it's not just for polarizing political opinions or to create discord. But there are real human beings who will make money based on the number of times the story gets clicked or the number of times it gets tweeted across the social media universe. And that's why they write these very provocative, often false headlines so that it can attract clicks.

Once they click, of course they don't care further because the story could be completely different from what the headline promised. But clickbait itself is a big object of study among people who study fake news because we know that that is the first point of entry into this false universe. But one of the unfortunate consequences of that is that the threshold for people to click has been kind of going up. So when they then encounter a regular news story by a regular news outlet, it's not clickworthy, it doesn't seem attractive enough for them to click on.

So what the news media have are having to do, the legitimate, credible news media, mainstream media is to actually create clickbaity headlines for otherwise normal stories. And so you'll see now a dramatic change in the kind of story headlines that respectable newspapers carry. And that's primarily I feel because they are competing, especially in the online space.

Cole Cullen:

Why is it important? Why is this lab important? Why is the work you do important to the everyday Joe?

Shyam Sundar:

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If we don't have this knowledge about how this particular object that we call media affect individuals, we will not know how to react with it.

Beth Bamford:

Almost everybody has a smartphone.

Cole Cullen:

What do you use your smartphone for?

Beth Bamford:

You know, the normal. Text messaging, Facebook, YouTube videos.

Cole Cullen:

Do you play games?

Beth Bamford:

I don't, but my kids do.

Cole Cullen:

Of course you don't. The smartphone can be so much more than just a gaming device or a communication device. It's actually very important in research.

Beth Bamford:

Dr Marty Sliwinski is going to tell us about how it accelerates research studies by enabling-
And tell us about how it accelerates research studies, by enabling a technology used to capture and analyze data, all on a device that everybody already has. The smart phone.

PART 1 OF 3 ENDS [00:12:04]

Marty:

I'm Marty Sliwinski. I'm a professor in Human Development and Family Studies, and I also direct the Center for Healthy Aging.

Beth Bamford:

What types of things are you currently researching?

Marty:

I've always been very interested in what happens on a daily basis, that can affect how mentally sharp we are, how we perform. And when you take the GREs or the SATs, you go into this high stakes testing situation, and you get to show what you have once. And what our research and the research of others has shown, is that we aren't always performing at our peak. And there's a lot of variability from day to day and moment to moment, within the day, that's related to our stress and stuff. I've always been interested in that.

In this study, we have people carry around smartphones, and on the smart phones there's an app that will pop them, in the morning when they wake up, to tell us what they think their day is going to be like. They answer questions like, do you think today's going to be pleasant? Is it going to be enjoyable? Is it going to be stressful? And then throughout the day, they also answer some questions, as to, whether or not anything stressful or pleasant has happened. And when they do that, they also play a few brain games. They'll do some cognitive testing as they go throughout the day. And what we found, and this was a little unexpected, is your morning outlook when you wake up in the morning, and if you think today's going to be stressful, your memory performance is worse later in the day, even if nothing stressful happened.

Beth Bamford:

This is one of those unintended consequences.

Marty:

Yeah, yeah. Then we became interested in this. Has anyone done work on this topic? And we found that there is actually, relatively little work looking at how stress anticipation affects your wellbeing, your emotional function, and your cognitive functioning.

I think many of us are stressed about the things that might happen. Yet, a lot of the research is focused just on how things that have already happened, are affecting us. I do think this is a neglected area in health research, on how this outlook in these anticipatory processes might impact us. And then is there something you can do about it? I think so, right? Because there are proven methods for trying to manage your stress: mindfulness, meditation, practicing a gratitude, taking a deep breath, going for a walk. But the thing is, we don't often have all the time we need to do them. Wouldn't it be great if we could have an app that tells us when we need to. When it's most important to take that breather. When it would be most effective and have the most impact. And that's where we hope this research will take us.

Technology lets us do that, because if we're interested in trying to understand how everything that transpires on a daily basis happens to us, we have our smart phones. And our smart phones allow us to capture this information in very precise and user friendly ways. This particular study included about 240 people, who use the app. We asked them to use it for about 14 days, and they use the app up to six times per day. Six or seven times per day. And then they also came back a year later, and did it again for another 14 days. These were people who were living in one apartment complex in the Bronx called, Co-op City. That's actually the largest cooperative living development in the world. It has its own zip code. It's a very interesting community. We selected it, because we wanted to have people who had similar residential and similar types of lifestyles, so that's where we went. And we're getting ready now to develop this app out, where we're hoping now, to scale this up to where we have tens of thousands of people using it across the country.

It used to be, that for some of these types of tests we wanted to do, we'd have to bring people into the lab or the clinic, and use a computer to do that. Or have a trained technician or research assistant administer a test. But now the computers that we carry with us in our pockets, smartphones, are way more powerful than what used to sit on our desktops, even just 10 years ago. That's really opened up the doors to where we can put a laboratory in everyone's pocket, essentially.

After we collect the data, that's actually where the fun begins. One of the other challenges and opportunities afforded by using this type of technology pertains to, how to deal with big data. Now we have more information than we ever had as researchers, and it's a rich environment for being able to do

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this kind of research. But sometimes, we have so much information we don't know what to do with it. We work with colleagues in engineering. And in our own department, who are experts in machine learning and other types of high intensity computing analytics, to try and make sense of all the different data streams we get.

We're doing the job that's not so glamorous, which is just developing a tool that lets you do these types of measurements. We have colleagues who are using these tools. For example, right now working with the National Institute of Health and a company that makes glucose monitors. There's going to be a study with type two diabetics, to look at how glucose excursions moving outside of the normal limits for glucose levels, how that affects your cognitive function. We can use this to help evaluate these types of monitors, help evaluate the effectiveness of insulin pumps. We're doing all that hard work, that then, other companies could just use this to see how their products work and make them better.

Employers could use this to monitor their employees, to determine what time of the day people are at their peak productivity. Being able to identify different kinds of situations, or conducting mini experiments in their own workplace, to how to optimize a productivity. For example, just swapping in different kinds of light bulbs can affect people's moods and productivity. And we'll provide a very cost effective way for people to determine, whether or not, those actually affect the bottom line.

Beth Bamford:

How big is your team?

Marty:

Depends how you define team? Just on this one project, the Infrastructure Project, we have 24 PhDs from different institutions-

Beth Bamford:

Oh, wow.

Marty:

... And then plus research staff, app developers, technical support. We do work with people and directly with people, and we do bring people into the clinic and do evaluations. But if you were to go to my lab at Penn State, you'll just see graduate students running analysis, and two guys drinking Mountain Dew writing apps. And in fact, our lead app developer is a Penn State Alum. I found him here. He was actually... Around nine years ago, he was a computer science major, and he was writing games for the first mobile phones. And he's a guy I got to write the first programs that we ran in the stressful day study. Kept him around, paying him as a consultant to do stuff. And then finally with our recent grant, we were able to offer him a full time position. He's been one of these cases where, you find a talented undergraduate, and they do the transformative work, because without him, none of this would have happened. Don't tell him that, I'll have to give him a raise.

For this project, the grant is awarded to Penn State. I'm the principal investigator on it. But our team... It is a team effort-

Beth Bamford:

Yeah.

Marty:

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... And I've been really lucky to be able to assemble the best people in the world to work on this.

Beth Bamford:

Curt [Cling 00:20:28] if you're listening, Dr. Sliwinski owes you a raise.

Speaker 3:

Look at this podcast, making people money.

Beth Bamford:

Helping out wherever we can.

Speaker 3:

That's what we do. Our final story is about Chatbots. Beth, do you know what a Chatbot is?

Beth Bamford:

I didn't know what a Chatbot was until this interview.

Speaker 3:

Chatbots are, if you're shopping online, a little window pops up, and maybe there's a picture of somebody there that says, can I help you find whatever you're shopping for? That's actually a robot. That's a computer on the other end, and that is called a Chatbot. And I'm the same way as you, I never knew that was a computer. I always thought it was a real person.

Beth Bamford:

Yeah, it makes me feel less guilty closing out of them, now that I know that it's not a real person.

Speaker 3:

It actually makes me feel dumb because I get angry at them, because they're not answering my questions. The Media Effects Research Lab also studies Chatbots. Dr. Sham Sundar, joins us again, to talk about the work they are doing on Chatbots.

Shyam Sundar:

Chatbots, historically, have been these a chat agents that sit on top of a website or an app, which has this conversation with you. Sometimes you might go to an eCommerce website, and then you're looking for a product. And you open the chat window, and then you have this interaction.

These days it's risen in prominence, and has become an everyday part of eCommerce websites, where whenever you have a first line question, you're faced with a Chatbot. And only when the questions get deeper, do you engage with a human agent. And this is true even with our online phone service, right? If you call your bank, you'll have to punch in your numbers, and you'll get a very robotic voice answering all your questions, or at least answering all your basic concerns. Once you know your balance, and you know your basic detailed, it's a bot. If it's a very involved issue, when you hit zero and go to an actual customer service agent, who is a human.

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The companies save a lot of money by not having to answer the same questions over and over by humans, but rather automating that. And that's where Chatbots have come in to place, in a very big way.

Speaker 3:

What are you studying?

Shyam Sundar:

The main functions of an online chat agent, is to interact with users, to respond to their questions, and address their concerns. So bottom line, that's really what a Chatbots are supposed to do. They can be very good at delivering information much better than FAQ, frequently answered questions, on a site, because they are much more interactive. They deliver the messages to users, ask users, think of questions rather than just saying, here's a bunch of questions that most people ask, and here's a bunch of responses to those commonly asked questions. There's more specificity in the way the Chatbots can respond.

One of the things that we study, is the degree to which that message interactivity can be structured to help users feel more connected to the interface, to engage them more. If two people having a conversation, there are certain aspects to that conversation, that when you break it down, technically we need to imitate on a Chatbot. That is, as it turns out, a very big engineering challenge. To have a conversation with an automated agent, because if you talk and I talk, that's not interactive. If you ask a question, and I respond, it's a little bit interactive. This is what we call reactivity, but if you ask a question.

Little bit interactive, this is what we call reactivity. But if you ask a question and I respond, and you ask a follow-up question then I respond in a way that takes into account not only your follow-up question but also your earlier question, then it's considered fully interactive. That's when we have what we call contingency in the conversation. That's why many websites, for example, show that kind of contingency by keeping track of your activity on the site, by showing what we call footprints, where you been in different parts of the site or if you go to a Google search engine, as you start typing in, it'll show you all the other searches you've done in the recent past. So it kind of knows you, so to speak. That's kind of building in that contingency or that interaction history that you might have. And so, those are all aspects of human-human conversation where if you meet a friend and you talk, they kind of know you from other conversations and then take that into account while responding to your more immediate or present question.

And so, building that into a chatbot as it turns out is a very big challenge. But if you can build it, it can have all kinds of very important psychological consequences. And some of our research have shown that there are ways to build contingency. You can actually just acknowledge what the user's response was. That itself goes a long way than just giving an answer you said, and then you can repeat what they said and that itself can build contingency. Furthermore, these days with the increase in artificial intelligence, the chatbots are becoming smart enough to pull together different responses at different points in time in the chat, and give you more kind of a comprehensive, coordinated response. And that is full contingency and that is a real promise. And we find that that affects not only people's attitudes toward the chatbot and the site that sponsored the chatbot, but also the degree to which they believe in the content, the degree to which they would follow up on the content of the conversation.

Another line of research has to do with how we present the chatbot. Many times the emphasis among designers is to make the chatbot as humanlike as possible. So even though at some level we are trying to

imitate humanness in conversation, we found in our research that providing humanlike cues on the interface, making the chatbot look like a human for example, unnecessarily raises expectations. So some of our studies have shown that people expect more interactive communication if the image is anthropomorphic, if the icon is not just a bubble, but instead if it's a picture of a human being with, sometimes they even have their headsets on and it seems like this is just a little warmth that they designer induces into it. But it actually can be detrimental to people's psychology because they expectations get braised as a result of these little icons.

We've also looked at how chatbots should express themselves, should chatbots show empathy? Because when you think about it, that is disingenuous, right? Because chatbots have not been through that experience. So how can they empathize? Sympathy might be okay, but empathy is that even legitimate, coming from a chat bot? And so we did an experiment where we compared expression of empathy, expression of sympathy and no expression of any kind. And we found that empathy was just as good as sympathy, and both were better than no expression of support. And so at some level we find that uniquely human aspects of conversation, uniquely human attributes are indeed okay coming from a chatbot, because what a chatbot does by initiating a conversation, is it triggers a social script in the heads of the users. And that social script then makes users treat the machine as if it's another social entity.

There's a long line of research from the lab I come from at Stanford where they've demonstrated that computers are social actress, computers are treated as social actress. We are polite to computers that talk, we consider computers that are part of our team as having more affinity to us and listen to computers in our team more than we listened to computers in the opposing camp so to speak. We think that male voice computers are better at certain topics than female voice computers, even though voice is just an artificial entity that you can attach to any computing. So we don't stop to think that these are machines. One such social script is triggered via automatically social and apply the rules of human social interaction to human-computer interaction. And so we are seeing that with the chatbots as well.

The vaults had encountered the so called uncanny valley. If you make it too social or too human, people then freak out. It becomes too eerie. So this is called uncanny valley in the literature on human-robot interaction. The more humanlike the robot is, people like it more, but it reaches a point where it's at the very high end of humanness. There it's too freaky, it's too eerie for it to be human. And that's when all your liking kind of takes a nose dive and that's what we call the uncanny valley.

PART 2 OF 3 ENDS [00:24:04]

Speaker 4:

Comparing the two stories, fake news I feel like your research is helping fix a problem. With chatbots, your research is helping to improve something that's already happening. I mean, it's not really a problem you're looking to fix. What's the outcome of your chatbot research? Are you giving information to Google? Where do your studies go?

Shyam Sundar:

I think even in the chatbot scenario we are dealing with the problem solving situation because people loathe to interact with the machines if they have the expectation of interacting with a human agent, and they also don't get the sense of conversation that they get with humans when they interact with a machine. So the problem here is solving that mental block that users have and also the engineering handicap that we have. We cannot really design a fully conversant human being. So how do we kind of

solve that problem? We do that by coming halfway with these contingency building devices in the linguistic characteristics as well as in the message exchange characteristics of an interaction.

And users are also evolving to a point where they're accepting of chatbots. I think as a culture we've now become much more accepting of a smart speaker in terms of interacting with them. Although we have other concerns about their privacy and them always listening and so forth. But at least in terms of the oddity of you talking to a barrel on your kitchen table, I think is now dwindling. I mean, it is no longer that much of an oddity where 10 years ago that I would look completely futuristic and they found use for it. I mean, they found legitimate advantages. In the morning when you get up and ask for the weather or ask the smart speaker to play NPR. It's a very convenient tool to have this voice-based interaction.

But since people have warmed up to this technology that say something about how you can introduce a technology, even though people may not be ready for it. But then, if you'd learn and study people's responses and tweak technology as the people's acceptance goes up, then you can come to a happy middle ground where even though the technology is not fully developed, there are certain things that the technology can do that people are happy with, that they can live with. And people also realize that there are certain things that technology cannot do, and they would not bother but a smart speaker to answer those kinds of questions, for example. So I think it's a matter of learning both, studying both, both users and technology and trying to come up with a happy median that can help both users and designers.

Speaker 5:

Thank you for the NPR plug.

Speaker 6:

Thank you for listening to REACH, and a special thanks to Dr. Chanson Derek and Martins Lewinski.

Cole Cullen:

And don't forget, all the episodes of REACH can be found on our website. Please consider making a contribution to WPSU so that we can bring you content like this. Visit wpsu.org/donate. Thanks.

PART 3 OF 3 ENDS [00:33:13]