VIEW to the U transcribed
Season 6: Adventures in Podcasting; Episode #7
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[intro music fades in and out]

Keisuke Fukuda (KF):

I was thinking one day, why is it so hard to study these? Because seems to me that even if I spend some time, I'm not getting those things into my memory.

My name is Keisuke Fukuda. I go by Kei. And I'm an assistant professor in the Psychology Department.

So, I started reading into psychology texts only to find a way to be lazy, to study history. That was my motivation. And little did I know that I'm still studying something and I will have to continue doing that for my life. But, the good thing is I now study things that I love. That's my motivation. How challenging the life is.

[theme music fades in]

Carla DeMarco (CD): Memory and motivation

Hello and welcome to *VIEW to the U*: An eye on UTM research.

I'm Carla DeMarco at U of T Mississauga. *VIEW to the U* is a monthly podcast that will feature UTM faculty members from a range of disciplines who will illuminate some of the inner workings of the science labs and enlighten the social sciences and humanities hubs at UTM.

There has been a lot of talk about memory in these pandemic times, and on this episode of *VIEW to the U* we highlight Professor Keisuke Fukuda, also known as Kei, who talks about his research related to visual working memory and how memory guides behaviour. But along with that, K also talks about other studies his lab is taking on such as why is it so hard to forget things we would rather not remember – like that time I tripped on the dance floor and knocked over an amp at the edge of a stage at a karaoke-night outing with friends – true story.

But back to K – he also talks about how memory distortion can come into play when we are processing information.

Kei also talks about some of the inspirations that motivate his research.

[theme music fades out]

Kei Fukuda is an Assistant Professor in the Department of Psychology at the University of Toronto Mississauga. He completed a BSc in Psychology, with a minor in Mathematics at the University of Oregon, where he also completed a Masters and PhD both in Psychology.

Kei completed a postdoctoral position at Vanderbilt University in Nashville, Tennessee prior to joining the faculty at UTM in 2016.

KF: I study many challenges that everybody face in everyday life. For example, why can't we remember all the things that we want to remember? I'm sure the struggle is not just mine, I have a fair share of my struggle. Other things would be like, why can't we keep our attention on things that we should be paying attention to? I think this is another question that everybody can relate to, especially in the COVID time. Well, on the flip side of things, not everything that we encounter in daily lives are the colorful ones that we want to stick in our memory. We sometimes encounter something that we want to forget, but forgetting things seem to be also difficult. Why can't we do that? Or, why can't we keep our attention away from something that keeps distracting, like YouTube video or Netflix, what have you, that you might have been turning on during your work hours?

KF: So those everyday challenges are what I study. And big reason why I want to study them is I myself struggle with all of them. And by knowing how our mind or brain process information. The mechanism and limitation of information processing, we may be able to come up with a way to assist us to lessen these burdens and make us better information processors.

CD: And I understand that you've recently started looking at how using a memory actually changes memory itself. And so, I'm wondering if you could tell me a little bit more about that.

KF: Sure. So before getting into that, I want to kind of define one of the memory system that we use in every moment. This memory system is called working memory. Working memory refers to our ability to keep small amount of tasks, relevant information in the mind so that we can use that information to guide our behaviour.

So, for example, well, this doesn't happen that often anymore in the COVID time, but when we need to look for a friend in a really busy crowd, what we need to do is to remember what the friend looks like. And we have to keep that look of the friend in your head clearly, so that you can compare that memory to people in the crowd until you find your friend. So in this situation, you are holding your friend in your working memory to use it in a perceptual comparison.

KF: Recently, the studies that we've been conducting our lab examined what happens to this memory when you compare it to the new perceptual input. A part of the reason why we did that is because past studies have been looking at how accurate those working memory representations are when you're holding it simply. We didn't necessarily know what happens to these memories when we use them for perceptual comparison. And to our

surprise, to some extent, what we found is that this usage in perceptual comparison was the hidden culprit in memory distortion. What that means is that whenever you think, "Oh, that person in the crowd looks like my friend." That sensation changes your memory of your friend. So, if you find somebody who looks like your friend, you may not be realizing this, but your memory of your friend is changing in the same direction toward that person that looks him.

CD: This is just the way that we process, or is this also then related to what's going on right now where we aren't seeing her friends as much as possible?

KF: Right. Oh, that's an interesting question. So yeah, this happens naturally. So, the part of the study was done before COVID time. So, it's a good thing to know is that this is not a COVID related disease, so to speak. But there may be a possibility, depending on the circumstances or type of information that you're holding in working memory, those effect might be magnified.

KF: So, we find this effect to be fascinating because it can touch on many important every day, to not so everyday phenomena that can have grave consequences. Imagine in an eyewitness testimony, when you have to say who the person that you saw in a crime scene, whether you see in a lineup of people. Those cases, you have to use your memory to perform the comparison. If those comparison can change your memory our memory report may not be as accurate as we hope.

CD: So, it can be influenced then too, by maybe the context though, also?

KF: So, those are the exciting line of work that we are wanting to investigate into. Is there some specific context effect that will make our memory more vulnerable? The past studies have shown that for particularly not necessarily working memory, but for long-term memory information that you've included in the past. If there's some suggestive information that's provided at the time of inquiry that could make a memory more vulnerable to distortion. And we are trying to test these ideas using the working memory, the information that you're currently holding in mind, does that also change depending on these contexts? Is something that we want to do in the near future.

CD: And your research, though specifically, you're talking about the visual memory. You don't deal so much with auditory, anything like that?

KF: Right. So yeah, our lab examines visual memory particularly, and we haven't really done any auditory memory work just yet. But some researchers in the field proposed this idea that working memory has this domain general component to it. So, what does suggest is that maybe if you find something in a specific domain like visual domain, those effect might also be observable in other domains, given that working memory is domain in general. So I think it'd be very interesting to examine these memory distortion phenomenon, even using the auditory clips. So if this was to happen, if you think your friend's voice was similar to somebody else's voice that you hear on the street, your

memory for what the friends sounded like might be changed, just because of that perception and your realization that that stranger sounds like your friend.

CD: And it's funny, the only reason, I'm kind of going off topic here, but I was thinking about the last time we chatted about your work, you told me about some study that you were doing, that you could show things for like a split second, and you were testing to see about memory retention. And it just, I know now that a lot of people are listening to podcasts and things, but sometimes they listen to it, speed it up so that they can listen to more podcasts and fit in more stuff. But I just, I think that that's a whole like sort of interesting thing, what is our memory retention like if we're listening in accelerated?

KF: That's an excellent question. And great memory for our previous conversation. Yes. Some other line of work that we look at is motivated by my inferior memory. My memory is not that great so I want to find some tricks that will help my memory. And one of the tricks about our research and also other many, many past research has found is that one way to improve your memory is to increase the number of the time that you encounter that information.

So, if you're going to have, say one minute to look up a given picture, if you can split that one minute into say six, 10 seconds of viewing time and distribute them from across time, that's going to lead to a better memory than staring at that picture for a full once 60 second on sharp. If you have a specific podcast that you want to really stick into your memory, I'd recommend that you're going to try your best to split that. You're going to listen to it multiple times and speeding up might be a good way to increase the number of the opportunity that you're going to listen to. Because if you have a 30 minutes show, if you can speed it up to say twice as fast, you can listen to that show twice within that 30 minutes of the time that you spent.

CD: Oh, that is so interesting. And then I'm wondering then, because I know that exams will be coming up, then when students are studying for their exams, you suggest that they may be, look at the material quickly, but frequently?

KF: Yep. Quick, it has to be quick, but you want to still be able to capture the information. So long as you can capture that information, yep, increase the time that you encounter that information.

CD: Okay. Good to know. And so, but I am curious, and we probably chatted about this maybe the last time, but what led you specifically to study this area of research in particular?

KF: Oh, yes. So, this is the same for everybody. We used to be a student and I was a student, but particularly not a good one. I hated studying. There are some subject, I'm going to say history was not my favourite subject, but the reality is that you got to study to graduate and to go on with your life. So, I was thinking one day, why is it so hard to study these? Because seems to me that even if I spend some time, I'm not getting those things into my memory. So, I was like, "Okay, if I'm going to study it, I want to do it in the most

efficient way. That way I can be lazy, I can spend a short amount of time and get a good benefit. How do I do that?" And then realize it's a psychology that might provide the answer.

Psychology is a scientific inquiry of how our mind works. So, I started reading into psychology texts only to find a way to be lazy, to study history. That was my motivation and little did I know that I'm still studying something and I will have to continue doing that for my life. But the good thing is I now study things that I love. That's my motivation. How challenging the life is. I want to be lazy is my ideal research.

CD: Well, it's very practical though, really?

I don't want this to be sort of a negative conversation, but it has come up that I am curious about how your work has been impacted by the current COVID situation. Because I know some people can't get into their labs and things like that, but I'm just wondering.

KF: Yes, that exactly is our case. In normal days before COVID, our lab conducted many, many in-person experiments with the human volunteers. Because what we are interested in is human mind, and we want to measure them through behaviour and also from brainwaves. So, we will be measuring brain brainwaves while people do some memory experiments or attention experiments. And we additionally have people fail by challenging tasks because that's what we want to study. But now we have COVID, we can't really do any in-person studies. So basically, our lab and opportunity to do in-person experiment is completely shut down.

However, this research field, these other researchers just can't live without any new data. So, you have to come up with a new way to conduct the research. And one of the ways that we are doing this research in this COVID time is to take these experiments online. So, we are conducting many studies using an online platform, using like Zoom. In our lab, we'll be using some internet friendly computer script so that we can conduct experiments on participants computer while they sit in the home or wherever they feel comfortable. And we'll be monitoring the experiment using Zoom or some other ways so that we can establish connections.

So yeah, some of the experiments are continuing on, but these things couldn't have happened without all the students and trainees in my lab. And I know there are many other labs who do research like that, and we just have to thank these trainees and students who make these possible. And they are doing this by learning completely new skills that they never ever thought of acquiring coming into psychology lab. So, I just want to thank all these people who are helping us going through these difficult times.

CD: Yeah. And it does make me think of something that Alex Gillespie, our current principal said, when she was on the podcast, that researchers find new creative ways to... Because you have this resiliency sort of built in, but you find new creative ways to approach your research. Because that's what you do. That's the nature of research and an experiment

doesn't work out the way that you anticipated so you find a new way to maybe approach it and find your way around that obstacle.

KF: You're absolutely right. And that's what we do is to come up with creative solutions. But that being said, I do not think those online testing will replace the other research that we were doing before COVID because we still want to know how, for example, brain instantiates such information processing. And to do that, we really need to measure the brain when people are tackling these everyday phenomena. So yes, we just can't wait for the world to become a safer place to conduct this research.

CD: For sure.

And so, this season of the podcast I mentioned is Adventures in Research. I always like to joke, we have a captive audience. People are sort of sidelined a little bit, but I'm just curious if you have a story that you'd like to tell about something that stuck with you over your time as a researcher.

KF: Yeah. That's an excellent question. And I was thinking hard on this. Is there anything that really nice short story that I can tell from my memory? But as I said, my memory really sucks.

But then realized that much of the research for me happens literally in everyday, everyday moment is an inspiration. Why can't I remember this or why I have this really precise memory of the things that didn't happen? I swear, I took my garbage out this week. Turns out I didn't. These mundane moments are what drives my memory and it's full of it. Every day is full of these inspirations. And that's how my adventures in research are happening. Instead of a big journey or big event that happens, it's more like a tiny, tiny stories that kind of continue on producing a new work for me.

KF: But when I get stuck in my scientific inquiry or when I can't come up with a new way to think about a data or question, I often take a day out in the nature. So, I'd go out for a walk. Well usually fishing is a cure for me, and taking some hike or going out in the river trying to get some fish on the other end of the line is what I do to get going with the internal adventure, if you will, to find a new answer for that question.

CD: That's great. And it does make me think, people often say that, that when you're really stuck on something, it's like you never come up with your best ideas sitting in front of your computer. You have to get away from it and then that's when things start to percolate. You can't just sit there and think, sometimes you need to remove yourself.

KF: Yes. You have to get to the point where your brain is completely boiled and there's nothing left in there. And then you go out and that's when I usually find the breakthrough. But the problem is that you don't know when that happens. It could happen when you go out on fishing or it could happen in the 7:00 AM in the morning shower. So, it's unpredictable in that way.

CD: Yeah, sure. And so, the other thing I wanted to ask you about was along with your contributions to your field, and I'm going to link your site from ours. But I'm just wondering if there was anything that if people are interested in memory research or anything like that, if there's something that you would recommend that would be a good starting off point to learn more about it?

KF: Yeah. So, I think we are in this beautiful era where there's so much information out there and the information is tailored for any people with any background. You can find whatever, that's great. And a podcast is one of the really good resource for you to find the channel that works best for you. And there's a podcast that I listen to regularly. This is called a *Brain Inspired* by Paul Middlebrooks [https://braininspired.co/podcast/]. He does a lot of interviews with neuroscientists and people who work in AI industry and trying to see how these two things come together, neuroscience and AI. I think that interests many people, including me. People who love sci-fi would be listening to that.

And this show particularly is made so that anybody with any background, if you're a scientist, you're going to get to listen to a great scientist talking about their work. Or if you don't have an expert background in neuroscience or AI, you can still get something out of it because those people who are invited will speak their work in a really accessible way. And sometimes you'd also talk about career development in academia. So yeah, this show has been something that I've been listening to as my favorite and getting inspiration about my work. And also, my general curiosity about AI and neuroscience.

CD: Is the person who hosts it, is he like a researcher?

KF: Yes. Also, here's a little background story. And Paul and I, and another person shared an office as post-docs back in the days. And I took this path as my career to become a professor. Paul decided to do work on science communication and things like that, doing this podcast. And the other person went into industry. So, we shared our past and our path has diverted, but we are still looking at the same cognition from a different angle. And that's just really interesting, how many paths that you can take by being interested in the same thing.

CD: Oh, that's really cool. And so, then that does bring me to my last question, but I know you kind of touched on some of these things already. So, you mentioned the podcast and then you mentioned you liked fishing and hiking. Is there anything else that you've been sort of doing? And I know you're a busy dad and a researcher, but is there anything else that you're doing that has helped to keep you afloat?

KF: Yes. Yes. Taking break is really important, especially, nowadays what's really challenging for me is to draw a boundary between work and home work. Because you are at the same place, I often am in basement or my house, trying to work and that's where I spend most of my time. And so, if you are spending your majority of time in a specific place, the same place, the boundary becomes really blurred. You get emails no matter when and you are forced to be there. So, I try to draw that boundary explicitly whenever I can. So, taking a walk outside or taking time away from your work also is important. So,

for that, I watch Netflix. I'm not going to lie, I spend a lot of time on Netflix putting some boundary between work and some other time. Or I listen to lo-fi music on YouTube. That's another thing I spent a lot of time to kind of mend my mind when I have to.

CD: Was there anything on Netflix that you saw that you really liked?

KF: I love a lot of detective shows because there's a lot of interesting mental manipulation that happens in each show. And my most recent favorite is this *Line of Duty*. I think it's a British show and yeah, that was the one that I've been watching. And I don't know. I think that jibed really well with right before the spring, when the weather's a little gloomy, I think that jibed really well with the UK scenery. Lots of rain and gray cloud. But yeah, I often watch sci-fi shows. I think those show really feature our hope, how we want the future to turn out. I think this show kind of shows a danger of some AI and things, but still those are inspired by our hope, what kind of future we want to have. And seeing those is just interesting entertainment wise and also provide some motivation for my research. So yeah, Netflix is a great, great way to put some boundary in your life or maybe not because I'm still thinking about work. So, I don't know, but....

CD: I know, and it's funny because someone just said a quote to me recently and I thought it was so apt, but they said, "I'm not working from home, I'm living at work."

KF: Exactly. There literally is no boundary. And your life, I don't know which one's creeping into the other, but they blend in the same much. And I just realized this 15-minute commute from my home to work was such a great boundary center. It's not that I hadn't worked from home back then. I used to work from home when I have to do deal with emails, but still having that commute to fit a clear boundary between home and work, was such an important function in my day. So, if you don't have it, you got to take a break, be it Netflix, or YouTube, or what have you.

CD: Yeah. And getting a walk around the block even just to get a break from a screen too is very important.

KF: Yes. Yes.

CD: Well, thank you so much for chatting with me today about your work. It's just so interesting. And I feel like there'll be a lot more studies on the horizon as people are I think dealing with the sort of COVID log that we're all getting into. I know this is having effects on our memory, so I'm sure there's more to come.

KF: Yeah. I know that some of my friends are doing some studies using face mask. How did that changes face memory and things like that. So, I'm sure that scientists will find something that's productive and fun from anything that they are thrown into. So COVID is one of them, scientists will be resilient like you said, pushing a scientific understanding of human mind and whatever the scientific field that they are in.

CD: Thank you so much. I really appreciate your time.

KF: Thank you.

[theme music fades in]

CD: I would like to thank everyone for listening to today's show.

I would especially like to thank my guest Professor Keisuke Fukuda from the Department of Psychology at UTM for being so generous with his time and for telling me about his research and the motivations behind his work. Definitely ideas to ponder about memory and remembering going forward – and I hope that I do not forget what my friends look like. It's been so long since I've seen them in person!

I would like to thank the Office of the Vice-Principal, Research for their support.

For any UTM researchers who have a story to tell and would like to be featured on the podcast, please get in touch with me. I would love to hear your story.

Also, if you can take the time to rate the podcast in iTunes, it helps others find the show and hear more from our great UTM researchers.

Lastly, and as always, thank you to Timmy Lane for his tracks, tunes, support, and everything!

Thank you!

[theme music fades out]