

Key:

S: Dr. Stark

S: Hello, my name is Craig Stark and I'm here to talk today about how memory works and how it can actually interface with the court system. And if you really take home just one thing from the talk today, what I'd really like you to grab can be summarized in this quote from Frederick Bartlett. Bartlett said that memory is not the re excitation of innumerable fixed lifeless ideas and fragmentary traces. We often don't write like that so let's just unpack this here for a second. He's saying that memory isn't re-exciting, reactivating, bringing back to mind this huge number of fixed and lifeless ideas. Memory isn't, something happens to you, it gets stored inside of your memory and you can then bring back and reactivate all of this information. And this information isn't in some fixed and lifeless frame, it's not that it's been etched into your memory and it just stuck there instead what is it, he said, it's an imaginative reconstruction or construction. So, you're making it up, out of what? Out of a whole active mass of organized past reactions or experiences. A lot of your memory retrieval is based on what's happened to you throughout your lifetime, a whole organized mass of active experiences and also to a little bit of detail, which commonly appears in image or language form. We kind of turns a memory on its head and said, memory isn't bringing back this huge amount of information instead, what it really is, is you're filling it in, you're making it up based on everything you expect to have happened into a little bit of information actually from that event. He's kind of turning memory on its head in terms of how we think about it. We all know we fill in a little bit, he says you're filling in most of it. What I'm going to try to convince you is that Frederick Bartlett was right and that we've known about it for a long time because Frederick Bartlett said this back in 1932. Now to try to do this, I think one of the best ways I can do it is actually with this video clip. Let's watch this.

[MUSIC]

Male Speaker: Clearly, somebody in this room murdered Lord Smythe, who, at precisely 3:34 this afternoon? Was brutally bludgeoned to death with a blunt instrument. I want each of you to tell me your whereabouts at precisely the time that this dastardly deed took place.

Female Speaker: I was polishing the brass in the master bedroom.

Male Speaker 2: I was buttering his Lordships scones below stairs, sir.

Female Speaker 2: Well, I was planting my petunias in the potting shed.

Male Speaker: Constable, arrest, Lady Smythe.

Female Speaker 2: But how did you know?

Male Speaker: Madam, as any horticulturist will tell you one does not plant petunias until May is out, take her away. It's just a matter of observation. The real question is how observant were you?

S: All right, some of you probably noticed maybe one thing that differed? My guess is nobody actually got all 21. So here, we're watching the scene again and you can start to see, okay look there, the flowers change the tablecloth changes. What's going on behind him there is changing. Oh, wait look there goes the body, body's going out. The bear just left, in comes a suit of armor. Oh, here comes the new body. Oh, look, even his jacket that he's wearing is actually changing. Things on the back wall have changed there. There's the new body is lying down. And all right. This is actually a PSA from the UK saying to watch out for cyclists and that's a great message but to me, it actually tells us something else. It tells us something about how memory works. It tells us that Frederick Bartlett was right, you have a limited capacity to your memory. You held on to just a couple little details. You knew that, look, this is some clues, some murder mystery kind of thing and you maybe remember that maybe she was planting her petunias in the potting shed or that was the one who actually did it. But that's all you actually had because if your memory really did work like a video recorder, the first time the camera went across, you would have encoded that information so it went across again, you would have said, "Wait a minute, wait a minute, that used to be a bear and now it's a suit of armor or that's a different body." But you didn't notice. And that again tells us as I say how memory works, you just held on to a couple little details. I can show you videos like this, but you may be saying, that's not really very real life and you weren't really even trying on something like that. Well, memory researchers have looked at this kind of thing for a long time and there's been pioneering work by Elizabeth Loftus with experiments like this. She showed people a traffic accident and then asked them the question, how fast was the black car going when it hit the blue car? Well, half the people got that question. Half the people got the question, how fast was the black car going when it's smashed into the blue car. They all saw the same thing; same thing should have gotten inside their memory. But if you asked with the word hit, you get 34 miles an hour. When you ask with the word smashed, you get 41 miles an hour. How you probe the memory altered the contents of that retrieval. You do these kinds of things a different way and implant misinformation into the memory itself, show people a scene of a car driving along a country road and then after they've watched this little video, ask them one of two questions, either how fast was the white car going on the country road? Or how fast was the white car going when to pass the barn while on the country road? And of course, the trick was, there was no barn. But just by having this little bit of misleading information, this misinformation in that question, it's not really

even about the barn it's just asking how fast they're going. When you do that a week later, about 3% of the people will report seeing a barn if nobody ever mentioned a barn, but almost six times as many people, 17% of them will now actually remember seeing a barn just if they got that leading question. Presenting this information after the fact becomes part of the memory. That kind of thing is getting us a little bit closer but it's still not really something traumatic. It's not like you witnessed a crime or something like this. We can do these kinds of things, both in animal models and in human studies. For example, if you take a rat, you put him inside of a box and you give them a little bit of a shock. It's not an incredibly painful shock or something like this it's like putting the nine-volt battery on your tongue, if you ever did that. It's an unpleasant experience. If you put the rat into this box and then later on, day later, week later, or even a month later, put him back inside that box, it shows a little bit of a fearful behavior we call freezing, which says, "Oh, wait a minute, this isn't a great place." If you put him inside that same box, it shows that freezing behavior right away. But if instead you put them inside of a different box, in this case he was shocked in a blue box and then is being tested in a red box, if you do something like that after only a day or so the rat knows the difference between the safe box and the box in which it got the shock. It shows freezing just in that shocked blue box. All right. But now wait a month and test that rat again and what you see is that instead of showing this real discrimination between the two, the rat now will freeze inside of both boxes. It's as if the contents of memory went from, I know this blue box is bad to just boxes are bad. No misinformation but the contents of the memory has changed into a gist. Some really pioneering work by Morgan has done this kind of thing in people. Well not sticking people inside of boxes and shocking them but looking at people undergoing prisoner of war training camp. What happens is these soldiers are in a survival school and getting trained to be able to deal with being interrogated after being captured. They get classroom training and then after that they have an actual practical in which they put them out in the woods there and have them captured a day or so later. And then bring them in and have them interrogated for 30 minutes with somebody right here, right in front of them, trying to actually get information out of them. And then the tests, see how well they can actually remember that interrogator. After 30 minutes of interrogation, bring them back two days later and give them a standard kind of photo array, just put some photos out on a table and ask, is the interrogators face in that array? If you do that and the interrogators face is in there about three quarters of the time they'll say, "Yeah, he is in there." Which though does mean that one out of every four of them despite being interrogated in a high stress environment right here for 30 minutes only two days ago, despite that, still one out of every four of them say, "No, he's not in there." They've forgotten it. But the real problem is, what if the interrogator face isn't in the array? Still, about two thirds of the time they say, "Yeah, he's in there." And they go on and they pick somebody. These are some of them our best and our brightest and this is a pretty real-life situation on it, we

can see this kind of false memory happening. It gets even worse than that though. You can implant false memories in these people just as you could with something like that leading question that that Loftus had before. Here when asking questions about the interrogator, you can have a pretty standard nice, open ended question like, please describe the uniform and rank of the interrogator or please describe what he was wearing or anything like this. Describe what was in the room? Did he wear glasses or something like this? You can always ask open-ended questions, or you can ask them leading questions like was the uniform worn by your interrogator green with red boards or blue with orange boards? And if you do something like that then the false memory comes in incredibly. They remember that, yes, he had glasses, they remember that there was a telephone in the room, they remember details on the uniform, they remember what kind of weapon he had just by these kinds of leading questions. And it even gets worse than that, you can actually change the identification of the interrogator. We've got the picture here of the actual interrogator on the left and the person that they changed it to. And the way they did this, is after the interrogation, then they said the person is now in another kind of holding room, give them a photo of the guy on the right, and then just start asking questions. Did your interrogator this, did your interrogator that? Did he do this, did he do that? And after these questions, take the photo back then bring them back later and ask them details. What happens is that first off, remember that whole photo array, is he in there? Yes or no? When he's not in there now, the number of false identifications has gone up incredibly, almost everybody is saying that yeah, he's in there. And who do they pick? Of course, they pick not the actual interrogator they picked a person in that photo. Now, they never even said this is your interrogator asking about him, they just gave him the photos said hold on to it, look at it and ask these questions. By doing this kind of thing, you can make massive changes in the actual appearance in the identification of the person. These are huge problems we can see that memory really is fallible and it has these kinds of distorted properties. But the real problem isn't this, the real problem is that we don't treat memory like this, we treat it as if, if you have a detailed high confidence kind of memory that it must be true but that's just not the case. We've seen that kind of thing. But if you're using that kind of metric as to how memory must work, we're going to run into a problem. And that's where we are because when you ask people, "Hey, human memory works like a video camera accurately recording the events we see and hear so that we can review and inspect them later. Do you agree or disagree with that statement? Think about it for a second. Hopefully, by now in the talk, you've realized that I'm not going to agree with that statement. But when you ask your jurors, two thirds of them will agree with that other, strongly or mostly agree with that statement. When you ask memory experts, people like me that question, look we're scientists, we disagree with each other all the time on things but every single one of us will disagree with this statement. The only thing we argue about is how vehemently we disagree with the statement but still,

as you can see, over 94% of us still strongly disagree with it. We have this gap between how most people think memory works and how it actually works. And that mismatch leads to a real problem. But we have to think about why is it that our memory actually does this? Why do we have these flaws? We have these flaws, because this is how our system was designed to work from the get-go. Memory isn't about looking back, memory isn't designed so that in your old age, you can kick back and say, "Geez, I remember when." Memory is actually about looking forward, it's so that your past experiences can make you more adaptive in the here and now so that you can actually do a better job planning for the future and the decisions that you make right now. It's a forward-looking device. The errors that we have in memory, things like bias and forgetting these are actually the flip side, the evil twin, these biases the flip of them, you can think of as knowledge and wisdom. When we try to divvy this kind of thing up here, we can see that memory is not designed to give you the perfect details of everything, you get the gist of the event and most of the time that's what you need. You'll get a few details and what this means is that eyewitness's memory, jurors' memory, judges' memory, everybody's memory is going to be lacking in these kinds of specific details. It also leads to things like implicit bias and it leads to misidentification. But on the flip side, by generalizing across a whole series of different similar kinds of events, we extract knowledge, and we get wisdom and it's more efficient and that's why we actually do it. Now we can see these kinds of things, not just in the sort of false memories I've been talking about, but in things like witness identification. For example, 271 cases in California found higher accurate suspect identification for the own race faces than for other race faces so if the face matched the witness's own race, why? There's the thing psychologists have known for a long time called the other race effect, in which you are more accurate of being able to identify faces of your own race has nothing to do with something built in. What it comes down to is the amount of experience and exposure you've actually had from an early age with that other race. This kind of thing you can see that Caucasians identifying Caucasian faces are higher in this case than Asian Americans identifying Asian faces. But it really comes down a lot to actually the experiences that you had particular while growing up and from a young age as to whether you'll even see this bias or not. These kinds of biases alter identification, and they alter just fundamentally how we instinctively interact and work with the world, you probably heard of the term implicit bias. Implicit bias is something that you don't consciously think that you have but it's still altering your behavior and how you go through the world. For example, if you ask people, and I encourage you at some point, there's a website implicit.harvard.edu that you can go to and take one of these tests, they have about a dozen or so of them. And it'll go through and ask you questions about what explicit bias you may have, in terms of some area. In this case, I'm showing some data from race, but also try to probe your implicit bias for us. And I can even tell you how it works, it's going to have you make all sorts of decisions based upon putting good things

on this side and bad things on that side. And even if you know how the tests work, it still goes and picks out the implicit bias that you have, because you're a little slower to make certain kinds of judgments than others. And what we find in these kinds of tests, is that your explicit bias how you think you act in the world can be completely separate from your implicit bias. This kind of thing, of course impacts not only things like hiring decisions and this kind of thing but it also impacts the courts. This is a study done on about 600 police cases, death penalty cases from Philadelphia, in which in each case, it was a black defendant and a white victim. And then after the cases had actually gone through, they figured out which ones were actually given the death penalty and which ones were given life without parole. And then they went to another group of participants had nothing to do with a case and asked them, "Hey, here's some pictures, how stereotypical of an African American face do you think this is?" That's all they asked them. They knew nothing about these people, nothing about what was going on. They just ranked each face in terms of some arbitrary notion of how stereotypical African American do you think it is. They then took those ratings and used them to see what actually happened to those defendants. The study was called looking death worthy. And what it showed is that you were over twice as likely to be given the death sentence if you were a more stereotypical African American looking face than a less stereotypical one. This implicit bias can have a huge effect. Now when you start sticking all of these things together, and let's say you see a crime, somebody robbing or liquor store, you see this image, this is what sort of happens to you. And then later on, you're asked questions like, was it a man? How old was he? Could you see the weapon? Was it a gun? Think about that for a second. In that image, was it a man? How old was he? All right, you probably pulled some things back and yet actually, there's nothing in this image that answers any of those questions. You can't tell right now if it's male or female, you can try to guess but you're certainly not really [INAUDIBLE] who's going to be perfectly confident and accurate on it. And yet, you probably thought it was a man and maybe stuck some age on there. And maybe now that I'd mentioned a gun, maybe that's actually inside of your memory as well. So, Frederick Bartlett was right. You knew that it's a liquor store, and you start filling in a lot of that information. It's not little old ladies who rob liquor stores. It's probably a young guy. So, to recap, in terms of the errors where we are here, we not only forget but we generalize, we believe things happen that are similar to things that actually happened. And misleading information sort of misinformation presented after the fact in some question, or something like this can distort the contents of your memory. It becomes a part of your memory and you can't tell where it came from. These things also happen automatically. Every time you remember an event, you retell that story, either to somebody else or to yourself, not only are you retrieving the memory, you're sticking it back into your memory, and anything that happened to it along the way, any new detail that came in now gets to get re encoded and you don't know that you're actually doing this. Nobody's immune to it,

eyewitnesses aren't immune to it certainly, jurors aren't immune to it. Think about all of the testimony that they're hearing and all of the back and forth between the two sides. That's a pretty good opportunity for misinformation there. Judges aren't immune to it either, none of us are. This is actually how our system was designed to work, the result of an adaptive memory system so we have this huge problem. We have these false memories that come in and we're going to need to deal with that. But at the same time, we also do need to deal with the fact that what we've been talking about so far is just honest false memories, not some attempt to actually lie or to deceive. Can we do something though, to try to at least pick apart that notion of is this person intentionally lying? Well, there have been a lot of techniques over the years to try to do this. Of course, the classic polygraph was one such technique in which you're looking at heart rate and respiration, a number of other biophysical factors to try to determine that. These days people are trying to use more and more high technology kinds of equipment like MRI machines to actually try to detect true from lie with the idea being that if you're lying or I show you say a picture of an actual crime scene, something you should know something about, you're going to activate in your mind something about that. And maybe we can spot that. That's the idea behind all of these and the answer is right now that they're not quite there, they still may have a little ways to go, I'm going to put it that way. For example, in the MRI studies, you can find something that they call the deception network in which when you look across a whole bunch of different studies, you can see that typically, these regions will come up and be more active when somebody is lying than when they're telling the truth but in a large analysis that actually looked at all of these studies, there wasn't a single region that was actually present in all or even most of the studies. So, there's still a lot of variability that researchers need to sort out. There're even some regions that flip their activities, more active in lie than true in one study, but more active and true than lie in another. We're ways off on this kind of thing. Not only that, in all of these, you can beat them, just as people can learn how to beat a polygraph, you can actually learn how to beat an MRI lie detector as well. In one of the studies, for example, they had one of these great algorithms and look at the brain scans to try to actually figure out who is concealing knowledge of an event. In this case, they fake stole a watch or a ring, and who really has no knowledge of it. And these were the innocent people who didn't do anything. And you can train these kinds of algorithms to look at the brain activity and figure out, hey, these are the people who are concealing knowledge, they are lying versus those that people are telling the truth, they know nothing of it. But the problem is if you take people who do know something about it and you give them some notion of some little counter measures they can do in terms of making small movements at certain times or thinking in certain ways then these algorithms think that they're telling the truth as well. A very, very fancy scan that might sound great and sound credible to jurors can easily be [INAUDIBLE]. The upshot on all this, researchers are working on this, we would love to have a great answer, we just

don't have it right now so don't count on any kind of technological breakthrough to really divine true from false, or honesty from lie. We may get there someday but we're not there now. What can we do right now? We're not going to change the fact that memory is imperfect, we can't do that, this is biologically how our brains are actually built. So what we're going to need to do is try to minimize the imperfections, get the best data that we possibly can, and also change how much weight is placed on evidence from memory and get it so the jurors won't treat it like a video recorder. There are a number of ways that we can actually do this in different jurisdictions throughout the country are starting to try some of these here. And this notion of getting the best information from the witness, there's something called the cognitive interview that was designed specifically for this, that starts off with a very open-ended set of questions, asking them to remember everything they can giving them all sorts of time to do it and then following in with very specific non leading kinds of questions. And that does a much better job of getting accurate, unbiased information out of the witness. We can do those kinds of things, but the other sort of thing has to happen really at the level of the courts. We need to somehow educate jurors, on issues surrounding false memory and the fact that you can be incredibly confident in your memory and still have be completely false here. In addition, we need to know things that just because you had some personally traumatic event, doesn't mean that this is going to get etched into your brain think of that prisoner of war training camp thing. They had very high stress emotionally arousing kinds of events and yet they were very, very susceptible to false memories, just like we all are. So, having that kind of event doesn't guarantee accuracy either. Therefore, eyewitness testimony is certainly not like DNA. I started off the talk with this quote from Frederick Bartlett. And hopefully by now you've seen that in fact, Frederick Bartlett was right. And these are long established kinds of effects. The pioneering work by Frederick Bartlett, by folks like Elizabeth Loftus and by a huge number of other people in the literature who've been looking at this kind of thing has said, this fundamentally is how our memory system works. We can't keep treating it like it's actually a video kind of camera. Now is the time we have to change how we think about memory and how it's used in the law.