

Episode 15: The Malleability of Memory

Show Notes

Some people have the idea that memory is like a tape recorder: if you remember it, that's the way it happened. But, the data show that our memories can change quite a bit over the course of time. We discuss these experiments and what it means for games.

Game References

Aeon's End, Assassins Creed, Clue, Dominion, Fury of Dracula, Letters from Whitechapel, Monikers, Outburst, Sherlock Holmes Consulting Detective, Sleuth, The Stanley Parable, Taboo

Research References

Jacoby, L. L., Kelley, C., Brown, J., & Jasechko, J. (1989). Becoming famous overnight: Limits on the ability to avoid unconscious influences of the past. *Journal of Personality and Social Psychology*, *56*, 326-338.

Loftus, E. F., & Palmer, J. C. (1974). Reconstruction of automobile destruction: An example of the interaction between language and memory. *Journal of verbal learning and verbal behavior*, *13*(5), 585-589.

Roediger H. L.III, McDermott K. B. (1995). Creating false memories: Remembering words not presented in lists. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *21*, 803-814. doi:10.1037/0278-7393.21.4.803

Transcript

Hello! This is Episode 15 of the Cognitive Gamer podcast. I am your host, Steve Blessing. Today we are going to be talking about how memory changes across time, something that I hit upon a little back in Episode 10 when we discussed narrative. I find this to be a fascinating topic, because ultimately it leads you to wonder how true any of our memories might be.

Before beginning this discussion, though, I would like to stump for a project that I'm involved currently with on Kickstarter. Tim Fowers, of Burple Brothers fame, has a project going on right now, called the Tabletop Network - Boardgame Designer's Retreat. It's a conference that's going to be held June 8-9 at a resort near Salt Lake City. The conference is specifically for tabletop game designers, focused on learning, collaboration, and inspiration. If you look at the speakers, it's quite the list: Rob Daviau, Geoff Englestein, Kathleen Mercury, and others. I am very honored to be part of it all. Please check out the kickstarter! It ends March 30. Even if you are not a designer, you may be interested in going. If you can't make it out to Utah, you can buy a virtual pass and see everything from the comfort of your home. Please check out the project on

Kickstarter! Search for either Tim Fowers, or Tabletop Network. It will be a great weekend of fun and learning. Oh, and, I believe I already know the rough topic of my talk, including title. Currently, I'm thinking "What is GRUE? A Cognitive Guide for Game Design." I figure if I can't make a Zork reference around this crowd, I'll never be able to, so I might as well go for it. You'll have to tune in to see how exactly the acronym GRUE expands, and what it's all about.

Okay, back to the topic at hand, memory. I would like to start a little experiment with you all. It's pretty much a straight-up memory experiment, where I'm simply going to give you a list of words to remember, and then a short time later I'm going to ask you to recall the words. Okay, you ready? Here's the list: bed, rest, awake, tired, dream, wake, snooze, blanket, doze, slumber, snore, nap, peace, yawn, drowsy. And that's it. There's 15 words, so it's a bit beyond what you'll be able to keep in your working memory, so I'm not expecting a perfect score on this by any means. If you remember back from Episode 7, when we talked about chunking, you'll remember working memory is pretty precious, just about 3-4 meaningful units of information. But, with these high frequency words, I bet you do pretty good. Okay, it's probably about time to recall them. Are you ready? Okay, 1, 2, 3, go, recall as many as you can. Go ahead. Just say what you remember out loud. I'll give you a few seconds.

How many did you remember? As it turns out, I don't really care how many you remembered. Let me ask you about a couple of specific words. Did you remember slumber? What about drowsy? Okay, raise your hand if you remembered the word sleep? Did you say sleep was on the list? Hate to break it to you, but sleep was not on the list. Go ahead, rewind the podcast back. I did not say sleep as one of those 15 words. All the words had to do with sleep, but sleep itself was not on the list. When I do this in class, I'll have over half the students mis-remembering that sleep is on the list. Indeed, they often list it first. This is something called the DRM paradigm. DRM stand for Deese, Roediger, and McDermott, the researchers who first used these particular types of lists in their experiments. It's pretty robust, so it makes for a good class experiment. It effectively shows that memory is not a tape recorder, and that while we know we can forget stuff, it's also quite possible that memory intrusions will happen as well, and we will believe we remember something that simply wasn't there. For the reason why it happens in this particular task, if you remember all the way back to Episode 1, when we talked about activation, you can come up with the reason why it's so easy to false alarm to sleep. Each of the 15 words on the list has to do with sleep. Even though sleep itself was not on the list, because all the other words had to do with sleep, sleep itself was getting a lot of activation by the activation from the other words spreading out to sleep. So, people are likely to mis-recall the word sleep, due to its increased activation.

In the 1995 paper by Roediger and McDermott, they list 24 such lists. I'll put the reference in the show notes if you want to track it down. One could almost imagine a simple game placed around this premise. Once you catch on, though, the effect is ruined, at least for collecting data. The game then becomes what word is the list trying to make you false alarm to, Roediger and McDermott referred to these as the critical lure. Here's one more of their lists: water, stream, lake, Mississippi, boat, tide, swim, flow, run, barge, creek, brook, fish, bridge, and winding. What's the critical lure? River, of course. It does have a bit of a Taboo, Outburst, or Monikers kind of vibe happening.

As I mentioned, I talk about this same kind of confabulation within our memories back in Episode 10 and how we remember stories. We often smooth over the rough edges, so to speak, in order to remember stories, and it's due to these sorts of memory processes like spread of activation and using schemas, which I mentioned in that episode. These kinds of processes not only work on our verbal memory, but also our visual memory as well. In another classic experiment, Brewer and Treyens showed their participants an ordinary office in the psychology building. After seeing the office, the researchers asked what the participants remembered seeing. When asked if they saw a phone, many reported they did. But, there was no phone in that particular office. Using schemas to help encode memories also shows that for salient items, those that stick out, you are more likely to remember those. For example, this particular office had a picnic basket, and participants were more likely to remember it. Using schemas to help us encode information and allowing activation of memory items to help us retrieve memories can lead us astray: we might believe something is there that wasn't, like the word sleep or a telephone, but ultimately these processes allow us more efficient use of our memories, particularly given the constraints that we have as humans.

How might this affect our game playing? One straight-forward application is in how we remember the narrative behind games. I'm now a couple of months done with playing through the main mission in Assassins Creed Origins. I'm sure if I recounted the story, I would show a lot of memory loss and confabulation, just like Bartlett's participants did in the War of the Ghost story I mentioned back in episode 10. My first Assassin's Creed game was Assassin's Creed III, the one set in the Revolutionary War. Again, I would get some of the story, but I know I would majorly smooth out the story line and drop parts with regards to the events that happened in the present day.

With regards to board games, these processes come into play with how we remember rules. I'm sure many of you have had the experience of making a house rule for some game, and then at some later point being surprised that that rule wasn't actually part of the rules that came in the box. Or, you've swapped rules unintentionally between two different, but similar games. I recently played Aeon's End, a cooperative deck building game where you are part of a team of wizards battling monsters. For Aeon's End, when your deck runs out, you don't shuffle it as you move it back over, like about in very other deck building game since Dominion. In Aeon's end, you just turn it over. But, because reshuffling in those types of games is so common, I imagine some number of players believe the rule is to reshuffle in Aeon's End. Or, maybe you started to learn a new deck building game, and believed in this new game you also don't need to reshuffle when you replenish your deck, because you got it confused with Aeon's End's mechanic.

That particular issue would be called a source monitoring error by a cognitive psychologist. That is, you have forgotten or misremembered from what source you originally heard the rule. It happens a lot when people try to remember if a plot point comes from the book or a movie; they will get the two sources confused. Seeing the Kickstarter page for the Tabletop Network conference reminded me of a classic source monitoring finding, specifically called the false fame effect. In an experiment done by Larry Jacoby and his colleagues, they presented participants with a list of made up names, like "Valerie Marsh." After reading these names, they were then given a task where they had to go down another list of names and indicate which were famous and which were non-famous. Some of the names were on the original list, like good old "Valerie

Marsh.” At this point, people correctly knew that “Valerie Marsh” was non-famous, and say “Johnny Depp” was famous. The experiment then had one final part, that happened a couple of days later. The participants were back in the lab, and had to go down the exact same list of famous and non-famous names. During this third part, a fair number of participants now correctly mis-identified “Valerie Marsh” as famous, because of source mis-attribution. They have a vague memory of the name now, having been exposed to it a couple of days prior. And, Valerie’s name was among all the famous names, so hey, she must be famous too! I’m hoping for the false fame effect for my name, as people looking on the Kickstarter page see Rob Daviau, Ryan Laukat, and Stephen Blessing, and begin to believe that I’m famous now too!

Again, one could imagine a game surrounding this phenomenon as well, as people have to correctly perform a source monitoring task in order to advance in the game. Given what psychologists know about how to manipulate what and how people remember information, one could make the game easier or harder. Games like Clue, Sherlock Holmes Consulting Detective, and Sleuth already have this to some degree, where it’s important to remember from where you heard each bit of information as you piece together what might have happened or what the stolen gem is.

I have one more thing I’d like to talk about here concerning the malleability of memory. It’s referred to as misleading post-event information, or MPI. Here, information that you hear or see after an event causes you to mis-remember the event itself. The classic example was done by Loftus and Palmer, back in 1974. They showed all participants the same video of a car crash. After everyone had seen the video, they were then asked questions about it. Loftus and Palmer subtly changed some of the words between the questions that different participants were asked. For example, some people were asked, “How fast were the cars going when they hit each other?” Other participants were asked “How fast were the cars going when they smashed into each other?” That small change of verb, from hit in the first sentence to “smashed into” in the second caused participants to change how they answered the question. Participants who heard the “hit” version of the question replied that the cars were going 34 miles per hour, and participants who heard “smashed” replied 41 miles per hour. I’m sure people are bad at estimating speeds in these instances anyways, but the evidence is very suggestive that by asking the question slightly differently, researchers can get people to change their memories of the event. And, answering 34 v 41 miles per hour might make a difference in a court of law. A subsequent question asked if there was any broken glass after the accident. There was none seen in the video, but the participants who had been asked the “smashed” version of the question were over twice as likely to report having seen broken glass after the accident, 14% to 32%.

This happens in real-life with some frequency. The common example is with eyewitness identification. There are high profile examples of Ted Kacynski and Timothy McVeigh being misidentified initially, with police using inadequate descriptions based on faulty eyewitness testimony.

It would be interesting to think of designing a video game or a board game that somehow makes use of the malleability of memory. Like I said before, games like Clue and Sleuth have this to some degree, as you try to remember past clues, as would hidden movement games like Letters from Whitechapel and Fury of Dracula, as you need to accurately connect threads of information

from different sources through the course of play. And, later information may start you to second-guessing how you remember the earlier information. We've all been in the situation where we thought we kept pretty good notes, but now we need to fill in some missing information, and we're unsure how best to do it. That happens in those boardgames, but also in adventure video games too, where you need to keep track of information across play sessions. Or, some recent games have made use of an unreliable narrator, and that gives the player this same sense, that they cannot trust what they have seen or remember in the game so far, such as *The Stanley Parable* by Davey Wreden.

I hope you have enjoyed this discussion on the malleability of memory. Hopefully I didn't cause you to doubt your own memory that much, but a bit of healthy skepticism in that department might be called for! I feel like the next topic up might be discussion virtual and augmented reality games. As always, I welcome any comments or questions you may have, so please email me, steve@cognitivegamer.com and also visit my website, cognitivegamer.com. Also, you can like me on Facebook, Cognitive Gamer, or follow me on Twitter, [@cognitive_gamer](https://twitter.com/cognitive_gamer).

If you haven't done so already, I'd appreciate it if you took the time to give this podcast a rating and a few kind remarks on iTunes or wherever you listen to Cognitive Gamer. This will make it easier for other people to discover the podcast. I appreciate those 5-star reviews! And, check out the Tabletop Network conference! Until next time, remember to think about what you play, and have fun doing it.