

Episode 33: Get Your Head in the Game

Show Notes

This episode considers how best to learn and teach games. Are there particular techniques that enables people to learn games more quickly and efficiently, and that also results in a longer memory for those rules?

Game References

Fog of Love, Magic Maze, Mechs and Minions, Wingspan

Research References

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Transcript

Hello! This is Episode 33 of the Cognitive Gamer podcast. I am your host, Dr. Stephen Blessing, professor of cognitive psychology at the University of Tampa. I use games to both explain and explore concepts in psychology. In this episode I'm going to go a bit meta, as I talk not about how our cognitions work as we play a game, but rather how best to learn a game. Are there particular ways or methods of learning the rules to a game that are better than others? Let's see what learning science has to say.

Before beginning, I should say that this particular topic idea came in from a listener, Jeff Warrender. He had written a blog post on boardgamegeek.com concerning this topic, and was curious if I had anything to add. I emailed back my thoughts and a couple of references, and he wrote another blog post. I encourage you to read those posts, which I'll link to in the show notes, but I thought I would also add in my thoughts concerning this topic during this episode.

I'll begin by making an absurd statement, but one that I believe sums up the situation quite nicely, not only for learning games but for learning anything. I hate to break it to you all, but it turns out that learning is hard. Obviously I say that partly facetiously, but also to point out that

there's not a magic bullet when it comes to learning. There are some good, research proven ways to make it more efficient and enduring, but at the end of the day, learning requires some amount of effort on the student's part, be it learning your times tables, how to speak Spanish, or even digesting the rules to a game like Gloomhaven. Some things are extrinsically complicated like calculus or the rules to the crunchiest Euro game, and thus will require more effort to learn, if all other things were equal. However, regardless of extrinsic difficulty, there are things that the learner and teacher can do to make learning the thing easier, and these are the things I'll highlight in this podcast.

Before I get to these research-proven processes and techniques, I'll mention one thing that doesn't have any real empirical support, but does have some cache in certain circles, that of learning styles. I've heard students say they are an auditory learner or maybe even a kinesthetic learner, but the actual research literature has no real support for these learning styles. I'll link to a 2018 article by Olga Khazan that lists a number of studies done by well-respected learning scientists that describes studies all containing a null result for learning styles. Suffice it to say, teaching in general, and specifically teaching boardgames, does not hinge on knowing if the learner indicated having a more visual or auditory learning style. That's not to say there are not individual differences in learning, but simply that those differences are not correlated to learning styles.

Instead, differences in learning can be linked to things like motivation, working memory capacity, and previous knowledge. I've mentioned some of my previous work in earlier episodes, but for this podcast, I'll use a past paper I helped to write to frame the discussion. A lot of my past research centers on learning more complex material, like algebra or geometry, but I did do a study with a colleague looking at the ability to remember television commercials. My colleague, Lisa Haverty, was working with an advertising firm at the time, and wanted to develop a model for how memorable commercials were. Ultimately, commercials are trying to sell you something, and to do so successfully, they need to be memorable for the product brand they are trying to push. The model that she and I developed uses a small number of cognitive principles, ones that are applicable not only to remembering commercials, but also rules to games.

We developed a model we called CogScore, and it contained six different components: Implicit Affect, Sensory Processing, Working Memory, Knowledge Representation, Elaboration, and Cognitive Engagement. Any commercial could be rated on a 4 point scale on each of these measures, with higher numbers indicating better adherence to that particular component. I'll discuss each of these components shortly, but in order to back up what I'm saying here, let me quickly tell you about the success we had using the model. We used CogScore to rate the commercials showed during the 2006 Superbowl. Superbowl commercials had a number of interesting and useful attributes for us, such as the fact that many people see them and often only see them the one time. We polled people almost a full year after that Superbowl was played as to if they remembered the brands within the commercials. Let me be clear, we weren't just looking for a fuzzy memory of the commercial, but rather we wondered if the participants remembered the actual brand being advertised. We found a significant and positive correlation between CogScore and people's ability to remember the brand. And, this correlation was significantly higher than if you correlated the likability of the ad with brand remembrance. Indeed, people's ability to remember the brand in the highest rated commercial, featuring Budweiser and a magic

fridge, was better than their ability to remember who won the game (the Pittsburgh Steelers beat the Seattle Seahawks, 21 to 10).

Let's talk about each of CogScore's components. My claim here is that not only are these aspects important for remembering commercials specifically, but in general, these sorts of things come into play anytime you want to remember anything. As such, learners and teachers should keep this in mind and try to maximize its usefulness when learning or teaching new material. First up is implicit affect. Essentially, this is how much you like the thing. In our study, we used the AdMeter ratings of these commercials as a proxy for implicit affect. That is, the higher rated commercials per AdMeter, the higher their rating on this CogScore dimension. I'm not going to say too much about this one, as this isn't a cognitive principle per se, but it stands to reason that if you like something, if you have a good gut reaction to it, you'll remember it more. Some people just like a game's theme, because they like the Cthulu stories or they like pirates, and some people just won't latch onto it because of the theme. There are other things besides theme as well, such as art style, or mechanics, or maybe even the designer, but these are all essentially gut reactions that do not have a strong rational component. It's just how you feel, and if you feel positive towards something, you'll remember it more. If you want to learn a game, it stands to reason that if you intrinsically like something about the game, you will remember how to play it better. There's not much the game's teacher can do about this, except to perhaps be enthusiastic themselves about the game, and to pick games to teach with the learner's interests in mind.

Okay, let's start talking about the more cognitive components, ones that can be accommodated for as you teach and learn a game. First, the information has to come into your cognitive system through sensory processing. This component reminds us that humans can't process everything coming in through our eyes, ears, and other senses. We can only attend to a small slice of it, as I discussed more fully in episode 3. I'm sure you've all seen commercials where there is a voice over, text on the screen that doesn't match the voice over, and then maybe a graph and some music and sounds effects. That's too much. When presenting information, be mindful of how the information is being presented and don't overwhelm the learner, be it through video, a rulebook, or a live play through. If you are using multiple modalities, be sure they complement each other and don't compete for attention. And, as we'll see in the later components of the model, make sure you give each segment enough time so that the information can be processed by the learner.

Next up is a trio of components surrounding how memory works. I've touched on memory a number of times in these episodes, and had a good discussion of a basic model of human memory back in Episode 11. The first component in this group is Working Memory. It is no secret or surprise that we can only keep around a few items in our conscious memory, our working memory, at any particular point in time. We are very limited in terms of the number of items, or chunks, that we can have in working memory. Episodes 7 and 28 have a lot more information about that, but in general, we can only consciously consider about 3-4 meaningful pieces of information. In commercials, you only want to have a couple of big ideas in there. I've seen medical and financial commercials that try to pack a lot more in. Likewise, when you teach a game, you want to make sure you don't overload the learner with more than they can handle at any one point in time. Make sure to parcel the information out slowly, and, the best you can, make sure items get committed to a longer term store before you introduce newer items. In short,

unless the game is very simple, don't teach it all at once. Think of ways to introduce a little bit of it at a time.

The other two memory items form a nice pair, Knowledge Representation and Elaboration. With regards to Knowledge Representation, as we wrote in the paper, different people know different things (Lisa particularly liked that line). It's simple but it's true. You need to work with what the learner already knows, what their current state of knowledge might be. If you are trying to teach someone how to play Spades, and it's their first time learning how to play a trick taking game, you're going to need to explain rounds and tricks and trump and all of those sorts of concepts. But, if they already know how to play other trick taking games like Hearts or Euchre, then you can assume they have much of that type of knowledge. In thinking about commercials, you need to assume what type of knowledge your typical viewer might have. In writing a manual or teaching a game to someone, you also will need to assume what the person brings to the table, pun intended I suppose. Obviously you'll teach experienced gamers differently than novices. But, there are probably also more subtle ways in which you might want to consider this. For example, you might teach Wingspan slightly differently to someone who knows birds versus someone who doesn't. Or, if they are coming from roleplaying, maybe you'll teach Gloomhaven differently. Working with someone's previous knowledge is key to teaching them new material.

The Elaboration component of CogScore is all about how the information is interconnected within the commercial, or within the instruction for our current purposes. Increasing the probability that information is remembered when it needs to be remembered is all about linking all that knowledge together, so that you have multiple routes to retrieving it when desired. The more hooks and connections you can give people, the better. As indicated with the Knowledge Representation component, building off prior knowledge is an awesome beginning. But, as you start to give them new information, make sure it's all connected together as well. Don't just tell them disjointed facts and rules. Knowledge that doesn't get hooked up together and becomes irretrievable is referred to as inert knowledge. If a rule ends up being lost in isolation, it's not going to be applied properly. I'm sure we've all forgotten a rule because it only applied to a special case that doesn't happen very much, so that rule is not well-connected to the others. When you teach a game, or write a rulebook, make sure everything connects together; tell a story and try not to have too many special case rules, if any. Games where the mechanism and theme complement each other are easier to teach, because connecting everything together is much easier to do.

The last component of CogScore is Cognitive Engagement, which we used as a proxy for active processing. This measures if the watcher of the commercial or the learner of the rules is actively processing what they are watching or listening to. As you are teaching, do what you need to ensure engagement—ask questions, make jokes, see if they have questions; don't just spout the rules one after the other. Also, mental underload can be just as bad as mental overload; you don't want the learner to be bored. There's a "just right" level of engagement to ensure the most efficient learning.

We have now quickly touched on each of the six components of CogScore, implicit affect, sensory processing, working memory, knowledge representation, elaboration, and cognitive engagement. As indicated, Lisa and I developed this to assess the quality of commercials, as

measured by the probability of the watcher remembering the brand. But, I believe these components will come into play, in not too dissimilar of a way, when remembering and learning anything, including rules. These are the basic underlying principles that underscore all of learning. And, as I said at the beginning, learning is hard, because you have to worry about all these different things. With that in mind, let's consider how these principles can be put into practice in teaching games, in light of different techniques that have been used to do so.

Let's get to two of the common ways people learn games, by reading rules and being taught by another person. First up, reading a rule book. As long as there have been games, I imagine there have been rule books. Or, at least rules on the back of the lid. I imagine Egyptian games of Senet in ancient times being packaged up with hieroglyphic rules on papyrus. I don't envy those who write rules. You have to be complete, covering all possible conditions, clear, and not assume that your player comes to the table with any but the most basic of knowledge. How many sets of rules start with, "First, put the board in the middle of the table, within reach of all players." It's also a one-size fits all kind of affair; you will sometimes see Quick Start rules, but generally it's a singular set of rules in the box. That means you can't do much with the Knowledge Representation aspect of what you provide. However, you can worry about sensory processing, in terms of the text, tables, and pictures you provide, making sure things are clear from a visual layout standpoint. Given that you need to be methodical, you can do so with Working Memory constraints in mind, while providing the Elaboration needed in order to have all the rules hang together. Lastly, inasmuch as you can make the ruleset interesting, do so in order to provide that hook of cognitive engagement.

Just as popular as learning rules by reading them is learning rules by being taught them by another person. In the educational tutoring literature, this is the gold standard of learning new material, by being taught it by a human tutor. In a very influential study, Benjamin Bloom observed that students taught one-on-one by a human tutor scored two standard deviations higher than those taught by conventional means (in a mathematical sense, that means 50% of the tutored students scored higher than 98% of the conventionally taught students). Human teachers, when engaging with a single student, or even 2 or 3 others as when being taught a game, can maximize all the CogScore components by individualizing the instruction. The game's teacher can account for the previous knowledge and interests of the people learning the game, making the teaching be more focused and efficient.

I personally like learning the rules for a new game by watching a rules video, particularly those by Rodney Smith. For certain games that I have my students play, when I can't teach the rules, I have them watch a video ahead of time. Videos offer some advantages over text, such as seeing the game in action with its components, and many people will find them more engaging. And, while any single video will have to assume the knowledge state of its listener, different people can produce different videos that assume different levels of knowledge. That is, Rodney Smith tends to assume very little previous knowledge of games for his listeners, but other video creators assume at least a bit more knowledge for shorter videos, and if you already have a lot of games-based knowledge, perhaps a 5 minute rules explanation will work instead of a 12 minute one. He also does a very good job at observing working memory limitations. On the downside, it's hard to refer back to videos to remember a rule as you are playing, and you may not be able

to put all the rules in the video, or if you do, you start to bend some of the cognitive principles like Elaboration.

There are other techniques that I have seen some recent games do. For example, *Fog of Love* has all of its cards packaged in a pre-determined order, with tutorial cards interspersed within the decks. For your first play through, you do not shuffle any cards, but rather just put the cards down in the order they were packaged. The rules then get introduced to you as you need them during the natural play of the game. I really enjoyed this approach, as you get the game to the table as quickly as you can, and then the rules are nicely already chunked for you, in the order and timing that you need them, so you are not overwhelmed during your first play through. Kudos to whoever did that, for I imagine that was a time-consuming task. I managed to get *Wingspan* near its release, so my copy doesn't have this, but I understand that it now ships with a quick start guide, a small number of cards and a short walkthrough of the first few turns of playing, indicating which cards should be played when, as another way to introduce new players to the rules. Both of these games are catering to players who may be new to the hobby, and so might need a bit more guidance in learning how to play, but in general, I think this is a great idea for many games.

Another approach I like is one that is made by *Magic Maze*, where it goes through 8 or 9 increasingly more complicated setups and scenarios to gradually introduce new rules. *Mechs and Minions* and also *Jaws of the Lion* does that to some degree as well. Many video games also do this as you start out, as its going through its tutorial mode. These learning by doing approaches are awesome, and more than likely would naturally capture a high CogScore-like rating, as they reduce working memory capacity, have you interact with the game itself, and will naturally create links across the different parts of the game. I recognize they are hard to do, but will result in players more efficiently and more strongly learning the game.

One last interesting point to make. When we did our CogScore study, we noticed that sometimes people would remember an incorrect product for a commercial, but would still have the right category. For example, that particular year, there was a FedEx ad, but some people remembered it as a UPS ad. In commercials, that's terrible, because essentially that company has just spent millions of dollars to do an advertisement for its competitor. As another not too surprising example, if you are not Budweiser, don't do a beer commercial during the Super Bowl. Coors made that unfortunate decision that year. In our paper, we called that phenomenon Brand Fuzziness; right category, wrong brand, and you need to figure out how to avoid it, because again, you would be wasting your money if people not only don't remember your brand, but rather remember a competitor's brand. There's a similar thing that goes on with rules; perhaps we can call it Rule Fuzziness, and it would play out as right rule, but wrong game. You might have a rule, perhaps for very good reasons, that is similar to, but still different than a rule in a similar class game. You need to make sure your players are aware of the difference in design and teach things with that in mind. In many deck builders, when you have exhausted your deck of cards, you take the discard pile, shuffle, and start going through that shuffled deck. But, in *Aeon's End*, you don't shuffle, you just flip the discard pile to the play pile. That allows for even more strategic planning. However, I imagine a fair number of people shuffle the discard deck, due to rule fuzziness. I was playing *Love Letter* just last week, and I misdealt twice because I gave everyone their initial card, but then when I went to lay aside the one card per the rules, I

flipped it over, I believe because I wanted to start a discard or choose pile. Oftentimes proceduralization is fine, like we discussed in Episode 22, but it can get in the way of learning new stuff, and instructors need to be mindful of that. I overcame my issue with Love Letter by starting to deal to an imaginary fifth player in order to not feel like I should turn over the card.

That brings us to the close of this episode on how to teach and learn games. I hope you enjoyed learning about CogScore and how its components could be thought of as you teach and learn your next game. 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. And, if you like the podcast, please give a rating in whatever service you use to play podcasts. Just like most dice rolls, higher is better! This will make it easier for other people to discover the podcast. Until next time, remember to think about what you play, and have fun doing it.