Episode 05: (I Can't Get No) Satisficing

Show Notes

Humans do not always make the most optimal decisions. We are limited by our cognitive resources. We usually make decisions, even in playing games, that are just "good enough." The process of making a "good enough" decision is known as satisficing.

Game References

Backgammon, Indulgence

Research References

Blessing, S. B., & Ross, B. H. (1996). Content effects in problem categorization and problem solving. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *22*, 792-810.

Griggs, R. A., & Cox, J. R. (1982). The elusive thematic-materials effect in Wason's selection task. *British Journal of Psychology*, *73*, 407-420.

Simon, H. A. (1947). Administrative Behavior: A Study of Decision-making Processes in Administrative Organization. New York: Macmillan.

Wason, P. C. (1968). Reasoning about a rule. *The Quarterly Journal of Experimental Psychology*, *20*, 273-281.

Transcript

Hello! This is episode five of Cognitive Gamer. I am your host, Steve Blessing. In this episode we discuss what many people think about when they consider psychology and game playing, the process of decision making. Indeed, we will come back to this topic in many future podcasts, looking at various facets as we go along. At the heart of any game is making decisions. If the player is not making decisions, then then they are just being an observer, which isn't very much fun. Even the simplest of games have at least one decision, do I bet on red or black? Will my next roll be lower or higher? More complicated games have lots of decisions to be made on each turn. How we make these decisions are influenced by our psychology. Today we will talk about one small aspect of this larger conversation: satisficing.

First off, let me assure you that "satisficing" really is a word, at least in cognitive psychology circles. And, as you will see, it's a really good one to describe what is going on when we make most decisions. You can hear and see it's a combination of both "satisfaction" and "sufficing." And, really, that's what the term means. When we make a decision, we typically either can't know the optimal choice, or don't have the time or resources to find it. So, instead of optimizing, we satisfice, or in other words, find a solution that satisfies our minimum set of requirements.

When I explain this in class, I don't use a game example, but one from real life. Imagine going to buy a car, a used one that can get you to work and back. You have a list of things that the car must have, like maybe a back-up camera and a nice radio. Perhaps you also have some things that would be nice to have, like for it to be red in color and to have less than 40,000 miles. Those are all your constraints. You are also constrained by time and money of course, and we can also consider cognitive constraints like memory and attention. These all come into play when you go out to find your car. Conceptually, THE BEST car for you exists someplace out there. But, are you going to find THE BEST car? Probably not, you'll find a car that's "good enough:" one that meets your minimal constraints, and hopefully one that meets many of those "nice to have constraints." At a certain point in your car shopping, you will hopefully have found a number of cars that would be okay, and perhaps a couple that are really good choices that you will ultimately decide between. None are perfect, but you will pick the one that rises above the rest. In other words, you will satisfice.

You probably satisfice for many of the decisions you make. You don't have unlimited time and unlimited budget, so those are often constraints. More importantly for us are those cognitive constraints. As we touched on in episode 3, we don't have unlimited attention. We don't have unlimited memory capacity either. We can only attend to so many things at once, and we can only remember so many items. These all conspire to where it's difficult if not impossible to make the optimal decision for any given situation.

And, many decisions you make while playing games are ones in which you satisfice. You don't have all the information you need, and even if you did, you couldn't keep track of it all or remember it perfectly. So, you make the best decision you can, given the cognitive and other constraints placed on you as you play the game. Should I move my knight or pawn? Should my dwarven fighter drink the potion or go storming into battle? Where should my mech go on the board? Where should I place this new tile? Chess, role-playing games, Scythe, Kingdominos, any game, really, almost all of your decisions are ones that involve satisficing. The same is true in video games, as you figure out where to go next on the map or how best to defeat your opponent; we are always satisficing.

This seems like common sense. Humans usually don't make the optimal decision, but rather one that is just good enough at the time you make the decision. Many of us have been the person in the car buying scenario. If not car buying, then maybe apartment renting, or how to structure an English essay or whatever; If we spent more time on any of those decisions, maybe we could have come up with something better, but we make the decision that satisfies the most constraints that we are aware of at the time we make the decision.

This probably sounds like so much common sense, that you may be surprised to hear that this wasn't the prevailing view in economics back in the early 1900s. Back then, the assumption was that, in making economic decisions at least, people always made the most rational decision. It wasn't until Herbert Simon wrote Administrative Behavior in 1947 that economists began to think differently, that we shouldn't assume that humans always make the most rational decision. Indeed, that work led Simon to winning the Nobel Prize in economics in 1978. This theory that started in economics strongly influenced Simon's thinking within the field of psychology. We have to satisfice in our decision making, according to Simon, because we operate not under full

rationality, but rather bounded rationality. That is, there are bounds or constraints placed on our ability to make decisions, just like we discussed above.

What are some of these cognitive bounds placed on our ability to make the rational decision? We've touched on some already, in this podcast and in earlier ones, like memory and attention. I would like to touch on another one in this podcast. The context that a problem is placed in affects our ability to make decisions and solve problems. That is, the same problem wrapped in a different content affects our ability to make choices about that problem. A simple re-theming of the content doesn't change the fundamentals of the game, but can maybe affect how we play it. Obviously if you don't like the theme, maybe you're just not into zombie games, you may not get into it as much. But I'm talking about something more fundamental and important than that.

Let me give you the classic example. Peter Wason, an English cognitive psychologist, developed what is now known as the Wason Card task. In the task participants are told they are going to be shown four cards. Each card has a letter on one side and a number on the other. Their job is to determine if a particular rule has been followed when the cards were constructed. The experimenter then lays down four cards on the table. One card has an E face up, another has a K, a third has a 4 showing, and a 7 can be seen on the last card. So, E, K, 4, 7; that's what the participant sees. The experimenter then tells the participant they need to flip over only the cards necessary in order to determine if a rule has been followed. The rule is: "If a card has a vowel on the one side, then it has an even number on the other." Okay, so remember, you see an E, K, 4, and a 7 on the cards' faces, the rules is "If a card has a vowel on the one side, then it has an even number on the other," or more simply, if vowel then even. You should only turn over the cards necessary in order to verify if the rule has been followed. Which cards do you turn to check the "If vowel then even" rule? Again, the cards show E, K, 4, 7. Here's a hint: you only need to turn over two cards.

This is a challenging task, and the majority of college students get it wrong. Most people get one of the cards right, though, which is you have to turn over the E. If there's not an even number on the other side, then the rule has not been followed. So, the E card needs to be turned over. Most people believe the 4 also needs to be turned over. But, it doesn't. Even if there was a consonant on the other side, the rule would still have been followed. Remember, the rule boils down to "If vowel then even." The opposite does not have to be true, that is, if even, then vowel. It's only if vowel THEN even. But, most people like to turn over the 4; that's something called confirmation bias that we will talk more about in a future podcast. Less than 25% of people indicate that you also have to turn over the 7 card to make sure if the rule has been followed. If you turn over the 7, and there's a vowel on the other side, then the rule, if vowel then even, has not been followed.

Don't feel bad if you didn't get it right. As I said, the data show that most people don't. Here, if we were truly logical beings, we have the complete information with which to make a perfect decision, to turn over just the E and the 7. But the data show we don't; we go with what seems right. In other words, we satisfice, using the constraints we have as cognitive systems. What does this have to do with how context affects our ability to make decisions? Let's consider another experiment, this one done by Richard Griggs and James Cox. This experiment has you imagining you are a police officer in a college town, making the rounds at the local bars. You go into one bar, and you see that one person is drinking beer and another person is drinking a Coke. You also

recognize two other of the people there, and you know one is 22 years old and the other is16. So, you know information about 4 people, someone who is drinking beer, another who is drinking Coke, and you know a third person is 22 years old, and the fourth person is 16. You have to make sure that the law is being followed, that if a person is drinking beer, then they have to be at least 21 years old; or in other words, if beer, then 21 or older. The question is, which people do you either need to either check their cup or check ID for their age? You don't want to be bothersome, so only check the people you need to. Which people do you check? A majority of people get this one right, about three-quarters of participants. It turns out you only have to check 2 people. You have to check the beer drinker and make sure they are of the legal age. And, you have to check the 16 year old, and make sure there's not beer in their cup. That's it, those are the people to check, and as I said, a majority of people get this one right.

You may have noticed, these two problems are exactly the same fundamentally. At an abstract level, they are identical. If you boil them down to logical statements and use the P's and Q's that logicians like to use, they are equivalent. Choosing the E to turn over is the same as checking the age of the Beer drinker. In logical parlance, it's doing modus ponens, and it turns out that humans are pretty good at understanding that type of logical argument. That is, to put it in the abstract, if P then Q, and if you also know P, then Q deductively follows. Turning over the 7 to make sure there's not a vowel is the same as checking the cup of the 16 year old to make sure there's not beer. That's called modus tollens, and people are bad at modus tollens-style arguments. Or, in logician speak, if P then Q, and you know not Q, then not P logically follows.

People in the Griggs and Cox version of the task are much less likely to commit the confirmation bias error, which here would be checking what the 22 year old is drinking. Just like you don't need to turn over the 4, because it's irrelevant if there's a vowel or a consonant, you also don't need to check the drink of the 22 year old, because it just doesn't matter. They could be drinking beer or Coke, and the rule would still be followed. Or, in logical terms, if you know P then Q, and you also know Q is true, then it is an error, affirmation of the consequent, to state that P is also true.

Okay, let's stop minding our P's and Q's and take a step back and see what this tells us about human decision making. First, it shows that we are not truly logical. We are terrible at the original version of the Wason card task. But, we are pretty good when faced with the Griggs and Cox version of the task about being in the bar. So, secondly, it shows us the importance of the context in which the problem is placed. The context can make the problem seemingly easier or harder to solve. There have been a few different specific theories to explain the difference in these logic exercises, but they all come back to the role of experience and how context plays into that. Wason's original version uses this abstract context about vowels and different types of numbers, and people don't have any meaningful cognitive experience to use to help them out. But, the bar version of the task is something quite familiar to the typical college sophomore. They can use that experience and context to help them make the decisions as to what people to check much more expertly. It allows them to satisfice in a more accurate manner. Different versions of the Wason Card task has been developed over the years, with different contexts, and familiarity with context does help to explain people's performance at the task.

The importance of context can be seen in many different areas of cognitive psychology, from decision making, to problem solving, to language, to memory. In an experiment that we'll talk about on a later podcast, chess grandmasters only have good memory for chess; their memory for other things is thoroughly average. We will turn to how important context is again and again. On a personal level, it is something I've considered for quite a while. My undergraduate honors thesis, which was published in the Journal of Experimental Psychology: Learning, Memory, and Cognition, looked at how context affected a problem solver's ability to solve algebra word problem. The finding was that different contexts for the same underlying algebraic manipulations affected the speed and accuracy at which they solved the word problems. Again it wasn't so much about raw algebraic prowess, these were experts at algebra, but the context mattered. The context either relaxed or placed constraints on their problem solving, causing them to satisfice differently depending on how the problems were phrased.

I thought about this recently as I was reading about one of the new games being done by Restoration Games. Well, the games aren't really new. They take older games and spruce them up, classic games that have a core of a good idea, but maybe need just a little touch here and there so that they can be re-introduced to a current audience. Their first three games are soon to be released: Stop Thief, Downforce, and Indulgence. It's that last one I would like to talk about here. Indulgence is based on a 1981 game from Milton Bradley called Dragonmaster. As you can imagine from its name, Dragonmaster had a fantasy theme. Given the numerous fantasy card games out there, Restoration Games decided to re-theme it, and came up with a context about families coming to power during the Italian Renaissance and the role of indulgences in the Catholic Church. They also made some under-the-cover changes as well to the gameplay, which will of course affect how players make decisions. But, as I was reading the description, and thinking about the change from a fantasy setting to the Italian Renaissance, I wondered how that in itself would affect player decisions. Will the different theme and wording of the instructions make a difference in decisions by the players, even if there were no changes to the rules? Maybe; that would make for an interesting experiment. As a scientist would say, it is an empirical question.

As a related thought, I took an online course from MIT about game design a year ago. In an early discussion one of the instructors was talking about backgammon. The object of backgammon is to get your pieces home. That is what that area of the board is called, home. The instructor asked the question if that one small word choice affects how people play the game. Instead of something that sounds a bit more aggressive, like how the moves are described in chess, here in backgammon you have the object being to get your pieces to your home board, which sounds more defensive.

Next time you play a game, particularly one that has been re-themed, think about how the content and concepts of the game presents itself to the players. Mechanics are obviously important and affect how the game is played, but as we have discussed here, content matters too.

We have reached the end of another episode of the Cognitive Gamer. Future episodes will look at other issues in decision making and game playing. As I said, this is a rich topic, and we just barely scratched the surface here. Next time the podcast will have a different focus, as we'll be doing something I call a game vivisection. Instead of taking a topic in cognitive psychology, and

fitting games to the topic, I'm going to take a game, and talk about it from a number of different angles. I'm looking forward to it! Between now and then, if you have any questions or comments, please email me at steve@cognitivegamer.com. I would love to hear from you. Also, be sure to like my facebook page, Cognitive Gamer, and to visit the website cognitivegamer.com. You can also follow me on Twitter, at cognitive underscore gamer. Until next time, remember to think about what you play, and have fun doing it.