

# INTUITIVE RATIONALITY

## *Simulating Sherlock*

With the new science of  
**intuitive general intelligence**



By Grant Renier & Dr Howard Rankin

# 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

(Intuitive Rationality is the name of the human decision-making simulation science, which is the core of the commercial product, IntualityAI)

## Introduction

I was in Walmart and had the strangest of experiences. I remember it well. It was a Wednesday.

I was looking at various types of light bulbs. As I was doing so a Walmart associate, a man in his fifties named Dan, asked me if I found what I was looking for.

"I think so," I said in an unconvincing way. "I'm just not sure which to choose. I can't decide."

"Well," said Dan, "According to Aristotle, all human actions have one or more of these seven causes: chance, nature, compulsion, habit, reason, passion, and desire. I'm sure you'll work it out but if you need me, I'll be over in Men's Socks."

Dan then left, leaving me to figure out my choice and exactly why I made it. It seemed to me that at first glance I had chosen the long life 100 watt light bulbs with a combination of chance, nature and habit as per Aristotle via Dan.

I pondered my reasoning as I headed over to the kitchen appliances. I was looking for a new toaster, as mine had recently blown up while heating four English muffins.

There was quite a selection, and as luck would have it, a delightful Hispanic young lady, called Maria, was rearranging the shelves.

"Need any help?" she asked with a pleasant smile.

"No, I just need to get my thoughts together," I replied.

"Ah," said Maria with a knowing look. "As Buddha says, we are what we think. All that we are arises with our thoughts. With our thoughts, we make the world."

"Excuse me," I said to Maria, "Is there something special going on today?"

"What do you mean, sir?" she asked with a smile.

# 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

“Well, you’re the second associate today who....” I stopped in my tracks. This was a bit weird, but I really didn’t want to pursue it further, and detain Maria any longer.

I chose my toaster, put it thoughtfully in my cart and proceeded to the socks department, where I thought I might catch up with Dan. He wasn’t there but I realized I did need some new running socks and size 14s aren’t always easy to find.

While rummaging through the exercise socks supplies, I noticed that there was a box of 5 for \$10 and a box of 10 for \$9. As I was checking out the tags with a perplexed look, another associate happened to be passing by. Aloysius, a tall striking man of African American origin, saw my confusion and stopped to ask if I needed any help.

“Is this right, I can get these 10 for less than these 5?” I asked, holding up the two bags.

Aloysius didn’t miss a beat. “Yes, that’s right. As Fyodor Dostoyevsky said, “One may say anything about the history of the world--anything that might enter the most disordered imagination. The only thing one can't say is that it's rational. The very word sticks in one's throat.”

I was stunned.

“Aloysius, is there something special going on today?”

“What do you mean, sir?” asked Aloysius clearly not knowing what the hell I was talking about.

“Is this something like Walmart Wise Wednesday?” I asked. “Everyone working here today is quoting wise people of the past, and basically talking about how people aren’t rational.”

“I can assure you that having worked here for the past five years, people are definitely not rational!” said Aloysius.

I laughed out loud.

“No problem, man,” I said. “I’m just going over to the produce department and then I am out of here.”

The produce department proved to be a little disappointing. The fruit I was looking for was in short supply, and what was there didn’t look too good, apart from the bananas.

## 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

As luck would have it, a grocery associate, was rearranging some vegetables nearby. I must have looked annoyed.

“Everything OK?” asked the associate Crystal, a short, dark-haired woman with a rather weathered face.

I replied I was fine, but I must have sounded very unconvincing.

“You know sir,” Crystal continued, “Sigmund Freud said unexpressed emotions will never die. They are buried alive and will come forth later in uglier ways.”

“I’ll try to make sure that doesn’t happen,” I replied with a bemused smile.

And with that I decided my shopping was done. I was tempted to seek out more associates and ask them about their views on rationality, but I was running late. Besides there was part of me that thought I had imagined the whole thing.

As I was putting my purchases on the check-out counter, a small older lady named Maggie was trying to engage me even as she rang up my purchases.

“How are you doing, today, sir?” Maggie asked in an almost routine way. “I hope we met your predictions,” she said sweetly.

I wasn’t sure what she meant, until it dawned on me.

“Oh, you mean my *expectations*?” I said.

“What are expectations but predictions, sir? Aren’t they the same?” said Maggie as she rang up the toaster.

“Well, I never thought about it that way, but I guess you’re right,” I replied earnestly.

“Did you visit the jewelry section today?”

“Er, actually I didn’t. Why do you ask?”

## 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

“Well, I see you are not wearing a watch but I’m guessing you don’t think of Walmart as a place for nice jewelry. You have negative expectations of Walmart jewelry, but let me tell you, some of it is very good quality,” said Maggie.

“I’ll have to remember that the next time I come in,” I replied.

“You see people think of Walmart as cheap, and most people predict that cheap means poor quality. Some of the time it doesn’t, but most people are thinking automatically and not aware of their thinking and the predictions that it creates.”

Maggie carefully packed the socks into a new storage bag before continuing.

“Your movement around the store today was based on your expectations – predictions – about what would be available, how much it would cost, and its value. You might not have been aware of those predictions, but they drove your decisions,” said Maggie.

“Well, I certainly wouldn’t have predicted having this conversation with you at the check-out counter,” I added.

“Well,” Maggie continued, “as Daniel Kahneman says, ‘We are very influenced by completely automatic things that we have no control over, and we don't know we're doing it.’”

At this point, the guy waiting in line behind me chimed in angrily.

“And I certainly didn’t predict that I would be waiting in line while the clerk waxed all philosophical!! Have you two finished?”

“I apologize, for delaying you Maggie,” I said. “When I came into the store this morning, I thought I was completely rational but now I am beginning to have some severe doubts.”

“That’s Walmart for you!” she said with a smile as she handed over my purchases.

As I proceeded to my parked car, I figured that the day couldn’t get any more bizarre.

But that prediction was way off the mark.

You never really know how wrong you can be.

## Chapter 2

As I made my way through the parking lot back to my car, I was deep in thought about what had just happened. Was this a dream?

I reached my car and started to load up my purchases into the back of my vehicle when I was aware that there was a well-dressed man, looking in my direction. I stared back at him, questioning his demeanor.

“Excuse me, sir,” he said in a well-defined British accent. “I was trying to determine what your purchases reveal about you.”

“Reveal about me?!” I said angrily.

“Well, not you specifically, sir, but you as an example of what one can learn by looking at other people’s behavior.”

“Are you some sort of perverted voyeur?” I asked with some malice.

“I’m afraid you’re falling foul of cognitive bias,” the Brit said to me.

“I’m not biased,” I responded immediately, “I have many black and Hispanic friends!”

“No, I’m not talking about ethnic bias,” said the man, “I’m talking about cognitive bias.”

“You see, you have fallen afoul of the availability bias,” he said. “Just because you feel that a questioning stranger in a Walmart parking lot is odd, you have labeled it as criminal, too. Just because I am a stranger engaging you in conversation, doesn’t mean I have malicious motives. Perhaps this idea comes from your experience, or what others have programmed you to believe. It’s what humans do, Dave.”

“My name is not Dave,” I said snarkily.

“I know it isn’t, Howard,” replied the Brit.

“How did you know my name? How did you know it wasn’t Dave?”

## 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

“Well, if most humans I know were called Dave, I would assume that was your name and it would be another example of availability bias, just like your assumption of me,” said the guy, whomever he was.

“So, let me get this right,” I said. “You’re saying that my experience prevents me from seeing things from a totally rational point of view?”

“Very good, Howard. That’s exactly what I am saying.”

The man eyed the goods that were still in my cart waiting to be transferred into the back of my car.

“I see you bought a lot of bananas, Howard,” the man said, eyeing my cart. “I bet you bought them because you thought it was a good deal.”

“Of course, this is Walmart. They were a great deal,” I replied.

“But Howard are you really going to eat 25 bananas in the next four days?” said the guy.

“Probably not, more like 10 days.”

“Howard, half of them will have gone rotten by then and you’ll end up throwing them out.”

Hmm. Perhaps he had a point.

“It’s another example of cognitive bias. Because you were in a place looking for great deals, you were overly influenced by the low price, and bought too many,” said the guy.

“I’m sorry, what’s your name?” I said beginning to feel that this guy was smarter than he looked.

“The name is Holmes. Sherlock Holmes,” he said reaching out his hand.

“Ok, Holmes,” I said, trying to change the subject and all this cognitive bias stuff. “What do you think of my car? I just bought it the other week and I love it.”

## 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

“Of course, you do,” said Holmes. “It’s another example of bias. This one’s called the confirmation bias. You’re looking to justify your purchase. Unless the car was running poorly, you would overvalue it because of your choice,” said Sherlock.

“For God’s sake Sherlock!” I exclaimed “What’s wrong with you? Is everything a damn cognitive bias?!”

“A lot of it. It applies to so much of your thinking and decision-making. However, when you understand the relationship between biases based on your experiences and real facts, you can really understand the world better and you make far better predictions about your world. Like how much money you need for your retirement.”

“Retirement? That’s a long way off. I can’t think about that now,” I replied.

Before Sherlock could actually speak again, I thought I could read his mind and interjected.

“You’re not going to tell me that’s another cognitive bias, are you?” I said with some apprehension.

“Actually, it is. It’s called temporal discounting, which is a result of undervaluing the future because it’s in the future and doesn’t have emotional resonance right now,” said Sherlock.

“It’s a bit like memory decay in that the further away from an experience we are the less emotional resonance it has,” explained Holmes, beginning to look exasperated at my lack of knowledge on this subject.

This seemed like very important stuff to me and I didn’t want it to fade into memory and lose any potential significance.

“Suppose I wanted to know more about this cognitive bias stuff. Could you tell me more?” I asked Sherlock.

Holmes prevaricated at my request. He was not a man to give away his time and attention easily, or at all.

“I won’t take much of your time. I’ll have a few questions and you can then direct me where to find out more,” I pleaded.

## 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

"All right," he agreed somewhat reluctantly. "I'll give you fifteen minutes, no more."

"Thank you!" I said, gratefully. "It would be an honor for me to buy you lunch," I offered.

"No, that will take too long," replied Holmes. "Let's meet at a coffee house and get it over with as quickly as possible."

That's how Holmes and I arranged a time to get together again so I could learn about cognitive bias and how it apparently influences my thinking. I was hoping to be able to make better decisions and predictions.

### A Starbucks Encounter

Sherlock and I agreed to meet at the local Starbucks. Honestly, I did have some serious reservations about meeting him so publicly, but in the end, I decided there was nothing to lose. I wanted to learn more about this cognitive bias stuff.

I arrived at Starbucks and looked around. I spotted him, seated at a corner table, poring over a rather large book. I waved back and gestured that I was getting a coffee. He acknowledged me with a less than enthusiastic hand gesture, and I proceeded to order my venti caramel macchiato.

"Morning Howard, how are things?" he asked, as I sat down at the table.

"Fine, thanks," I replied. "I bet you weren't sure whether I was going to show up," I said.

"No, I was pretty sure you'd come," Sherlock replied.

"How so?"

"It's to do with the risk averse bias," he said.

"What's that?" I asked trying to control any emotional reaction to this whole notion of bias that seemed to dominate Sherlock's thinking.

"In general, people are more averse to risk. They would prefer not to lose \$100 than a chance to win the same amount. It's to do with the way humans are wired. Survival is the most

## 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

important goal and as a result, they are very, very sensitive to any kind of threat. Their whole system is devised to respond to threat first.”

“What’s that got to do with me showing up here, though?” I asked

“Well, there was very little risk for you. You come here all the time, so if I didn’t show up, there was really nothing lost for you. But if I had asked you to join me at a place you had never been before, that was a 40 minute commute, you would have probably rated that as too risky, as in a possible waste of an important resource – your time.”

“That’s probably true,” I agreed.

“But surely it’s not that cut and dried,” I suggested. “There must be some situations where it’s worth taking the risk?”

Holmes looked at me a little differently. It was almost as if he was showing some respect. Perhaps I was misjudging him.

After a short pause, he continued.

“On average studies have shown that people will choose to give up possible gains when they are more than 2.5 times their perceived risk of loss,” said Holmes.

“But what happens if you play it too safe? Don’t you miss out on some possible big rewards and pay-offs?” I asked.

“Yes, when the ratio goes to 3 to 1 or higher, the potential gain to possible loss - overall less risky - people will likely minimize the “riskier” option and go for the potential gain.

At this point, one of the baristas called out my name and I went to collect my vente caramel macchiato.

After I had added some sugar to it, I returned to the table to continue my conversation with Sherlock.

“Ah, isn’t coffee great!?” I said. “I guess you know about the studies that have shown that coffee is very good for you and can reduce your risk of Alzheimers?”

## 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

“Except that benefit is eliminated if you add milk and sugar to the coffee,” Sherlock said.

“Well, I’m still guessing there are still some benefits even with the milk and sugar,” I replied.

“Of course, you do,” said Sherlock, “that’s....”

“Confirmation bias!” I yelled, before he could finish his sentence.

“Well, if we know what influences people’s risk-taking, why don’t we take it into account when making predictions about their choices and preferences? I mean I could see how this would be very useful, in say, adjusting the odds in a gambling situation, or predicting stock market activity,” I ventured to suggest.

“Interesting you should say that. A friend of mine has devised an AI-based program that does just that,” Sherlock said.

“But I can see how that might operate in any situation. For example, When I first came in here, I saw those extra glazed sugar doughnuts but decided against getting one because I am a little concerned about my health. I have been having some palpitations recently, so I decided against the doughnut but allowed myself a creamy coffee with sugar,” I said.

“Yes, so see how all of these biases interact. Your attention has been drawn to your health by those palpitations – a function of the *availability bias*. You then justified your coffee choice by the *confirmation bias*, believing that it was less risky than the doughnut, which it probably was, but not as much as you thought.”

“Wow!” I said. This was mind-blowing, or at least mind revealing.

“But how can you keep track of all these biases and how they interact?”

“Well, that is beyond human functioning, at least in real time. You can’t think about every small detail and check it for bias. You just have to ensure you do it for the big decisions and take into account the major biases and how they interact. That’s what my friend’s prediction program does. It takes the most important twelve biases and factors them, and their interactions with each other, to simulate human decision-making,” said Sherlock.

How cool is that.

# 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

“What’s your friend’s program called?”

“Intuitive Rationality.”

“Well, how many of these biases are there?” I asked.

“There are lots of them. However, it’s generally much easier to see them in other people than yourself because they often are subconscious,” said Sherlock. “A friend of mine, William James, called them part of the “fringe of consciousness”, forces that we are really aren’t aware of that influence our thinking process.”

“William James. That name sounds familiar. Was he the guy who invented Intuitive Rationality?” I asked, while searching my brain from where I had heard the name before.

“No, he did lay some of the foundations for it, though,” said Sherlock who seemed to be reading my mind that I was consciously trying to recall where I had heard that name before.

“James? James?” I asked myself. I was beginning to get a glimpse of the answer. “Is he the guy who plays basketball? For the Lakers? The guy with the headband?” I asked tentatively.

“No, no,” said Sherlock indignantly. “William James was a nineteenth century psychologist.”

“Of course!” I yelled, as vague memories from my introductory class in psychology, formed in my consciousness.

“Wait a minute. I thought you said you knew him?” I frowned in confusion.

“I do in the sense I have read a lot of his work, Howard. He is a very important figure with crucial things to say.”

“Have you ever heard of temporal discounting?” Sherlock asked. He wasn’t changing the subject exactly, more his approach.

“Temporal discounting? Hmm. Is that when you get a discount when buying something if you put it on lay-away?” I ventured to guess.

“Almost. Temporal discounting is the human tendency to minimize and undervalue events that are in the future,” said Sherlock. “So, if I said you have a year to learn all about cognitive bias,

## 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

you wouldn't be too concerned because a year is a long time and there's no pressure in the moment. As a result, you would undervalue the future and put things off today."

"I can see that. I have done that before. It took me a long time to quit smoking when I was younger because the negative consequences of smoking seemed so far off in the future that I minimized the importance of quitting."

"But how does such temporal discounting affect everyday life? It seems a bit esoteric to me."

"Well," said Sherlock, "You just mentioned your experience with smoking. Many people delay attending to their health issues because the serious consequences seem so far in the future. But it doesn't take long before those symptoms appear and by then valuable time has been lost. And how about saving money for retirement? Many people don't do that because that day seems so far off. However, most retirement funds are about gradual accumulation over time. If you start saving when you're 25, and keep the funds generating income year after year, in 40 years you will have amassed a lot of money. If you start when you're 50, there's no way you can accumulate anywhere near that amount because you have lost 25 years of investment."

"I can see that. It seems as if temporal discounting is a dangerous and distorting mindset. It can mean you leave it too late to effectively address a problem."

"Yes, indeed. Think about climate change," said Sherlock. "Temporal discounting not only delays action; it actually leads to people denying the problem. It's a human failing that unless people can actually see it, whatever it is, they doubt it, often to their detriment."

"I guess that's what makes prediction so difficult and so important," I added.

"We humans are too easily led by what we want to believe. That's why these biases are so critical. The confirmation bias is so strong, and humans don't realize how much they are fooling themselves. It only comes back to hurt them in the end. Humans are more concerned about feeling good than being right. It's a very short-sighted and short-term way of thinking."

"Why do you think we are so sensitive – and stupid?" I asked.

"It's just the way our brains and minds have evolved. The human brain is very limited, but, of course, we don't see it that way, because we arguably have the most advanced minds on the planet," said Holmes.

## 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

At this point, the guy who had been sitting at the next table, stood up and leaned down to talk to Sherlock.

“I’ve been sitting here listening to you for the last twenty minutes,” he said aggressively, focusing on Holmes’ eyes. “I’d rather be a real human not a psychotic nerd like you! Seriously, dude, what planet are you from? All this bias shit! Humans are the most rational people in the universe. You need to get a real life!” And with that he threw his coffee cup in the trash and stomped out, muttering loudly to himself.

“Confirmation bias in action,” I volunteered.

“Yes, but how do you think he would have reacted if, instead of hearing this at Starbucks from a nerdy looking stranger, he had consulted his favorite source of information and wisdom?”

“You mean Facebook?” I smiled.

“Yes, that sort of thing,” replied Sherlock

“I guess it’s all about context?” I conjectured.

“Yes, human beings are too influenced by context. Don’t get me wrong, Howard, context is important, but it is often overvalued by us humans. We have a tough time looking beyond the present, or even the obvious,” said Sherlock with a pained expression. “For example, Humans have the anchoring bias. Which means that the first thing that is mentioned, discussed or thought about anchors the discussion or thought process.”

“Do you mean like in a negotiation? If I want to buy something from you and you say it will cost \$50, that number anchors the negotiation?”

“Yes, exactly. That’s somewhat a function of the fact that human beings can only focus on one thing at a time. We humans can’t hold several numbers or facts or ideas in our heads simultaneously, which leads to the anchoring bias.”

“So, it’s all about stepping outside the limits of our consciousness, then. That William James idea of the “fringe of consciousness”? I suggested.

“Yes. Imagine if you had access to a file of all your ideas and beliefs, where they originated, their factual support and how synchronous they were to each other,” said Sherlock.

## 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

“Wow! What a mind-blowing concept! I bet Google has something like that in development,” I suggested. Holmes said nothing, nor did he even flinch.

“Talk about introspection and insight! That is so cool! You could look up exactly when you started to hate the New England Patriots or like blondes, and why! Oh my God!” I was completely blown away by the idea.

“Well, at the very least it would make us humbler,” added Holmes. “How many times have you thought you knew the reason for doing or believing something and then found out your perception was wrong. It hopefully would make you more realistic about your cognitive capacities.”

“That would also influence the availability bias, too, then?” I suggested. “If we had access to multiple sources of information, we would be less influenced by what is easily available,” I suggested.

“Very good, Howard!” Sherlock said in a surprised tone that was a little disconcerting. He continued. “However, you would have to be willing to refer to these alternative sources, not just stick with the ones that were easily available.”

“So, does every species have the tendency to seek the meaning in everything? As we’re talking it seems to me that our consciousness is all about trying to make sense of what is happening to us?” I asked.

“That’s a great and complex question, Howard. Yes, for the most part all species are somewhat geared to see the patterns that are meaningful to them. So, for example, what a whale will attend to is different from what a gorilla will pay attention to. We will only seek meaning and patterns in the things that are important to our survival,” explained Sherlock.

“What about species with more advanced consciousness, though. Don’t they have the ability to influence the innate, survival process?” I asked.

“Well, there’s the irony, Howard. Despite having a consciousness that potentially allows us to look beyond these programmed processes, humans still are slave to habitual thinking. They have a tough time knowing what they can know about their thinking and changing it,” argued Sherlock.

## 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

“Is there a name for this tendency to be consciously unconscious and not realize how habitual and biased our thinking is?” I asked.

“Well, there’s the symmetry bias. As we have discussed, Human beings are constantly trying to make sense of everything. They look for symmetry to find meaning and are therefore overly influenced by the need for trends and meaning.”

“It seems like there have been wise humans in the past who recognized this, though?”

“Well, Socrates said, ‘The only true wisdom is knowing you know nothing.’”

There was a pause before Sherlock spoke again.

Do you know who said, “Knowledge speaks but wisdom listens?” Sherlock asked.

I thought about it.

“Buddha?”

“No, not Buddha.”

“Confucius?”

Sherlock shook his head vertically.

“Jesus?”

Sherlock again shook his head.

“Tolstoy?”

Sherlock didn’t even bother shaking his head.

“Shakespeare?”

No.

“Aristotle?”

No.

“Plato?”

Sherlock shook his head from side to side.

When it was clear that this wasn't the right answer either I gave up.

“Who was it?” I asked.

Sherlock looked at me and after a short pause gave me the answer.

“Jimi Hendrix”.

“No Way!” I said, breaking out into a laugh.

“Why not?” asked Sherlock. “Wisdom isn't only for Greeks and geeks.”

“It's just that I don't think of Jimi Hendrix as a philosopher,” I said.

“So, you see, there you go again, Howard. You're stereotyping.”

“Anyone with consciousness theoretically can make some very insightful statements,” said Sherlock.

“Oh, yeah, like Yogi Berra,” I said, rolling my eyes.

“Hey, Howard, Yogi was a smart guy. He actually said things that challenged people's binary and habitual thinking.”

“Like what?”

“Well, people laughed at his comment, ‘it's like déjà vu all over again’, said Sherlock. “But why can't you have more than one déjà vu experience?”

“I guess,” I said, needing to think more about it.

## 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

“So, how does all of this apply to Intuitive Rationality?” I asked.

“Well, as you saw earlier from the gentleman sitting next to us, humans don’t understand their thinking is a combination of intuition, the fringes of consciousness and rationality. So, any real understanding of human behavior, let alone prediction, needs to take these factors and the biases that drive them, into account.

“So, the creator of Intuitive Rationality cleverly focused on 12 core cognitive biases of humans. These are the biases that most influence human thought and perception. Can you guess which twelve they are?” Sherlock asked in a moment of supreme optimism.

“Well, let me think,” I said, playing for more time. “I’m guessing the availability bias, confirmation bias, anchoring bias, symmetry bias, risk-avoidance, memory decay...”

“Yes, they are all in there,” said Holmes.

“There are also some other important ones. Biases like the environment, the hot hand fallacy and memory decay,” said Sherlock.

“Hot hand fallacy? Is that anything to do with putting your hand on a stove?” I wondered out loud.

“No. It has a lot to do with your basketball player James.”

“What? How?”

“Well, if a basketball player on your team makes six shots in a row, would you want to keep giving him the ball to take shots, or try to keep the ball away from him?” asked Sherlock.

“Keep giving him the ball, of course. He has the hot hand.... Oh, I see,” I said as I made the connection.

“But what if his usual shooting percentage is not 100% but 35%?” asked Sherlock. “Surely, if anything, he is about to miss a lot of shots, isn’t he?”

“I guess you have a point there,” I conceded, not realizing the pun.

## 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

“You see, the emotional, intuitive side of us embraces the emotion of the continued success and wants to seek symmetry in it continuing. The more rational side of us might concede that he is ultimately going to miss some shots but on balance you would want to have him keep shooting until he missed because it satisfies symmetry and emotional needs,” explained Sherlock.

“I hope I’ll be able to remember all of this stuff,” I admitted honestly.

“Now that’s a good point. Human memory decays much quicker than you imagine. Just because you heard something once, or learned something once, doesn’t mean you’ll remember it forever. In fact, your memory will decay much quicker because human memory is unreliable and influenced by many factors. So, Intuitive Rationality has programming that does the same thing to data trends, it “forgets” them, like memory decay,” explained Sherlock.

“Well, that makes sense to me. Memories are context dependent and if you kept applying the same conclusion from different data sets, you might be led astray. For example, I typically don’t stay in Starbucks for a few minutes but here we are thirty minutes after I sat down,” I said.

Holmes then went on to tell me about how the creator of Intuitive Rationality, understood there were data and facts that were measurable, but that the quality of that data also had to be taken into account. Just because you have some rational facts, doesn’t mean that they are very useful to the issue you are considering. Quality had to be factored in as much as quantity.

I then asked him another question.

“So, how does this fit in with Artificial Intelligence?”

“So now, *THE GAME IS AFOOT!*”, Sherlock excitedly responded.

“Interesting question and I’ll give you some simple answers.”.

“There are various types of AI. The first consists of reactive machines that simply respond to a given input. The second are limited- memory machines that are trained to do a very specific function. A lot of current AI on earth is like that,” Sherlock explained.

“Please can you tell me what you are calling about? Press 1 to make a payment, Press 2 to get your account balance and press 3 to speak to a representative, “ I mimicked. Sherlock wasn’t terribly amused and continued without missing a beat.

## 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

“Then there’s Theory of Mind AI in which the system will be able to discern and respond to different human cues, like emotions. Humans are still working hard on that and it’s the next version that you’ll see,” said Sherlock.

“The fourth stage is the development of self-aware AI that would have the same abilities as humans but at potentially much faster speeds, which would give them an advantage. However, no need to worry yet. That is a very long way off here on planet Earth.”

“But it sounds like Intuitive Rationality is a predictive version of self-aware AI in that it simulates human decision-making. Is that right?” I asked.

“Yes, that is correct. It’s not advanced intelligence but it does a great job of simulating human thinking around the concept of predictions. In fact, think of it like this: bias itself has its own logic. There is consistency to how we use these biases, so that they become important sources of data in their own right,” said Holmes. “Intuitive Rationality has created a new category called Intuitive General Intelligence. IGI!”

“Sounds a bit like IBM Watson,” I suggested.

“I’ll tell you more about Watson later. But for now, let’s stay with things that are...” Sherlock stared into the distance.

“Are what?” I asked

“*Elementary*, my dear Howard,” said Holmes, emphasizing the first word.

# 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

(The following chapter is 1 of 12 chapters that describe each of the 12 cognitive biases simulated by Intuitive Rationality, including additional chapters describing the integration logic used by the system to create actionable alerts)

## Risk Averse and Gain Biases

Given that survival is the guiding principle of the brain, it should come as no surprise that most people are naturally more cautious than impulsive.

Research shows that given a chance to win a \$100 or avoid losing \$100, most people choose not to lose money rather than speculate. However, as the benefits of the risk rise, choices change. More people would choose to risk losing a \$100 if the prize was a \$1000. Many more would risk losing \$100 if the prize was \$10,000. And each week many people are prepared to risk around \$20 for a chance to win millions in the lottery, even though the chance of winning is minute but hey, someone's got to win right? (Actually, no, there is no guarantee that the major prize is won each week, and in any event this is an example of the optimism bias and the anchoring bias – the talk is about the \$300 million that someone could win, not the \$20 you are almost certain to lose).

CNBC reports that consumers spend an average of \$86 per month on lottery tickets and note that the chance of winning the Mega Millions jackpot is around 300,000,000:1 give or take. Or to put it another way,

“To put that in perspective, you have a far greater chance of being attacked by a grizzly bear while on vacation at a U.S. National Park. And even that only happens every one in 2.7 million visits, according to [the National Park Service](#).”

Interestingly, the wealthiest people don't spend the most on lottery tickets. As you will read in the next section, IntualityAI has given strong support to the Prospect Theory of Kahneman and Tversky that sets the parameters for when risk becomes more appealing.

There are conditions under which people do become more impulsive. Impressive work by Dr Adriane Raine and others in the field of neuro-criminology suggests that there are broadly two types of criminal brain profiles. The first of these is impaired frontal lobe function, leading to much more impulsive behavior. The second is a reduction in emotional areas of the brain which lead to a psychopathic sense of not caring and worse emotional control.

Sherlock admits that when he first started investigating crimes, he didn't fully account for this difference in impulsiveness and lack of empathy.

“I somewhat assumed that master criminals were pretty intelligent in planning and executing their crimes. However, as intelligent as they were, it was only over time that I began to recognize that I needed to factor in impulsiveness and risk-taking.”

# 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

“For example, would you seriously risk spending the rest of your life in prison to steal 500 pounds? At what point does the number become so tempting that you might consider it worth the risk? 100,000 pounds? \$1 million pounds?”

“Many crimes are committed because people get too emotional. Look at the Boscombe Valley Mystery. The old man Turner killed his “friend” McCarthy because he didn’t want his son to marry his daughter and share in her inheritance. Turner was ill and was going to die anyway. Should he not have let his daughter decide who to marry?” asked Sherlock, sinking back into the sofa, taking another deep inhalation of his cigar.

Some people act so impulsively that they don’t even consider weighing up the odds. These are typically instant reactions to circumstances not well-planned out crimes. For example, there’s the guy, who had led a perfectly moral life, who threw his wife out of the apartment window after strangling her. A massive tumor in his frontal lobe reduced his sentence from a lifetime in jail to a mere 7 years.

However, these are the exceptions to the rule. Most people’s default position is to be risk averse UNLESS the benefits of action, or the *perception* of the benefits, vastly outweigh any inherent conservatism.

<https://www.cnbc.com/2019/12/12/americans-spend-over-1000-dollars-a-year-on-lotto-tickets.html>

## Technical Summary

The development of a heuristic to simulate the risk versus gain function in human decision making was included early in the creation of the Intuitive Rationality logic. Again, it was a process of creating mathematical variables that, over 10’s of thousands of data series events, converged on consistent values, within reasonable tolerances, to produce the most profitable solutions for all applications sectors. Profitable solutions were measured by the quantity and quality of right and wrong actionable alerts (decisions) made the Intuitive Rationality logic.

The data series were from sectors including the investment markets, health databases, opinion polling data, sports, Internet transactions and more. In addition, large data series were also included from seemingly unrelated human behavioral sectors such as, electro-mechanical

# 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---

component operation, random number generators and Brownian Motion data. The reason for inclusion of this second group was to see if there was any high correlation between this 'second order' result of human decision making and the first group of direct human behavior.

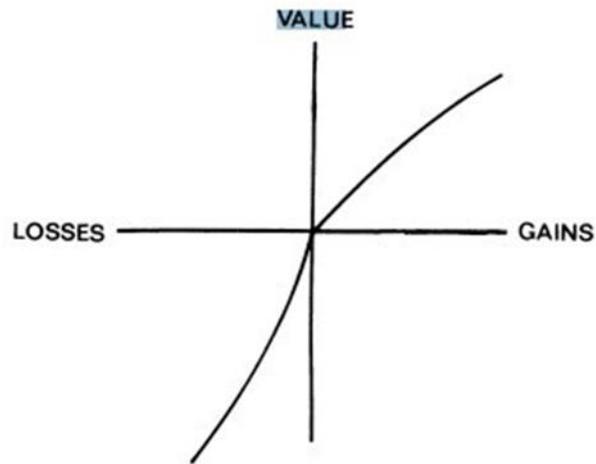
The results of this extensive research were surprising! Intuitive Rationality converged on variables within its risk-versus-gain function that were not linear like those of conventional economic and gaming utility functions. The variables were found to be direct functions of the size of the potential risk versus gain relationships, independent of the application sectors. When confronted with potential risk versus gain, human behavior and resulting decisions were showing high degrees of consistency for all applications, regardless of their apparent disconnectedness. This is like saying there is a rather fixed risk/gain function within human cognitive decision making that is the same when making a bet on a football game or designing a refrigerator, or even buried in the charted results of a seismograph that measures earthquakes.

These findings coincided with the development of the prospect theory and the certainty effect by Amos Tversky and Kahneman in the 1980s. The following is an excerpt from *Econometrica*, Prospect Theory: an Analysis of Decision under Risk, Kahneman and Tversky, Volume 47, March 1979, Number 2, that explains their approximation method of the behavioral decision-making characteristic that favors marginal risks over gains, where the average slope of the value curve for Gains is less than that of Losses, and has been called the S-curve.

"A salient characteristic of attitudes to changes in welfare is that losses loom larger than gains. The aggravation that one experiences in losing a sum of money appears to be greater than the pleasure associated with gaining the same amount [17]. Indeed, most people find symmetric bets of the form  $(x,.50; -x,.50)$  distinctly unattractive. Moreover, the aversiveness of symmetric fair bets generally increases with the size of the stake." . . . "A value function which satisfies these properties is displayed in Figure 3. Note that the proposed S-shaped value function is steepest at the reference point, in marked contrast to the utility function postulated by Markowitz [29] which is relatively shallow in that region."

# 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

---



VALUE LOSSES GAINS FIGURE 3.-A hypothetical value function.

Their publications and others generally confirmed Intuitive Rationality's results. A simple game presented to many groups of people generally supported this so-called irrational behavior and decision making.

## Game 1:

Would you rather take \$1,000 from me, on question asked, or elect to win \$2,000 upon a coin flip coming up Heads?

Most of the groups chose taking the \$1,000.

## Game 2:

Would you rather take \$1,000 from me, on question asked, or elect to win \$3,000 upon a coin flip coming up Heads?

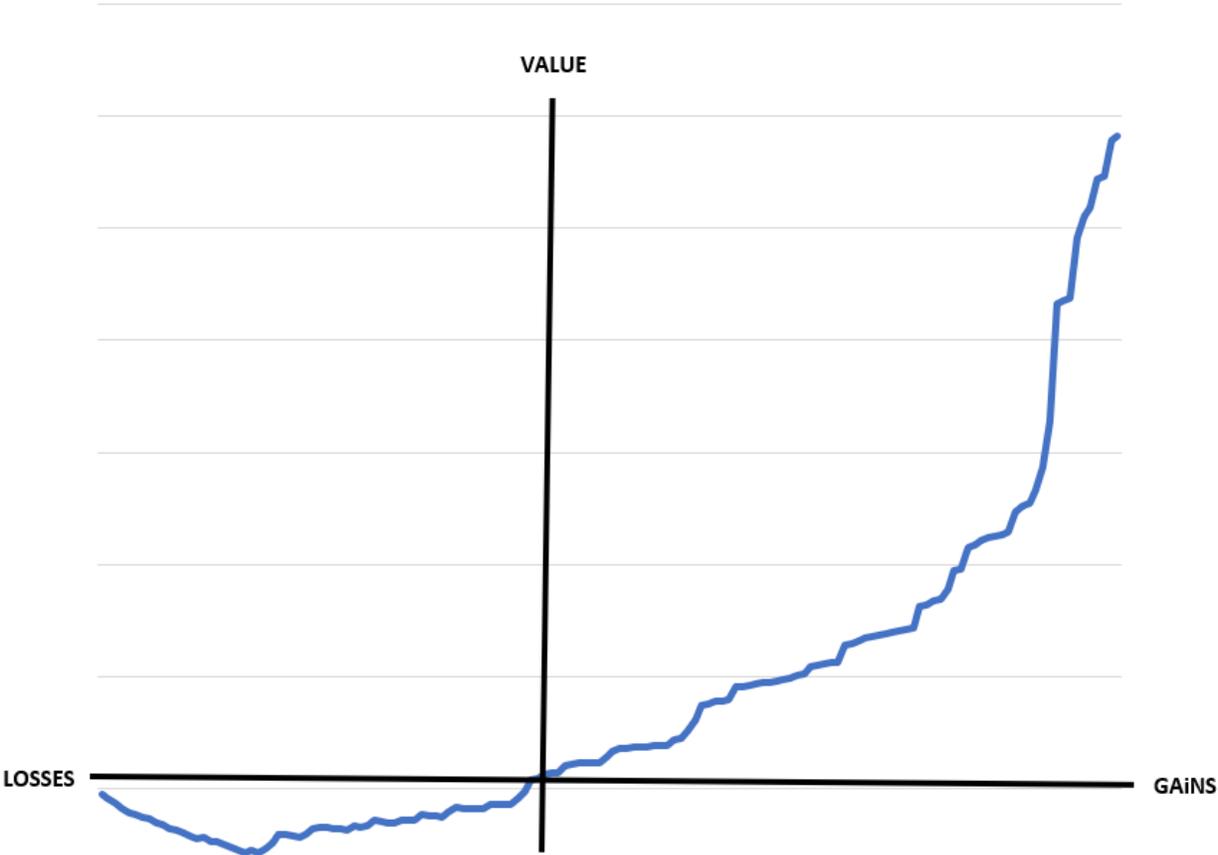
Most of the groups chose to risk the coin flip and go for the \$3,000.

Obviously, the coin flip odds are the same. Over many trials like this and the results of the profit-optimizing function of Intuitive Rationality, a very general 'breaking point' became obvious: in general, when the perceived ratio of risk versus gain is less than 2.5 to 1, the decision will be to minimize risk and forgo potential gains. When perceived gains are greater than 2.5 to 1 over risks, the decision will be to go for or stay with the prospect of future gains. What was a variable in the Intuitive Rationality trials became a constant within its logic.

# 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

Of course, Intuitive Rationality's risk/gain function creates new S-curves that change shapes with every successive new data event, as other biases affect that new data and pass the results to this function. Much like when the above game results vary with the demographic make-up of the groups. Higher income groups are more likely to take their chances with flips of the coin than lower income groups at that value of the game. To best simulate this dynamic, the system's logic makes independent predictions for all near and far future events for each new data input event to produce an equal number of competing future S-curves. The following charts are examples of S-curve plots for predicted future events, including the gain/risk ratios at maximum positive slopes.

1/15/21 Prediction of Advance Auto Parts Inc Stock Price Change on 1/21/21  
S-Curve of Predicted Price Close Probabilities  
Predicted Gain/Risk Ratio: 6.9/1

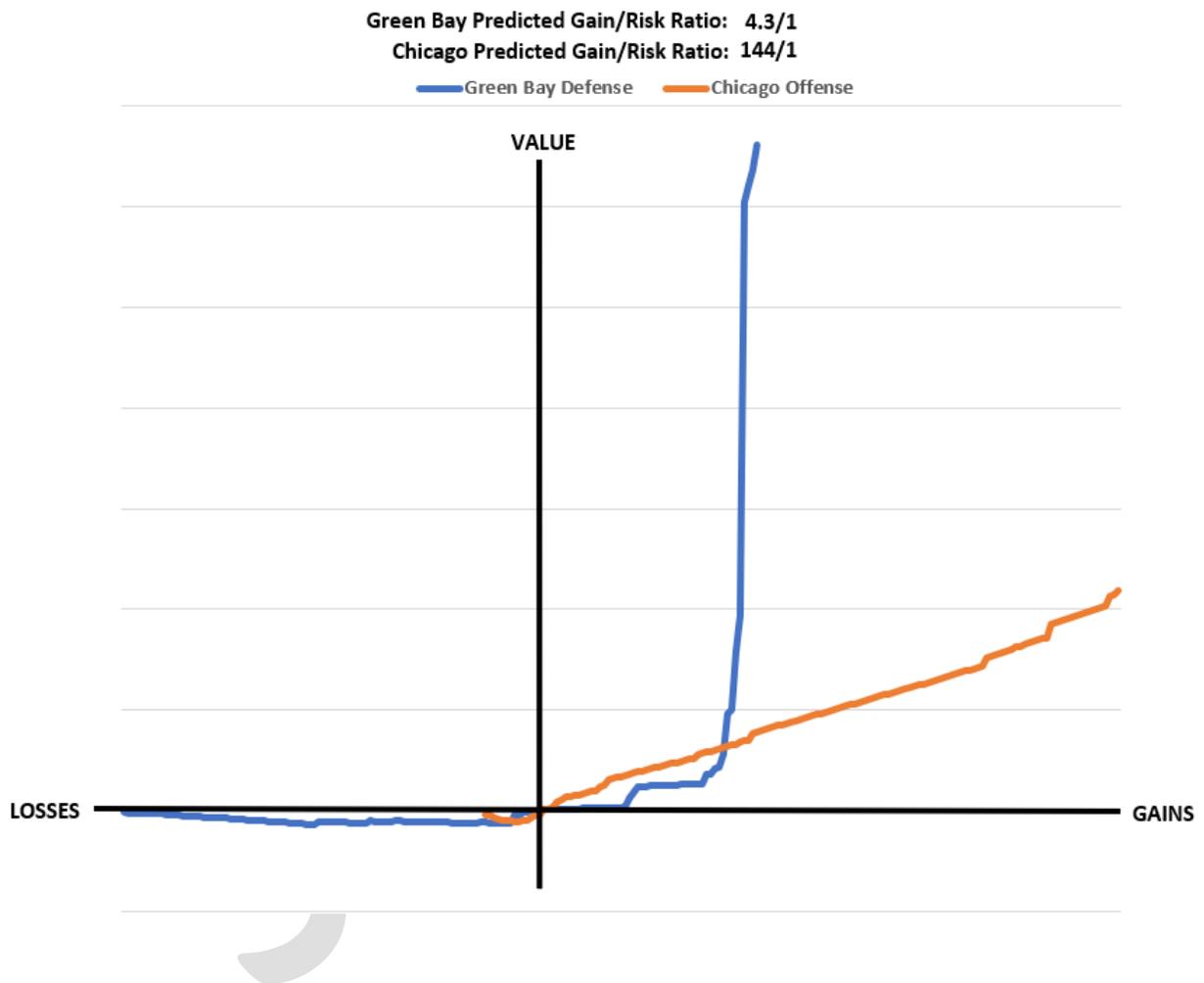


The prediction made on 1/15/2021 of the Advance Auto Parts Inc price change between 1/15/2021 and the close on 1/22/2021 shows a gain/risk ratio of 6.9, well above the internal constant of 2.5, mentioned

# 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

above. The predicted curve suggested that Intuitive Rationality was less risk averse and, when all other biases are included, might recommend a “Buy” on 1/22/2021.

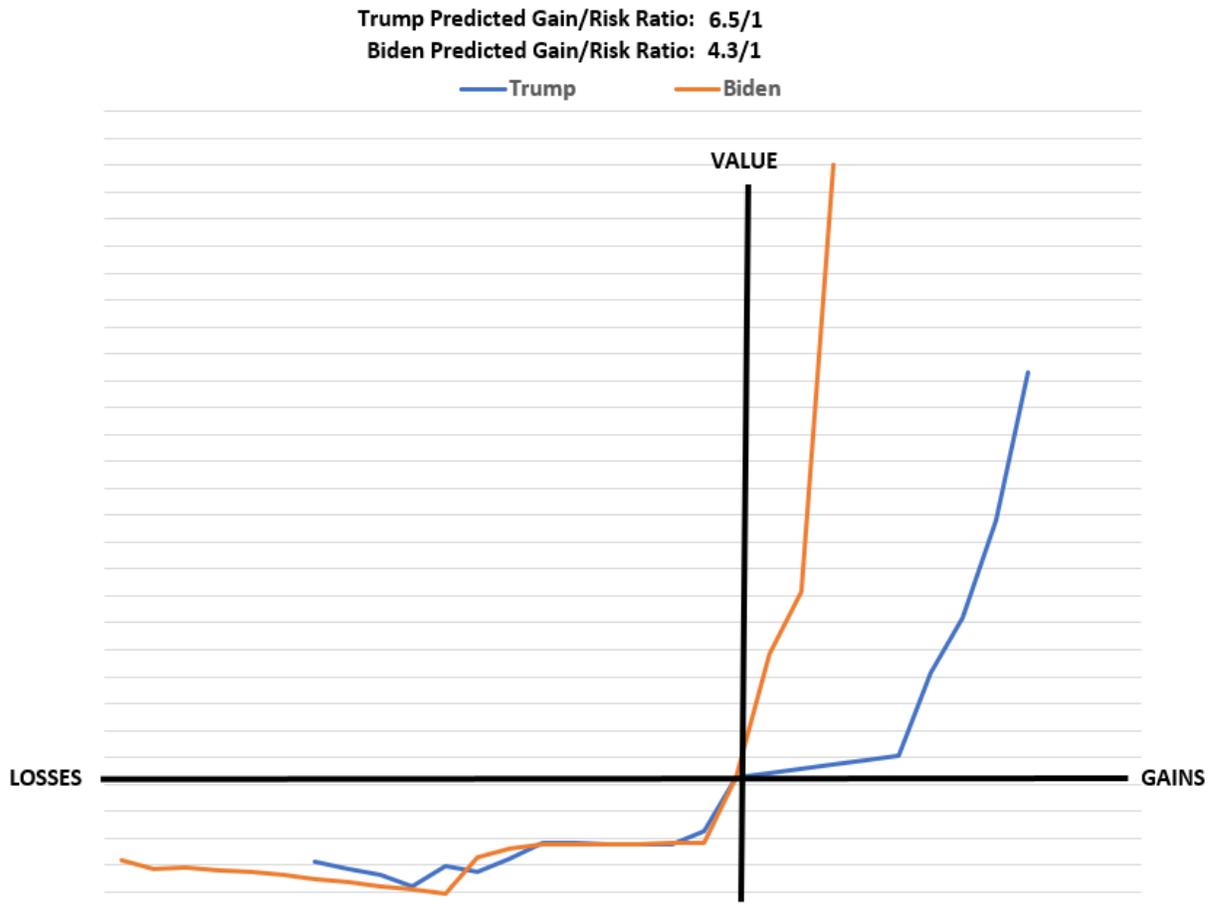
1/2/21 Prediction of Green Bay Packers v Chicago Bears, on 1/3/21  
S-Curve of Predicted Play 69 Probabilities



The actual result of the 69<sup>th</sup> play of the game between the Green Bay Packers and the Chicago Bears was a short pass by Chicago for a gain of 5 yards. The comparative predicted S-curves for that play (1 day before the actual game) indicate that Chicago could choose potential gain over risk with a high ratio of 144 to 1, compared to Green Bay’s ratio of 4.3 to 1 or a higher Gain slope of Chicago probabilities over Green Bay.

# 1 INTUITIVE RATIONALITY: SIMULATING SHERLOCK

10/14/20 Prediction of Trump v Biden Election on 11/5/21  
S-Curve of Election Probabilities



The final election results on 11/5/21 – an extra 2 days after Election Day to include mail-in ballot results – was a Biden victory. The comparative S-curves from the 10/14/20 predictions show Trump and Biden Risk probabilities, in the lower-left quadrant, to be about the same. On the other hand, Biden had significantly higher Gain probabilities than Trump, in the upper-right quadrant, even though Trump's Gain/Risk Ratio had a slight edge over Biden's, and both being above Intuitive Rationality's 2.5/1 tipping point.