CHAPTER 1

# Cognitive Biases 1

In this section, we are going to take a look at research findings about *cognitive biases*. These are universal quirks found in the human thought process. Cognitive biases are a bit different from other kinds of biases, such as racial biases. Everyone, regardless of nationality, race, or gender is subject to these cognitive traps. You might be wondering, why do I need to learn about cognitive science in order to be an engineer? The most important tool we have as problem solvers is our own minds. We are going to be looking at ways that our minds can trip us up.

Our brains were designed over millions of years by the evolutionary process. The resulting mind is an amazing and powerful tool, but it is not flawless. The human brain has tendencies (or biases) that nudge us toward bad judgment and poor decisions.

When someone first gave you a hammer they handed it over with a warning: "Don't hit your thumb!" No matter how careful you are with the hammer, at some point you will still hit your thumb. It's the same with cognitive biases. In the course of life, all of us will fall prey to these cognitive biases. Knowing about them is the first step in protecting ourselves.

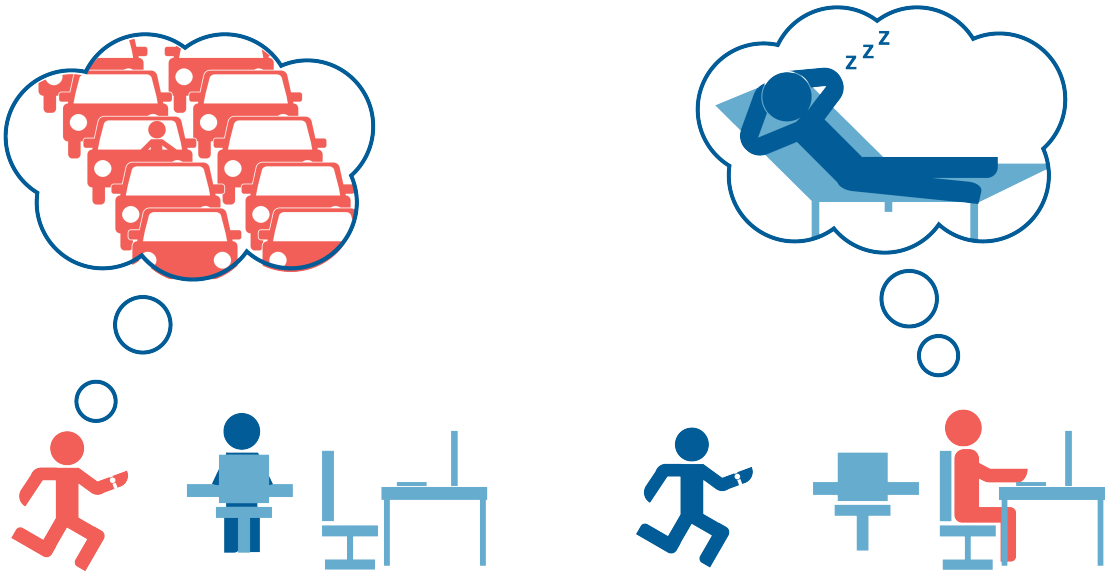
It would be irresponsible to teach you powerful ideas without also teaching you about the cognitive biases that follow them. There are about 50 that you should know about, but let's start with only a few.

## 1.1 Fundamental Attribution Error

You tend to attribute the mistakes of another person to their character, but attribute your own mistakes to the situation.

If someone asks you "Why were you late for work today?" you are likely to have an excuse, such as "I got stuck in a crazy traffic jam."

However, if you notice your coworker is late for work, you are likely to think "My coworker is lazy."




The solution? Cut people some slack. You probably don't know the whole story, so assume that their character is as strong as yours.

Or maybe you also need to hold yourself to a higher standard? Do you find yourself frequently rationalizing your bad judgment, lateness, or rudeness? This could be an opportunity for you to become a better person whose character is stronger regardless of the situation.

## 1.2 Self-Serving Bias

*Self-serving bias* is when you blame the situation for your failures, but attribute your successes to your strengths.

For example, when asked "Why did you lose the match?" you are likely to answer "The referee wasn't fair." When you are asked "Why did you win the match?" you are likely to answer "Because I have been training for weeks, and I was very focused."

This bias tends to make us feel better about ourselves, but it makes it difficult for us to be objective about our strengths and weaknesses.

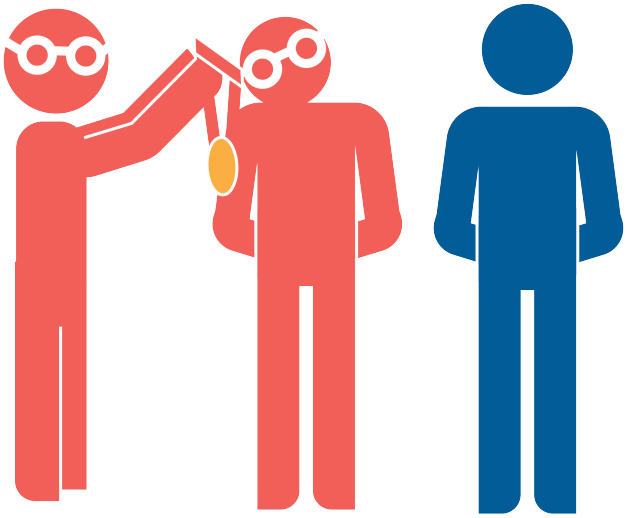
## 1.3 In-group favoritism

*In-group favoritism*: We tend to favor people who are in a group with us over people who are not in groups with us.

When asked "Who is the better goalie, Ted or John?"

If Ted is a Star Trek fan like you, you are likely to think he is also a good goalie.

As you might imagine, this unconscious tendency is the source of a lot of subtle discrimination based on race, gender, age, and religion. As we mentioned earlier, racial bias isn't a cognitive bias, but one can still feed into the other.



## 1.4 The Bandwagon Effect and Groupthink

*The bandwagon effect* is our tendency to believe the same things that the people around us believe. This is how fads spread so quickly: one person buys in, and then the people they know have a strong tencdency to buy in as well.

*Groupthink* is similar: To create harmony with the people around us, we go along with things we disagree with.

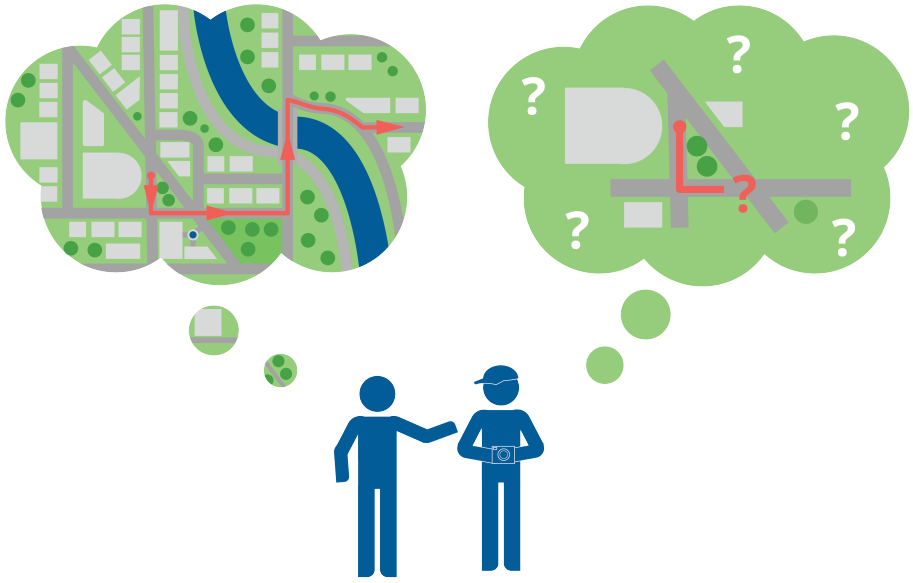
It takes a lot of perspective to recognize when those around us are wrong. And it takes even more courage to openly disagree with them.

## 1.5 The Curse of Knowledge

Once you know something, you tend to assume everyone else knows it too.

This is why teaching is sometimes difficult; a teacher will assume that everyone in the audience already knows the same things the teacher knows.

For example, imagine a local who has lived in a city for years giving directions to a tourist. The local has an in-depth understanding of the city, and gives overly quick and detailed instructions. The tourist politely smiles and nods, but stopped following after the local began listing unfamiliar street names and landmarks.



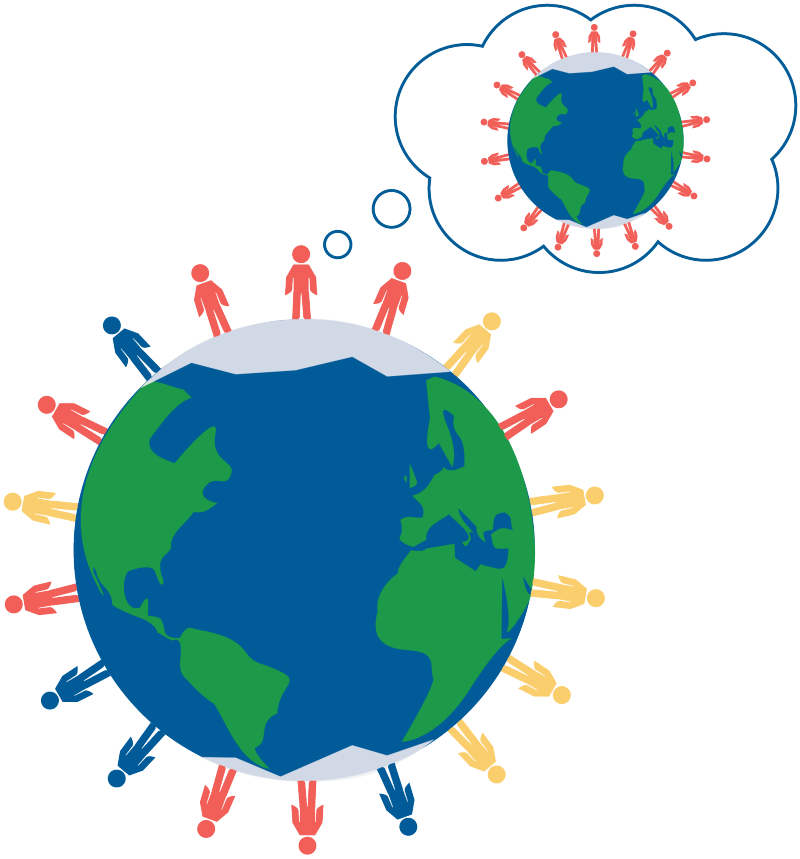
When we learn that a friend doesn't know something that we know, we are often very surprised. This surprise can sometimes manifest as hurtful behavior.

When we find a gap in our friend's knowledge, we try to remind ourselves that the friend certainly knows many things that we don't. We also try to imagine how it would feel if they teased us for our ignorance.

## 1.6 False Consensus

We tend to believe that more people agree with us than is actually the case. For example, if you are a member of a particular religion, you tend to overestimate the percentage of people in the world who are members of that religion.

When people vote in elections, they are often surprised when their preferred candidate loses. "Everyone, and I mean EVERYONE, voted for Smith!" they yell. "There must have been a mistake in counting the votes."

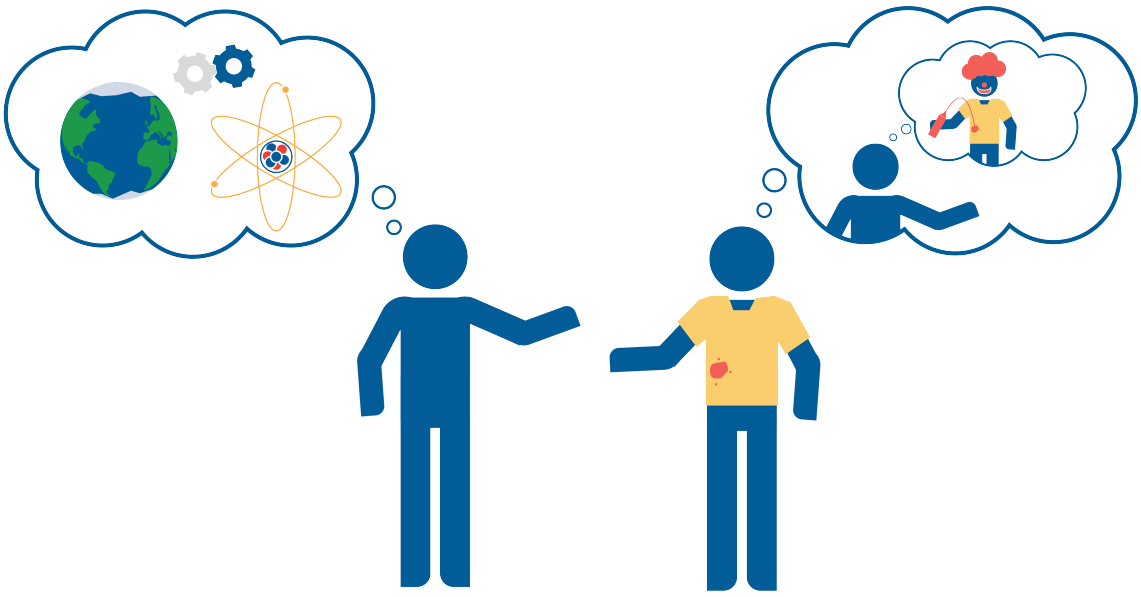


## 1.7 The Spotlight Effect

You tend to overestimate how much other people are paying attention to your behavior and appearance.

Think of six people that you talked to today. Can you even remember what shoes most of them were wearing? Do you care? Do you think any of them remember which shoes you wore today?

There is an old saying, "You would worry a lot less about how people think of you, if you realized how rarely they do."



## 1.8 The Dunning-Kruger Effect

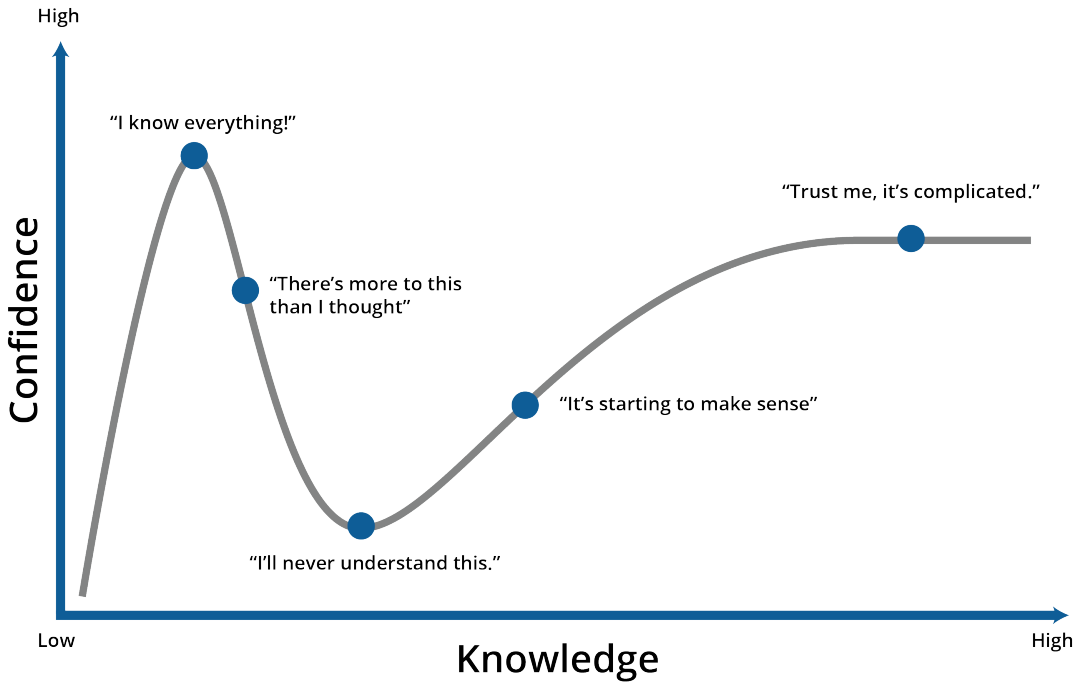
The less you know, the more confident you are.

When a person doesn't know all the nuance and context in which a question is asked, the question seems simple. Thus, person tends to be confident in their answer. As they learn more about the complexity of the space in which the question lives, they often realize the answer is not nearly so obvious.

For example, a lot of people will confidently proclaim "Taxes are too high! We need to lower taxes." An economist who has studied government budgets, deficits, history, and monetary policy, might say something like "Maybe taxes *are* too high. Or maybe they are too low. Or maybe we are taxing the wrong things. It is a complex question."

When we are talking with people about a particular topic, we do our best to defer to the person in the conversation who we think has the most knowledge in the area. If we disagree with the person, we try to figure out why our opinions are different.

Similarly, you should assume that any opinion that is voiced in an internet discussion is, at best, wildly over-simplified. If you really care about the subject, read a book by a respected expert. Yes, a whole book — there are few interesting topics that can be legitimately explained in under 100 pages.

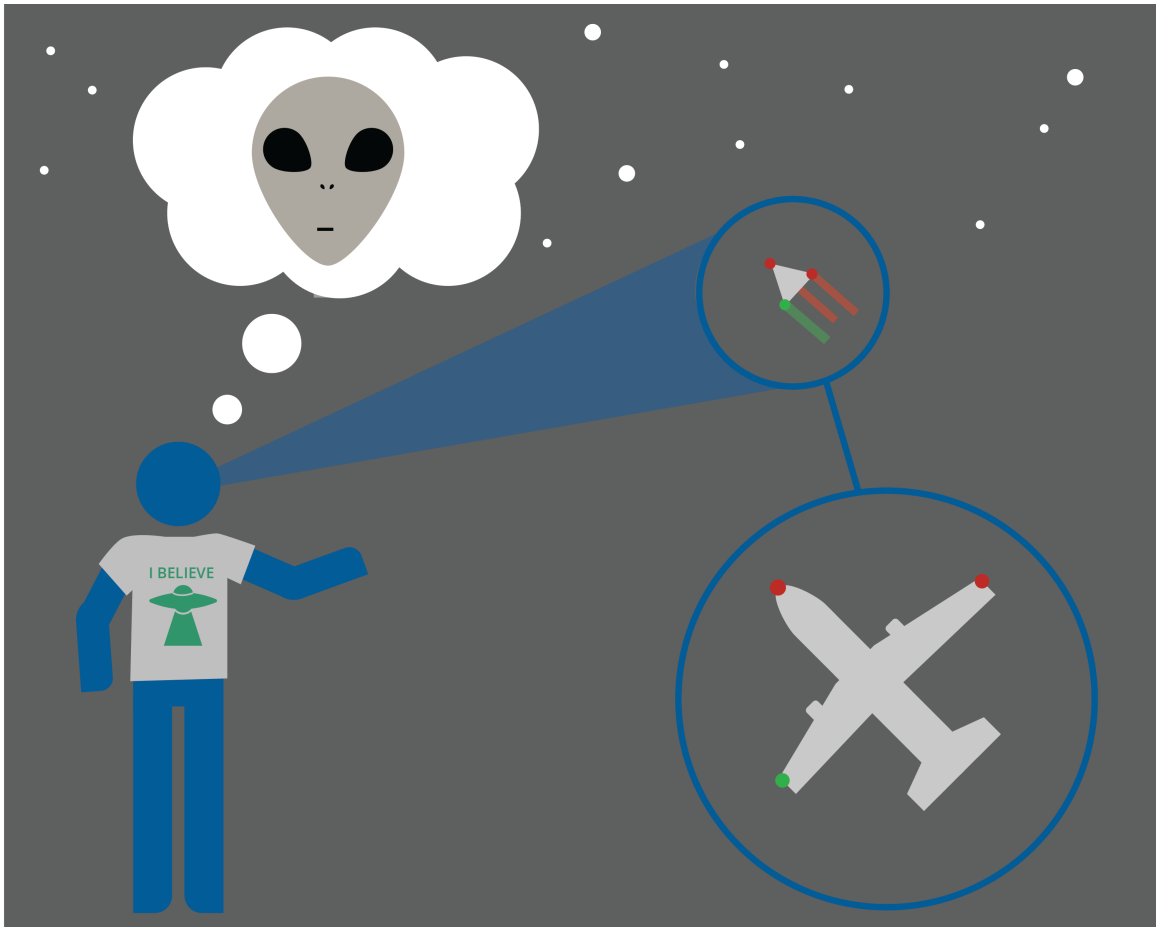



## 1.9 Confirmation Bias

You tend to find and remember information that supports beliefs you already have. You also tend to avoid and dismiss information that contradicts your beliefs.

If you believe that intelligent creatures have visited from other planets, you will tend to look for data to support your beliefs. When you find data that shows that it is just too far for any creature to travel, you will try to find a reason why the data is incorrect.

Confirmation bias is one reason why people don't change their beliefs more often.




Confirmation bias wrecks many, many studies. The person doing the study often has a hypothesis that they believe and very much want to prove true. It is very tempting to discard data that doesn't support the hypothesis. A person may even throw all the data away and experiments again and again until they get the result they want.

When you design an experiment, you must describe it explicitly before you start. You must tell someone: "If the hypothesis I love is incorrect, the results will look like this. If the hypothesis I love is correct, the results will look like that. And if the results look any other way, I have neither proved nor disproved the hypothesis."

Once the experiment is underway, you must not change the plan and you must not discard any data.

This is scientific integrity. You should demand it from yourself, and you should expect it from others.

**Watch a TED Talk and Learn More About Confirmation Bias**: What shapes our perceptions (and misperceptions) about science? In an eye-opening talk, meteorologist J. Marshall Shepherd explains how confirmation bias, the Dunning-Kruger effect and cog-

nitive dissonance impact what we think we know – and shares ideas for how we can replace them with something much more powerful: knowledge.

https://www.ted.com/talks/j_marshall_shepherd_3_kinds_of_bias_that_shape_your_worldview


## 1.10 Survivorship bias

You will pay more attention to those that survived a process than those who failed.

After looking at several old houses, you might say "In the 1880s, they built great houses." However, you haven't seen the houses that were built in the 1880s and didn't survive. Which houses tended to survive for a long time? Only the great houses – you are basing your opinion on a very skewed sample.

*This is a draft chapter from the Kontinua Project. Please see our website (https://kontinua.org/) for more details.*

Appendix A

# Answers to Exercises