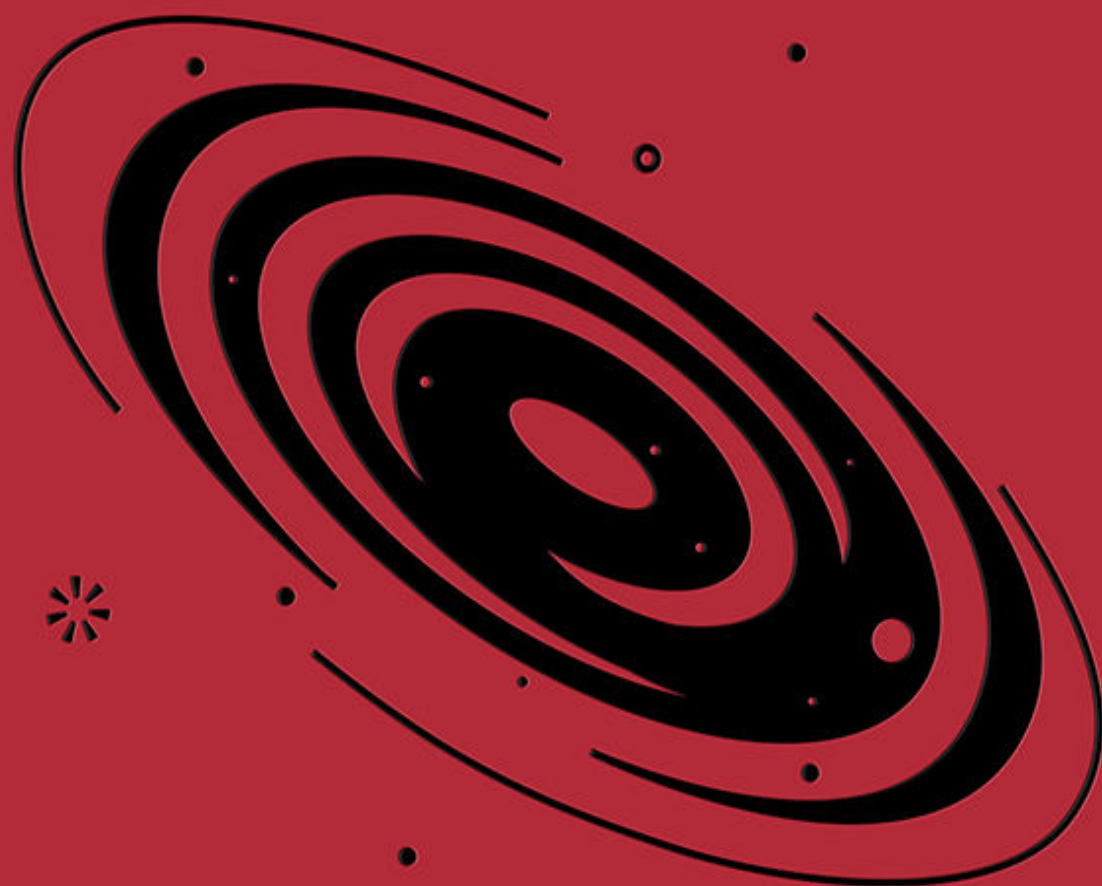


The Great Mental Models

Vol.2



Physics, Chemistry and Biology

fs Farnam Street

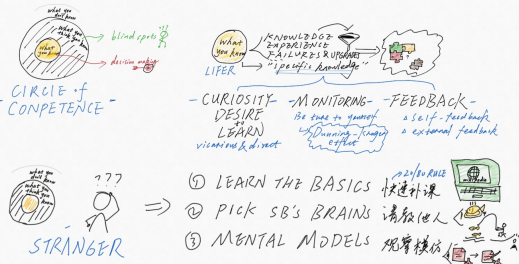
THE GREAT MENTAL MODELS - VOL 1

INSPIRED NEW PERSPECTIVE KNOW THYSELF

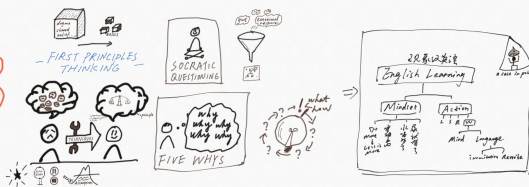
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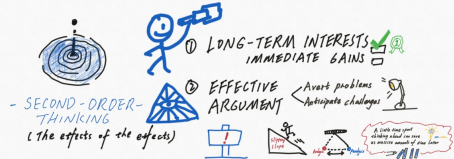
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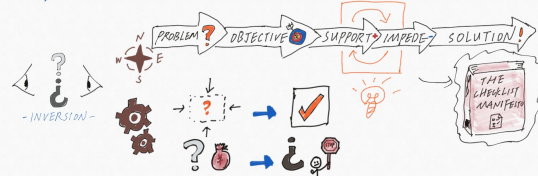
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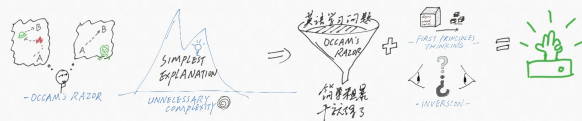
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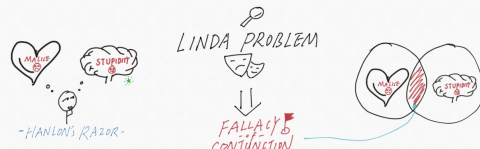
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The Great
Mental Models
Vol.2



Physics, Chemistry and Biology

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Introduction

The world is beautiful, fascinating, and full of curiosities, but it doesn't have to be completely mysterious. Humans may not know everything about the world, and indeed it often feels like we have just scratched the surface, but we have figured out some fundamentals about how everything on this planet operates. It is those fundamentals that make up Farnam Street's latticework of mental models, a way of approaching new ideas and situations, problems and challenges with a toolkit of valuable knowledge.

In Volume 1 of *The Great Mental Models*, we introduced nine general thinking concepts to get you started on the journey of building a latticework of timeless knowledge. Those models had broad applicability, and we hope you were inspired and excited to apply them to achieve better results with fewer problems as you tackled both opportunities and challenges in your life.

In Volume 2 of *The Great Mental Models*, we continue the journey and explore fundamental ideas from physics, chemistry, and biology. These disciplines offer an exceptional amount of insight that we can apply across all areas of our lives to improve our careers, our relationships, and ourselves.

The truths about the physical world, from the forces that allow us to manipulate energy to the behaviors that drive the actions of all organisms, are constants that can guide our choices.

In *Storm in a Teacup: The Physics of Everyday Life*, Helen Czerski tells the story of the *Fram*, a boat designed “to work with nature instead of against it.”¹ In the late 1800s there was immense curiosity about the North Pole. But the ships that were sent to try to

get there would get stuck in the ice of the Arctic, freezing in place. As the ice around the ships grew, it put immense pressure on the hulls, eventually breaking them apart. No one could get to the North Pole without dealing with ice, and the total amount of ice and corresponding pressure to be dealt with was essentially an unknown. No ship had the hull strength to deal with the upper limits of ice pressure possibility. A Norwegian scientist named Fridtjof Nansen came up with the idea for the *Fram*—a truly unique ship. “She had a smooth curvy hull, almost no keel, and engines and rudder that could be lifted right out of the water. When the ice came, the *Fram* became a floating bowl. And if you squeeze a curved shape like a bowl or a cylinder from below, it will pop upward. If the squeeze from the ice got too much, the *Fram* would just be pushed upward to sit on it.”² Nansen did not try to improve on the design of existing boats. Instead, he let the reality of ice expansion determine the design of his ship.

The *Fram* floated across the Arctic Ocean for the next three years, not quite making it to the pole, but collecting reams of valuable scientific data. She got closer to the pole than any ship previously and provided conclusive evidence that the Arctic was an ocean. All of this success was due to trying to answer one question, ‘How can I work with the world, not against it?’ As Czerski concludes, “Instead of fighting the inexorable expansion of the ice, [the *Fram*] had used it to ride across the top of the world.”³

Taking action that works with the world is more effective, less stressful, and ultimately more rewarding. We don’t waste our time fighting to accomplish the impossible.

About the series

The Great Mental Models series is designed to inspire and challenge you. We want to give you both knowledge and a framework for making it useful.

One of our goals for the series is to provide you with a set of tools built on timeless knowledge that you can use again and again to make better decisions. We will present over a hundred mental models, spread across five volumes, that define and explore the foundational concepts from a variety of disciplines. We then take the concept out of its original discipline and show you how you can apply it in nonintuitive situations. We encourage you to dive into new ideas to augment your knowledge toolbox, but also to leverage what you already know by applying it in new ways, to give yourself a different perspective on the challenges you face. In the first book, we explained that a mental model is simply a representation of how something works. We use models to retain knowledge and simplify how we understand the world. We can't relearn everything every day, and so we construct models to help us chunk patterns and navigate our world more efficiently. Farnam Street's mental models are reliable principles that you can see at work in the world time and again. Using them means synthesizing across disciplines, and not being afraid to apply knowledge from different areas far outside the milieu they usually cover.

Not every model applies to all situations. Part of building a latticework of mental models is about educating yourself regarding which situations are best addressed by which models. This takes some work and is not without error. It's important to constantly

reflect on your use of models. If something didn't work, you need to try to discover why. Over time, by reflecting on your use of individual models, you will learn which models will best help you tackle which situations. Knowing why a model works will help you know when to use it again.

About this book

This book explains and explores the core mental models from physics, chemistry, and biology. A degree in these subjects is not required, though if you happen to have one, you might see parts of your discipline in a new light. The models we have chosen from these fields are foundational, relevant far beyond their normal academic applications. We take time in each chapter to explain the science and situate the concepts in real-world examples. We want you to see each concept in action and to be inspired to find analogous uses in your own life. In order to achieve this goal, we discuss how using the model as a lens will help you by applying the science to stories and themes in history.

As you go through this book, you will begin to see patterns and understand that both natural systems and people organize themselves in a limited number of ways. What applies in biological growth applies in economic growth. What governs chemical reactions relates to any process of change. Furthermore, lessons for an individual have relevance for teams and organizations. As you learn the models, identifying the forces at play in any situation will become easier. You'll see things that others don't and avoid costly mistakes.

Some of the models in this book function like metaphors, especially in the physics section. Our aim is to show you how to use these models to uncover the functions or forces at play in your life.

When a problem seems too complex, or the behavior of people too mysterious, these models will give you insight into the "why." The more you know, the easier it is to design solutions that will work.

Other models, many from biology, have a more literal application. Although useful for understanding why certain things are the way they are, these models have a more direct application to human behavior. They can be mapped to your life experiences to give you ideas on better ways to solve common problems. For example, the forces that explain inertia are used more metaphorically to understand why some erroneous beliefs continue to persist, while the concept of cooperation can be applied quite literally to identifying business opportunities.

Finally, it is important to remember that all these science models are value-neutral. They can be used to illuminate both the positive and negative aspects of any situation. It's up to you to ask yourself, what can this model show me about what not to do? Where will it help me find a better way forward?

You will know the differences in how to apply each model through the stories we have chosen to explain them. Each example is crafted to give you insight on where the model can apply. You can take the elements of each story as a signpost directing you to finding similar situations in your life where the lens of a particular model will be most useful.

The most important thing to remember is that all of these models are tools. You are meant to try them out, play with them, and learn what you can use each of them to fix. Not all tools are useful for all problems, and just like a traditional toolbox has a hammer when you need to pound a nail but a wrench for when you need to turn a bolt, you 'll learn through practice which tools are useful in which situations. The best way to do that is to start by being curious. As you begin each chapter, be open to learning and

updating your knowledge. Then, practice. Pick a new model every day, apply it to a situation you are in, and see if you can improve your understanding and decision-making. Finally, reflect. Take some time to evaluate your success and failures. In doing so, you will begin to learn the full potential of the toolkit you are building.

Let's get started.

Physics

Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.

Marie Curie ¹

Physics

Relativity

Reciprocity

Thermodynamics

Inertia

Friction and Viscosity

Velocity

Leverage

Physics

Relativity



Put it into perspective.

f

Relativity

We often think someone is wrong because they see things from a different perspective than we do. Relativity helps us to understand that there is more than one way to see everything. That doesn't mean everyone's perspective is equally valid, only that we might not have the most complete view into a problem or situation.

« The theory of relativity is founded on empathy. Not empathy in the ordinary emotional sense; empathy in a rigorous scientific sense. The crucial idea is to imagine how things would appear to someone who's moving in a different way than you are.»

Steven Strogatz ¹

Thought experiments that changed the world

The science of relativity is best explained through two famous thought experiments—one conducted by Galileo and the other by Albert Einstein. Each describes a situation that demonstrates the reality of differing perspectives.

In the 1630s, Galileo discovered that any two observers moving at constant speed and direction will obtain the same results for all mechanical experiments they perform.

Galileo's original thought experiment describes a scientist on a ship moving at constant velocity. The scientist is below deck with no portholes to give him a frame of reference for the movement of the ship. When this scientist drops a ball from waist level, he will notice only the vertical movement caused by gravity. He will observe that the ball drops to the floor of the ship. However, there is also a horizontal movement that the scientist doesn't perceive. Both the scientist and the ball are also moving the distance covered by the ship as the ball is falling to the ground.

Thought Experiments

In Volume I, we dedicated a chapter to thought experiments because they are such valuable mental models. Frequently used as tools by scientists, thought experiments let us take on the impossible, evaluate the potential consequences of our actions, and re-examine history to make better decisions. They are rigorous applications of the scientific method to determine what we can infer from what we can imagine.

An outside observer, someone standing on a nearby beach or a fish in the water can detect the complete movement of the ball because their perspective is different. By being outside the ship, they see a more complete version of reality. The scientist on the boat would have to make a conscious effort to remember that both he and the ball are moving with the ship. Before you conclude that the motion of the ship should be obvious to the scientist, consider how often you reflect on your movement through space every day. Right now you probably feel as though you're stationary. However, if you're on Earth, you're moving around the sun at 67,000 miles per hour. Galileo developed this thought experiment partly thanks to his belief that Copernicus was right and that the earth itself is in motion that we do not perceive.

Galileo thus demonstrated that perspective influences what we perceive as reality and how we understand the world. His thought experiment is a great one you can use all the time. Imagine

the scientist performing experiments on the boat and ask yourself, now what does a fish see? And how does that relate to what the scientist experiences? Imagine being either one, or a bird in the sky, and you start to get an idea of how multiple eyewitness accounts of the same robbery can be so different.

In the early 1900s, Einstein used another famous thought experiment when developing his theory of special relativity, which linked mass and energy using the formula $E=mc^2$. This formula demonstrates that energy is equivalent to mass times the speed of light squared. With this theory, Einstein stated that the speed of light is fixed within any frame of reference moving at a constant velocity, and therefore there is no fixed frame of reference from which one can measure the physical laws. This is what Galileo had argued, but his ideas were put aside in the 1700s in favor of a view that said that there was an absolute frame of reference. Einstein's theory of special relativity revived Galileo's ideas.

Einstein's thought experiment to describe special relativity illustrated the concept that observers in relative motion experience time differently. This means that two events can happen simultaneously from one observer's perspective and at different times from another observer's perspective. Both are right. Here is the experiment:

Imagine you are watching a train go by. Lightning strikes each end just as the train's midpoint is passing you. The lightning strikes are each the same distance from you, so you correctly conclude that the two bolts of lightning hit the train at exactly the same time.

Later on, you catch up with your friend who was on the train. "Crazy that two bolts of lightning struck your train at exactly the

I'LL MEET YOU A MILE THAT WAY.



**Before you criticize someone, walk
a mile in their shoes. That way,
you'll be a mile from them,
and you'll have their shoes.**

-Jack Handey

same time,” you say.

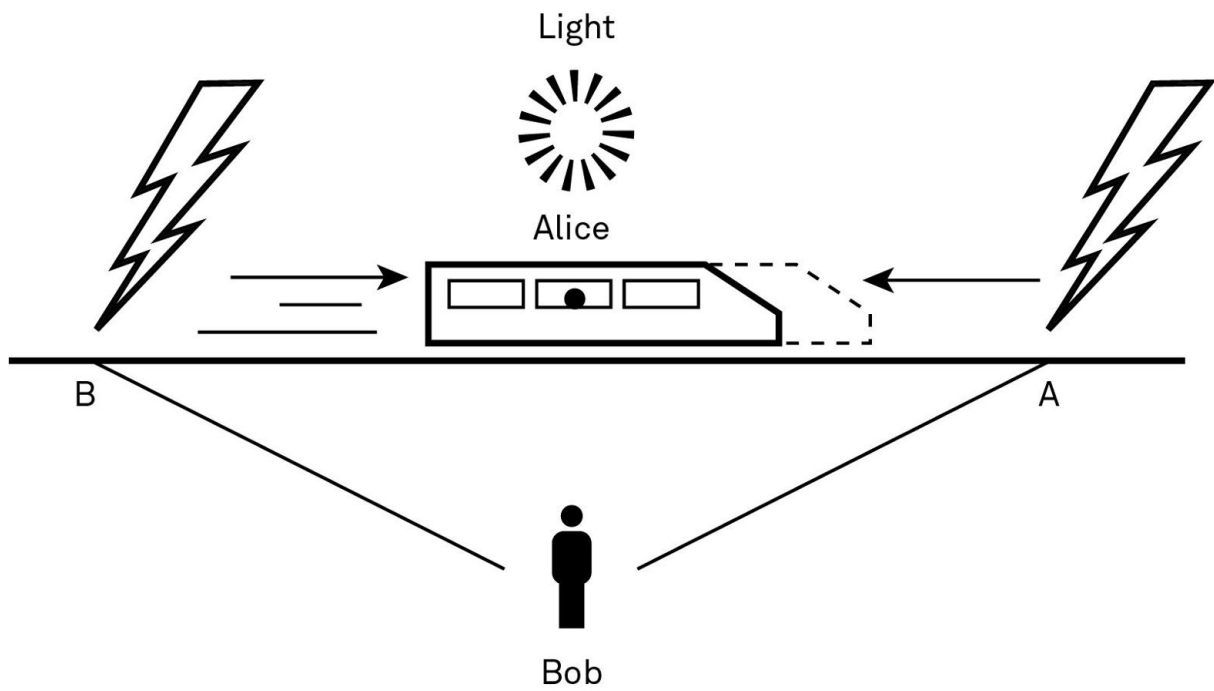
“What are you talking about?” she responds. “The front of the train got hit by lightning first.”

You dismiss her interpretation. After all, you witnessed the whole thing. But here is what was happening for her:

She was sitting at the midpoint of the train. If the train had been stationary, she would have observed the two lightning strikes being simultaneous like you did. However, because the train was moving, the light from the rear strike had farther to travel to reach her. She perceived the light from the strike at the front first. So, she correctly concluded that the lightning strikes were not simultaneous; the one in front happened first.

These are two valid interpretations of the same event. Both are correct. The difference arises because of the perspective of each person.

Our perspective is very much unique to us, as both Galileo and Einstein so vividly demonstrated. In the day-to-day world that we live in, this means that you are seeing what nobody else sees but also that you do not automatically, unconsciously see through the eyes of others. There is an objective reality, but none of us can perceive it in totality without doing a little work. Is it any wonder we make suboptimal decisions? — Sidebar: Perspective-taking in psychology



—
Your perspective informs your experience.

As we make little mental shifts in our perspectives, we can create luck and opportunities all around us. We can singlehandedly restructure how we see the world and how we see ourselves. Can you think of one negative thought that you have about yourself? What if you practiced seeing things differently?

Reality is negotiable.

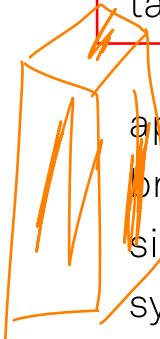


Reality is negotiable.

— *Tim Ferriss* —

The subjectivity of perspective

You now know that you are always going to have an imperfect perspective. You will never be able to see everything at once. Nor will you be able to completely trust that everything you do see is viewed by others. What you see is useful but limited. The less willing you are to accept and acknowledge limitations, the less useful your perspective. You will always have limitations to your frame of reference that you need to account for in an effort to better understand reality. You must recognize what these limits are and, in situations where the risks are high or the outcomes important, take steps to augment your perception.



Multiple perspectives are the reality of life. At the most basic application, we see a different view out of each of our eyes. Our brain adjusts the inputs from each eye to give us the perception of a single three-dimensional image. Seeing with two eyes offers a synthesized view that's more complete than either eye can see individually. This concept helps us understand that integrating multiple perspectives gives us a better view. In any specific moment, we only have one set of information hitting our retina. That image is incomplete in terms of everything occurring and different from the people standing next to us.

The reality of multiple perspectives is critical to understanding the world and your place in it. We can only see so much. In concrete terms, relativity highlights a subjectivity of perspective that explains partly why eyewitness testimonies have lost their credibility over the years.

Farnam Street Principles

1. Direction Over Speed
2. Live Deliberately
3. Thoughtful Opinions Held Loosely
4. Principles Outlive Tactics
5. Own Your Actions



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Perspective Taking

Perspective-taking in psychology refers to the ability to perceive a situation from an alternative point of view. We are not born with this ability. It develops throughout childhood. There are two broad types of perspectives that we learn: differing physical perspectives, such as that the view out of your neighbor's window is different than yours; and conceptual perspectives, such as that people have different feelings or beliefs that in turn influence their perspectives. Some conditions can negatively impact the development of the ability to fully understand a different perspective. And although the vast majority of us are capable of appreciating the wide variety of perspectives that exist, we are often lazy about developing this ability.

When considering an eyewitness testimony during a trial, there are many aspects to consider in order to understand that person's perspective. First, there are the physical aspects—how good is that person's vision? What was the light like at the time? How long did they have to observe the person in question? But there are also a host of psychological ones—what mood was the person in? Were they rushing to get somewhere? Had they just had a fight with their spouse? Do they have an incentive to take a certain position? And what about the biases—do they consider certain ethnicities as more likely to commit crime? How predisposed are

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What Is Eyewitness Testimony? Eyewitness testimony is what happens when a person witnesses a crime (or accident, or other legally important event) and later gets up on the stand and recalls for the court all the details of the witnessed event. It involves a more complicated process than might initially be presumed.



Noba Project

<https://nobaproject.com/modules/eyewitness-testimon...>



they to being helpful to police? All of this factors into what a witness believes they saw and helps explain why two witnesses can have remarkably different accounts of the same situation, as in

Rashomon.

Rashomon, the classic Japanese film, is an excellent exploration of the differences in the testimonies of several eyewitnesses to a crime. A samurai is found murdered in a forest. A bandit is accused of the crime. During the subsequent trial, the bandit, the samurai—speaking through a medium—his wife, and a woodcutter who observed the whole incident each give testimony. Each story is different, partly due to the self-interest of each of the characters, and partly due to the fact that each can only understand the events that play out through a single perspective—their own. *Rashomon* is exceptionally interesting because the end does not give the viewer “the truth.” The audience does not get any closure on what actually happened, which is an accurate portrayal of life. They are simply left with the contradictory testimonies and the implication that each of these have become the truth for the persons telling them.

In addition, our memories are not infallible. 'We often think of memories as being like a video recording, capturing a scene with perfect fidelity. The truth is far more complicated. Our memories are highly subjective and malleable. We often misattribute memories, such as a witness thinking something they read in the news about a crime is something they witnessed. We are also highly suggestible, such as when a police officer asks us a leading question or uses emotive language.

Google

rashomon effect

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Wikipedia
https://en.wikipedia.org/wiki/Rashomon_effect

Rashomon effect

The Rashomon effect describes how parties describe an event in a different and contradictory manner, which reflects their subjective interpretation and self-...

People also ask :

- What is an example of Rashomon effect?
- What is meant by Rashomon effect?
- What is the Kurosawa effect?
- What is the main point in Rashomon?

Feedback

StudioBinder
<https://www.studiobinder.com/Directing>

What is The Rashomon Effect in Film? Definition ...

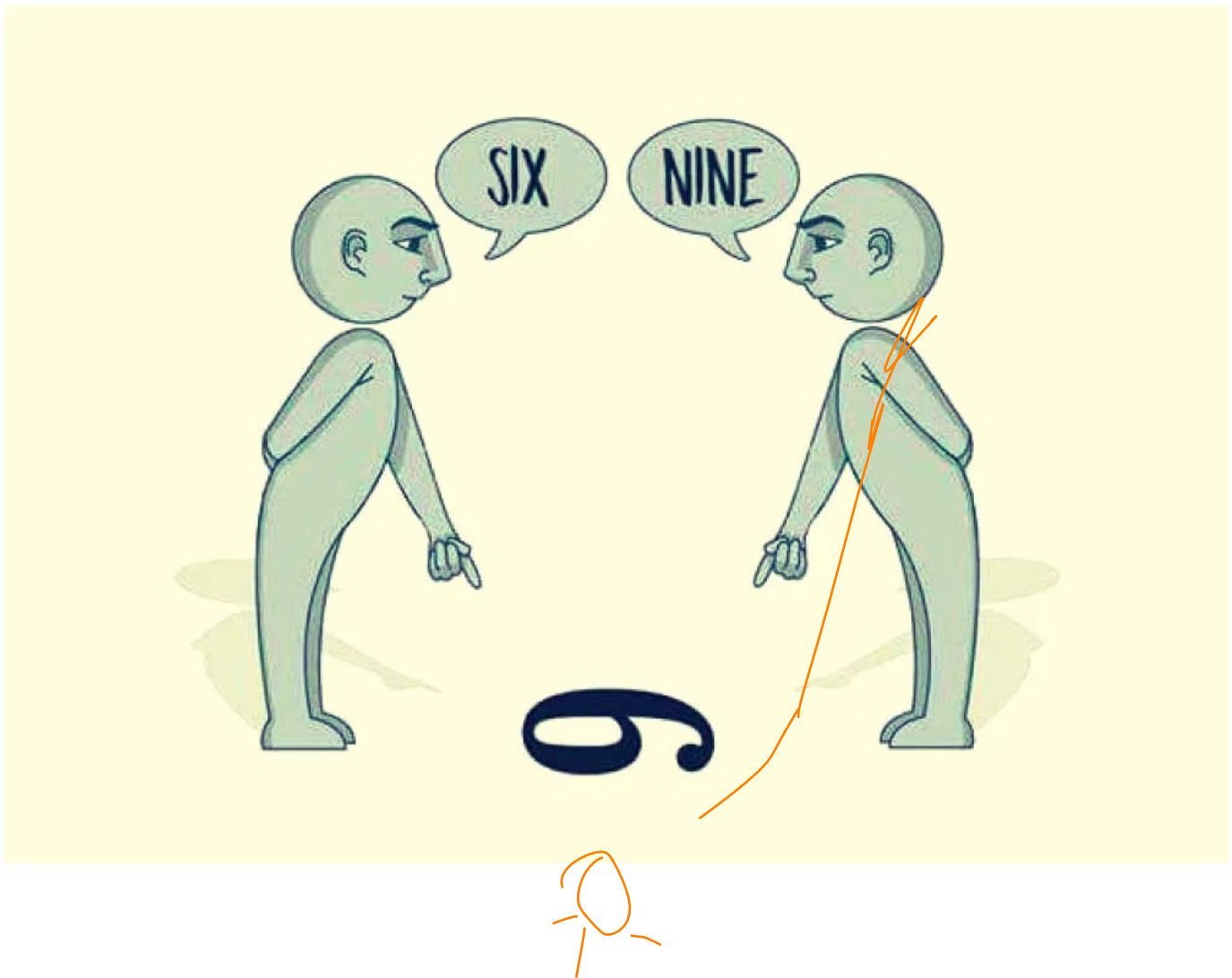
Rashomon effect

The Rashomon effect is a storytelling and writing method in cinema in which an event is given contradictory interpretations or descriptions by the individuals involved, thereby providing different perspectives and points of view of the same incident.

Wikipedia

Rashomon Effect:

The contradictory (but plausible) interpretations of the same incident by different people.



rashomon effect 12 angry men



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Twelve Angry Men | A New Praxis in a Changed World

Aug 25, 2549 BE — **"Rashomon Effect"**: This was a phrase I heard once in a talk given by a former distinguished correspondent for the Frontline, Sukumar ...



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A Matter of Perspective -A Review of Rashomon

Feb 5, 2564 BE — While 12 Angry Men tackles this issue in the context of an actual courtroom procedural, **Rashomon makes the viewers the judge and jury** having ...

People also ask :

What is the effect of Rashomon?



What do you think the Rashomon effect tells us about our perception of reality?



Our memories of the past are also distorted by what we know now, such as when a witness learns a new piece of information during a case and feels they knew it at the time.² These and other common memory distortions feed into the subjectivity of eyewitness reports. People rewrite and reshape their memories, often to fit their existing beliefs. We often feel committed to our original perception and unconsciously adjust our memories to support what we think we originally saw.

When juries hear eyewitness testimony, they must sort through the limits and influences on that person's perspective, and how self-interest and time have distorted that person's memory. It is no small feat. One example of the challenge is chronicled below.

On the morning of July 4, 2000, 20-year-old Chris Kinison was killed in a convenience store parking lot in Ocean Shores, Washington, USA. Minh Duc Hong was charged with the crime. Hong was visiting the area to see a firework show with his twin, Hung Hong. Both were Asian-Americans and Kinison was white. During the subsequent trial, a dozen eyewitnesses provided testimony. As David A. Neiwert explains in *Death on the Fourth of July*, "For every bit of testimony, it sometimes seemed, there arose a view of events that conflicted with the description provided by previous witnesses, creating a web of questions about competing self-interests, and the extent to which they colored different witnesses' testimony."³ Many witnesses described seeing things they physically could not have once their positioning during the violence was mapped out. Others were clearly biased by their relationship with the victim, a local, versus the accused who was from out of town. Racial bias was a huge factor, and in his book,

Neiwert makes the case for Hong first being a victim of a hate crime and whose subsequent actions were really about defense.

According to witnesses, Kinison waved a Confederate battle flag at Hong and his friends and shouted racial slurs. He also made threatening gestures, indicating a desire to harm Hong who took a knife from the convenience store, fearing for his safety. When Kinison physically assaulted Hong's brother, Hong used the knife on him. Kinison had previous accusations of racist violent threats.⁴

Many of the witnesses had been drinking, and many admitted to being scared. These distortions meant that the jury did not get a reliable, consistent account from each witness. They had to piece together what might have happened. The jury then had to evaluate the credibility of how each witness saw the crime and the laws of physics governing the physical perspectives. One life had already ended. The future of another one was completely dependent on how the jury untangled the testimony through the limits of their own perceptions.

After deliberation, the jury could not reach a verdict and the judge declared a mistrial. The jury revealed that they had deadlocked 11-1 in favor of acquittal. What's interesting, though, is the ambiguous end to the story. The jurors continued to be comfortable with the position they took, believing that Minh Hong acted reasonably in self-defense. The local sheriff's office recognized that Minh Hong had been the victim of a hate crime and the officers committed to an education program so they could deal with similar situations better in the future. But, Neiwert further writes, "if there is any lingering sentiment in Ocean Shores, it is a quiet dismay at the outcome of Minh Hong's trial. Even though the

Grays Harbor jury found otherwise, many in town, especially those who knew Chris Kinison, believe an injustice was done.”⁵

The multiple and conflicting perspectives displayed in the trial of Minh Hong are a common phenomenon. We have all been in situations where we have a totally different perspective on events than the person standing next to us. It's important to be aware of and compensate for different perspectives if you want to get the most complete picture possible of the situation you are in. What you see is never all there is.

« John, when people thought the earth was flat, they were wrong. When people thought the earth was spherical, they were wrong. But if you think that thinking the earth is spherical is just as wrong as thinking the earth is flat, then your view is wronger than both of them put together.”

»

Isaac Asimov⁶

Through the eyes of others

L → The limits of perspective are fundamental to how the world works. As we have seen, considering multiple perspectives is the best chance we have to understand what is really going on. Given that you can't go back in time to situate yourself differently, what can you do to augment your perspective? This is where thought experiments come in handy. Think back to Galileo's scenario of the scientist conducting experiments on the boat. The scientist cannot hang out in the ocean and watch the boat go past. Our scientist can, however, imagine what the view would be like from the perspective of a fish.

Thought experiments need not be literal. They don't have to be confined to what already is or even what's possible. The scientist, when considering the perspective of the fish, can also imagine the boat as being made of glass and the water as easy to see through as air. Or he need not limit the experiment to the visual perspective of the fish. After all, we don't gain perspective only with our eyes, but through the lens of our experiences, biases, desires, and more.

→ [When you see someone doing something that doesn't make sense to you, ask yourself what the world would have to look like to you for those actions to make sense.] While we all see our own version of events, the goal is to enlarge our perspective to be a closer representation of reality by removing some of the factors that cloud our judgment. One of the best ways to do this is by noticing and observing the details of what is going on around you.

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Diction-wise, are situate and contextualize interchangeable?



While "situate" and "contextualize" share some similarities in meaning, they are not entirely interchangeable in terms of diction. Let's delve into their definitions and usage to understand their nuances:



1. Situate: The term "situate" refers to the act of placing or locating something in a particular position or setting. It emphasizes the physical or spatial aspect of positioning or arranging something. For example, you might say, "Let's situate the new furniture in the living room."
2. Contextualize: "Contextualize" involves placing something within its appropriate context or framework, typically to enhance understanding or interpretation. It focuses more on providing the necessary background or surrounding circumstances for a particular subject or concept. For instance, you could say, "To understand the historical significance of this event, we need to contextualize it within the broader socio-political climate of the time."

While both words involve placing something within a specific framework, "situate" tends to emphasize the physical or spatial aspect, whereas "contextualize" emphasizes the intellectual or interpretive aspect. Thus, their usage may differ based on the intended emphasis or the specific connotation desired.

In most cases, "contextualize" would be a more suitable choice when discussing abstract or conceptual matters, whereas "situate" is better used when discussing physical or spatial arrangements. However, there may be instances where their meanings overlap, allowing for some degree of interchangeability depending on the context.

« It is good to know something of the customs of various peoples, so as to judge our own more soundly and so as not to think that everything that is contrary to our ways is ridiculous and against reason, as those who have seen nothing have a habit of doing. »

Descartes⁷

There is a fascinating story of six Muslim students landing in London in 1815, one of whom kept a diary of his observations and experiences.⁸ The story provides a gateway to exploring the effects of bias and how to look at the world through another's eyes. Britain and Iran were allies at the time, for the moment politically aligned. From Iran, the students had been sent by their prince to learn what the English were doing that was giving them such power in the world. They were to gather knowledge on technology, medicine, military matters, and anything else Iran could use to gain an advantage in dealing with their neighbors, particularly Russia.

One of the students, Mirza Salih, kept a diary. In his book *The Love of Strangers*, Nile Green translates and puts into context the experience of these students as they navigate Britain, based on this diary and letters that they wrote. It provides an interesting way to consider how relativity helps to understand perspective.

Green recounts Mirza Salih's visit to the British Museum. Part of the vast collection was taken from ancient Iranian ruins. For the first time,

Salih could instead see Iranian history in a comparative setting, its artistic achievements displayed side by side with those of ancient Egypt, Rome, and especially Greece. It helped him see history in a new way. We can detect the influence of this side-by-side approach in his diary's lengthy summary of world history, where he applied this comparative method to the history of France, America, and India by making sense of historical developments through connection and comparison.⁹

As Salih discovered, we are not dispassionate, neutral observers. We bring our sensibilities into what we see. The problem is, most of us usually forget this. We are so used to being on Einstein's train that we forget it is there. But traveling to new places far outside our normal experiences can jolt us into remembering our train, seeing it in a new light, understanding better its size and shape, and remind us that not everyone is on it.

Another story that drives home the point that considering others' perspective can substantially enrich our own, is that of Rifa'a Rafi' al-Tahtawi*, an Egyptian who traveled to Paris in the late 1820s and recorded in detail the minutiae of what he saw in his book *An Imam in Paris*. His book tells us a lot about Parisian society in the late 1820s. We can learn loads about the social customs and idiosyncrasies of the urban French and how they reconciled scientific development with religious sensibilities.

We can also, however, draw some conclusions about the author al-Tahtawi. His book is more like a report, a gathering of facts about a foreign culture. He was an observer who was seeking not only to understand the French, but how what he could see related to French culture and France's influence in the world. In so

doing, he hoped to gain useful knowledge that he could bring back to Egypt to encourage development. His time in France changed his perception of his own culture, and when he returned he instituted teachings based on the things he had learned from observing the French.¹⁰ Daniel L. Newman explains in his introduction to al-Tahtawi's book: "In the end, al-Tahtawi stayed in Paris for five years and the experiences, know-how and skills acquired during his Paris days ... were to have a decisive and lasting impact on the cultural and scientific development of his native country."¹¹ Al-Tahtawi had multiplied his perspective and in doing so contributed to significant change in Egypt.

How other people frame something is their vantage point. It's not an unobstructed description of reality, but rather their individual perspective. Making efforts to understand someone's view helps you understand their frame, their set of beliefs and biases that guide how they see their world.

The core concepts of relative perspective and framing have a broad application. When someone gives you something, an opinion, a report, an article, a plan, consider how it is framed. Who is involved in this information, and what do you know about their vantage point? Knowing the factors that influence how a person frames issues helps you understand their perspective and how you can use it to augment your own.

Salih and al-Tahtawi's experiences of trying to understand their own cultures by juxtaposing them against other cultures demonstrates the value of considering other perspectives and comparing them with your own. Namely, that you get a more complete picture of the context in which you are operating and

where opportunities might be. This is why the publishing industry relies heavily on editors, and research needs peer review to be credible. Outside views combine to make a better product.

Perspective often comes from distance or time. If you're trying to solve a problem and you're stuck, try shifting your vantage point. Examples of this are moving up and contemplating the bigger picture, moving down and seeing more details, or assuming the perspective of other stakeholders—customers, suppliers, partners, government. Many problems become clearer if you extend the timeline. What does this situation look like in the weeks, months, and years ahead? Assuming different perspectives allows you to gain a more complete understanding of what's really going on.

→ Conclusion

In the physical world, there is subjectivity of perception partly because everything is moving relative to everything else. Back to Einstein's scenario, both the lightning and the train are moving relative to the location of each observer. Our perspective has similar complexity.

What matters is understanding the complexity and value of multiple perspectives. No one sees it all. Multiple perspectives layered together reduce blind spots and offer us a more textured and truer sense of the underlying reality. Furthermore, we are constantly confounded by the unknown which we must somehow make sense of through the lens of our own experience.

We all get stuck, frustrated when no one seems to understand us, or angry that we aren't making progress based on how we understand the world. This is when it is most helpful to remember relativity and refresh our perspective by stepping outside of ourselves for a little bit.
