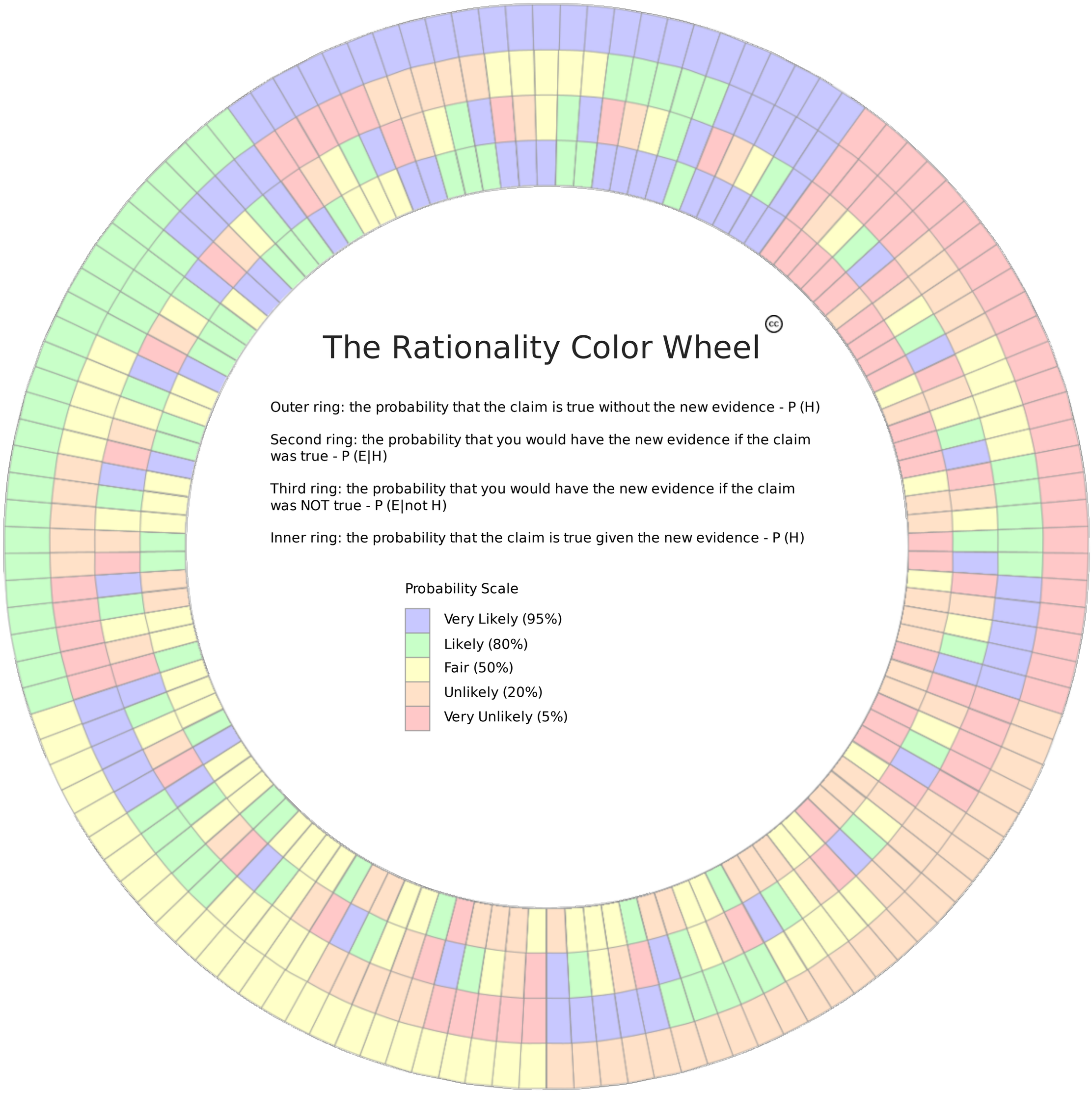
The Rationality Color Wheel©



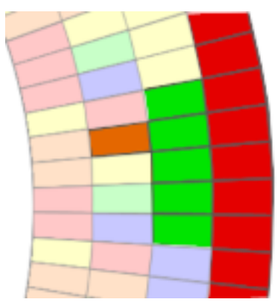
The Rationality Color Wheel is a tool for weighing evidence. When presented with evidence for a claim, simply move your finger from one color region to the next to determine how likely the claim is given the evidence. For example:

Imagine that a woman takes a medical test to determine whether or not she has a rare disease that afflicts 5% of the population. The test is highly sensitive: when a person has the disease, it returns a positive result 90% of the time. Otherwise, the it returns a positive result 10% of the time. The woman gets a positive test result. What is the likelihood that she has the disease?

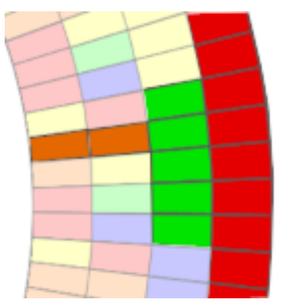
Only 5% of the population has the disease, so before the test result, the woman was "very unlikely" to have the disease. Therefore, start in the red segment of the outermost ring.

When a person has the disease, they are "likely" to get a positive test result. Therefore, move to the green region in the second ring.

When a person does not have the disease, they are "unlikely" to have a positive test result. So we move inward onto the orange region in the third ring.



Now, we simply move inward to the adjacent cell. It's orange so we conclude that the woman is "unlikely" to have the disease.



When given this scenario, many people incorrectly believe that the woman has a high probability of having the disease. We can easily find the correct answer however by using the color wheel. In general, this color wheel can be used whenever the probabilities involved are not extremely small or extremely large. The calculations are based on a branch of mathematics called Bayesian Inference, which is used by statisticians in science, medicine, and research. You can find more information about Bayesian Inference at https://en.wikipedia.org/wiki/Bayesian_inference.

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Rationality Color Wheel Worksheet Introduction

This worksheet is part of a series that illustrates how you can use the Rationality Color Wheel to think critically.

Cause and Effect

Let's say that someone claims that doing A increases the likelihood of some outcome O. We can weigh their argument using the color wheel.

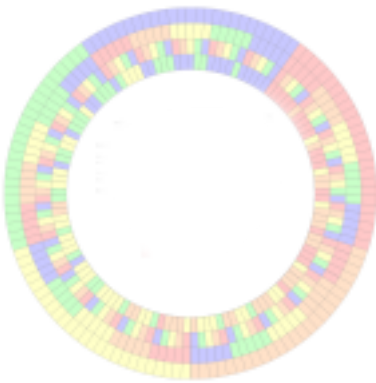
Step 1: how often did the outcome occur in general? Place your finger on the corresponding color in the outer ring.

Step 2: how often did the action precede the outcome? Move your finger inward to the corresponding color in the second ring.

Step 3: how often did the action precede the alternative outcome? Move your finger inward to the corresponding color in the third ring.

Step 4: move your finger inward to the adjacent cell? Its color indicates the probability that a person who did the action experienced the outcome.

The following worksheets illustrate how to use the color wheel to assess claims of cause and effect and to weigh evidence generally.



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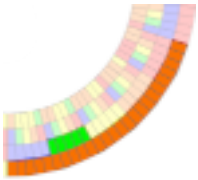
Rationality Color Wheel Worksheet 1

This worksheet is part of a series that illustrates how you can use the Rationality Color Wheel to think critically.

Cause and Effect

Example 1: Researchers studied 1,000 people who developed a dangerous disorder that has a 20% survival rate. They found that 80% of those who survived took an homeopathic remedy. Of those who died, 40 did not take the homeopathic remedy. Did the remedy help?

A randomly selected person was "unlikely" (20%) to survive the disease.

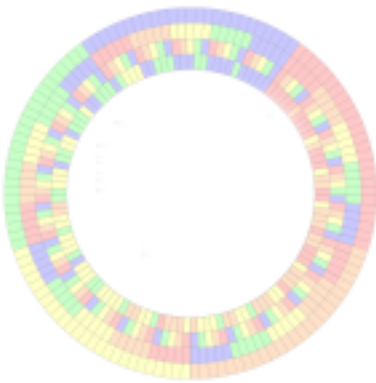


An ill person who survived was "likely" (80%) to take a homeopathic remedy.

But those who did not survive were "very likely" (95%) to have taken a homeopathic remedy (only 40 (5%) out of the 800 people who died did not take a remedy).

Hence, we can see that those who took the homeopathic remedy were "unlikely" to survive. The homeopathic remedy did not help (it actually reduced the likelihood of survival).

Can you think of instances where you have seen stories advocating for alternative medicines presented like this one? Did you find the result surprising? Did you find it misleading? How do you think advertisers and online "influencers" might use similar "facts" to attract attention and make money?



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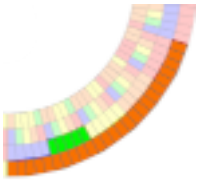
Rationality Color Wheel Worksheet 2

This worksheet is part of a series that illustrates how you can use the Rationality Color Wheel to think critically.

Cause and Effect

Example 2: Researchers surveyed 1,000 entrepreneurs and found that 20% of them were successful. Of those who were successful, 80% "avoided overthinking" and "trusted their intuition" when making important business decisions. They interviewed the 40 unsuccessful entrepreneurs who relied on critical thinking and concluded that intuitive decision making was superior. Should you follow their advice?

A randomly selected entrepreneur was "unlikely" (20%) to be successful.

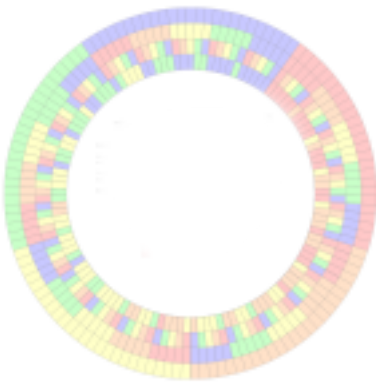


A successful entrepreneur was "likely" (80%) to "avoid overthinking".

But those who failed were "very likely" (95%) to rely on intuition (only 40 (5%) of the 800 people who failed used critical thinking).

Hence, we can see that those who relied on intuition were actually "unlikely" to succeed (critical thinking actually increased the likelihood of success in business).

Can you think of times when you've heard similar advice? When people advise you to "trust your gut," and to "trust your instinct" how often do they present stories like this one? This story hid the behavior and outcomes of those who failed to mislead you. Can you recall justifications you've heard that omitted this kind of information completely?



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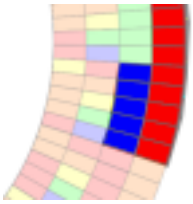
Rationality Color Wheel Worksheet 3

This worksheet is part of a series that illustrates how you can use the Rationality Color Wheel to think critically.

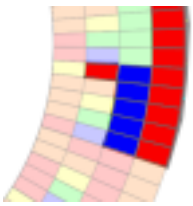
Evidence and Tests

Example 3: A resident of a small town commited a crime. A detective in the town narrows down the potential suspects to 20 people and decides to use a forensic test to pin down the culprit. The test is sensitive. If a person commited the crime, the test will return a positive result 95% of the time, and has a false positive rate of only 5%. The test returns a positive result for one of the suspects. Has the detective found her perp?

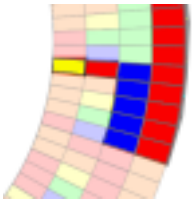
Before the test, each suspect is "very unlikely" (5%) to be the culprit.



If a suspect is guilty, they are "very likely" (95%) to get a positive test result.

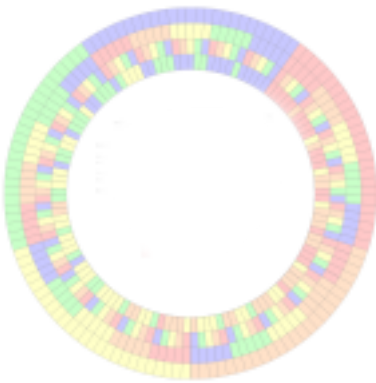


If a suspect is innocent, they are "very unlikely" (5%) to get a positive test result.



Yet, the color wheel correctly shows, that the suspect flagged by the test only has a "fair" (50%) chance of being the culprit (literally a coin toss)!

Was this result surprising? What did you think the likelihood was? Our intuition about probability is often wrong. How might errors like these play out in a jury? How might errors like these play out in other areas of society?



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