

# Confirmation bias

Edited from Wikipedia by Ken Jenkins

[https://en.wikipedia.org/wiki/Confirmation\\_bias](https://en.wikipedia.org/wiki/Confirmation_bias)

**Confirmation bias**, also called **my-side bias**, is the tendency to search for, interpret, favor, and recall information in a way that confirms one's **beliefs** or **hypotheses**, while giving disproportionately less attention to information that contradicts it.<sup>[</sup> It is a type of **cognitive bias** and a systematic **error** of **inductive reasoning**. People display this bias when they gather or remember information selectively, or when they **interpret** it in a **biased way**. The effect is stronger for **emotionally** charged issues and for deeply entrenched **beliefs**. People also tend to interpret **ambiguous evidence** as supporting their existing position. Biased search, interpretation and memory have been invoked to explain **attitude polarization** (when a disagreement becomes more extreme even though the different parties are exposed to the same evidence), **belief perseverance** (when **beliefs** persist after the evidence for them is shown to be false), the irrational **primacy effect** (a greater reliance on information encountered early in a series), and **illusory correlation** (when people falsely perceive an association between two events or situations). **Illusory correlation** can be called “connecting too many dots” and “connecting dots that don’t connect”.

A series of experiments in the 1960s suggested that people are biased toward confirming their existing **beliefs**. Later work re-interpreted these results as a tendency to test ideas in a one-sided way, focusing on one possibility and ignoring alternatives. In certain situations, this tendency can bias people's conclusions. Explanations for the observed biases include **wishful thinking** and the limited human capacity to process information. Another explanation is that people show confirmation bias because they are weighing up the costs of being wrong, rather than investigating in a neutral, scientific way.

Confirmation biases contribute to **overconfidence** in personal **beliefs** and can maintain or strengthen beliefs in the face of contrary evidence. Poor **decisions** due to these biases have been found in various contexts.

## Types

Confirmation biases are effects in [information processing](#). They differ from what is sometimes called the *behavioral confirmation effect*, commonly known as [self-fulfilling prophecy](#), in which a person's **expectations** influence their own behavior, bringing about the expected result.

Some psychologists restrict the term *confirmation bias* to **selective collection of evidence** that supports what one already **believes** while ignoring or rejecting evidence that supports a different conclusion. Other psychologists apply the term more broadly to the tendency to preserve one's existing **beliefs** when searching for evidence, interpreting it, or recalling it from memory.

### **Biased search for information**

Confirmation bias has been described as an internal "[yes man](#)", echoing back a person's beliefs.

Experiments have found repeatedly that people tend to test hypotheses in a one-sided way, by searching for evidence consistent with their current hypothesis. Rather than searching through **all** the relevant evidence, they phrase questions to receive an affirmative answer that supports their hypothesis. They look for the consequences that they would expect if their hypothesis were true, rather than what would happen if it were false. This strategy can confirm existing **beliefs** or **assumptions**, independently of whether they are true. **In real-world situations, evidence is often complex and mixed. Thus any search for evidence in favor of a hypothesis is likely to succeed.** One illustration of this is the way the phrasing of a question can significantly change the answer.

Even a small change in a question's wording can affect how people search through available information, and hence the conclusions they reach.

[Selective exposure](#) occurs when individuals search for information that is consistent, rather than inconsistent, with their personal beliefs. An experiment examined the extent to which individuals

could refute arguments that contradicted their personal beliefs. People with high **confidence** levels more readily seek out contradictory information to their personal position to form an argument. Individuals with low confidence levels do not seek out contradictory information and prefer information that supports their personal position. People generate and evaluate evidence in arguments that are biased towards their own **beliefs** and **opinions**. Heightened confidence levels decrease preference for information that supports individuals' personal **beliefs**.

### **Biased interpretation**

Confirmation biases are not limited to the collection of evidence. Even if two individuals have the same information, the way they interpret it can be biased.

**People set higher standards of evidence for hypotheses that go against their current expectations.** This effect is known as "disconfirmation bias".

Another study of biased interpretation occurred during the **2004 US presidential election** and involved participants who reported having strong feelings about the candidates. They were shown apparently contradictory pairs of statements, either from Republican candidate **George W. Bush**, Democratic candidate **John Kerry** or a politically neutral public figure. They were also given further statements that made the apparent contradiction seem reasonable. From these three pieces of information, they had to decide whether or not each individual's statements were inconsistent.<sup>[28]:1948</sup> There were strong differences in these evaluations, with participants much more likely to interpret statements from the candidate they opposed as contradictory.



An **MRI scanner** allowed researchers to examine how the human brain deals with unwelcome information.

In this experiment, the participants made their judgments while in a **magnetic resonance imaging** (MRI) scanner which monitored their brain activity. As participants evaluated contradictory statements by their favored candidate, **emotional** centers of their brains were aroused. This did not happen with the statements by the other figures. The experimenters inferred that the different responses to the statements were not due to passive reasoning errors. Instead, the participants were actively reducing the **cognitive dissonance** induced by reading about their favored candidate's irrational or hypocritical behavior. <sup>[28][page needed]</sup>

Biases in belief interpretation are persistent, regardless of intelligence level. Participants in an experiment took the **SAT** test (a college admissions test used in the United States) to assess their intelligence levels. They then read information regarding safety concerns for vehicles, and the experimenters manipulated the national origin of the car. American participants provided their opinion if the car should be banned on a six-point scale, where one indicated "definitely yes" and six indicated "definitely no."

Participants firstly evaluated if they would allow a dangerous German car on American streets and a dangerous American car on German streets. Participants believed that the dangerous German car on American streets should be banned more quickly than the dangerous American car on German streets. There was no difference among intelligence levels at the rate participants would ban a car. <sup>[21]</sup>

Biased interpretation is not restricted to emotionally significant

topics. In another experiment, participants were told a story about a theft. They had to rate the evidential importance of statements arguing either for or against a particular character being responsible. When they hypothesized that character's guilt, they rated statements supporting that hypothesis as more important than conflicting statements.<sup>[29]</sup>

### **Biased memory**

Even if people gather and interpret evidence in a neutral manner, they may still remember it selectively to reinforce their expectations. This effect is called "selective recall", "confirmatory memory" or "access-biased memory".

Surprising information stands out and so is memorable.

People demonstrate sizable myside bias when discussing their opinions on controversial topics. Memory recall and construction of experiences undergo revision in relation to corresponding emotional states.

Myside bias has been shown to influence the accuracy of memory recall. Individuals appear to utilize their current emotional states to analyze how they must have felt when experiencing past events.<sup>[36]</sup>

Emotional memories are reconstructed by current emotional states.

### Related effects

#### **Polarization of opinion**

*Main article: [Attitude polarization](#)*

When people with opposing views interpret new information in a biased way, their views can move even further apart. This is called "attitude polarization".

The polarization effect does not necessarily occur when people simply hold opposing positions, but rather when they openly commit to them.

Opinions tend to become more extreme in response to ambiguous information.

Polarization is a real phenomenon but far from inevitable.

Even when instructed to be even-handed, people are more likely to read arguments that support their existing attitudes than arguments that did not. This biased search for information correlated well with the polarization effect.

Given evidence against their beliefs, people can reject the evidence and believe even more strongly.

### **Persistence of discredited beliefs**

Beliefs can survive potent logical or empirical challenges. They can survive and even be bolstered by evidence that most uncommitted observers would agree logically demands some weakening of such beliefs. They can even survive the total destruction of their original evidential bases.

—Lee Ross and Craig Anderson

Confirmation biases can be used to explain why some beliefs persist when the initial evidence for them is removed. This belief perseverance effect has been shown by a series of experiments using what is called the "debriefing paradigm": participants read fake evidence for a hypothesis, their attitude change is measured, then the fakery is exposed in detail. Their attitudes are then measured once more to see if their belief returns to its previous level. A common finding is that at least some of the initial belief remains even after a full debrief.

### **Preference for early information** [Primacy bias]

Experiments have shown that information is weighted more strongly when it appears early in a series, even when the order is unimportant. For example, people form a more positive impression of someone described as "intelligent, industrious, impulsive, critical, stubborn, envious" than when they are given the same words in reverse order.<sup>[50]</sup> This *irrational primacy effect* is independent of the primacy effect in memory in which the earlier items in a series leave a stronger memory trace.<sup>[50]</sup> Biased interpretation offers an explanation for this effect: seeing the initial evidence, people form a working hypothesis that affects how they interpret the rest of the information.

One demonstration of irrational primacy used colored chips supposedly drawn from two urns. Participants were told the color distributions of the urns, and had to estimate the probability of a chip being drawn from one of them.<sup>[50]</sup> In fact, the colors appeared in a pre-arranged order. The first thirty draws favored one urn and the next thirty favored the other.<sup>[46]</sup> The series as a whole was neutral, so rationally, the two urns were equally likely. However, after sixty draws, participants favored the urn suggested by the initial thirty.<sup>[50]</sup>

Another experiment involved a slide show of a single object, seen as just a blur at first and in slightly better focus with each



succeeding slide.<sup>[50]</sup> After each slide, participants had to state their best guess of what the object was. Participants whose early guesses were wrong persisted with those guesses, even when the picture was sufficiently in focus that the object was readily recognizable to other people.

### **Illusory association between events**

**Illusory correlation** is the tendency to see non-existent correlations in a set of data.

#### Individual differences

Myside bias was once believed to be associated with greater intelligence; however, studies have shown that myside bias can be more influenced by ability to rationally think as opposed to amount of intelligence. Myside bias can cause an inability to effectively and logically evaluate the opposite side of an argument. Studies have stated that myside bias is an absence of "active open-mindedness," meaning the active search for why an initial idea may be wrong.<sup>[57]</sup> Typically, myside bias is operationalized in empirical studies as the quantity of evidence used in support of their side in comparison to the opposite side.<sup>[58]</sup>

A study has found individual differences in myside bias. This study investigates individual differences that are acquired through learning in a cultural context and are mutable. The researcher found important individual difference in argumentation. Studies have suggested that individual differences such as deductive reasoning ability, ability to overcome belief bias, epistemological understanding, and thinking disposition are a significant predictors of the reasoning and generating arguments, counterarguments, and rebuttals.

A study by Christopher Wolfe and Anne Britt also investigated how participants' views of "what makes a good argument?" can be a source of myside bias that influence the way a person creates their own arguments.<sup>[58]</sup> The study investigated individual differences of argumentation schema and asked participants to write essays. The participants were randomly assigned to write essays either for or against their side of the argument they preferred and given balanced or unrestricted research instructions. The balanced research instructions instructed participants to create a balanced argument that included both pros and cons and the unrestricted research instruction did not give any particular instructions on how

to create the argument.<sup>[58]</sup>

Overall, the results revealed that balance research instruction significantly increased the use of participants adding opposing information to their argument. These data also reveal that personal belief is not a source of myside bias. Furthermore, participants who believed that good arguments were based on facts were more likely to exhibit myside bias than participants who did not agree with this statement. This evidence is consistent with the claims proposed in Baron's article that people's opinions about good thinking can influence how arguments are generated.

## History

### **Informal observation**

Before psychological research on confirmation bias, the phenomenon had been observed anecdotally throughout history, by

Greek historian [Thucydides](#) (c. 460 BC – c. 395 BC)

Italian poet [Dante Alighieri](#) (1265–1321)

English philosopher and scientist [Francis Bacon](#) (1561–1626)

Russian novelist [Leo Tolstoy](#)

The term "confirmation bias" was coined by English psychologist [Peter Wason](#).

## Explanations

**Confirmation bias is often described as a result of automatic, unintentional strategies rather than deliberate deception.**

According to Robert Maccoun, most biased evidence processing occurs through a combination of both "cold" (cognitive) and "hot" (motivated) mechanisms.<sup>[81]</sup>

Cognitive explanations for confirmation bias are based on limitations in people's ability to handle complex tasks, and the shortcuts, called *heuristics*, that they use.<sup>[82]</sup> For example, people may judge the reliability of evidence by using the *availability heuristic*—i.e., how readily a particular idea comes to mind.<sup>[83]</sup> It is also possible that people can only focus on one thought at a time, so find it difficult to test alternative hypotheses in parallel.<sup>[84]</sup>

Another heuristic is the positive test strategy identified by Klayman and Ha, in which people test a hypothesis by examining cases where they expect a property or event to occur. This heuristic avoids the difficult or impossible task of working out how diagnostic



each possible question will be. However, it is not universally reliable, so people can overlook challenges to their existing beliefs.<sup>[13][85]</sup>

Motivational explanations involve an effect of **desire** on **belief**, sometimes called "**wishful thinking**".<sup>[86][87]</sup> It is known that people prefer pleasant thoughts over unpleasant ones in a number of ways: this is called the "**Pollyanna principle**".<sup>[88]</sup> Applied to **arguments** or sources of **evidence**, this could explain why desired conclusions are more likely to be believed true.<sup>[86]</sup> According to experiments that manipulate the desirability of the conclusion, **people demand a high standard of evidence for unpalatable ideas and a low standard for preferred ideas**. In other words, they ask, "Can I believe this?" for some suggestions and, "Must I believe this?" for others.<sup>[89][90]</sup> Although **consistency** is a desirable feature of attitudes, an excessive drive for consistency is another potential source of bias because it may prevent people from neutrally evaluating new, surprising information.<sup>[86]</sup> Social psychologist **Ziva Kunda** combines the cognitive and motivational theories, arguing that motivation creates the bias, but cognitive factors determine the size of the effect.<sup>[91]</sup>

Explanations in terms of **cost-benefit analysis** assume that people do not just test hypotheses in a disinterested way, but assess the costs of different errors.<sup>[92]</sup> Using ideas from **evolutionary psychology**, James Friedrich suggests that people do not primarily aim at **truth** in testing hypotheses, but try to avoid the most costly errors. For example, employers might ask one-sided questions in job interviews because they are focused on weeding out unsuitable candidates.<sup>[93]</sup> Yaacov Trope and Akiva Liberman's refinement of this theory assumes that people compare the two different kinds of error: accepting a false hypothesis or rejecting a true hypothesis. For instance, someone who underestimates a friend's honesty might treat him or her suspiciously and so undermine the friendship. Overestimating the friend's honesty may also be costly, but less so. In this case, it would be rational to seek, evaluate or remember evidence of their honesty in a biased way.<sup>[94]</sup> When someone gives an initial impression of being introverted or extroverted, questions that match that impression come across as more **empathic**.<sup>[95]</sup> This suggests that when talking to someone who seems to be an introvert, it is a sign of better **social skills** to ask, "Do you feel awkward in social situations?" rather than, "Do you like noisy parties?" The connection between confirmation bias

and social skills was corroborated by a study of how college students get to know other people. Highly [self-monitoring](#) students, who are more sensitive to their environment and to [social norms](#), asked more matching questions when interviewing a high-status staff member than when getting to know fellow students.<sup>[95]</sup>

Psychologists [Jennifer Lerner](#) and [Philip Tetlock](#) distinguish two different kinds of thinking process. *Exploratory thought* neutrally considers multiple points of view and tries to anticipate all possible objections to a particular position, while *confirmatory thought* seeks to justify a specific point of view. Lerner and Tetlock say that when people expect to justify their position to others whose views they already know, they will tend to adopt a similar position to those people, and then use confirmatory thought to bolster their own credibility. However, if the external parties are overly aggressive or critical, people will disengage from thought altogether, and simply assert their personal opinions without justification.<sup>[96]</sup> Lerner and Tetlock say that people only push themselves to think critically and logically when they know in advance they will need to explain themselves to others who are well-informed, genuinely interested in the truth, and whose views they don't already know.<sup>[97]</sup> Because those conditions rarely exist, they argue, most people are using confirmatory thought most of the time.<sup>[98]</sup>

## Consequences

### **In science**

A distinguishing feature of [scientific thinking](#) is the search for falsifying as well as confirming evidence.<sup>[128]</sup> However, many times in the [history of science](#), scientists have resisted new discoveries by selectively interpreting or ignoring unfavorable data.<sup>[128]</sup>

Previous research has shown that the assessment of the quality of scientific studies seems to be particularly vulnerable to confirmation bias. It has been found several times that scientists rate studies that report findings consistent with their prior beliefs more favorably than studies reporting findings inconsistent with their previous beliefs.<sup>[80][129][130]</sup> However, assuming that the research question is relevant, the experimental design adequate and the data are clearly and comprehensively described, the found results should be of importance to the scientific community and should not be viewed prejudicially, regardless of whether they conform to current theoretical predictions.<sup>[130]</sup>

An experimenter's confirmation bias can potentially affect which data are reported. Data that conflict with the experimenter's expectations may be more readily discarded as unreliable, producing the so-called [file drawer effect](#). To combat this tendency, scientific training teaches ways to prevent bias.<sup>[133]</sup> For example, [experimental design](#) of [randomized controlled trials](#) (coupled with their [systematic review](#)) aims to minimize sources of bias.<sup>[133][134]</sup> The social process of [peer review](#) is thought to mitigate the effect of individual scientists' biases,<sup>[135]</sup> even though the peer review process itself may be susceptible to such biases.<sup>[130][136]</sup> Confirmation bias may thus be especially harmful to objective evaluations regarding nonconforming results since biased individuals may regard opposing evidence to be weak in principle and give little serious thought to revising their beliefs.<sup>[129]</sup> Scientific innovators often meet with resistance from the scientific community, and research presenting controversial results frequently receives harsh peer review.<sup>[137]</sup>

See also

- [Cherry picking \(fallacy\)](#)
- [Cognitive inertia](#)
- [Denial](#)
- [Congruence bias](#)
- [Observer-expectancy effect](#)
- [Reinforcement theory](#)
- [Reporting bias](#)
- [Selective perception](#)