

People tend to overestimate their own awareness and underestimate its bounds. As a result, they often overlook information that is crucial to making successful decisions.

**BOUNDS**

**AREN'T**

**WHAT YOU**

**FAIL TO**

**SEE CAN**

**HURT  
YOU**

# INATTENTIONAL BLINDNESS:

**Economists and psychologists** rely on widely-divergent assumptions about human behaviour in constructing their theories. Economists tend to assume that people are fully rational, while psychologists – particularly behavioural decision researchers – identify the systematic ways in which people depart from rationality. While the two disciplines have offered different predictions of how individuals react to external stimuli, they share the implicit assumption that individuals will accurately perceive the stimuli available to them.

Nobel Laureate in Economics **Herbert Simon** introduced ‘bounded rationality’ as “a behavioural model in which human rationality is very much bounded by the situation and by human computational powers.” In this article, we propose that awareness can also be bounded, and that this occurs when people fail to see, seek, use or share highly relevant, easily-accessible and readily-perceivable information during the decision making process.

Following are three common types of ‘bounded awareness’.

## 1. Inattentional Blindness

In a well-known study, cognitive psychologist **Ulric Neisser** presented a videotape of two visually-superimposed teams passing

basketballs, one wearing light-coloured shirts and the other wearing dark-coloured shirts, and asked participants to count the number of passes made between the two teams. Because the players were superimposed on top of each other, the task was moderately difficult. To score accurately, participants had to pay close attention to the task. Yet only 21 per cent of participants reported seeing a woman abruptly and clearly walk through the group of players carrying an open umbrella. A repeated viewing of the videotape, without the counting task, reveals that the woman is unambiguously visible in the middle of the screen for a significant part of the video.

We have used this video in our classrooms and have found that an even smaller percentage notices the woman. After the first showing, during which students count passes, we ask whether anyone saw anything noteworthy. In a large class, it is common for just a few people to mention seeing a woman with an umbrella. Predictably, others scoff at the suggestion. Yet, when we show the video for the second time, everyone sees the woman, leading to significant laughter and disbelief. This information sits visible and available in the visual field, yet escapes awareness when competing with a task requiring other attentional resources.

This phenomenon, known as ‘inattentional blindness,’ has



# BOUNDED AWARENESS

## OFTEN RESULTS WHEN DECISION MAKERS AND GROUPS LIMIT THEIR ANALYSIS TO THE DATA AT HAND, RATHER THAN SEEKING OUT THE INFORMATION MOST RELEVANT TO THE QUESTION BEING CONSIDERED.

become an important area of study for cognitive and perceptual psychologists. Its consequences extend to real, life-and-death activities. For example, an airplane pilot who is attending to his controls could overlook the presence of another plane on his runway. Similarly, cell phones can divert drivers' attention, making inattentive blindness a likely contributor to car accidents.

### 2. Change Blindness

Change-detection researcher **Daniel Simons** of Carnegie-Mellon University has demonstrated that people fail to notice changes in the information that is visually available to them. Interestingly, they often cannot describe the change that has taken place, but do demonstrate traces of memory of what they saw before the change.

For example, in one Simons study, an experimenter holding a basketball stopped pedestrians to ask for directions. While the pedestrian was giving directions, a group of people walked between the experimenter and the pedestrian. During this interruption, the experimenter handed the basketball to one person in the group. After giving directions, the pedestrian was asked if he or she noticed any sort of change during the brief exchange with the experimenter. Most did not. However, when led to think about a basketball, the pedestrian did recall seeing it at the beginning of the exchange, and some even recalled specific features of the ball. So, while the participants failed to explicitly notice that a change took place, they did hold accurate implicit memory representations of both the pre- and post-change image.

The possible influence of change blindness in decision making is evident in a study by **Petter Johansson** and his colleagues, in which participants were asked to choose the more attractive of two faces displayed on a computer screen. As participants moved the

cursor to indicate their choice, a flash on the screen distracted them, and the two pictures were reversed. Nonetheless, most subjects continued to move their cursor in the same direction, selecting the picture they originally viewed as the more attractive. Importantly, they both failed to notice the switch and provided reasons to support their unintended decision.

### 3. Focalism and the Focusing Illusion

'Focalism' is the common tendency to focus too much on a particular event (the 'focal event') and too little on other events that are likely to occur concurrently. **Timothy Wilson** and **Daniel Gilbert** of the University of Virginia found that individuals overestimate the degree to which their future thoughts will be occupied by the focal event, as well as the duration of their emotional response to the event. For example, individuals overestimate the impact of positive events, such as the win of a preferred sports team or political candidate, on their overall happiness. And even more dramatically, individuals overestimate the impact of negative events, such as a major medical condition, on overall happiness.

Using similar logic, **David Schkade** of UC San Diego and Nobel Laureate **Daniel Kahneman** of Princeton defined the 'focusing illusion' as the human tendency to make judgments based on attention to only a subset of available information, to overweight that information, and to underweight unattended information. They had college students in the Midwest and southern California evaluate their own life satisfaction and the perceived life satisfaction of others. While Californians and Midwesterners reported similar levels of life satisfaction, both groups predicted that Californians had greater life satisfaction than Midwesterners. The factor that led to this pattern was that salient differences

between California and the Midwest, such as climate, heavily influenced nonresidents' judgments of residents' life satisfaction. This study argued that when Californians imagined moving to the Midwest, and vice versa, weather became a salient factor, and all other life events affecting satisfaction were outside of awareness. But these factors played a much smaller role in determining the experienced life satisfaction of residents of either region.

The implications of focalism are not limited to laboratory studies. The Challenger space shuttle tragedy, for example, can be better understood through this lens. On January 28, 1986, the Challenger was launched at the lowest temperature in its history, leading to a failure of the 'O-rings' and an explosion that killed all seven astronauts aboard. Before the launch, the decision makers at NASA examined seven prior launches in which some sort of O-ring failure occurred. No clear pattern between O-rings and temperature emerged from this data, and the launch continued as scheduled. Critically, the decision makers failed to consider 17 previous launches in which no O-ring failure occurred. A logistic regression of all 24 launches would have led to an unambiguous conclusion: the Challenger had more than a 99 per cent chance of malfunction. The scientists at NASA, however well meaning, inadvertently caused a tragedy by missing information that was easily visible and accessible to them.

More broadly, bounded awareness often results when decision makers and groups limit their analysis to the data at hand, rather than seeking out information most relevant to the question being considered.

### Awareness in Decision Making

While the information that is missed in each of the studies we have described is visual, and the mental processes at work appear to be perceptual, we believe that bounded awareness extends from perceptual processes to decision-making processes.

A study by Harvard's **Daylian Cain** and Carnegie-Mellon's **George Loewenstein** and **Don Moore** describes the 'slippery slope' of auditors becoming unethical. Essentially, it argues that auditors may be blind to changes made in corporate accounting practices as long as the changes are made slowly. Imagine that an accountant is in charge of the audit of a large corporation with a strong reputation. The auditor and client have an excellent relationship, and the auditor receives tens of millions of dollars in fees from the client each year. For three years, the accountant has viewed and approved the client's high-quality, extremely-ethical financial statements. Suddenly, the corporation begins stretching, and even breaking, the law in certain areas. If the accountant were asked if she noticed these transgressions, would she sign a statement certifying that the financial statements were acceptable

according to government regulations?

Now suppose that the auditor saw and approved of high-quality, highly-ethical financial statements for one year, after which the corporation begins stretching the law in a few areas, but does not appear to break the law. In the third year, the firm stretches the ethicality of its returns a bit more. Some of the company's accounting decisions may now violate federal accounting standards. By the fourth year, the corporation has begun to stretch the law in many areas and occasionally, to break it. Auditors are much more likely to notice and refuse to sign the statements in the first version than in the second version, even if the unethical behaviour is the same in year four of both stories.

A study I [Prof. Bazerman] conducted with my Harvard colleague **Francesca Gino** showed that people are indeed less likely to perceive change if it occurs slowly over time rather than abruptly. In it we argued that recent business scandals such as the fall of **Enron** and **Worldcom** illustrate the 'boiling frog syndrome.' According to this folk tale, if you place a frog in a pot of water and raise the temperature ever so slowly, the gradual warming will comfort the frog into a state of relaxation. Eventually, however, the frog will die due to his inability to sense the gradual increase in water temperature.

### Awareness in Negotiations

Two types of information are critical for any effective negotiator: the decisions of others and the rules of the game. However, due to bounded awareness, these types of information are often not seen or used by negotiators, leading to critical errors. Two types of negotiation problems illustrate the phenomenon: the Monty Hall problem, and the Acquiring a Company problem.

#### 1. The Monty Hall problem

In the 1960s, **Monty Hall** was the host of the American television game show 'Let's Make a Deal'. On the show, Monty would ask contestants to pick one of three doors. He and the contestants knew that one of the doors led to the grand prize and that the other two doors led to 'zonks' – small prizes or gag gifts. After a contestant picked a door, Monty would often open one of the other two doors, reveal a zonk, and then offer the contestant the chance to trade their chosen door for the remaining unchosen and unopened door. Most contestants preferred to stick with their original door.

Years after the show went off the air, statisticians and economists became intrigued with the analytical choice faced by the contestants. Their analysis argued that contestants erred by not switching to the remaining unchosen door. In addition, they argued against the common belief that, with only two doors remaining following the opening of one door by the host, the odds of winning the grand prize are 50-50.

The researchers proposed the following logic. When a contestant first chose a door, she had a one-in-three chance of winning the prize. Let's assume that Monty always opened an unchosen door (the 'Monty Always Opens' condition) and then offered the contestant the opportunity to switch. When Monty opened one door to reveal a zonk, as he always could do, the one-in-three probability did not change. In other words, the contestant still had a one-in-three chance of having picked the grand prize from the start, and a two-in-three chance that the grand prize was behind one of the other two, unchosen doors. After Monty opened one zonk door, the two-in-three chance was now carried by the unopened, unchosen door. Switching doors is the winning strategy, as it increases the participant's odds of winning the grand prize from one to two-in-three.

The critical assumption in this analysis was that Monty always opens an unchosen door. A different assumption would be the 'Mean Monty' condition, in which Monty knew where the grand prize was located and made decisions in order to minimize the contestant's chances of winning. So, after the contestant picked a door, 'Mean Monty' could either choose to end the game or open one door and offer a switch. Because Monty was actively trying to minimize the probability that the contestant would win the grand prize, the contestant should never have accepted an offer from Monty to switch. In fact, Monty's choice to offer a switch should have served as a signal that the contestant had already picked the winning door.

Thus, the winning strategy in the 'Monty always opens' condition is to always switch doors, while the winning strategy in the 'Mean Monty' condition is to never switch doors. Seeing the importance of Monty's decision rule, and his likely decisions, is the key to the winning strategy.

Bounded awareness can prevent individuals from seeing such readily-available information: in the 'Always Opens' condition of the Monty Hall problem, most people (59 per cent) do not switch doors, essentially opting for a one-in-three chance of winning, rather than trading for a two-in-three chance. In the Mean Monty version, 79 per cent made the right decision to keep the existing door. Finally, the majority of participants made the same decision in both versions of the game; only 24 per cent answered both versions correctly. The key takeaway is that consistency across these two very different versions of the game demonstrates that the rules of the game and the decisions of others are outside of the bounds of awareness for most decision-makers.

## 2. The Acquiring a Company Problem

In this problem, an acquiring firm has the opportunity to buy out a target firm. The acquiring firm does not know the exact current value of the target, only that it falls between \$0 and \$100 per share, with all

values equally likely. The target firm is expected to be worth 50 per cent more under the acquirer's management than under the current ownership. Thus, it appears to make sense for a transaction to take place. The target firm can accept or reject the acquiring firm's offer.

Consider the logic that would lead to a rational response when considering whether to make an offer of \$60 per share:

If I offer \$60 per share, the target will accept the offer 60 per cent of the time – whenever the firm is worth between \$0 and \$60 to the target. Since all values between \$0 and \$60 are equally likely, the firm will, on average, be worth \$30 per share to the acquirer, for a loss of \$15 per share (\$45 to \$60). Thus, a \$60 per share offer is unwise.

Similar reasoning applies to any positive offer, such that, on average, the acquirer obtains a company worth 25 per cent less than the price it pays when its offer is accepted. If the target accepts the acquirer's offer of \$X, the company is currently worth anywhere from \$0 and \$X. As the problem is formulated, any value in that range is equally likely. Thus, the expected value of the offer equals  $\$X/2$ . Because the company is worth 50 per cent more to the acquirer, the expected value to the acquirer is  $1.5(\$X/2) = 0.75(\$X)$ , just 75 per cent of its offer price. Thus, for any value of \$X, the acquirer's best option is to not make an offer (\$0 per share).

The paradox of the problem is that although the firm is always worth more to the acquirer than to the target, any offer higher than \$0 generates a negative expected return to the acquirer. The paradox results from the high likelihood that the target will accept the acquirer's offer when the firm is least valuable to the acquirer – in other words, when it is a 'lemon'.

The Acquiring a Company problem demonstrates the 'winner's curse,' where one side, typically the seller, often has much better information than the other side, putting the buyer at a disadvantage. A structural asymmetry is built into the problem: a rational buyer will bid \$0 despite the fact that the buyer's valuation of the company is higher than the seller's valuation. The strategic seller will not provide the buyer with information about the company's true value, especially when that value is low. As a result, to avoid an expected value loss, game theory recommends that buyers not make any offer.

Extensive research on this problem suggests that bounded awareness leads decision makers to ignore or simplify the cognitions of opposing parties, as well as the rules of the game. Across studies, the modal response range falls between \$50 and \$75. The common reasoning is: "On average, the firm will be worth \$50 to the target and \$75 to the acquirer; consequently, a transaction in this range will, on average, be profitable to both parties." Typically, less than 10 per cent of participants offer \$0 per share. Replications with accounting firm partners, CEOs, investment bankers, and many other skilled groups have produced similar results. Finally, even participants who were paid according to their

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RATHER, WE PROPOSE THAT PEOPLE TEND TO DISBELIEVE THAT THEY HAVE OVERLOOKED INFORMATION CRUCIAL TO MAKING A SUCCESSFUL DECISION.

performance and given many opportunities to learn through experience exhibited the same pattern of responses.

Most people can follow the logic that the optimal offer in this problem is \$0 per share, yet when unaided, most people make a positive offer. Why? Because they systematically exclude information from their decision-making processes that they have the ability to include. They overlook the fact that their expected return depends on an acceptance by the other party, which in turn is affected by the rules of the game, which state that the other side knows its true value before accepting or rejecting the offer. This logic implies that acceptance by the target is most likely to occur when the acquirer is in the least-desirable position.

## In closing

Bounded awareness is the phenomenon whereby individuals do not 'see' accessible and perceivable information during the decision-making process, while 'seeing' other equally-accessible and perceivable information; as a result, useful information remains out-of-focus for the decision-maker.

In work parallel to our own, the University of Chicago's **Richard Thaler** suggests that there are two additional ways in which decision making is limited: 'bounded willpower' and 'bounded self-interest'. The former describes the pervasive human tendency to give greater weight to present concerns than to future concerns, leading to inconsistencies between temporary motivations and longterm interests. The latter notes that our self-interest is bounded; unlike the stereotypical economic actor, we care about the outcomes of others. Similarly, in past work we have introduced the concept of 'bounded

ethicality' to refer to the limits on our ethics of which we are not even aware. Together with bounded awareness, these concepts provide a specific roadmap of how human judgment departs from economic models and common intuition.

We are not advocating an unrealistic state of 'unboundedness'. Rather, we propose that people tend to overestimate their own awareness and underestimate its bounds. Subsequently, they disbelieve that they have overlooked information crucial to making a successful decision.

The failure to recognize these normal psychological limitations poses an even greater danger than the limitation itself. That is, the risks of the meta error may exceed those of the error itself. We suspect that people tend to oversearch for information in lower-priority contexts and undersearch in higher priority contexts. The costs of bounded awareness are greatest, then, in contexts where the decisions are of the highest priority. **R**



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