**Ce qui est important 26 > PlusJApprends**

Daniel Kahneman, Thinking, Fast and Slow, 2011

THE CHARACTERS OF THE STORY

[...]

TWO SYSTEMS

[...]

Everyone has some awareness of the limited capacity of attention, and our social behavior makes allowances for these limitations. When the driver of a car is overtaking a truck on a narrow road, for example, adult passengers quite sensibly stop talking. They know that distracting the driver is not a good idea, and they also suspect that he is temporarily deaf and will not hear what they say.

Intense focusing on a task can make people effectively blind, even to stimuli that normally attract attention. The most dramatic demonstration was offered by Christopher Chabris and Daniel Simons in their book *The Invisible Gorilla*. They constructed a short film of two teams passing basketballs, one team wearing white shirts, the other wearing black. The viewers of the film are instructed to count the number of passes made by the white team, ignoring the black players. This task is difficult and completely absorbing. Halfway through the video, a woman wearing a gorilla suit appears, Tosses the court, thumps her chest, and moves on. The gorilla is in view for 9 seconds. Many thousands of people have seen the video, and about half of them do not notice anything unusual. It is the counting task—and especially the instruction to ignore one of the teams—that causes the blindness. No one who watches the video without that task would miss the gorilla. Seeing and orienting are automatic functions of System 1, but they depend on the allocation of some attention to the relevant stimulus. The authors note that the most remarkable observation of their study is that people find its results very surprising. Indeed, the viewers who fail to see the gorilla are initially sure that it was not there—they cannot imagine missing such a striking event. The gorilla study illustrates two important facts about our minds: we can be blind to the obvious, and we are also blind to our blindness. [...]

La perception peut-elle s’éduquer?

Que sait-on du réel ?

Les apparences sont-elles trompeuses ?

Notre liberté de pensée a-t-elle des limites ?

In summary, most of what you (your System 2) think and do originates in your System 1, but System 2 takes over when things get difficult, and it normally has the last word.

The division of labor between System 1 and System 2 is highly efficient: it minimizes effort and optimizes performance. The arrangement works well most of the time because System 1 is generally very good at what it does: its models of familiar situations are accurate, its short-term predictions are usually accurate as well, and its initial reactions to challenges are swift and generally appropriate. System 1 has biases, however, systematic errors that it is prone to make in specified circumstances. As we shall see, it sometimes answers easier questions than the one it was asked, and it has little understanding of logic and statistics. One further limitation of System 1 is that it cannot be turned off. If you are shown a word on the screen in a language you know, you will read it—unless your attention is totally focused elsewhere.

Notre liberté de pensée a-t-elle des limites ?

CONFLICT

Figure 2 is a variant of a classic experiment that produces a conflict between the two systems. You should try the exercise before reading on.

Figure 2

Your first task is to go down both columns, calling out whether each word is printed in lowercase or in uppercase. When you are done with the first task, go down both columns again, saying whether each word is printed to the left or to the right of center by saying (or whispering to yourself) “LEFT” or “RIGHT”.

LEFT upper

left lower

right LOWER

RIGHT upper

RIGHT UPPER

left lower

LEFT LOWER

right upper

You were almost certainly successful in saying the correct words in both tasks, and you surely discovered that some parts of each task were much easier than others. When you identified upper- and lowercase, the left-hand column was easy and the right-hand column caused you to slow down and perhaps to stammer or stumble. When you named the position of words, the left-hand column was difficult and the right-hand column was much easier.

These tasks engage System 2, because saying “upper/lower” or “right/ left” is not what you routinely do when looking down a column of words. One of the things you did to set yourself for the task was to program your memory so that the relevant words (*upper* and *lower* for the first task) were «on the tip of your tongue.” The prioritizing of the chosen words is effective and the mild temptation to read other words was fairly easy to resist when you went through the first column. But the second column was different, because it contained words for which you were set, and you could not ignore them. You were mostly able to respond correctly, but overcoming the competing response was a strain, and it slowed you down. You experienced conflict between a task that you intended to carry out and an automatic response that interfered with it.

Conflict between an automatic reaction and an intention to control it is common in our lives. We are all familiar with the experience of trying not to stare at the oddly dressed couple at the neighboring table in a restaurant. We also know what it is like to force our attention on a boring book, when we constantly find ourselves returning to the point at which the reading lost its meaning. Where winters are hard, many drivers have memories of their car skidding out of control on the ice and of the struggle to follow well-rehearsed instructions that negate what they would naturally do: “Steer into the skid, and whatever you do, do not touch the brakes!” And every human being has had the experience of *not* telling someone to go to hell. One of the tasks of System 2 is to overcome the impulses of System 1. In other words, System 2 is in charge of self-control.

Notre liberté de pensée a-t-elle des limites ?

La culture nous rend-elle plus humains ?

La culture est-elle libératrice ?

L’idée d’inconscient exclut-elle celle de liberté ?

Admettre l'existence de l'inconscient est-ce rendre vain tout effort de lucidité à l'égard de soi même ?

Avons nous le choix d’être libre ?

Quelle est la part de l’inné et de l’acquis dans le caractère ?

L'idée d'une liberté totale a-t-elle un sens ?

Être libre, est-ce ne rencontrer aucun obstacle ?

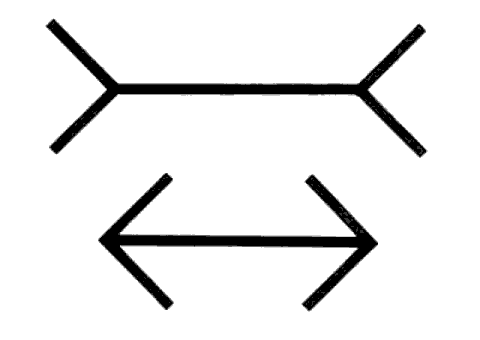
Toute prise de conscience est-elle libératrice ?

ILLUSIONS

To appreciate the autonomy of System 1, as well as the distinction between impressions and beliefs, take a good look at figure 3.

This picture is unremarkable: two horizontal lines of different lengths, with fins appended, pointing in different directions. The bottom line is obviously longer than the one above it. That is what we all see, and we naturally believe what we see. If you have already encountered this image however, you recognize it as the famous Müller-Lyer illusion. As you can easily confirm by measuring them with a ruler, the horizontal lines are in fact identical in length.

Fugure 3



Now that you have measured the lines, you—your System 2, the conscious being you call “I”—have a new belief: you *know* that the lines are equally long. If asked about their length, you will say what you know. But you still see the bottom-line as longer. You have chosen to believe the measurement, but you cannot prevent System 1 from doing its thing; you can not decide to see the lines as equal, although you know they are. To resist the illusion, there is only one thing you can do: you must learn to mistrust your impressions of the length of lines when fins are attached to them. To implement that rule, you must be able to recognize the illusory pattern and recall what you know about it. If you can do this, you will never again be fooled by the Müller-Lyer illusion. But you will still see one line as longer than the other. [...]

La perception peut-elle s’éduquer ?

Les apparences sont-elles trompeuses ?

Que sait-on du réel ?

Peut-on percevoir sans juger ?

L’esprit a-t-il accès aux choses ?

ATTENTION AND EFFORT

[...]

MENTAL EFFORT

[...]

One of Hess’s findings especially captured my attention. He had noticed that the pupils are sensitive indicators of mental effort—they dilate substantially when people multiply two-digit numbers, and they dilate more if the problems are hard than if they are easy.

[...]

Much like the electricity meter outside your house or apartment, the pupils offer an index of the current rate at which mental energy is used. The analogy goes deep. Your use of electricity depends on what you choose to do, whether to light a room or toast a piece of bread. When you turn on a bulb or a toaster, it draws the energy it needs but no more. Similarly, we decide what to do, but we have limited control over the effort of doing it. Suppose you are shown four digits, say, 9462, and told that your life depends on holding them in memory for 10 seconds. However much you want to live, you cannot exert as much effort in this task as you would be forced to invest to complete an Add-3 transformation on the same digits.

System 2 and the electrical circuits in your home both have limited capacity, but they respond differently to threatened overload. A breaker trips when the demand for current is excessive, causing all devices on that circuit to lose power at once. In contrast, the response to mental overload is selective and precise: System 2 protects the most important activity, so it receives the attention it needs; “spare capacity” is allocated second by second to other tasks. In our version of the gorilla experiment, we instructed the participants to assign priority to the digit task. We know that they followed that instruction, because the timing of the visual target had no effect on the main task. If the critical letter was presented at a time of high demand, the subjects simply did not see it. When the transformation task was less demanding, detection performance was better. [...]

As you become skilled in a task, its demand for energy diminishes. Studies of the brain have shown that the pattern of activity associated with an action changes as skill increases, with fewer brain regions involved. Talent has similar effects. Highly intelligent individuals need less effort to solve the same problems, as indicated by both pupil size and brain activity. A general “law of least effort” applies to cognitive as well as physical exertion. The law asserts that if there are several ways of achieving the same goal, people will eventually gravitate to the least demanding course of action. In the economy of action, effort is a cost, and the acquisition of skill is driven by the balance of benefits and costs. Laziness is built deep into our nature. [...]

Notre liberté de pensée a-t-elle des limites ?

A crucial capability of System 2 is the adoption of “task sets”: it can program memory to obey an instruction that overrides habitual responses. Consider the following: Count all occurrences of the letter *f* in this page. This is not a task you have ever performed before and it will not come naturally to you, but your System 2 can take it on. [...]

Now suppose that at the end of the page you get another instruction: count all the commas in the next page. This will be harder, because you will have to overcome the newly acquired tendency to focus attention on the letter *f*. [...]

You surely observed as you performed Add-3 how unusual it is for your mind to work so hard. Even if you think for a living, few of the mental tasks in which you engage in the course of a working day are as demanding as Add-3, or even as demanding as storing six digits for immediate recall. We normally avoid mental overload by dividing our tasks into multiple easy steps, committing intermediate results to long-term memory or to paper rather than to an easily overloaded working memory. We cover long distances by taking our time and conduct our mental lives by the law of least effort. [...]

Notre liberté de pensée a-t-elle des limites ?

THE LAZY CONTROLLER

[...]

It is normally easy and actually quite pleasant to walk and think at the same time, but at the extremes these activities appear to compete for the limited resources of System 2. You can confirm this claim by a simple experiment. While walking comfortably with a friend, ask him to compute 23 X 78 in his head, and to do so immediately. He will almost certainly stop in his tracks. My experience is that I can think while strolling but cannot engage in mental work that imposes a heavy load on short-term memory. [...]

Le temps est-il la limite de l’homme ?

Prendre son temps est-ce le perdre ?

For most of us, most of the time, the maintenance of a coherent train of thought and the occasional engagement in effortful thinking also require self-control. Although I have not conducted a systematic survey, I suspect that frequent switching of tasks and speeded-up mental work are not intrinsically pleasurable, and that people avoid them when possible. This is how the law of least effort comes to be a law. [...]

Comment peut-il y avoir du nouveau ?

Fortunately, cognitive work is not always aversive, and people sometimes expend considerable effort for long periods of time without having to exert willpower. The psychologist Mihaly Csikszentmihalyi (pronounced six-cent-mihaly) has done more than anyone else to study this state of effortless attending, and the name he proposed for it, *flow*, has become part of the language. People who experience flow describe it as “a state of effortless concentration so deep that they lose their sense of time, of themselves, of their problems,” and their descriptions of the joy of that state are so compelling that Csikszentmihalyi has called it an “optimal experience.” Many activities can induce a sense of flow, from painting to racing motorcycles— and for some fortunate authors I know, even writing a book is often an optimal experience. Flow neatly separates the two forms of effort: concentration on a the task and the deliberate control of attention. Riding a motorcycle at 150 miles an hour and playing a competitive game of chess are certainly very effortful. In a state of flow, however, maintaining focused attention on these absorbing activities requires no exertion of self-control, thereby freeing resources to be directed to the task at hand.

Notre liberté de pensée a-t-elle des limites ?

Le bonheur est-il dans l'inconscience ?

THE BUSY AND DEPLETED SYSTEM 2

[...]

People who are *cognitively busy* are also more likely to make selfish choices, use sexist language, and make superficial judgments in social situations. Memorizing and repeating digits loosens the hold of System 2 on behavior, but of course cognitive load is not the only cause of weakened self-control. A few drinks have the same effect, as does a sleepless night. The self-control of morning people is impaired at night; the reverse is true of night people. Too much concern about how well one is doing in a task sometimes disrupts performance by loading short-term memory with pointless anxious thoughts. The conclusion is straightforward: self-control requires attention and effort. Another way of saying this is that controlling thoughts and behaviors is one of the tasks that System 2 performs. [...]

The evidence is persuasive: activities that impose high demands on System 2 require self-control, and the exertion of self-control is depleting and unpleasant. Unlike cognitive load, ego depletion is at least in part a loss of motivation. After exerting self-control in one task, you do not feel like making an effort in another, although you could do it if you really had to. In several experiments, people were able to resist the effects of ego depletion when given a strong incentive to do so. In contrast, increasing effort is not an option when you must keep six digits in short-term memory while performing a task. Ego depletion is not the same mental state as cognitive busyness.

The most surprising discovery made by Baumeister’s group shows, as he puts it, that the idea of mental energy is more than a mere metaphor. The nervous system consumes more glucose than most other parts of the body, and effortful mental activity appears to be especially expensive in the currency of glucose. When you are actively involved in difficult cognitive reasoning or engaged in a task that requires self-control, your blood glucose level drops. The effect is analogous to a runner who draws down glucose stored in her muscles during a sprint. The bold implication of this idea is that the effects of ego depletion could be undone by ingesting glucose, and Baumeister and his colleagues have confirmed this hypothesis in several experiments. [...]

A disturbing demonstration of depletion effects in judgment was recently reported in the *Proceedings of the National Academy of Sciences*. The unwitting participants in the study were eight parole judges in Israel. They spend entire days reviewing applications for parole. The cases are presented in random order, and the judges spend little time on each one, an average of 5 minutes. (The default decision is denial of parole; only 35% of requests are approved. The exact time of each decision is recorded, and the times of the judges’ three food breaks—morning break, lunch, and afternoon break— during the day are recorded as well.) The authors of the study plotted the proportion of approved requests against the time since the last food break. The proportion spikes after each meal, when about 65% of requests are granted. During the two hours or so until the judges’ next feeding, the approval rate drops steadily, to about zero just before the meal. As you might expect, this is an unwelcome result and the authors carefully checked many alternative explanations. The best possible account of the data provides bad news: tired and hungry judges tend to fall back on the easier default position of denying requests for parole. Both fatigue and hunger probably play a role.

Notre liberté de pensée a-t-elle des limites ?

Le droit n'est-il qu'une justice par défaut ?

THE LAZY SYSTEM 2

One of the main functions of System 2 is to monitor and control thoughts and actions “suggested” by System 1, allowing some to be expressed directly in behavior and suppressing or modifying others.

For an example, here is a simple puzzle. Do not try to solve it but listen to your intuition:

A bat and ball cost $1.10.

The bat costs one dollar more than the ball.

How much does the ball cost?

A number came to your mind. The number, of course, is 10: 10 cents. The distinctive mark of this easy puzzle is that it evokes an answer that is intuitive, appealing, and wrong. Do the math, and you will see. If the ball costs 10 cents, then the total cost will be $1.20 (10 cents for the ball and $1.10 for the bat), not $1.10. The correct answer is 5 cents. It is safe to assume that the intuitive answer also came to the mind of those who ended up with the correct number— they somehow managed to resist the intuition.

Shane Frederick and I worked together on a theory of judgment based on two systems, and he used the bat-and-ball puzzle to study a central question: How closely does System 2 monitor the suggestions of System 1? His reasoning was that we know a significant fact about anyone who says that the ball costs 10 cents: that person did not actively check whether the answer was correct, and her System 2 endorsed an intuitive answer that it could have rejected with a small investment of effort. Furthermore, we also know that the people who give the intuitive answer have missed an obvious social cue; they should have wondered why anyone would include in a questionnaire a puzzle with such an obvious answer. A failure to check is remarkable because the cost of checking is so low: a few seconds of mental work (the problem is moderately difficult), with slightly tensed muscles and dilated pupils, could avoid an embarrassing mistake. People who say 10 cents appear to be ardent followers of the law of least effort. People who avoid that answer appear to have more active minds.

Many thousands of university students have answered the bat-and-ball puzzle, and the results are shocking. More than 50% of students at Harvard, MIT, and Princeton gave the intuitive—incorrect—answer. At less selective universities, the rate of demonstrable failure to check was in excess of 80%. The bat-and-ball problem is our first encounter with an observation that will be a recurrent theme of this book: many people are overconfident, prone to place too much faith in their intuitions. They apparently find cognitive effort at least mildly unpleasant and avoid it as much as possible. [...]

Intelligence is not only the ability to reason; it is also the ability to find relevant material in memory and to deploy attention when needed. Memory function is an attribute of System 1. However, everyone has the option of slowing down to conduct an active search of memory for all possibly relevant facts—just as they could slow down to check the intuitive answer in the bat-and-ball problem. The extent of deliberate checking and search is a characteristic of System 2, which varies among individuals. [...]

Those who avoid the sin of intellectual sloth could be called “engaged.” They are more alert, more intellectually active, less willing to be satisfied with superficially attractive answers, more skeptical about their intuitions. The psychologist Keith Stanovich would call them more rational.

Peut-on se fier à l’intuition ?

Peut-on croire sans savoir ?

La vérité dépend-elle de nous ?

Prendre son temps est-ce le perdre ?

Le doute: Une force ou une faiblesse ?

INTELLIGENCE, CONTROL, RATIONALITY

[...]

In one of the most famous experiments in the history of psychology, Walter Mischel and his students exposed four-year-old children to a cruel dilemma. They were given a choice between a small reward (one Oreo), which they could have at any time, or a larger reward (two cookies) for which they had to wait 15 minutes under difficult conditions. They were to remain alone in a room, facing a desk with two objects: a single cookie and a bell that the child could ring at any time to call in the experimenter and receive the one cookie. As the experiment was described: “There were no toys, books, pictures, or other potentially distracting items in the room. The experimenter left the room and did not return until 15 min had passed or the child had rung the bell, eaten the rewards, stood up, or shown any signs of distress.”

The children were watched through a one-way mirror, and the film that shows their behavior during the waiting time always has the audience roaring in laughter. About half the children managed the feat of waiting for 15 minutes, mainly by keeping their attention away from the tempting reward. Ten or fifteen years later, a large gap had opened between those who had resisted temptation and those who had not. The resisters had higher measures of executive control in cognitive tasks, and especially the ability to reallocate their attention effectively. As young adults, they were less likely to take drugs. A significant difference in intellectual aptitude emerged: the children who had shown more self-control as four-year-olds had substantially higher scores on tests of intelligence. [...]

However, Stanovich argues that high intelligence does not make people immune to biases. Another ability is involved, which he labels rationality. Stanovich’s concept of a rational person is similar to what I earlier labeled “engaged.” The core of his argument is that *rationality* should be distinguished from *intelligence*. In his view, superficial or “lazy” thinking is a flaw in the reflective mind, a failure of rationality. This is an attractive and thought-provoking idea. In support of it, Stanovich and his colleagues have found that the bat-and-ball question and others like it are somewhat better indicators of our susceptibility to cognitive errors than are conventional measures of intelligence, such as IQ tests. Time will tell whether the distinction between intelligence and rationality can lead to new discoveries. [...]

Le passionné est-il ennemi de lui-même ?

Faut-il libérer ses désirs ou se libérer de ses désirs ?

Le désir nous impose-t-il d'en faire l'épreuve ?

Peut-on vouloir le bien sans le faire ?

Suffit-il de voir le meilleur pour le suivre ?

Notre liberté de pensée a-t-elle des limites ?

Avons nous le choix d’être libre ?

Quelle est la part de l’inné et de l’acquis dans le caractère ?

THE ASSOCIATIVE MACHINE

To begin your exploration of the surprising workings of System 1, look at the following words:

Bananas Vomit

A lot happened to you during the last second or two. You experienced some unpleasant images and memories. Your face twisted slightly in an expression of disgust, and you may have pushed this book imperceptibly farther away. Your heart rate increased, the hair on your arms rose a little, and your sweat glands were activated. In short, you responded to the disgusting word with an attenuated version of how you would react to the actual event. All of this was completely automatic, beyond your control. [...]

An odd feature of what happened is that your System 1 treated the mere conjunction of two words as representations of reality. Your body reacted in an attenuated replica of a reaction to the real thing, and the emotional response and physical recoil were part of the interpretation of the event. As cognitive scientists have emphasized in recent years, cognition is embodied; you think with your body, not only with your brain.

The mechanism that causes these mental events has been known for a long time: it is the association of ideas. We all understand from experience that ideas follow each other in our conscious mind in a fairly orderly way. The British philosophers of the seventeenth and eighteenth centuries searched for the rules that explain such sequences. In *An Enquiry Concerning Human Understanding*, published in 1748, the Scottish philosopher David Hume reduced the principles of association to three: resemblance, contiguity in time and place, and causality. Our concept of association has changed radically since Hume’s days, but his three principles still provide a good start.

Qu'est-ce qu'une idée ?

Que suis-je par rapport à mon corps ?

Quelle différence peut-on faire entre l’esprit et le corps ?

I will adopt an expansive view of what an idea is. It can be concrete or abstract, and it can be expressed in many ways: as a verb, as a noun, as an adjective, or as a clenched fist. Psychologists think of ideas as nodes in a vast network, called associative memory, in which each idea is linked to many others. There are different types of links: causes are linked to their effects (virus —► cold); things to their properties (lime —► green); things to the categories to which they belong (banana —►fruit). One way we have advanced beyond Hume is that we no longer think of the mind as going through a sequence of conscious ideas, one at a time. In the current view of how associative memory works, a great deal happens at once. An idea that has been activated does not merely evoke one other idea. It activates many ideas, which in turn activate others. Furthermore, only a few of the activated ideas will register in consciousness; most of the work of associative thinking is silent, hidden from our conscious selves. The notion that we have limited access to the workings of our minds is difficult to accept because, naturally, it is alien to our experience, but it is true: you know far less about yourself than you feel you do.

THE MARVELS OF PRIMING

[...]

In the 1980s, psychologists discovered that exposure to a word causes immediate and measurable changes in the ease with which many related words can be evoked. If you have recently seen or heard the word EAT, you are temporarily more likely to complete the word fragment SO\_P as SOUP than as SOAP. The opposite would happen, of course, if you had just seen WASH. We call this a *priming effect* and say that the idea of EAT primes the idea of SOUP, and that WASH primes SOAP. [...]

Another major advance in our understanding of memory was the discovery that priming is not restricted to concepts and words. You cannot know this from conscious experience, of course, but you must accept the alien idea that your actions and your emotions can be primed by events of which you are not even aware. In an experiment that became an instant classic, the psychologist John Bargh and his collaborators asked students at New York University—most aged eighteen to twenty-two—to assemble four-word sentences from a set of five words (for example, “finds he it yellow instantly”). For one group of students, half the scrambled sentences contained words associated with the elderly, such as *Florida, forgetful, bald, gray*, or *wrinkle*. When they had completed that task, the young participants were sent out to do another experiment in an office down the hall. That short walk was what the experiment was about. The researchers unobtrusively measured the time it took people to get from one end of the corridor to the other. As Bargh had predicted, the young people who had fashioned a sentence from words with an elderly theme walked down the hallway significantly more slowly than the others.

The “Florida effect” involves two stages of priming. First, the set of words primes thoughts of old age, though the word old is never mentioned; second, these thoughts prime a behavior, walking slowly, which is associated with old age. All this happens without any awareness. When they were questioned afterward, none of the students reported noticing that the words had had a common theme, and they all insisted that nothing they did after the first experiment could have been influenced by the words they had encountered. The idea of old age had not come to their conscious awareness, but their actions had changed nevertheless. This remarkable priming phenomenon—the influencing of an action by the idea—is known as the ideomotor effect. Although you surely were not aware of it, reading this paragraph primed you as well. If you had needed to stand up to get a glass of water, you would have been slightly slower than usual to rise from your chair—unless you happen to dislike the elderly, in which case research suggests that you might have been slightly faster than usual! [...]

Reciprocal links are common in the associative network. For example, I being amused tends to make you smile, and smiling tends to make you feel amused. Go ahead and take a pencil, and hold it between your teeth for a few seconds with the eraser pointing to your right and the point to your left. Now hold the pencil so the point is aimed straight in front of you, by pursuing your lips around the eraser end. You were probably unaware that one of tíiese actions forced your face into a frown and the other into a smile. College students were asked to rate the humor of cartoons from Gary Larsons *The Far Side* while holding a pencil in their mouth. Those who were “smiling” (without any awareness of doing so) found the cartoons funnier than did those who were “frowning.” In another experiment, people whose face was shaped into a frown (by squeezing their eyebrows together) reported an enhanced emotional response to upsetting pictures—starving children, people arguing, maimed accident victims.

Simple, common gestures can also unconsciously influence our thoughts and feelings. In one demonstration, people were asked to listen to messages through new headphones. They were told that the purpose of the experiment was to test the quality of the audio equipment and were instructed to move their heads repeatedly to check for any distortions of sound. Half the participants were told to nod their head up and down while others were told to shake it side to side. The messages they heard were radio editorials. Those who nodded (a yes gesture) tended to accept the message they heard, but those who shook their head tended to reject it. Again, there was no awareness, just a habitual connection between an attitude of rejection or acceptance and its common physical expression. You can see why the common admonition to “act calm and kind regardless of how you feel” is very good advice: you are likely to be rewarded by actually feeling calm and kind.

Notre liberté de pensée a-t-elle des limites ?

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Le bonheur est-il dans l'inconscience ?

Est-ce illusoire de chercher à être heureux ?

PRIMES THAT GUIDE US

Studies of priming effects have yielded discoveries that threaten our self-image as conscious and autonomous authors of our judgments and our choices. For instance, most of us think of voting as a deliberate act that reflects our values and our assessments of policies and is not influenced by irrelevancies. Our vote should not be affected by the location of the polling station, for example, but it is. A study of voting patterns in precincts of Arizona in 2000 showed that the support for propositions to increase the funding of schools was significantly greater when the polling station was in a school than when it was in a nearby location. A separate experiment showed that exposing people to images of classrooms and school lockers also increased the tendency of participants to support a school initiative. The effect of the images was larger than the difference between parents and other voters! The study of priming has come some way from the initial demonstrations that reminding people of old age makes them walk more slowly. [...]

Money-primed people become more independent than they would be without the associative trigger. They persevered almost twice as long in trying to solve a very difficult problem before they asked the experimenter for help, a crisp demonstration of increased self-reliance. Money-primed people are also more selfish: they were much less willing to spend time helping another student who pretended to be confused about an experimental task. When an experimenter clumsily dropped a bunch of pencils on the floor, the participants with money (unconsciously) on their mind picked up fewer pencils. In another experiment in the series, participants were told that they vere asked to set up two chairs while the experimenter left to retrieve that person. Participants primed by money chose to stay much farther apart than their non primed peers (118 vs. 80 centimeters). Money-primed undergraduates also showed a greater preference for being alone.

The general theme of these findings is that the idea of money primes individualism: a reluctance to be involved with others, to depend on others. The psychologist who has done this remarkable research, Kathleen Vohs, has been laudably restrained in discussing the implications of her findings, leaving the task to her readers. Her experiments are profound—her findings suggest that living in a culture that surrounds us with reminders of money may shape our behavior and our attitudes in ways that we do not know about and of which we may not be proud. Some cultures provide frequent reminders of respect, others constantly remind their members of God, and some societies prime obedience by large images of the Dear Leader. Can there be any doubt that the ubiquitous portraits of the national leader in dictatorial societies not only convey a feeling that “Big Brother Is Watching” but also lead to an actual reduction in spontaneous thought and independent action?

The evidence of priming studies suggests that reminding people of their mortality increases the appeal of authoritarian ideas, which may become reassuring in the context of the terror of death.

Other experiments have confirmed Freudian insights about the role of symbols and metaphors in unconscious associations. For example, consider the ambiguous word fragments W\_\_H and S\_\_P. People who were recently asked to think of an action of which they are ashamed are more likely to complete those fragments as WASH and SOAP and less likely to see WISH and SOUP. Furthermore, merely thinking about stabbing a coworker in the back leaves people more inclined to buy soap, disinfectant, or detergent than batteries, juice, or candy. Feeling that one’s soul is stained appears to trigger a desire to cleanse one's body, an impulse that has been dubbed the “Lady Macbeth effect.”

The cleansing is highly specific to the body parts involved in a sin. Participants in an experiment were induced to “lie” to an imaginary person, either on the phone or in e-mail. In a subsequent test of the desirability of various products, people who had lied on the phone preferred mouthwash over soap, and those who had lied in e-mail preferred soap to mouthwash.

When I describe priming studies to audiences, the reaction is often disbelief. This is not a surprise: System 2 believes that it is in charge and that it knows the reasons for its choices. Questions are probably cropping up in your mind as well: How is it possible for such trivial manipulations of the context to have such large effects? Do these experiments demonstrate that we are completely at the mercy of whatever primes the environment provides at any moment? Of course not. The effects of the primes are robust but not necessarily large. Among a hundred voters, only a few whose initial preferences were uncertain will vote differently about a school issue if their precinct is located in a school rather than in a church—but a few percent could tip an election. [...]

Notre liberté de pensée a-t-elle des limites ?

L’idée d’inconscient exclut-elle celle de liberté ?

Admettre l'existence de l'inconscient est-ce rendre vain tout effort de lucidité à l'égard de soi même ?

Avons nous le choix d’être libre ?

Qu'est-ce qu'une idée ?

Les passions nous empêchent-elles de faire notre devoir ?

Comment peut-il y avoir un contre-pouvoir ?

Que nous apprend la mort ?

Peut-on penser la mort ?

Une action désintéressée est-elle possible ?

L'action politique doit-elle être guidée par la connaissance de l'histoire ?

Some years ago, the psychologist Timothy Wilson wrote a book with the evocative title *Strangers to Ourselves*. You have now been introduced to that stranger in you, which may be in control of much of what you do, although you rarely have a glimpse of it. System 1 provides the impressions that often turn into your beliefs, and is the source of the impulses that often become your choices and your actions. It offers a tacit interpretation of what happens to you and around you, linking the present with the recent past and with expectations about the near future. It contains the model of the world that instantly evaluates events as normal or surprising. It is the source of your rapid and often precise intuitive judgments. And it does most of this without your conscious awareness of its activities. [...]

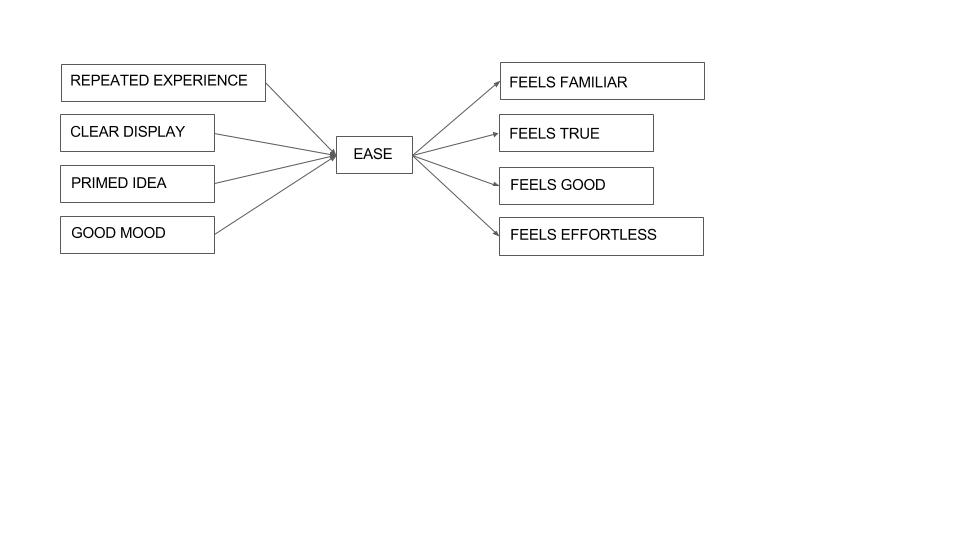
COGNITIVE EASE

Whenever you are conscious, and perhaps even when you are not, multiple computations are going on in your brain, which maintain and update current answers to some key questions: Is anything new going on? Is there a threat? Are things going well? Should my attention be redirected? Is more effort needed for this task? You can think of a cockpit, with a set of dials that indicate the current values of each of these essential variables. The assessments are carried out automatically by System 1, and one of their functions is to determine whether extra effort is required from System 2.

One of the dials measures *cognitive ease*, and its range is between “Easy” and “Strained.” Easy is a sign that things are going well—no threats, no major news, no need to redirect attention or mobilize effort. Strained indicates that a problem exists, which will require increased mobilization of System 2. Conversely, you experience *cognitive strain*. Cognitive strain is affected by both the current level of effort and the presence of unmet demands. The surprise is that a single dial of cognitive ease is connected to a large network of diverse inputs and outputs. Figure 5 on page 60 tells the story.

The figure suggests that a sentence that is printed in a clear font, or has been repeated, or has been primed, will be fluently processed with cognitive ease. Hearing a speaker when you are in a good mood, or even when you have a pencil stuck crosswise in your mouth to make you “smile,” also induces cognitive ease.

Figure 5. Causes and Consequences of Cognitive Ease



The various causes of ease or strain have interchangeable effects. When you are in a state of cognitive ease, you are probably in a good mood, like what you see, believe what you hear, trust your intuitions, and feel that the current situation is comfortably familiar. You are also likely to be relatively casual and superficial in your thinking. When you feel strained, you are more likely to be vigilant and suspicious, invest more effort in what you are doing, feel less comfortable, and make fewer errors, but you also are less intuitive and less creative than usual. [...]

ILLUSIONS OF TRUTH

[...]

The lesson of figure 5 is that predictable illusions inevitably occur if a judgment is based on an impression of cognitive ease or strain. Anything that makes it easier for the associative machine to run smoothly will also bias beliefs. A reliable way to make people believe in falsehoods is frequent repetition, because familiarity is not easily distinguished from truth. Authoritarian institutions and marketers have always known this fact. But it was psychologists who discovered that you do not have to repeat the entire statement of a fact or idea to make it appear true. People who were repeatedly exposed to the phrase “the body temperature of a chicken” were more likely to accept as true the statement that “the body temperature of a chicken is 144°” (or any other arbitrary number). The familiarity of one phrase in the statement sufficed to make the whole statement feel familiar, and therefore true. If you cannot remember the source of a statement, and have no way to relate it to other things you know, you have no option but to go with the sense of cognitive ease.

HOW TO WRITE A PERSUASIVE MESSAGE

[...]

In addition to making your message simple, try to make it memorable. Put your ideas in verse if you can; they will be more likely to be taken as truth. Participants in a much cited experiment read dozens of unfamiliar aphorisms, such as:

Woes unite foes.

Little strokes will tumble great oaks.

A fault confessed is half redressed.

Other students read some of the same proverbs transformed into non rhyming versions:

Woes unite enemies.

Little strokes will tumble great trees.

A fault admitted is half redressed.

The aphorisms were judged more insightful when they rhymed than when they did not. [...]

This is the message of figure 5: the sense of ease or strain has multiple causes, and it is difficult to tease them apart. Difficult, but not impossible. People can overcome some of the superficial factors that produce illusions of truth when strongly motivated to do so. On most occasions, however, the lazy System 2 will adopt the suggestions of System 1 and march on.

STRAIN AND EFFORT

[...]

On the other hand, the experience of cognitive strain, whatever its source, tends to mobilize System 2, shifting people's approach to problems from a casual intuitive mode to a more engaged and analytic mode.

The bat-and-ball problem was mentioned earlier as a test of people's tendency to answer questions with the first idea that comes to their mind, without checking it. Shane Fredericks Cognitive Reflection Test consists of the bat-and-ball problem and two others, all chosen because they evoke an immediate intuitive answer that is incorrect. The other two items in the CRT are:

If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

100 minutes OR 5 minutes

In a lake, there is a patch of lily pads. Every day, the patch doubles in size.

If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

24 days OR 47 days

The correct answers to both problems are in a footnote at the bottom of the page\*. The experimenters recruited 40 Princeton students to take the CRT. Half of them saw the puzzles in a small font in washed-out gray print. The puzzles were legible, but the font induced cognitive strain. The results tell a clear story: 90% of the students who saw the CRT in normal font made at least one mistake in the test, but the proportion dropped to 35% when the font was barely legible. You read this correctly: performance was better with the bad font. Cognitive strain, whatever its source, mobilizes System 2, which is more likely to reject the intuitive answer suggested by System 1.

\* 5,47.

THE PLEASURE OF COGNITIVE EASE

[...]

As we saw in figure 5, repetition induces cognitive ease and a comforting feeling of familiarity. The famed psychologist Robert Zajonc dedicated much of his career to the study of the link between the repetition of an arbitrary stimulus and the mild affection that people eventually have for it. Zajonc called it the mere exposure effect. A demonstration conducted in the Student newspapers of the University of Michigan and of Michigan State University is one of my favorite experiments. For a period of some weeks, an ad-like box appeared on the front page of the paper, which contained an ad-like box appeared on the front page of the paper, which contained one of the following Turkish (or Turkish-sounding) words: *kadirga, saricik, biwonjni, nansoma,* and *iktitaf*. The frequency with which the words were repeated varied: one of the words was shown only once, the others appeared on two, five, ten, or twenty-five separate occasions. (The words that were presented most often in one of the university papers were the least frequent in the other.) No explanation was offered, and readers’ queries were answered by the statement that “the purchaser of the display wished for anonymity.”

When the mysterious series of ads ended, the investigators sent questionnaires to the university communities, asking for impressions of whether each of the words “means something ‘good’ or something ‘bad.’ “ The results were spectacular: the words that were presented more frequently were rated much more favorably than the words that had been shown only once or twice. The finding has been confirmed in many experiments, using Chinese ideographs, faces, and randomly shaped polygons.

The mere exposure effect does not depend on the conscious experience of familiarity. In fact, the effect does not depend on consciousness at all: it occurs even when the repeated words or pictures are shown so quickly that the observers never become aware of having seen them. They still end up liking the words or pictures that were presented more frequently. As should be clear by now, System 1 can respond to impressions of events of which System 2 is unaware. Indeed, the mere exposure effect is actually stronger for stimuli that the individual never consciously sees.

Zajonc argued that the effect of repetition on liking is a profoundly important biological fact, and that it extends to all animals. To survive in a frequently dangerous world, an organism should react cautiously to a novel stimulus, with withdrawal and fear. Survival prospects are poor for an animal that is not suspicious of novelty. However, it is also adaptive for the initial caution to fade if the stimulus is actually safe. The mere exposure effect occurs, Zajonc claimed, because the repeated exposure of a stimulus is followed by nothing bad. Such a stimulus will eventually become a safety signal, and safety is good. Obviously, this argument is not restricted to humans. To make that point, one of Zajonc’s associates exposed two sets of fertile chicken eggs to different tones. After they hatched, the chicks consistently emitted fewer distress calls when exposed to the tone they had heard while inhabiting the shell. [...]

EASE, MOOD, AND INTUITION

Around 1960, a young psychologist named Sarnoff Mednick thought he had identified the essence of creativity. His idea was as simple as it was powerful: creativity is associative memory that works exceptionally well. He made up a test, called the Remote Association Test (RAT), which is still often used in studies of creativity.

For an easy example, consider the following three words:

cottage Swiss cake

Can you think of a word that is associated with all three? You probably worked out that the answer is *cheese*. Now try this:

dive light rocket

This problem is much harder, but it has a unique correct answer, which every speaker of English recognizes, although less than 20% of a sample of students found it within 15 seconds. The answer is *sky*. Of course, not every triad of words has a solution. For example, the words *dream, ball, book* do not have a shared association that everyone will recognize as valid.

Several teams of German psychologists that have studied the RAT in recent years have come up with remarkable discoveries about cognitive ease. One of the teams raised two questions: Can people feel that a triad of words has a solution before they know what the solution is? How does mood influence performance in this task? To find out, they first made some of their subjects happy and others sad, by asking them to think for several minutes about happy or sad episodes in their lives. Then they presented these subjects with a series of triads, half of them linked (such as *dive, light, rocket*) and haff unlinked (such as *dream, ball, book*), and instructed them to press one of two keys very quickly to indicate their guess about whether the triad was linked. The time allowed for this guess, 2 seconds, was much too short for the actual solution to come to anyone’s mind.

The first surprise is that people's guesses are much more accurate than they would be by chance. I find this astonishing. A sense of cognitive ease is apparently generated by a very faint signal from the associative machine, which “knows” that the three words are coherent (share an association) long before the association is retrieved. The role of cognitive ease in the judgment was confirmed experimentally by another German team: manipulations that increase cognitive ease (priming, a clear font, pre-exposing words) all increase the tendency to see the words as linked.

Another remarkable discovery is the powerful effect of mood on this intuitive performance. The experimenters computed an “intuition index” to measure accuracy. They found that putting the participants in a good mood before the test by having them think happy thoughts more than doubled accuracy. An even more striking result is that unhappy subjects were completely incapable of performing the intuitive task accurately; their guesses were no better than random. Mood evidently affects the operation of System 1: when we are uncomfortable and unhappy, we lose touch with our intuition.

These findings add to the growing evidence that good mood, intuition, creativity, gullibility, and increased reliance on System 1 form a cluster. At the other pole, sadness, vigilance, suspicion, an analytic approach, and increased effort also go together. A happy mood loosens the control of System 2 over performance: when in a good mood, people become more intuitive and more creative but also less vigilant and more prone to logical errors. Here again, as in the mere exposure effect, the connection makes biological sense. A good mood is a signal that things are generally going well, the environment is safe, and it is alright to let ones guard down. A bad mood indicates that things are not going very well, there may be a threat, and vigilance is required. Cognitive ease is both a cause and a consequence of a pleasant feeling.

The Remote Association Test has more to tell us about the link between cognitive ease and positive affect. Briefly consider two triads of words:

sleep mail switch

saIt deep foam

You could not know it, of course, but measurements of electrical activity in the muscles of your face would probably have shown a slight smile when you read the second triad, which is coherent (*sea* is the solution). This smiling reaction to coherence appears in subjects who are told nothing about common associates; they are merely shown a vertically arranged triad of words and instructed to press the spacebar after they have read it. The impression of cognitive ease that comes with the presentation of a coherent triad appears to be mildly pleasurable in itself. [...]

Notre liberté de pensée a-t-elle des limites ?

L’idée d’inconscient exclut-elle celle de liberté ?

Admettre l'existence de l'inconscient est-ce rendre vain tout effort de lucidité à l'égard de soi même ?

Avons nous le choix d’être libre ?

Toute prise de conscience est-elle libératrice ?

L'idée d'une liberté totale a-t-elle un sens ?

Qu'est-ce qu'une idée ?

Les passions nous empêchent-elles de faire notre devoir ?

Comment peut-il y avoir un contre-pouvoir ?

La vérité dépend-elle de nous ?

Peut-on se fier à l’intuition ?

Les apparences sont-elles trompeuses ?

La perception peut-elle s’éduquer ?

Peut-on percevoir sans juger ?

Peut-on dire que le langage entrave la pensée ?

Le langage trahit-il la pensée ?

Une connaissance scientifique du vivant est-elle possible ?

Le développement technique transforme-t-il les hommes ?

Serions-nous plus libres sans machines ?

Le doute: Une force ou une faiblesse ?

Faut-il préférer le bonheur à la vérité ?

Le bonheur est-il dans l'inconscience ?

Ne désirons-nous que les choses que nous estimons bonnes ?

Parler d´actes inhumains a-t´il un sens ?

La beauté transforme-t-elle notre conscience du réel ?

Y-a-til une beauté naturelle ?

Existe-t-il un privilège de la beauté ?

La beauté est elle promesse de bonheur ?

Que suis-je par rapport à mon corps ?

Quelle différence peut-on faire entre l’esprit et le corps ?

Quelle est la part de l’inné et de l’acquis dans le caractère ?

NORMS, SURPRISES, AND CAUSES

[...]

ASSESSING NORMALITY

The main function of System 1 is to maintain and update a model of your personal world, which represents what is normal in it. The model is constructed by associations that link ideas of circumstances, events, actions, and outcomes that co-occur with some regularity, either at the same time or within a relatively short interval. As these links are formed and strengthened, the pattern of associated ideas comes to represent the structure of events in your life, and it determines your interpretation of the present as well as your expectations of the future. [...]

A single incident may make a recurrence less surprising. Some years ago, my wife and I were vacationing in a small island resort on the Great Barrier Reef. There are only forty guest rooms on the island. When we came to dinner, we were surprised to meet an acquaintance, a psychologist named Jon. We greeted each other warmly and commented on the coincidence. Jon left the resort the next day. About two weeks later, we were in a theater in London. A latecomer sat next to me after the lights went down. When the lights came up for the intermission, I saw that my neighbor was Jon. My wife and I commented later that we were simultaneously conscious of two facts: first, this was a more remarkable coincidence than the first meeting; second, we were distinctly *less* surprised to meet Jon on the second occasion than we had been on the first. Evidently, the first meeting had somehow changed the idea of Jon in our minds. He was now “the psychologist who shows up when we travel abroad.” We (System 2) knew this was a ludicrous idea, but our System 1 had made it seem almost normal to meet Jon in strange places. We would have experienced much more surprise if we had met any acquaintance other than Jon in the next seat of a London theater. By any measure of probability, meeting Jon in the theater was much less likely than meeting one of our hundreds of acquaintances - meeting Jon seemed more normal. [...]

“How many animals of each kind did Moses take into the ark?” The number of people who detect what is wrong with this question is so small that it has been dubbed the “Moses illusion.” Moses took no animals into the ark; Noah did. Like the incident of the wincing soup eater, the Moses illusion is readily explained by norm theory. The idea of animals going into the ark sets up a biblical context, and Moses is not abnormal in that context. You did not positively expect him, but the mention of his name is not surprising. It also helps that Moses and Noah have the same vowel sound and number of syllables. As with the triads that produce cognitive ease, you unconsciously detect associative coherence between “Moses” and “ark” and so quickly accept the question. Replace Moses with George W. Bush in this sentence and you will have a poor political joke but no illusion.

When something cement does not fit into the current context of activated ideas, the system detects an abnormality, as you just experienced. You had no particular idea of what was coming after *something*, but you knew when the word *cement* came that it was abnormal in that sentence. Studies of brain responses have shown that violations of normality are detected with astonishing speed and subtlety. In a recent experiment, people heard the sentence “Earth revolves around the trouble every year” A distinctive pattern was detected in brain activity, starting within two-tenths of a second of the onset of the odd word. Even more remarkable, the same brain response occurs at the same speed when a male voice says, “I believe I am pregnant because I feel sick every morning,” or when an upper-class voice says, “I have a large tattoo on my back.” A vast amount of world knowledge must instantly be brought to bear for the incongruity to be recognized: the voice must be identified as upper-class English and confronted with the generalization that large tattoos are uncommon in the upper class.

We are able to communicate with each other because our knowledge of the world and our use of words are largely shared. When I mention a table. without specifying further, you understand that I mean a normal table. You know with certainty that its surface is approximately level and that it has far fewer than 25 legs. We have *norms* for a vast number of categories, and these norms provide the background for the immediate detection of anomalies such as pregnant men and tattooed aristocrats. [...]

Qu'est-ce qu'une idée ?

Peut-on percevoir sans juger ?

La perception peut-elle s’éduquer ?

Comment peut-il y avoir du nouveau ?

Que pouvons-nous savoir des autres ?

Faut-il s'identifier à autrui pour le comprendre ?

La conscience de l’individu n’est-elle que le reflet de la société à laquelle il appartient ?

SEEING CAUSES AND INTENTIONS

[...]

Finding such causal connections is part of understanding a story and is an automatic operation of System 1. System 2, your conscious self, was offered the causal interpretation and accepted it.

[...]

We have limited information about what happened on a day, and System 1 is adept at finding a coherent causal story that links the fragments of knowledge at its disposal.

Read this sentence:

After spending a day exploring beautiful sights in the crowded streets of New York, Jane discovered that her wallet was missing.

When people who had read this brief story (along with many others) were given a surprise recall test, the word *pickpocket* was more strongly associated with the story than the word *sights*, even though the latter was actually in the sentence while the former was not. [...]

The aristocratic Belgian psychologist Albert Michotte published a book in 1945 (translated into English in 1963) that overturned centuries of thinking about causality, going back at least to Hume’s examination of the association of ideas. The commonly accepted wisdom was that we infer physical causality from repeated observations of correlations among events. We have had myriad experiences in which we saw one object in motion touching another object, which immediately starts to move, often (but not always) in the same direction. This is what happens when a billiard ball hits another, and it is also what happens when you knock over a vase by brushing against it. Michotte had a different idea: he argued that we *see* causality, just as directly as we see color. To make his point, he created episodes in which a black square drawn on paper is seen in motion; it comes into contact with another square, which immediately begins to move. The observers know that there is no real physical contact, but they nevertheless have a powerful “illusion of causality.” If the second object starts moving instantly, they describe it as having been “launched” by the first. Experiments have shown that six-month-old infants see the sequence of events as a cause-effect scenario, and they indicate surprise when the sequence is altered. We are evidently ready from birth to have *impressions* of causality, which do not depend on reasoning about patterns of causation. They are products of System 1. [...]

The experience of freely willed action is quite separate from physical causality. Although it is your hand that picks up the salt, you do not think of the event in terms of a chain of physical causation. You experience it as caused by a decision that a disembodied you made, because you wanted to add salt to your food. Many people find it natural to describe their soul as the source and the cause of their actions. The psychologist Paul Bloom, writing in *The Atlantic* in 2005, presented the provocative claim that our inborn readiness to separate physical and intentional causality explains the near universality of religious beliefs. He observes that “we perceive the world of objects as essentially separate from the world of minds, making it possible for us to envision soulless bodies and bodiless souls.” The two modes of causation that we are set to perceive make it natural for us to accept the two central beliefs of many religions: an immaterial divinity is the ultimate cause of the physical world, and immortal souls temporarily control our bodies while we live and leave them behind as we die. In Bloom’s view, the two concepts of causality were shaped separately by evolutionary forces, building the origins of religion into the structure of System 1. [...]

Que suis-je par rapport à mon corps ?

Quelle différence peut-on faire entre l’esprit et le corps ?

L’homme a-t-il nécessairement besoin de religion ?

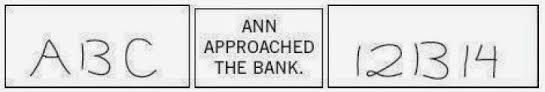
L’esprit a-t-il accès aux choses ?

A MACHINE FOR JUMPING TO CONCLUSIONS

[...]

Figure 6

NEGLECT OF AMBIGUITY AND SUPPRESSION OF DOUBT



What do the three exhibits in figure 6 have in common? The answer is that all are ambiguous. You almost certainly read the display on the left as A B C and the one on the right as 12 13 14, but the middle items in both displays are identical. You could just as well have read them as A 13 C or 12 B 14, but you did not. Why not? The same shape is read as a letter in a context of letters and as a number in a context of numbers. The entire context helps determine the interpretation of each element. The shape is ambiguous, but you jump to a conclusion about its identity and do not become aware of the ambiguity that was resolved.

As for Ann, you probably imagined a woman lan with money on her mind, walking toward a building with tellers and secure vaults. But this plausible interpretation is not the only possible one; the sentence is ambiguous. If an earlier sentence had been “They were floating gently down the river,” you would have imagined an altogether different scene. When you have just been thinking of a river, the word bank is not associated with money. In the absence of an explicit context. System 1 generated a likely context on its own. We know that it is System 1 because you were not aware of the choice of the possibility of another interpretation. Unless you have been canoeing recently, you probably spend more time going to banks than floating on rivers, and you resolved the ambiguity accordingly. When uncertain, System 1 bets on an answer, and the bets are guided by experience. The rules of the betting are intelligent: recent events and the current context have the most weight in determining an interpretation. When no recent event comes to mind, more distant memories govern. Among your earliest and most memorable experiences was singing your ABCs; you did not sing your A13Cs.

The most important aspect of both examples is that a definite choice was made, but you did not know it. Only one interpretation came to mind, and you were never aware of the ambiguity. System 1 does not keep track of alternatives that it rejects, or even of the fact that there were alternatives. Conscious doubt is not in the repertoire of System 1; it requires maintaining incompatible interpretations in mind at the same time, which demands mental effort. Uncertainty and doubt are the domain of System 2.

Peut-on percevoir sans juger ?

La perception peut-elle s’éduquer ?

Les apparences sont-elles trompeuses ?

Qu'est-ce qui a du sens ?

Les principes de la raison sont-ils issus de l'expérience ?

Admettre l'existence de l'inconscient est-ce rendre vain tout effort de lucidité à l'égard de soi même ?

L’idée d’inconscient exclut-elle celle de liberté ?

La pluralité des opinions est-elle un obstacle à la vérité ?

Peut-on être sûr d'avoir raison ?

Faut-il se méfier de la multiplicité des interprétations ?

A BIAS TO BELIEVE AND CONFIRM

The psychologist Daniel Gilbert, widely known as the author of *Stumbling on Happiness*, once wrote an essay, titled “How Mental Systems Believe,” in which he developed a theory of believing and unbelieving that he traced to the seventeenth-century philosopher Baruch Spinoza. Gilbert proposed that understanding a statement must begin with an attempt to believe it: you must first know what the idea would mean if it were true. Only then can you decide whether or not to *unbelieve* it. The initial attempt to believe is an automatic operation of System 1, which involves the construction of the best possible interpretation of the situation. Even a nonsensical statement, Gilbert argues, will evoke initial belief. Try this example: “whitefish eat candy.” You probably were aware of vague impressions of fish and candy as an automatic process of associative memory searched for links between the two ideas that would make sense of the nonsense.

Gilbert sees unbelieving as an operation of System 2, and he reported an elegant experiment to make his point. The participants saw nonsensical assertions, such as “a dinca is a flame,” followed after a few seconds by a single word, “true” or “false.” They were later tested for their memory of which sentences had been labeled “true.” In one condition of the experiment subjects were required to hold digits in memory during the task. The disruption of System 2 had a selective effect: it made it difficult for people to “unbelieve” false sentences. In a later test of memory, the depleted participants ended up thinking that many of the false sentences were true. The moral is significant: when System 2 is otherwise engaged, we will believe almost anything. System 1 is gullible and biased to believe. System 2 is in charge of doubting and unbelieving, but System 2 is sometimes busy, and often lazy. Indeed, there is evidence that people are more likely to be influenced by empty persuasive messages, such as commercials, when they are tired and depleted. [...]

Toute croyance est-elle contraire à la raison ?

Le doute: Une force ou une faiblesse ?

N’y a-t-il aucune vérité dans le mensonge ?

La perception peut-elle s’éduquer ?

Peut-on percevoir sans juger ?

EXAGGERATED EMOTIONAL COHERENCE (HALO EFFECT)

If you like the presidents politics, you probably like his voice and his appearance as well. The tendency to like (or dislike) everything about a person— including things you have not observed—is known as the halo effect. [...]

In an enduring classic of psychology, Solomon Asch presented descriptions of two people and asked for comments on their personality. What do you think of Alan and Ben?

Alan: intelligent—industrious—impulsive—critical—stubborn—envious

Ben: envious—stubborn—critical—impulsive—industrious—intelligent

If you are like most of us, you viewed Alan much more favorably than Ben. The initial traits in the list change the very meaning of the traits that appear later. The stubbornness of an intelligent person is seen as likely to be justified and may actually evoke respect, but intelligence in an envious and stubborn person makes him more dangerous. [...]

The sequence in which we observe characteristics of a person is often determined by chance. Sequence matters, however, because the halo effect increases the weight of first impressions, sometimes to the point that subsequent information is mostly wasted. [...]

To derive the most useful information from multiple sources of evidence, you should always try to make these sources independent of each other. This rule is part of good police procedure. [...]

The principle of independent judgments (and decorrelated errors) has immediate applications for the conduct of meetings, an activity in which executives in organizations spend a great deal of their working days. A simple rule can help: before an issue is discussed, all members of the committee should be asked to write a very brief summary of their position. This procedure makes good use of the value of the diversity of knowledge and opinion in the group. The standard practice of open discussion gives too much weight to the opinions of those who speak early and assertively, causing others to line up behind them.

La perception peut-elle s’éduquer ?

Peut-on percevoir sans juger ?

Comment peut-il y avoir un contre-pouvoir ?

Que pouvons-nous savoir des autres ?

Faut-il s'identifier à autrui pour le comprendre ?

WHAT YOU SEE IS ALL THERE IS (WYSIATI)

[...]

An essential design feature of the associative machine is that it represents only activated ideas. Information that is not retrieved (even unconsciously) from memory might as well not exist. System 1 excels at constructing the best possible story that incorporates ideas currently activated, but it does not (cannot) allow for information it does not have.

The measure of success for System 1 is the coherence of the story it manages to create. The amount and quality of the data on which the story is based are largely irrelevant. When information is scarce, which is a common occurrence, System 1 operates as a machine for jumping to conclusions. Consider the following: “Will Mindik be a good leader? She is intelligent and strong…” An answer quickly came to your mind, and it was yes. You picked the best answer based on the very limited information available, but you jumped the gun. What if the next two adjectives were *corrupt* and *cruel*? [...]

Amos, with two of his graduate students at Stanford, reported a study that bears directly on WYSIATI, by observing the reaction of people who are given one-sided evidence and know it. The participants were exposed to legal scenarios such as the following:

On September 3, plaintiff David Thornton, a forty-three-year-old union field representative, was present in Thrifty Drug Store #168, performing a routine union visit. Within ten minutes of his arrival, a store manager confronted him and told him he could no longer speak with the union employees on the floor of the store. Instead, he would have to see them in a back room while they were on break. Such a request is allowed by the union contract with Thrifty Drug but had never before been enforced. When Mr. Thornton objected, he was told that he had the choice of conforming to these requirements, leaving the store, or being arrested. At this point, Mr. Thornton indicated to the manager that he had always been allowed to speak to employees on the floor for as much as ten minutes, as long as no business was disrupted, and that he would rather be arrested than change the procedure of his routine visit. The manager then called the police and iad Mr. Thornton handcuffed in the store for trespassing. After he was booked and put into a holding cell for a brief time, all charges were dropped. Mr. Thornton is suing Thrifty Drug for false arrest.

In addition to this background material, which all participants read, different groups were exposed to presentations by the lawyers for the two parties. Naturally, the lawyer for the union organizer described the arrest as an intimidation attempt, while the lawyer for the store argued that having the talk in the store was disruptive and that the manager was acting properly. Some participants, like a jury, heard both sides. The lawyers added no useful information that you could not infer from the background story.

The participants were fully aware of the setup, and those who heard only one side could easily have generated the argument for the other side. Nevertheless, the presentation of one-sided evidence had a very pronounced effect on judgments. Furthermore, participants who saw one-sided evidence were more confident of their judgments than those who saw both sides. This is just what you would expect if the confidence that people experience is determined by the coherence of the story they manage to construct from available information that matters for a good story, not its completeness. Indeed, you will often find that knowing little makes it easier to fit everything you know into a coherent pattern. [...]

However, I will also invoke WYSIATI to help explain a long and diverse list of biases of judgment and choice, including the following among many others:

* Overconfidence: As the WYSIATI rule implies, neither the quantity nor the quality of the evidence counts for much in subjective confidence. The confidence that individuals have in their beliefs depends mostly on the quality of the story they can tell about what they see, even if they see little. We often fail to allow for the possibility that evidence that should be critical to our judgment is missing—what we see is all there is. Furthermore, our associative system tends to settle on a coherent pattern of activation and suppresses doubt and ambiguity.
* Framing effects: Different ways of presenting the same information often evoke different emotions. The statement that “the odds of survival one month after surgery are 90%” is more reassuring than the equivalent statement that “mortality within one month of surgery is 10%.” Similarly, cold cuts described as “90% fat-free” are more attractive than when they are described as “10% fat.” The equivalence of the alternative formulations is transparent, but an individual normally sees only one formulation, and what she sees is all there is.
* Base-rate neglect: Recall Steve, the meek and tidy soul who is often believed to be a librarian. The personality description is salient and vivid, and although you surely know that there are more male farmers than male librarians, that statistical fact almost certainly did not come to your mind when you first considered the question. What you saw was all there was. [...]

Peut-on être sûr d'avoir raison ?

Peut-on percevoir sans juger ?

Comment peut-il y avoir un contre-pouvoir ?

Notre liberté de pensée a-t-elle des limites ?

Les apparences sont-elles trompeuses ?

La vérité dépend-elle de nous ?

Peut-on se fier à l’intuition ?

La pluralité des opinions est-elle un obstacle à la vérité ?

Faut-il se méfier de la multiplicité des interprétations ?

Le doute: Une force ou une faiblesse ?

HOW JUDGMENTS HAPPEN

[...]

BASIC ASSESSMENTS

System 1 has been shaped by evolution to provide a continuous assessment of the main problems that an organism must solve to survive: How are things going? Is there a threat or a major opportunity? Is everything normal? Should I approach or avoid? The questions are perhaps less urgent for a human in a city environment than for a gazelle on the savannah, but we have inherited the neural mechanisms that evolved to provide ongoing assessments of threat level, and they have not been turned off. Situations are constantly evaluated as good or bad, requiring escape or permitting approach. Good mood and cognitive ease are the human equivalents of assessments of safety and familiarity. [...]

This ancient mechanism is put to a novel use in the modern world: it has some influence on how people vote. Todorov showed his students pictures of mens faces, sometimes for as little as one-tenth of a second, and asked them to rate the faces on various attributes, including likability and competence. Observers agreed quite well on those ratings. The faces that Todorov showed were not a random set: they were the campaign portraits of politicians competing for elective office. Todorov then compared the results of the electoral races to the ratings of competence that Princeton students had made, based on brief exposure to photographs and without any political context. In about 70% of the races for senator, congressman, and governor, the election winner was the candidate whose face had earned a higher rating of competence. This striking result was quickly confirmed in national elections in Finland, in zoning board elections in England, and in various electoral contests in Australia, Germany, and Mexico. Surprisingly (at least to me), ratings of competence were far more predictive of voting outcomes in Todorov’s study than ratings of likability. [...]

For another example, consider the question: What is the average length of the lines in figure 8?

Figure 8



[...]

The failure of System 1 to compute the total length of a set of lines at a glance may look obvious to you; you never thought you could do it. It is in fact an instance of an important limitation of that system. Because System 1 represents categories by a prototype or a set of typical exemplars, it deals well with averages but poorly with sums. The size of the category, the number of instances it contains, tends to be ignored in judgments of what I will call *sum-like variables*. [...]

Peut-on être sûr d'avoir raison ?

Peut-on percevoir sans juger ?

Comment peut-il y avoir un contre-pouvoir ?

Notre liberté de pensée a-t-elle des limites ?

Les apparences sont-elles trompeuses ?

La vérité dépend-elle de nous ?

Peut-on se fier à l’intuition ?

INTENSITY MATCHING

[...]

Here we encounter a new aptitude of System 1. An underlying scale of intensity allows *matching* across diverse dimensions. [...]

THE MENTAL SHOTGUN

[...]

We often compute much more than we want or need. I call this excess computation the mental shotgun. It is impossible to aim at a single point with a shotgun because it shoots pellets that scatter, and it seems almost equally difficult for System 1 not to do more than System 2 charges it to do. [...]

ANSWERING AN EASIER QUESTION

[...]

SUBSTITUTING QUESTIONS

I propose a simple account of how we generate intuitive opinions on complex matters. If a satisfactory answer to a hard question is not found quickly, System 1 will find a related question that is easier and will answer it. I call the operation of answering one question in place of another *substitution*. I also adopt the following terms:

The target question is the assessment you intend to produce.

The heuristic question is the simpler question that you answer instead.

The technical definition of *heuristic* is a simple procedure that helps find adequate, though often imperfect, answers to difficult questions. The word comes from the same root as *eureka*. [...]

When called upon to judge probability, people actually judge something else and believe they have judged probability. System 1 often makes this move when faced with difficult target questions, if the answer to a related and easier heuristic question comes readily to mind. [...]

The automatic processes of the mental shotgun and intensity matching often make available one or more answers to easy questions that could be mapped onto the target question. On some occasions, substitution will occur and a heuristic answer will be endorsed by System 2. Of course, System 2 has the opportunity to reject this intuitive answer, or to modify it by incorporating other information. However, a lazy System 2 often follows the path of least effort and endorses a heuristic answer without much scrutiny of whether it is truly appropriate. You will not be stumped, you will not have to work very hard, and you may not even notice that you did not answer the question you were asked. Furthermore, you may not realize that the target question was difficult, because an intuitive answer to it came readily to mind. [...]

Notre liberté de pensée a-t-elle des limites ?

La vérité dépend-elle de nous ?

Peut-on se fier à l’intuition ?

THE MOOD HEURISTIC FOR HAPPINESS

A survey of German students is one of the best examples of substitution. The survey that the young participants completed included the following two questions:

How happy are you these days?

How many dates did you have last month?

The experimenters were interested in the correlation between the two answers. Would the students who reported many dates say that they were happier than those with fewer dates? Surprisingly, no: the correlation between the answers was about zero. Evidently, dating was not what came first to the students’ minds when they were asked to assess their happiness. Another group of students saw the same two questions, but in reverse order:

How many dates did you have last month?

How happy are you these days?

The results this time were completely different. In this sequence, the correlation between the number of dates and reported happiness was about as high as correlations between psychological measures can get. What happened?

The explanation is straightforward, and it is a good example of substitution. Dating was apparently not the center of these students’ life (in the first survey, happiness and dating were uncorrelated), but when they were asked to think about their romantic life, they certainly had an emotional reaction. The students who had many dates were reminded of a happy aspect of their life, while those who had none were reminded of loneliness and rejection. The emotion aroused by the dating question was still on everyone’s mind when the query about general happiness came up. [...]

“Happiness these days” is not a natural or an easy assessment. A good answer requires a fair amount of thinking. However, the students who had just been asked about their dating did not need to think hard because they already had in their mind an answer to a related question: how happy they were with their love life. They substituted the question to which they had a ready-made answer for the question they were asked.

Here again, as we did for the illusion, we can ask: Are the students confused? Do they really think that the two questions—the one they were asked and the one they answer—are synonymous? Of course not. The students do not temporarily lose their ability to distinguish romantic life from life as a whole. If asked about the two concepts, they would say they are different. But they were not asked whether the concepts are different. They were asked how happy they were, and System 1 has a ready answer.

Dating is not unique. The same pattern is found if a question about the students’ relations with their parents or about their finances immediately precedes the question about general happiness. In both cases, satisfaction in the particular domain dominates happiness reports. Any emotionally significant question that alters a person’s mood will have the same effect. WYSIATI. The present state of mind looms very large when people evaluate their happiness.

Notre liberté de pensée a-t-elle des limites ?

La vérité dépend-elle de nous ?

Le bonheur est-il affaire privée ?

THE AFFECT HEURISTIC

The dominance of conclusions over arguments is most pronounced where emotions are involved. The psychologist Paul Slovic has proposed an *affect heuristic* in which people let their likes and dislikes determine their beliefs about the world. [...]

Your emotional attitude to such things as irradiated food, red meat, nuclear power, tattoos, or motorcycles drives your beliefs about their benefits and their risks. If you dislike any of these things, you probably believe that its risks are high and its benefits negligible. [...]

We see here a new side of the “personality” of System 2. Until now I have mostly described it as a more or less acquiescent monitor, which allows considerable leeway to System 1. I have also presented System 2 as active in deliberate memory search, complex computations, comparisons, planning, and choice. In the bat-and-ball problem and in many other examples of the interplay between the two systems, it appeared that System 2 is ultimately in charge, with the ability to resist the suggestions of System 1, slow things down, and impose logical analysis. Self-criticism is one of the functions of System 2. In the context of attitudes, however. System 2 is more of an apologist for the emotions of System 1 than a critic of those emotions—an endorser rather than an enforcer. Its search for information and arguments is mostly constrained to information that is consistent with existing beliefs, not with an intention to examine them. An active, coherence-seeking System 1 suggests solutions to an undemanding System 2.

Notre liberté de pensée a-t-elle des limites ?

La vérité dépend-elle de nous ?

Ne désirons-nous que les choses que nous estimons bonnes ?

Le désir peut-il se satisfaire de la réalité ?

Le passionné est-il ennemi de lui-même ?

Avons nous le choix d’être libre ?

Toute prise de conscience est-elle libératrice ?

L'idée d'une liberté totale a-t-elle un sens ?

Qu'est-ce qu'une idée ?

SPEAKING OF SUBSTITUTION AND HEURISTICS

Do we still remember the question we are trying to answer? Or have we substituted an easier one?”

[...]

ANSWERING AN EASIER QUESTION

The table below contains a list of features and activities that have been attributed to System 1. Each of the active sentences replaces a statement, technically more accurate but harder to understand, to the effect that a mental event occurs automatically and fast. My hope is that the list of traits will help you develop an intuitive sense of the “personality” of the fictitious System 1. As happens with other characters you know, you will have hunches about what System 1 would do under different circumstances, and most of your hunches will be correct.

Characterístics of System 1

* generates impressions, feelings, and inclinations; when endorsed by System 2 these become beliefs, attitudes, and intentions
* operates automatically and quickly, with little or no effort, and no sense of voluntary control
* can be programmed by System 2 to mobilize attention when a particular pattern is detected (search)
* executes skilled responses and generates skilled intuitions, after adequate training
* creates a coherent pattern of activated ideas in associative memory
* links a sense of cognitive ease to illusions of truth, pleasant feelings, and reduced vigilance
* distinguishes the surprising from the normal
* infers and invents causes and intentions
* neglects ambiguity and suppresses doubt
* is biased to believe and confirm
* exaggerates emotional consistency (halo effect)
* focuses on existing evidence and ignores absent evidence (WYSIATI)
* generates a limited set of basic assessments
* represents sets by norms and prototypes, does not integrate
* matches intensities across scales (e.g., size to loudness)
* computes more than intended (mental shotgun)
* sometimes substitutes an easier question for a difficult one (heuristics)
* is more sensitive to changes than to states (prospect theory)
* overweights low probabilities
* shows diminishing sensitivity to quantity (psychophysics)
* responds more strongly to losses than to gains (loss aversion)
* frames decision problems narrowly, in isolation from one another

Notre liberté de pensée a-t-elle des limites ?

L’idée d’inconscient exclut-elle celle de liberté ?

Admettre l'existence de l'inconscient est-ce rendre vain tout effort de lucidité à l'égard de soi même ?

Avons nous le choix d’être libre ?

Toute prise de conscience est-elle libératrice ?

L'idée d'une liberté totale a-t-elle un sens ?

Qu'est-ce qu'une idée ?

Les passions nous empêchent-elles de faire notre devoir ?

Comment peut-il y avoir un contre-pouvoir ?

La vérité dépend-elle de nous ?

Peut-on se fier à l’intuition ?

Les apparences sont-elles trompeuses ?

La perception peut-elle s’éduquer ?

Peut-on percevoir sans juger ?

Est-il préférable de se connaître ?

HEURISTICS AND BIASES

THE LAW OF SMALL NUMBERS

[...]

A random event, by definition, does not lend itself to explanation, but collections of random events do behave in a highly regular fashion. Imagine a large urn filled with marbles. Half the marbles are red, half are white. Next, imagine a very patient person (or a robot) who blindly draws 4 marbles from the urn, records the number of red balls in the sample, throws the balls back into the urn, and then does it all again, many times. If you summarize the results, you will find that the outcome “2 red, 2 white” occurs (almost exactly) 6 times as often as the outcome “4 red” or “4 white.” This relationship is a mathematical fact. You can predict the outcome of repeated sampling from an urn just as confidently as you can predict what will happen if you hit an egg with a hammer. You cannot predict every detail of how the shell will shatter, but you can be sure of the general idea. There is a difference: the satisfying sense of causation that you experience when thinking of a hammer hitting an egg is altogether absent when you think about sampling.

A related statistical fact is relevant to the cancer example. From the same urn, two very patient marble counters take turns. Jack draws 4 marbles on each trial, Jill draws 7. They both record each time they observe a homogeneous sample—all white or all red. If they go on long enough. Jack will observe such extreme outcomes more often than Jill—by a factor of 8 (the expected percentages are 12.5% and 1.56%). Again, no hammer, no causation, but a mathematical fact: samples of 4 marbles yield extreme results more often than samples of 7 marbles do.

Now imagine the population of the United States as marbles in a giant urn. Some marbles are marked KC, for kidney cancer. You draw samples of marbles and populate each county in turn. Rural samples are smaller than other samples. Just as in the game of Jack and Jill, extreme outcomes (very high and/or very low cancer rates) are most likely to be found in sparsely populated counties. This is all there is to the story.

We started from a fact that calls for a cause: the incidence of kidney cancer varies widely across counties and the differences are systematic. The explanation I offered is statistical: extreme outcomes (both high and low) are more likely to be found in small than in large samples. This explanation is not causal. The small population of a county neither causes nor prevents cancer; it merely allows the incidence of cancer to be much higher (or much lower) than it is in the larger population. The deeper truth is that there is nothing to explain. The incidence of cancer is not truly lower or higher than normal in a county with a small population, it just appears to be so in a particular year because of an accident of sampling. If we repeat the analysis next year, we will observe the same general pattern of extreme results in the small samples, but the counties where cancer was common last year will not necessarily have a high incidence this year. If this is the case, the differences between dense and rural counties do not really count as facts: they are what scientists call artifacts, observations that are produced entirely by some aspect of the method of research—in this case, by differences in sample size. [...]

The risk of error can be estimated for any given sample size by a fairly simple procedure. Traditionally, however, psychologists do not use calculations to decide on a sample size. They use their judgment, which is commonly flawed. An article I had read shortly before the debate with Amos demonstrated the mistake that researchers made (they still do) by a dramatic observation. The author pointed out that psychologists commonly chose samples so small that they exposed themselves to a 50% risk of failing to confirm their true hypotheses! No researcher in his right mind would accept such a risk. A plausible explanation was that psychologists’ decisions about sample size reflected prevalent intuitive misconceptions of the extent of sampling variation. [...]

Amos and I called our first joint article “Belief in the Law of Small Numbers.” We explained, tongue-in-cheek, that “intuitions about random sampling appear to satisfy the law of small numbers, which asserts that the law of large numbers applies to small numbers as well.” We also included a strongly worded recommendation that researchers regard their “statistical intuitions with proper suspicion and replace impression formation by computation whenever possible.”

A BIAS OF CONFIDENCE OVER DOUBT

[...]

The strong bias toward believing that small samples closely resemble the population from which they are drawn is also part of a larger story: we are prone to exaggerate the consistency and coherence of what we see. The exãggerated faith of researchers in what can be learned from a few observations is closely related to the halo effect, the sense we often get that we know and understand a person about whom we actually know very little. System 1 runs ahead of the facts in constructing a rich image on the basis of scraps of evidence. A machine for jumping to conclusions will act as if it believed in the law of small numbers. More generally, it will produce a representation of reality that makes too much sense.

CAUSE AND CHANCE

The associative machinery seeks causes. The difficulty we have with statistical regularities is that they call for a different approach. Instead of focusing on how the event at hand came to be, the statistical view relates it to what could have happened instead. Nothing in particular caused it to be what it is—chance selected it from among its alternatives.

Our predilection for causal thinking exposes us to serious mistakes in evaluating the randomness of truly random events. For an example, take the sex of six babies born in sequence at a hospital. The sequence of boys and girls is obviously random; the events are independent of each other, and the number of boys and girls who were born in the hospital in the last few hours has no effect whatsoever on the sex of the next baby. Now consider three possible sequences:

BBBGGG

GGGGGG

BGBBGB

Are the sequences equally likely? The intuitive answer—”of course not!”—is false. Because the events are independent and because the outcomes B and G are (approximately) equally likely, then any possible sequence of six births is as likely as any other. Even now that you know this conclusion is true, it remains counter-intuitive, because only the third sequence appears random. As expected, BGBBGB is judged much more likely than the other two sequences. We are pattern seekers, believers in a coherent world, in which regularities (such as a sequence of six girls) appear not by accident but as a result of mechanical causality or of someone’s intention. We do not expect to see regularity produced by a random process, and when we detect what appears to be a rule, we quickly reject the idea that the process is truly random. Random processes produce many sequences that convince people that the process is not random after all. You can see why assuming causality could have had evolutionary advantages. It is part of the general vigilance that we have inherited from ancestors. We are automatically on the lookout for the possibility that the environment has changed. Lions may appear on the plain at random times, but it would be safer to notice and respond to an apparent increase in the rate of appearance of prides of lions, even if it is actually due to the fluctuations of a random process. [...]

“To the untrained eye,” Feller remarks, “randomness appears as regularity or tendency to cluster.” [...]

We are far too willing to reject the belief that much of what we see in life is random. [...]

I quoted earlier Howard Wainer and Harris Zwerling. Their essay focused on a large investment, some $1.7 billion, which the Gates Foundation made to follow up intriguing findings on the characteristics of the most successful schools. Many researchers have sought the secret of successful education by identifying the most successful schools in the hope of discovering what distinguishes them from others. One of the conclusions of this research is that the most successful schools, on average, are small. [...]

Unfortunately, the causal analysis is pointless because the facts are wrong. If the statisticians who reported to the Gates Foundation had asked about the characteristics of the worst schools, they would have found that bad schools also tend to be smaller than average. The truth is that small schools are not better on average; they are simply more variable. If anything, say Wainer and Zwerling, large schools tend to produce better results, especially in higher grades where a variety of curricular options is valuable.

Thanks to recent advances in cognitive psychology, we can now see dearly what Amos and I could only glimpse: the law of small numbers is part of two larger stories about the workings of the mind.

* The exaggerated faith in small samples is only one example of a more general illusion—we pay more attention to the content of messages than to information about their reliability, and as a result end up with a view of the world around us that is simpler and more coherent than the data justify. Jumping to conclusions is a safer sport in the world of our imagination than it is in reality.
* Statistics produce many observations that appear to beg for causal explanations but do not lend themselves to such explanations. Many facts of the world are due to chance, including accidents of sampling. Causal explanations of chance events are inevitably wrong.

[...]

ANCHORS

[...]

The phenomenon we were studying is so common and so important in the everyday world that you should know its name: it is an *anchoring effect*. It occurs when people consider a particular value for an unknown quantity before estimating that quantity. What happens is one of the most reliable and robust results of experimental psychology: the estimates stay close to the number that people considered—hence the image of an anchor. [...]

Two different mechanisms produce anchoring effects—one for each system. There is a form of anchoring that occurs in a deliberate process of adjustment, an operation of System 2. And there is anchoring that occurs by a priming effect, an automatic manifestation of System 1.

ANCHORING AS ADJUSTMENT

[...]

People adjust less (stay closer to the anchor) when their mental resources are depleted, either because their memory is loaded with digits or because they are slightly drunk. Insufficient adjustment is a failure of a weak or lazy System 2. [...]

ANCHORING AS PRIMING EFFECT

When Amos and I debated anchoring, I agreed that adjustment sometimes occurs, but I was uneasy. Adjustment is a deliberate and conscious activity, but in most cases of anchoring there is no corresponding subjective experience. Consider these two questions:

Was Gandhi more or less than 144 years old when he died?

How old was Gandhi when he died?

Did you produce your estimate by adjusting down from 144? Probably not, but the absurdly high number still affected your estimate. My hunch was that anchoring is a case of suggestion. This is the word we use when someone causes us to see, hear, or feel something by merely bringing it to mind. [...]

The concept of suggestion is no longer obscure: suggestion is a priming effect, which selectively evokes compatible evidence. You did not believe for a moment that Gandhi lived for 144 years, but your associative machinery surely generated an impression of a very ancient person. System 1 understands sentences by trying to make them true, and the selective activation of compatible thoughts produces a family of systematic errors that make us gullible and prone to believe too strongly whatever we believe. [...]

THE ANCHORING INDEX

[...]

Anchoring effects of similar size have been observed in experiments in which the last few digits of the respondent’s Social Security number was used as the anchor (e.g., for estimating the number of physicians in their city). The conclusion is clear: anchors do not have their effects because people believe they are informative. [...]

USES AND ABUSES OF ANCHORS

[...]

We see the same strategy at work in the negotiation over the price of a home, when the seller makes the first move by setting the list price. As in many other games, moving first is an advantage in single-issue negotiations—for example, when price is the only issue to be settled between a buyer and a seller. As you may have experienced when negotiating for the first time in a bazaar, the initial anchor has a powerful effect. My advice to students when I taught negotiations was that if you think the other side has made an outrageous proposal, you should not come back with an equally outrageous counteroffer, creating a gap that will be difficult to bridge in further negotiations. Instead you should make a scene, storm out or threaten to do so, and make it clear—to yourself as well as to the other side—that you will not continue the negotiation with that number on the table. [...]

Toute prise de conscience est-elle libératrice ?

Notre liberté de pensée a-t-elle des limites ?

ANCHORING AND THE TWO SYSTEMS

[...]

THE SCIENCE OF AVAILABILITY

[...]

One of the best-known studies of availability suggests that awareness of our own biases can contribute to peace in marriages, and probably in other joint projects. In a famous study, spouses were asked, “How large was your personal contribution to keeping the place tidy, in percentages?” They also answered similar questions about “taking out the garbage,” “initiating social engagements,” etc. Would the self-estimated contributions add up to 100%, or more, or less? As expected, the self-assessed contributions added up to more than 100%. The explanation is a simple *availability bias*: both spouses remember their own individual efforts and contributions much more clearly than those of the other, and the difference in availability leads to a difference in judged frequency. The bias is not necessarily self-serving: spouses also overestimated their contribution to causing quarrels, although to a smaller extent than their contributions to more desirable outcomes. The same bias contributes to the common observation that many members of a collaborative team feel they have done more than their share and also feel that the others are not adequately grateful for their individual contributions. [...]

THE PSYCHOLOGY OF AVAILABILITY

[...]

Imagine yourself a subject in that experiment:

First, list six instances in which you behaved assertively.

Next, evaluate how assertive you are.

Imagine that you had been asked for twelve instances of assertive behavior (a number most people find difficult). Would your view of your own assertiveness be different?

Schwartz and his colleagues observed that the task of listing instances may enhance the judgments of the trait by two different routes:

* the number of instances retrieved
* the ease with which they come to mind

The request to list twelve instances pits the two determinants against each other. On the one hand, you have just retrieved an impressive number of cases in which you were assertive. On the other hand, while the first three or four instances of your own assertiveness probably came easily to you, you almost certainly struggled to come up with the last few to complete a set of twelve; fluency was low. Which will count more—the amount retrieved or the ease and fluency of the retrieval?

The contest yielded a clear-cut winner: people who had just listed twelve instances rated themselves as less assertive than people who had listed only six. Furthermore, participants who had been asked to list twelve cases in which they had *not* behaved assertively ended up thinking of themselves as quite assertive! If you cannot easily come up with instances of meek behavior, you are likely to conclude that you are not meek at all. Self-ratings were dominated by the ease with which examples had come to mind. The experience of fluent retrieval of instances trumped the number retrieved. [...]

Psychologists enjoy experiments that yield paradoxical results, and they have applied Schwarz’s discovery with gusto. For example, people:

* believe that they use their bicycles less often after recalling many rather than few instances
* are less confident in a choice when they are asked to produce more arguments to support it
* are less confident that an event was avoidable after listing more ways it could have been avoided
* are less impressed by a car after listing many of its advantages

[...]

As I have described it, the process that leads to judgment by availability appears to involve a complex chain of reasoning. The subjects have an experience of diminishing fluency as they produce instances. They evidently have expectations about the rate at which fluency decreases, and those expectations are wrong: the difficulty of coming up with new instances increases more rapidly than they expect. It is the unexpectedly low fluency that causes people who were asked for twelve instances to describe themselves as unassertive. When the surprise is eliminated, low fluency no longer influences the judgment. The process appears to consist of a sophisticated set of inferences. Is the automatic System 1 capable of it?

The answer is that in fact no complex reasoning is needed. Among the basic features of System 1 is its ability to set expectations and to be surprised when these expectations are violated. The system also retrieves possible causes of a surprise, usually by finding a possible cause among recent surprises. Furthermore, System 2 can reset the expectations of System 1 on the fly, so that an event that would normally be surprising is now almost normal. Suppose you are told that the three-year-old boy who lives next door frequently wears a top hat in his stroller. You will be far less surprised when you actually see him with his top hat than you would have been without the warning. In Schwarz’s experiment, the background music has been mentioned as a possible cause of retrieval problems. The difficulty of retrieving twelve instances is no longer a surprise and therefore is less likely to be evoked by the task of judging assertiveness.

Schwarz and his colleagues discovered that people who are personally involved in the judgment are more likely to consider the number of instances they retrieve from memory and less likely to go by fluency. They recruited two groups of students for a study of risks to cardiac health. Half the students had a family history of cardiac disease and were expected to take the task more seriously than the others, who had no such history. All were asked to recall either three or eight behaviors in their routine that could affect their cardiac health (some were asked for risky behaviors, others for protective behaviors). Students with no family history of heart disease were casual about the task and followed the availability heuristic. Students who found it difficult to find eight instances of risky behavior felt themselves relatively safe, and those who struggled to retrieve examples of safe behaviors felt themselves at risk. The students with a family history of heart disease showed the opposite pattern—they felt safer when they retrieved many instances of safe behavior and felt greater danger when they retrieved many instances of risky behavior. They were also more likely to feel that their future behavior would be affected by the experience of evaluating their risk.

The conclusion is that the ease with which instances come to mind is a system 1 heuristic, which is replaced by a focus on content when System 2 is more engaged. Multiple lines of evidence converge on the conclusion that people who let themselves be guided by System 1 are more strongly susceptible to availability biases than others who are in a state of higher vigilance. The following are some conditions in which people “go with the flow” and are affected more strongly by ease of retrieval than by the content they retrieved:

* when they are engaged in another effortful task at the same time
* when they are in a good mood because they just thought of a happy episode in their life
* if they score low on a depression scale
* if they are knowledgeable novices on the topic of the task, in contrast to true experts
* when they score high on a scale of faith in intuition
* if they are (or are made to feel) powerful

[...]

AVAILABILITY, EMOTION, AND RISK

[...]

Estimates of causes of death are warped by media coverage. The coverage is itself biased toward novelty and poignancy. The media do not just shape what the public is interested in, but also are shaped by it. Editors cannot ignore the public’s demands that certain topics and viewpoints receive extensive coverage. Unusual events (such as botulism) attract disproportionate attention and are consequently perceived as less unusual than they really are. The world in our heads is not a precise replica of reality; our expectations about the frequency of events are distorted by the prevalence and emotional intensity of the messages to which we are exposed. [...]

As mentioned earlier, Slovic eventually developed the notion of an affect heuristic, in which people make judgments and decisions by consulting their emotions: Do I like it? Do I hate it? How strongly do I feel about it? In many domains of life, Slovic said, people form opinions and make choices that directly express their feelings and their basic tendency to approach or avoid, often without knowing that they are doing so. The affect heuristic is an instance of substitution, in which the answer to an easy question (How do I feel about it?) serves as an answer to a much harder question (What do I think about it?). Slovic and his colleagues related their views to the work of the neuroscientist Antonio Damásio, who had proposed that people’s emotional evaluations of outcomes, and the bodily states and the approach and avoidance tendencies associated with them, all play a central role in guiding decision making. Damásio and his colleagues have observed that people who do not display the appropriate emotions before they decide, sometimes because of brain damage, also have an impaired ability to make good decisions. An inability to be guided by a “healthy fear” of bad consequences is a disastrous flaw. [...]

Consistent affect is a central element of what I have called associative coherence. [...]

As the psychologist Jonathan Haidt said in another context, “The emotional tail wags the rational dog.” The affect heuristic simplifies our lives by creating a world that is much tidier than reality. Good technologies have few costs in the imaginary world we inhabit, bad technologies have no benefits, and all decisions are easy. In the real world, of course, we often face painful tradeoffs between benefits and costs.

Toute prise de conscience est-elle libératrice ?

La vérité dépend-elle de nous ?

Peut-on se fier à l’intuition ?

Que pouvons-nous savoir des autres ?

Est-il préférable de se connaître ?

Notre liberté de pensée a-t-elle des limites ?

Le passionné est-il ennemi de lui-même ?

Quelle différence peut-on faire entre l’esprit et le corps ?

Que suis-je par rapport à mon corps ?

THE PUBLIC AND THE EXPERTS

[...]

In his desire to wrest sole control of risk policy from experts, Slovic has challenged the foundation of their expertise: the idea that risk is objective.

“Risk” does not exist “out there,” independent of our minds and culture, trailing to be measured. Human beings have invented the concept of “risk” to help them understand and cope with the dangers and uncertainties of life. Although these dangers are real, there is no such thing as “real risk” or “objective risk”

To illustrate his claim, Slovic lists nine ways of defining the mortality risk associated with the release of a toxic material into the air, ranging from “death per million people” to “death per million dollars of product produced.” His point is that the evaluation of the risk depends on the choice of a measure—with the obvious possibility that the choice may have been guided by a preference for one outcome or another. He goes on to conclude that “defining risk is thus an exercise in power.” You might not have guessed that one can get to such thorny policy issues from experimental studies of the psychology of judgment! However, policy is ultimately about people. What they want and what is best for them. Every policy question involves assumptions about human nature, in particular about the choices that people may make and the consequences of their choices for themselves and for society.

Another scholar and friend whom I greatly admire, Cass Sunstein, disagrees sharply with Slovic’s stance on the different views of experts and citizens, and defends the role of experts as a bulwark against “populist” excesses. Sunstein is one of the foremost legal scholars in the United States, and shares with other leaders of his profession the attribute of intellectual fearlessness. He knows he can master any body of knowledge quickly and thoroughly, and he has mastered many, including both the psychology of judgment and choice and issues of regulation and risk policy. His view is that the existing system of regulation in the United States displays a very poor setting of priorities, which reflects reaction to public pressures more than careful objective analysis. He starts from the position that risk regulation and government intervention to reduce risks should be guided by rational weighing of costs and benefits, and that the natural units for this analysis are the number of lives saved (or perhaps the number of life-years saved, which gives more weight to saving the young) and the dollar cost to the economy. Poor regulation is wasteful of lives and money, both of which can be measured objectively. Sunstein has not been persuaded by Slovic’s argument that risk and its measurement is subjective. Many aspects of risk assessment are debatable, but he has faith in the objectivity that may be achieved by science, expertise, and careful deliberation. [...]

An availability cascade is a self-sustaining chain of events, which may stall from media reports of a relatively minor event and lead up to public panic and large-scale government action. On some occasions, a media story about a risk catches the attention of a segment of the public, which becomes aroused and worried. This emotional reaction becomes a story in itself, prompting additional coverage in the media, which in turn produces greater concern and involvement. The cycle is sometimes sped along deliberately by “availability entrepreneurs,” individuals or organizations who work to ensure a continuous flow of worrying news. [...]

I share Sunstein’s discomfort with the influence of irrational fears and availability cascades on public policy in the domain of risk. However, I also share Slovic’s belief that widespread fears, even if they are unreasonable, should not be ignored by policy makers. Rational or not, fear is painful and debilitating, and policy makers must endeavor to protect the public from fear, not only from real dangers.

Slovic rightly stresses the resistance of the public to the idea of decisions being made by unelected and unaccountable experts. Furthermore, availability cascades may have a long-term benefit by calling attention to classes of risks and by increasing the overall size of the risk-reduction budget. The Love Canal incident may have caused excessive resources to be allocated to the management of toxic waste, but it also had a more general effect in raising the priority level of environmental concerns. Democracy is inevitably messy, in part because the availability and affect heuristics that guide citizens’ beliefs and attitudes are inevitably biased, even if they generally point in the right direction. Psychology should inform the design of risk policies that combine the experts’ knowledge with the public’s emotions and intuitions. [...]

Peut-on concevoir une société sans conflit ?

Comment peut-il y avoir un contre-pouvoir ?

La politique doit-elle faire le bonheur des citoyens ?

Le philosophe doit-il gouverner ?

La conscience de l’individu n’est-elle que le reflet de la société à laquelle il appartient ?

TOM W’S SPECIALTY

[...]

THE SINS OF REPRESENTATIVENESS

Judging probability by representativeness has important virtues: the intuitive impressions that it produces are often—indeed, usually—more accurate than chance guesses would be.

* On most occasions, people who act friendly are in fact friendly.
* A professional athlete who is very tall and thin is much more likely to play basketball than football.
* People with a PhD are more likely to subscribe to *The New York Times* than people who ended their education after high school.
* Young men are more likely than elderly women to drive aggressively.

In all these cases and in many others, there is some truth to the stereotypes that govern judgments of representativeness, and predictions that follow this heuristic may be accurate. In other situations, the stereotypes are false and the representativeness heuristic will mislead, especially if it causes people to neglect base-rate information that points in another direction. Even when the heuristic has some validity, exclusive reliance on it is associated with grave sins against statistical logic.

One sin of representativeness is an excessive willingness to predict the occurrence of unlikely (low base-rate) events. Here is an example: you see a person reading *The New York Times* on the New York subway. Which of the following is a better bet about the reading stranger?

She has a PhD.

She does not have a college degree.

Representativeness would tell you to bet on the PhD, but this is not necessarily wise. You should seriously consider the second alternative, because many more non graduates than PhDs ride in New York subways. And if you must guess whether a woman who is described as “a shy poetry lover” studies Chinese literature or business administration, you should opt for the latter option. Even if every female student of Chinese literature is shy and loves poetry, it is almost certain that there are more bashful poetry lovers in the much larger population of business students. [...]

Psychologists have conducted many experiments in which base-rate information is explicitly provided as part of the problem, and many of the participants are influenced by those base rates, although the information about the individual case is almost always weighted more than mere statistics. [...]

When an incorrect intuitive judgment is made, System 1 and System 2 should both be indicted. System 1 suggested the incorrect intuition, and System 2 endorsed it and expressed it in a judgment. However, there are two possible reasons for the failure of System 2—ignorance or laziness. Some people ignore base rates because they believe them to be irrelevant in the presence of individual information. Others make the same mistake because they are not focused on the task. If frowning makes a difference, laziness seems to be the proper explanation of base-rate neglect, at least among Harvard undergrads. Their System 2 “knows” that base rates are relevant even when they are not explicitly mentioned, but applies that knowledge only when it invests special effort in the task.

The second sin of representativeness is insensitivity to the quality of evidence. Recall the rule of System 1: WYSIATI. In the Tom W example, what activates your associative machinery is a description of Tom, which may or may not be an accurate portrayal. The statement that Tom W “has little feel and little sympathy for people” was probably enough to convince you (and most other readers) that he is very unlikely to be a student of social science or social work. But you were explicitly told that the description should not be trusted!

You surely understand in principle that worthless information should not be treated differently from a complete lack of information, but immediately to reject evidence (for example, by determining that you received it from a liar), your System 1 will automatically process the information available as if it were true. There is one thing you can do when you have doubts about the quality of the evidence: let your judgments of probability stay close to the base rate. Don’t expect this exercise of discipline to be easy—it requires a significant effort of self-monitoring and self-control. [...]

N’y a-t-il aucune vérité dans le mensonge ?

Notre liberté de pensée a-t-elle des limites ?

La perception peut-elle s’éduquer ?

Les apparences sont-elles trompeuses ?

Peut-on se fier à l’intuition ?

The mathematical details are not relevant in this book. There are two ideas to keep in mind about Bayesian reasoning and how we tend to mess it up. The first is that base rates matter, even in the presence of evidence about the case at hand. This is often not intuitively obvious. The second is that intuitive impressions of the diagnosticity of evidence are often exaggerated. The combination of WYSIATI and associative coherence tends to make us believe in the stories we spin for ourselves. The essential keys to disciplined Bayesian reasoning can be simply summarized:

* Anchor your judgment of the probability of an outcome on a plausible base rate.
* Question the diagnosticity of your evidence.

Both ideas are straightforward. It came as a shock to me when I realized that I was never taught how to implement them, and that even now I find it unnatural to do so.

[...]

Daniel Kahneman, Thinking, Fast and Slow, 2011