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【 1 】 2004

One of the first things Edmund Hillary did when he reached the top of Mount Everest half a century ago was to photograph the scene to prove he and climbing mate Tenzing Norgay Sherpa were first.

Somewhere on the vast mountain, is another camera that may prove they were not.

In 1924, Britain's most accomplished climber of his day, George Mallory, and partner Andrew Irvine disappeared after last being seen "moving expeditiously" toward the summit, sparking an enduring mystery:

Did they die on the way to the top or on their way back?

"The conundrum that elevates Mallory and Irvine's vanishing act to the realm of the mythic is the possibility that the pair could have reached the summit," Conrad Anker, who found Mallory's body in 1999, wrote in his book, "The Lost Explorer."

The answer may lie on the film in the missing portable camera Mallory, 37, took with him. His body was frozen into the scree at 8,140 metres, his fingers dug in as if trying to stop a fall, a broken rope around his waist and his body mummified to a marble white.

His skull was cracked, his right leg badly broken and he appeared to have died in a long fall, Anker wrote.

Anker and his colleagues found Mallory's pocket knife, his altimeter and a monogrammed handkerchief. But no camera and no backpack. No one knows if the camera was lost in the fall or if

it could be with Irvine's body, still somewhere on the mountain.

And nor can anyone be sure that even if the camera were found, it would still be possible to develop pictures.

"I can't give a definite answer," said James Blamphin, a spokesman for a world-famous photography company in New York. "It's very difficult to comment without seeing the condition of the camera."

New Zealander Hillary, now 83, does not care if his hero Mallory — who made the famous quip that he wanted to climb Everest "because it is there" — made it to the top first.

"Probably he didn't. But he certainly did not reach the bottom," he said in Kathmandu during last month's 50th-anniversary celebrations. "So, whatever happens, although he is a heroic figure, he didn't quite complete the job."

Mallory's 1924 expedition, his third to Everest, remains one of the world's greatest climbing feats. With Irvine, a relatively inexperienced 22-year-old, Mallory set out for the summit from a staging camp on June 8. They were climbing on the northern side, from Tibet, because the easier southern route used by Hillary and Tenzing almost three decades later was in Nepal, then closed to foreigners.

When they were last seen they were 150 vertical metres below the 8,850-metre summit.

Still, recent revelations by a member of the 1960 Chinese team that he saw a body at 8,290 metres — which could only be Irvine's — are likely to inspire more searches.

(注) conundrum : 難題

Kathmandu : ネパールの首都

【2】2004

Whether language is the exclusive property of the human species is an interesting question. The idea of talking animals probably is as old and as widespread among human societies as language is itself. No culture lacks a legend in which some animal plays a speaking role. All over West Africa, children listen to folk tales in which a “spider-man” is the hero. “Coyote” is a favorite figure in many Native American tales, and there is hardly an animal who does not figure in Aesop’s famous fables.

If language is viewed only as a system of communication, then many species communicate. Humans also use systems other than their language to relate to each other and to send “messages”. The question is whether the kinds of grammars which represent linguistic knowledge acquired by children with no external instruction are unique to the human animal.

Most humans who acquire language utilize speech sounds to express meanings, but such sounds are not a necessary aspect of language, as evidenced by the sign languages of the deaf. The use of speech sounds is therefore not a basic part of what we have been calling language. The chirping of birds, the squeaking of dolphins, and the dancing of bees may potentially represent systems similar to human languages. If animal communication systems are not like human language, it will not be due to a lack of speech.

4 STUDY COLLABO

Conversely, when animals vocally imitate human utterances, it does not mean they possess language. Language is a system that relates sounds (or gestures) to meanings. “Talking” birds such as parrots and mynah birds are capable of faithfully reproducing words and phrases of human language that they have heard; but when a parrot says “Polly wants a cracker,” she may really want a ham sandwich or a drink of water or nothing at all. A bird that has learned to say “hello” or “goodbye” is as likely to use one as the other, regardless of whether people are arriving or departing. The bird’s utterances carry no meaning. They are speaking neither English nor their own language when they sound like us.

A parrot says what it is taught, or what it hears, and no more. If it learns *cat* and *cats* and *dog* and *dogs* and then learns the word *parrot*, it will be unable to form the plural *parrots*. Therefore, the ability to produce sounds similar to those used in human language cannot be equated with the ability to learn a human language.

(注) mynah bird : 九官鳥

【3】2005

Promoting children’s self-esteem seems to be one of the great goals of modern childcare and education. It goes hand in hand with an enthusiastic praise culture, where children are feted for the most minor achievements.

The promotion of self-esteem is, rightly, a reaction against sterner times when children weren’t encouraged enough. But it

also seems to be caused by a fear of what failure will do to children. A fear that, if children don't succeed at a task, they will somehow be damaged.

I believe the opposite is true. Children need to experience failures to learn and to grow. Scientists know that trial and error — and, yes, failure — lead ultimately to greater knowledge of the world. Many scientists spend years experiencing continued failure in the laboratory until they finally make a breakthrough.

Parents shouldn't be frightened of their children failing at things — they should be encouraging their children to aim high and to be challenged.

There's absolutely nothing wrong with failure. The important thing is that children have the right grounding to be able to cope with it and bounce back, realising that failure is not the end of the world. It's a perfectly normal and necessary experience.

Constant, meaningless praise is more likely to make knock-backs difficult for a child. If children have been praised for everything they've done, regardless of how good it is, then failure will be all the more painful. By the same token, a brilliant achievement will be less remarkable.

Praise is important, but it should be used discriminately. It seems so obvious to say it, but if everything is worthy of praise, then pretty much everything is devalued and the whole exercise becomes rather pointless. Yet criticism seems to have become the new taboo.

In the world of the classroom, the fear of pointing out mistakes

is not doing our children any favours. A friend of mine is the mother of two boys who attend a primary school in north London. She's concerned about the lack of rigour in marking. "My eight-year-old son came home with a piece of work that contained no punctuation at all. His teacher had marked it 'Excellent'. It wasn't excellent and I've asked the teacher not to describe mediocre work as such."

There is nothing wrong with children doing something wrong — it's how they learn. We shouldn't be frightened of highlighting their mistakes, as long as they also get praise when they do well.

Failure is a good thing. It teaches children so much: the value of hard work and persistence; how to cope when problems arise; and ultimately the satisfaction of getting something right.

Children who are frightened of failure may well be cautious and may not fulfil their potential. And parents who are frightened of failure on their children's behalf also deny them chances.

Life is full of setbacks and there is no point in trying to protect our children from the reality that awaits. They need to learn how to cope with failure and, where appropriate, turn it to their advantage.

(注) fete : (みなの前で)称讚する

knock-back : 冷水を浴びせ(られ)ること

【4】2005

Saburo's father belonged to that generation which, having

survived the war, rebuilt Japan from ashes, distilling defeat and loss into a single-minded focus with which they erected cities and industries and personal lives. Reflecting on this as an adult, Saburo felt it accounted at least partially for his father's stoicism. This was conjecture, of course. When Japan surrendered he had been only six, too young to remember what his father had been like in peacetime.

Saburo's memories of the surrender included his uncle Kozo being brought home, delirious with hepatic fever, from Micronesia. He lived only a few weeks, unconscious the entire time and nursed round the clock by Saburo's parents. One of the visitors to their home was Uncle Kozo's sweetheart, a pretty girl of nineteen on whom Saburo had a crush. She wiped away her tears with a handkerchief patterned with cherry blossoms and announced brokenly that her life was now over. Saburo was impressed. "She really loves Uncle!" he said later that day to his parents at dinner.

"The grief didn't hurt her appetite," his mother said curtly. She was referring to the rationed tea she had served at lunch as well as to a certain fish cake that had been purchased, after two hours of waiting in line, for their own family dinner.

In a dispassionate voice, Saburo's father explained that the amount of energy you have is limited, just like your food, and that when you love a sick person you have to make the choice of either using up that energy on tears or else saving it for constructive actions such as changing bedpans and spoon-feeding and giving

sponge baths. “In the long run, which would help your uncle more?” he asked.

Saburo supposed the constructive actions would.

“That’s right,” his father said.

Saburo’s father had not fought in the war. He was barred from service because of his glaucoma, which was discovered for the first time during his military recruiting exam. So he stayed home while the war claimed the lives of his best friend, then his cousin, and last of all his brother-in-law Kozo. Growing up, all Saburo understood of the disease was that it consisted of some sort of elevated pressure within the eye. “Your father has to keep calm” was his mother’s constant refrain. “Don’t you dare upset him, or his eye pressure will go up.” It seemed to young Saburo that this condition was in some insidious way a result of the war, not unlike those radioactive poisons pulsing within survivors from Hiroshima.

- (注) hepatitic fever : 肝炎による発熱
 rationed : 配給の
 bedpan : 病人用の差し込み便器
 glaucoma : 緑内障

【5】2006

Richard Doll was born in 1912, at a time when smoking was just becoming popular. His father promised his son 50 pounds if he refrained from smoking until he was 21, not because he thought

it was harmful, but because it was a waste of money. ‘I was determined to get it,’ Doll says, ‘but I had a brother, seven years younger than me, and whenever we had friends in the house he would say, “Oh, Richard’s not going to smoke until he’s 21!” And I finally said, “I can’t stand this any longer — give me a cigarette.”’

He consumed two ounces of pipe tobacco a week and five cigarettes a day during his time as a medical student and an officer during the Second World War. ‘In the thirties, none of my teachers said smoking was harmful,’ he remembers. The medical textbooks of the forties made brief reference to cancers of the lip and tongue, and blindness caused by the combination of pipe smoke and malnutrition.

The incidence of lung cancer had increased steadily throughout the thirties, but no one knew why. Hospital beds filled up with people who arrived with choking coughs and soon graduated to emphysema, and during the war this became the second biggest cause of death after military action.

When the conflict ended, Richard Doll began working for the Medical Research Council (MRC), on the causes of gastric and duodenal ulcers. But the MRC had also become concerned with the lung cancer rates. At the time, the most likely cause of lung disease was believed to be atmospheric pollution. Doll’s own hunch was that it was caused by the increase in the tarring of roads.

In 1949, Doll visited hundreds of patients in London hospitals who had been diagnosed with lung cancer or were suspected of it. Most patients presented before they were very ill, and were able

to answer a detailed questionnaire. They were asked about their family history, diet and previous diseases, and whether they had ever worked on the roads. Doll then returned to the hospitals in the following months to examine their diagnoses. ‘The most striking thing was that if the person was a non-smoker, the diagnosis would always change,’ Doll says. ‘But if they were a heavy smoker it was usually lung cancer. It was changed occasionally, but not very often. In 649 cases of lung cancer there were two non-smokers.’

Today, we may regard these results as obvious and predictable, but the epidemiologists were astonished. German doctors had suspected a link before the war, and other surveys in Britain and the US had voiced suspicions. But Doll’s numbers were so striking that what others had regarded as an association, they could already claim to be a causation. Doll was so struck by the certainty of his research that he instantly gave up smoking. ‘It wasn’t so difficult.’

(注) incidence : 発生率 emphysema : 肺気腫

gastric and duodenal ulcers : 胃・十二指腸潰瘍

epidemiologist : 疫学者

【6】2006

Imagine you are sitting in a hall listening to a lecture on neurology. Basically, what you are doing is listening to a person

make various noises as he exhales. Why would you do that? This is because the person has packed information into a precise sequence of sounds and you have the ability to extract information from those sounds so that you can share ideas. And just think. With only a slight variation in the sounds, the lecturer could make the audience think about something completely different — anything from, say, Britney Spears to the crisis in Sudan.

How do we explain this amazing ability to fill each other's minds with so many different ideas just by making noises with our mouths? Linguists seem to have identified two principles behind this phenomenon. The first is the principle of the memorized word. Take the word "buffalo," for example. The word doesn't sound like a buffalo, or move like a buffalo, or do anything like a buffalo. But one person can make another person think of a buffalo just by using this word. This is because from childhood you memorize an association between a certain sound (that is, the sound of the word "buffalo" being spoken) and the idea (the animal buffalo itself). In this way, the brain can remember an enormous number of concepts.

The problem with this is that there are only a finite number of words and each word has a finite meaning. This is where the second principle comes into play. The second principle is that of combinatorial grammar, or computation. Words can be combined into phrases and sentences in such a way that the overall meaning can be computed from the meaning of the individual words and the way that they are arranged according to some scheme. This

scheme is known as grammar, and it allows a person to communicate an infinite set of ideas by using familiar words and thereby free them from the constraints of memory.

A good place to start would be the cliché from journalism: “If a dog bites a man, it isn’t news. If a man bites a dog, it is news.” Already, through the use of three words, “dog,” “bites” and “man,” you can get two different meanings. Taking this further, if there are 10,000 nouns with which to start a sentence and 4,000 verbs with which to continue it, there are 40 million ways to begin a sentence. The number of possibilities increases exponentially from then on.

(注) neurology : 神経学

linguist : 言語学者

cliché : 決まり文句

【7】2007

With their old-man eyes, reddish brown hair and extremely long arms, orangutans must be among the cutest of animals. And yet according to Dr. Willie Smits, world-renowned forest ecologist and founder of the Borneo Orangutan Survival foundation (BOS), their time is almost up. “If we don’t save them in the next three years there will be no areas of forest left that are big enough to sustain an orangutan population,” he says.

He’s jetlagged from circling the globe three times in the last month in a desperate attempt to raise awareness — and funds — to save his beautiful primates. Smits turns on his laptop computer

to show a series of photographs. The images on the screen are beautiful at first. Like a father showing off family snaps, Smits shares a picture of a handsome young male orangutan. “This is the son of the first orangutan I ever saved, and now he’s living independently in the wild,” he says with obvious joy. But the pictures get bleaker by the minute, with shots of burnt and beaten animals and ravaged skulls. Smits explains that orangutans are often maimed in forest fires. “Then the local villagers cut off their heads with knives. People sell those skulls. They carve them, dye them, make them look like antiques and sell them to stupid tourists.”

Now 47, Smits left the Netherlands as a young graduate, to do field work in Indonesia. “I wanted to really know what nature was, and I spent six months in the forest and learnt a lot from the indigenous people who live there, the Dyaks. So much of that knowledge is being lost so quickly!”

The moment that changed Smits’s life forever took place in a marketplace, where baby orangutans are regularly, and illegally, sold as pets, laboratory animals or tourist attractions. “I came across a dying orangutan baby,” he recalls. “Once I’d looked in her eyes I just fell in love and wanted to give her back her freedom. And that one dying baby changed my life. I managed to save her, and then I was given more orangutans, and I soon realized that it was only going to work if I had a forest to put them in.” It was at this point, in 1991, that Smits founded BOS, whose motto is ‘Primates Helping Primates.’

In the last 20 years, Borneo — one of the world's largest islands — has lost 80 per cent of its rainforests to fire, agricultural clearing and mostly illegal logging. Within these disappearing forests are the low-lying tropical peat swamps in which the orangutan lives. For Smits, the destruction of these swamps is a problem not just for the local people or the primates, but for every person on the planet.

Devastating statistics come thick and fast as Smits explains the connections between sludgy swampland, great apes and global warming. “You need to realize that 50 per cent of the world's tropical peat swamps are in Indonesia,” he says. “And the world's tropical peat swamps contain some 30 per cent of all terrestrial carbon. Now if those swamps — which have been growing at 2 mm a year for 8,000 years — are destroyed at the current rate it will lead to the doubling of global carbon emissions, within 30 years.”

According to climatologists, the recent increase in global carbon-dioxide levels is due in no small part to the burning of those swamps. “If only humans would be a little bit more like orangutans, peaceful and caring, then this would be a better world,” Smits says, with a sad shake of his head.

(注) peat: 泥炭

sludgy: ぬかるみの

【8】2007

‘In the beginning God created heaven and earth ...’

Today there are still millions of Christians who believe,

literally, in the Old Testament account of the Creation. The human race was made once and whole by God in His image and it remains the summit of His creation. Any other explanation is false, blasphemous and unthinkable. About 150 years ago, when Christianity was far stronger in Britain and Europe than it is now, when its churches colonized much of the world and its armies and traders encircled the globe, Christianity was a source of essential truths. It legitimized the Western empires, seemed to guarantee Western morality and preached Western superiority.

Although, as in every case in this book (*12 Books that Changed the World*), there was a movement which preceded the key publication from which so much is said to have flowed, there are few who would doubt that the greatest challenge to the Christian monopoly came from a book published in 1859 which deals almost exclusively with the genealogy of several plants and animals. Yet for this, the author, Charles Darwin, was called among much else ‘the most dangerous man in Britain.’

In great detail, Darwin laid out the evidence for evolution as an undeniable process, with natural selection as its driving force. In doing so the book demolished beliefs in the fixity of the species and seriously challenged, and some claimed wholly undermined, views and convictions about both the nature of man and the presence of God in the natural world.

The core of it is Darwin’s theory of natural selection. This, encapsulated, is based on three observations. First that organisms produce far more offspring than could possibly survive. Darwin

pointed out that if the millions of eggs produced by the cod all survived it would not be long before cod filled up the oceans and piled up on the land. The second observation is that all organisms — vary the human species is a readily observed case in point with individual fingerprints just one of the proofs. Third, the sum of the variation is inherited, that is, you do not produce clones but new individuals genetically derived from ancestors but different each one from the other. Add these three together and the inference is that only some can survive and therefore, on average, those that survive will be the ones that are better adapted, better suited for their environment and this will be determined by the individual differences.

The late Professor Stephen Jay Gould gave a simple but striking example: ‘a ridiculous caricature,’ he called it. ‘Say there is a population of ordinary elephants in Siberia when it is warm and then the ice age starts. Well, there is natural variation in the amount of hair of those elephants on average ... [and they] will do better and have more offspring and a hundred generations down the line you get a woolly mammoth.’ It does not seem, on the surface, very earth-shattering now. But at the time Darwin’s book caused a conceptual earthquake.

It wholly decries all ideas which up to that time had taken it for granted that humankind was special, superior and apart. In the course of doing this, in a book of striking clarity and easy access, Darwin forced a profound rethink of the workings of life, just as Newton’s discoveries forced a rethink of the workings of the

universe.

(注) cod: タラ科の魚

【9】2008

The patient was an 8-year-old California girl with severe headaches. Her parents, who were both struggling to adjust to new high-pressure jobs, took her to top neurologists and pediatricians. The child's symptoms, the doctors concluded, were a response to stress at home. But four or five months later, it became clear that she had a brain tumor and needed surgery. When her doctors looked back at early scans of her brain, they were shocked to see the shadow of a tumor they had previously overlooked.

For Harvard hematologist Jerome Groopman, who is a friend of the child's parents, the missed diagnosis was more than just a cautionary tale. It was the start of an investigative journey. "People talk about technical errors in medicine, but no one talks about thinking errors," he explains in an interview. "I realized I had no framework for understanding these kinds of problems."

The result of Groopman's journey is *How Doctors Think*, an engagingly written book that is must reading for every physician who cares for patients and every patient who wishes to get the best care. Groopman says patients can prompt broader, sharper and less prejudiced thinking by asking doctors open-ended questions and learning to identify some of their common thinking mistakes:

ERROR 1: Doctors, like most of us, are often led astray by

stereotypes that are based on someone's appearance, emotional state or circumstances. Groopman describes this kind of "attribution error" in the case of a nervous young woman who kept losing weight even when prescribed a high-calorie diet. Her doctors, convinced that she was lying about her food intake, suspected anorexia or bulimia, but her problem, diagnosed after years of ill health, turned out to be celiac disease — an allergy to wheat. Had the patient been male or older or less anxious, the doctors might have got it right in the first place.

ERROR 2: "We all tend to be influenced by the last experience we had or something that made a deep impression on us," Groopman says. So if it's January, your doctor has just seen 14 patients with the flu and you show up with muscle aches and a fever, he or she is more likely to say you have the flu — which is fine unless it's really meningitis or a reaction to a tetanus shot that you forgot to mention.

The best defense — besides giving as complete a history as you can — is to be alert and ready to ask questions anytime a doctor says, "There's a lot of this going around."

ERROR 3: Physicians typically prefer to act even when in doubt about the nature of the problem. And yet this kind of "commission bias" can lead to all sorts of new problems if the treatment turns out to be incorrect.

"Don't just do something. Stand there," one of Groopman's mentors told him years ago when he was uncertain of a diagnosis. This buys a doctor time to think — which is especially important

when trying to ensure that something hasn't been overlooked.

ERROR 4: Groopman cautions that emotions are more of an issue than most physicians like to admit. Doctors who are particularly fond of a patient have been known to miss the diagnosis of a life-threatening cancer because they just didn't want it to be true. But negative emotions can be just as blinding, sometimes stopping a doctor from going the extra mile. "If you sense that your doctor is irritated with you, that he or she doesn't like you," says Groopman, "then it's time to get a new doctor." Studies show that most patients are pretty accurate in describing their doctors' feelings toward them.

Groopman's book makes abundantly clear that despite all the electronic databases that are being used to improve health care in the U.S., a lot of medicine still comes down to a doctor or two puzzling out what might be wrong with your body.

(注) hematologist: 血液学者 anorexia: 拒食症
bulimia: 過食症 meningitis: 髓膜炎
tetanus: 破傷風

【10】2008

One gloomy day in early 1991, a couple of months after my father died, I was standing in the kitchen of my parents' house, and my mother, looking at a sweet and touching photograph of my father taken perhaps fifteen years earlier, said to me, with a note

of despair, “What meaning does that photograph have? None at all. It’s just a flat piece of paper with dark spots on it here and there. It’s useless.” The bleakness of my mother’s grief-drenched remark set my head spinning because I knew instinctively that I disagreed with her, but I did not quite know how to express to her the way I felt the photograph should be considered.

After a few minutes of emotional pondering — soul-searching, quite literally — I hit upon an analogy that I felt could convey to my mother my point of view, and which I hoped might lend her at least a tiny degree of consolation. What I said to her was along the following lines.

“In the living room we have a book of the Chopin études for piano. All of its pages are just pieces of paper with dark marks on them, just as two-dimensional and flat and foldable as the photograph of Dad — and yet, think of the powerful effect that they have had on people all over the world for 150 years now. Thanks to those black marks on those flat sheets of paper, untold thousands of people have collectively spent millions of hours moving their fingers over the keyboards of pianos in complicated patterns, producing sounds that give them indescribable pleasure and a sense of great meaning. Those pianists in turn have conveyed to many millions of listeners, including you and me, the profound emotions that churned in Frédéric Chopin’s heart, thus affording all of us some partial access to Chopin’s inferiority — to the experience of living in the head, or rather the soul, of Frédéric Chopin. The marks on those sheets of paper are no less than soul-

shards — scattered remnants of the shattered soul of Frédéric Chopin. Each of those strange geometries of notes has a unique power to bring back to life, inside our brains, some tiny fragment of the internal experiences of another human being — his sufferings, his joys, his deepest passions and tensions — and we thereby know, at least in part, what it was like to be that human being, and many people feel intense love for him. In just as potent a fashion, looking at that photograph of Dad brings back, to us who knew him intimately, the clearest memory of his smile and his gentleness, activates inside our living brains some of the most central representations of him that survive in us, makes little fragments of his soul dance again, but in the medium of brains other than his own. Like the score to a Chopin étude, that photograph is a soul-shard of someone departed, and it is something we should cherish as long as we live.”

Although the above is a bit more flowery than what I said to my mother, it gives the essence of my message. I don't know what effect it had on her feelings about the picture, but that photo is still there, on a counter in her kitchen, and every time I look at it, I remember that exchange.

(出典: Douglas Hofstadter, *I AM A STRANGE LOOP*, 2007, Basic Books)

(注)

Frédéric Chopin: フレデリック・ショパン(1810~1849; 作曲家, ピアニスト) churn: 波立つ

【 1 1 】 2009

What's behind the world food crisis?

These days you hear a lot about the world financial crisis. But there's another world crisis under way — and it's hurting a lot more people.

I'm talking about the food crisis. Over the past few years the prices of wheat, corn, rice and other basic foodstuffs have doubled or tripled, with much of the increase taking place just in the last few months.

High food prices dismay even relatively well-off Americans, but they're truly devastating in poor countries, where food often accounts for more than half a family's spending.

There have already been food riots around the world. Food-supplying countries, from Ukraine to Argentina, have been limiting exports in an attempt to protect domestic consumers, leading to angry protests from farmers — and making things even worse in countries that need to import food.

How did this happen? The answer is a combination of long-term trends, bad luck — and bad policy.

Let's start with the things that aren't anyone's fault.

First, there's the march of the meat-eating Chinese — that is, the growing number of people in emerging economies who are, for the first time, rich enough to start eating like Westerners. Since it takes about 700 calories' worth of animal feed to produce a 100-calorie piece of beef, this change in diet increases the overall

demand for grains.

Second, there's the price of oil. Modern farming is highly energy-intensive: a lot of BTUs go into producing fertilizer, running tractors and, not least, transporting farm products to consumers. With oil persistently above \$100 per barrel, energy costs have become a major factor driving up agricultural costs.

High oil prices, by the way, also have a lot to do with the growth of China and other emerging economies. Directly and indirectly, these rising economic powers are competing with the rest of us for scarce resources, including oil and farmland, driving up prices for raw materials of all sorts.

Third, there has been a run of bad weather in key growing areas. In particular, Australia, normally the world's second-largest wheat exporter, has been suffering from an epic drought.

OK, I said that these factors behind the food crisis aren't anyone's fault, but that's not quite true.

The rise of China and other emerging economies is the main force driving oil prices, but the invasion of Iraq — which proponents promised would lead to cheap oil — has also reduced oil supplies below what they would have been otherwise.

And bad weather, especially the Australian drought, is probably related to climate change. So politicians and governments that have stood in the way of action on greenhouse gases bear some responsibility for food shortages.

Where the effects of bad policy are clearest, however, is in the rise of demon ethanol and other biofuels.

The subsidized conversion of crops into fuel was supposed to promote energy independence and help limit global warming. But this promise was, as Time magazine bluntly put it, a “scam.”

This is especially true of corn ethanol: even on optimistic estimates, producing a gallon of ethanol from corn uses most of the energy the gallon contains. But it turns out that even seemingly “good” biofuel policies, like Brazil’s use of ethanol from sugar cane, accelerate the pace of climate change by promoting deforestation.

(注) BTU (British Thermal Unit): 英国熱量単位

scam: いかさま

【 1 2 】 2009

Patients today often complain of feeling that they are merely peripheral phenomena in the busy schedule of a general practitioner or consultant. One study found that hospital patients were less satisfied with the way medical staff communicated with them than they were with the food they were served. The rising use of computers in general practice means that doctors are often typing in data as they speak with patients, sometimes reducing eye contact to a bare minimum. In the US, the average time a patient is allowed to speak in a first consultation before being interrupted by their physician is twenty-three seconds.

Primary-care medicine today is generally directed at the management of patients. They should be kept as healthy as possible, and the frequency of their visits kept to an ideal

minimum. It is important to recognize that although no doctor would be averse to curing a patient, this is not always the cardinal aim, especially given the prevalence of chronic illnesses like heart disease and diabetes which can be managed but not cured. Most doctors have to cope with a staggering workload and ever-increasing bureaucracy, so it is hardly surprising that there is less and less time to listen to the individual.

Yet without careful listening, can more than a partial aspect of illness ever be grasped? Many patients complain of not being properly listened to and of receiving hasty advice. They are often left feeling literally unrecognized. One survey even found that in 50 per cent of medical encounters, the patient and the doctor disagreed as to what the main presenting problem was. If today's hospital has become what one physician has called 'a mosaic of specialties', patients are turning elsewhere to find different forms of recognition and receptiveness. Doctors before the Second World War were already lamenting how the study of disease had begun to overshadow the study of the patient. Commenting on the changes he had witnessed in the first decades of the twentieth century, an Austrian writer said that 'disease meant now no longer what happens to the whole man but what happens to his organs'.

This movement away from biography and particularity towards fragmentation inevitably encourages a wide range of alternative and complementary therapies. In America the number of visits to alternative practitioners exceeds the number of all visits to primary-care physicians. Today, more than a third of the

American population use so-called alternative therapies. And significantly, more than 70 per cent of these people don't tell their conventional doctors about these treatments. One might wonder what effect this has on assessments of the efficacy of conventional treatments.

The expansion of alternative practices is sometimes explained as a consequence of the medical profession's unwillingness to listen to its patients. For much of the medicine practiced today, the body is merely the sum of its parts and little more. In a 1,400-page best-selling textbook for medical students, lip service is paid in the first chapter to the doctor-patient relationship, before the book gets down to the real business of the human organism. Doctors are told to show empathy by indicating to the patient that their experiences are recognized and accepted, yet the suggested phrasing of questions and responses to patients reads like extracts from a bad foreign language primer. Likewise, scare quotes around phrases like 'treat the whole patient' seem to imply that they shouldn't be taken too seriously.

(注) scare quotes: 注意を促す引用符

【13】2010

Obesity and smoking may be the most conspicuous causes of illness in the developed world, but physical factors don't account for everything. Your psychology — namely, your personality and

outlook on life — can be just as important to your well-being as exercising and eating right. And especially these days, with the global economy tumbling toward a depression, it's a good time to prevent yourself from slipping into one too.

An entire science has grown up around the perils of negative thinking (as well as the power of positive psychology), and the latest findings confirm that a pessimistic outlook not only kindles anxiety, which can put people at risk for chronic mental illnesses like depression, but may also cause early death and set people up for a number of physical ailments, ranging from the common cold to heart disease and immune disorders.

Optimism, meanwhile, is associated with a happier and longer life. Over the course of a recent eight-year study, University of Pittsburgh researchers found that optimistic women outlived dour ones. Which may be good news for the motivational gurus out there, but what about the rest of us who aren't always so cheerful? Are we destined for sickness and failure? Or is it possible to master the principles of positivity the same way we might learn a new hobby or follow a recipe?

The answer from the experts seems to be yes. But it does take effort. Seeing the sunny side doesn't come easily.

Most people would define optimism as being eternally hopeful, endlessly happy, with a glass that's perpetually half full. But that's exactly the kind of deluded cheerfulness that positive psychologists wouldn't recommend. "Healthy optimism means being in touch with reality," says Tal Ben-Shahar, a Harvard

professor who taught the university's most popular course, Positive Psychology, from 2002 to 2008. "It certainly doesn't mean being Pollyannaish and thinking everything is great and wonderful."

Ben-Shahar describes realistic optimists as "optimalists" — not those who believe everything happens for the best, but those who make the best of things that happen.

In his own life, Ben-Shahar uses three optimalist exercises, which he calls PRP. When he feels down — say, after giving a bad lecture — he grants himself *permission* (P) to be human. He reminds himself that not every lecture can be a Nobel winner: some will be less effective than others. Next is *reconstruction* (R). He analyses the weak lecture, learning lessons for the future about what works and what doesn't. Finally, there's *perspective* (P), which involves acknowledging that in the grand scheme of life, one lecture really doesn't matter.

Studies suggest that people who are able to focus on the positive fallout from a negative event — basically, cope with failure — can protect themselves from the physical toll of stress and anxiety.

Being optimistic doesn't mean shutting out sad or painful emotions. As a clinical psychologist, Martin Seligman, who runs the Positive Psychology Center at the University of Pennsylvania, says he used to feel proud whenever he helped depressed patients rid themselves of sadness, anxiety or anger. "I thought I would get a happy person," he says. "But I never did. What I got was an

empty person.” That’s what prompted him to launch the field of positive psychology. Instead of focusing only on righting wrongs and lifting misery, he argued, psychologists need to help patients foster good mental health through constructive skills, like Ben-Shahar’s PRP. The idea is to teach patients to strengthen their strengths rather than simply improve their weaknesses. “It’s not enough to clear away the weeds and underbrush,” Seligman says. “If you want roses, you have to plant a rose.”

When a loved one dies or you lose your job, for example, it’s normal and healthy to mourn. You’re supposed to feel sad and even depressed. But you can’t cocoon yourself in sadness for too long. A study of HIV-positive men whose partners had died found that the men who allowed themselves to grieve while also seeking to accept the death were better able to bounce back from the tragedy. Men who focused only on the loss as opposed to, say, viewing the death as a relief of their partner’s suffering, tended to grieve longer, presumably because they couldn’t find a way out of their sadness.

(注)

guru : 専門家, 権威者 Pollyannaish : 極めて楽天的な(Pollyanna は Eleanor Porter の小説の主人公の名前)

【 1 4 】 2010

The mystery of how we make decisions is one of the oldest mysteries of the mind. Even though we are defined by our

decisions, we are often completely unaware of what's happening inside our heads during the decision-making process.

In 1982, a patient named Elliot walked into the office of neurologist Antonio Damasio. A few months earlier, a small tumor had been cut out of Elliot's cortex, near the frontal lobe of his brain. Before the surgery, Elliot had been a model father and husband. He'd held down an important job in a large corporation and was active in his local church. But the operation changed everything. Although Elliot's IQ had stayed the same — he still tested in the 97th percentile — he now exhibited one psychological flaw: he was incapable of making a decision.

This dysfunction made normal life impossible: routine tasks that should have taken ten minutes now required several hours. Elliot endlessly deliberated over irrelevant details, like whether to use a blue or black pen, what radio station to listen to, and where to park his car. When he chose where to eat lunch, Elliot carefully considered each restaurant's menu, seating plan, and lighting scheme, and then drove to each place to see how busy it was. But all this analysis was for naught: Elliot still couldn't decide where to eat. His indecision was pathological.

Before long, Elliot was fired from his job. That's when things really began to fall apart. He started a series of new businesses, but they all failed. He was taken in by a con man and was forced into bankruptcy. His wife divorced him. The IRS began an investigation. He moved back in with his parents. As Damasio put it, "Elliot emerged as a man with a normal intellect who was

unable to decide properly, especially when the decision involved personal or social matters.”

But why was Elliot suddenly incapable of making good decisions? What had happened to his brain? Damasio’s first insight occurred while talking to Elliot about the tragic turn his life had taken. “He was always controlled,” Damasio remembers, “always describing scenes as a dispassionate, uninvolved spectator. Nowhere was there a sense of his own suffering, even though he was the protagonist. ... I never saw a tinge of emotion in my many hours of conversation with him: no sadness, no impatience, no frustration.” Elliot’s friends and family confirmed Damasio’s observations: ever since his surgery, he’d seemed strangely devoid of emotion, numb to the tragic turn his own life had taken.

To test this diagnosis, Damasio hooked Elliot to a machine that measured the activity of the sweat glands in his palms. (When a person experiences strong emotions, the skin is literally aroused and the hands start to perspire. Lie detectors operate on the basis of this principle.) Damasio then showed Elliot various photographs that normally triggered an immediate emotional response: a severed foot, a naked woman, a house on fire, a handgun. The results were clear: Elliot felt nothing. No matter how grotesque or aggressive the picture, his palms never got sweaty. He had the emotional life of a mannequin.

This was a completely unexpected discovery. At the time, neuroscience assumed that human emotions were *irrational*. A person without any emotions — in other words, someone like

Elliot — should therefore make better decisions. His cognition should be uncorrupted.

What, then, had happened to Elliot? Why couldn't he lead a normal life? To Damasio, Elliot's pathology suggested that emotions are a crucial part of the decision-making process. When we are cut off from our feelings, the most banal decisions became impossible. A brain that can't feel can't make up its mind.

(注)

cortex : (大脳)皮質

con man : 詐欺師

the IRS : the Internal Revenue Service ((米国の)内国歳入庁)

【 1 5 】 2011

Calling a dog “the dog”

It is the nature of scientific study of non-human animals that a few individual animals who have been thoroughly poked, observed, trained, or dissected come to represent their entire species. Yet with humans we never let one person's behavior stand for all of our behavior. If one man fails to solve a Rubik's cube in an hour, we do not extrapolate* from that that all men will so fail (unless that man had bested every other man alive). Here our sense of individuality is stronger than our sense of shared biology. When it comes to describing our potential physical and cognitive capacities, we are individuals first, and members of the human

race second.

By contrast, with animals the order is reversed. Science considers animals as representatives of their species first, and as individuals second. We are accustomed to seeing a single animal or two kept in a zoo as representative of their species; to zoo management, they are even unwitting “ambassadors” of the species. Our view of the uniformity of species members is well exemplified in our comparison of their intelligence. To test the hypothesis, long popular, that a bigger brain indicates greater intelligence, the brain volumes of chimpanzees, monkeys, and rats were compared with human brains. Sure enough, the chimp’s brain is smaller than ours, the monkey’s smaller than the chimp’s, the rat’s a mere cerebellum-sized** node of the primates’ brains. That much of the story is fairly well known. What is more surprising is that the brains used, for comparative purposes, were the brains of just two or three chimpanzees and monkeys. These couple of animals unlucky enough to lose their heads for science were henceforth considered perfectly representative monkeys and chimps. But we had no idea if they happened to be particularly big-brained monkeys, or abnormally small-brained chimps. (Of course, researchers soon found brains bigger than ours: the dolphin’s brain is larger, as are the brains of physically larger creatures such as whales and elephants. The “big brain” myth has long been overturned.)

Similarly, if a single animal or small group of animals fails in a psychological experiment, the species is tainted with the brush

of failure. Although grouping animals by biological similarity is clearly useful shorthand, there is a strange result: we tend to speak of the species as though all members of the species were identical. We never make this slip with humans. If a dog, given the choice between a pile of twenty biscuits and a pile of ten biscuits, chooses the latter, the conclusion is often stated with the definite article: “the dog” cannot distinguish between large and small piles — not “a dog” cannot so distinguish.

So when I talk about *the dog*, I am talking implicitly about *those dogs studied to date*. The results of many well-performed experiments may eventually allow us to reasonably generalize to *all dogs*, period. But even then, the variations among individual dogs will be great: your dog may be an unusually good smeller, may never look you in the eye, may love his dog bed and hate to be touched. Not every behavior a dog does should be interpreted as telling, or taken as something intrinsic; sometimes they just *are*, just as we are.

*extrapolate : to use known facts as a basis for general statements about a situation or about what is likely to happen in the future

**cerebellum : the bottom part of your brain that controls your muscles

【 1 6 】 2011

I'd be the last person to discourage children from playing sports. Indeed, I wish many more would move away from their computers, put down their iPods and cellphones and devote more time and energy to physical activities. But for many children and adolescents, the problem is the opposite of being sedentary. Encouraged by parents and coaches, many with visions of glory and scholarships, too many young athletes are being pushed to the point of breaking down, physically and sometimes emotionally.

The statistics cited by Mark Hyman in his book, "Until It Hurts: America's Obsession with Youth Sports and How It Harms Our Kids", are sobering indeed: "Every year more than 3.5 million children under 15 require medical treatment for sports injuries, nearly half of which are the result of simple overuse." Injuries are only part of the problem, Mr. Hyman wrote. As adults become more and more involved, he noted, "with each passing season youth sports seem to stray further and further from its core mission of providing healthy, safe and character-building recreation for children."

Mr. Hyman, a sports journalist, was prompted to tackle this subject in part by his own misguided behavior as the father of an athletically talented son. At 13, Ben Hyman was a prized pitcher for a local team when his shoulder began to hurt — and hurt enough for him to complain — just before the start of league playoffs. Despite a professional assessment that Ben's problem was caused by throwing too many baseballs and a recommendation to rest his arm up to a month, his father put him

in the game, and again three days later, urging him to “blaze a trail to the championship.” When the injured boy began lamely throwing balls at home plate, Mr. Hyman realized his foolish shortsightedness in putting winning ahead of his son’s well-being.

The problem was put into focus three years ago by the American Academy of Pediatrics’ Council on Sports Medicine and Fitness. In a report in the academy’s journal, *Pediatrics*, Dr. Joel S. Brenner wrote, “Overuse injuries, overtraining and burnout among child and adolescent athletes are a growing problem in the United States.” The goal of youth participation in sports, the council said, “should be to promote lifelong physical activity, recreation and skills of healthy competition.” “Unfortunately,” it went on, “too often the goal is skewed toward adult (parent/coach) goals either implicitly or explicitly. As more young athletes are becoming professionals at a younger age, there is more pressure to grab a piece of the ‘professional pie,’ to obtain a college scholarship or to make the Olympic team.” But most young athletes and their parents fail to realize that depending on the sport, only a tiny few — 2 to 5 out of 1,000 high school athletes — ever achieve professional status.

Clearly we’ve gone too far when the emphasis on athletic participation and performance becomes all-consuming and causes injuries that can sometimes compromise a child’s future. The sports surgeon Dr. James R. Andrews said that he now sees four times as many overuse injuries in youth sports as he did just five years ago and that more children today are having to undergo

surgery for chronic sports injuries. A major factor in the rising injury rate is the current emphasis on playing one sport all year long, which leaves no time for muscles and joints to recover from the inevitable microtrauma that occurs during practice and play. With increased specialization, there is also no cross-training that would enable other muscles to strengthen and lighten the load.

Even when a sport is done seasonally, daily practice can result in problems. The pediatrics council recommends that young athletes “have at least one to two days off per week from competitive athletics, sport-specific training and competitive practice to allow them to recover both physically and psychologically.”

【 1 7 】 2012

Is man an ape or an angel, as Benjamin Disraeli* asked in a famous debate about Darwin’s theory of evolution? Are we merely chimps with a software upgrade? Or are we in some true sense *special*, a species that transcends the mindless fluxions of chemistry and instinct? Many scientists, beginning with Darwin himself, have argued the former: that human mental abilities are merely elaborations of faculties that are ultimately of the same *kind* we see in other apes. This was a radical and controversial proposal in the nineteenth century — some people are still not over it — but ever since Darwin published his world-shattering treatise on the theory of evolution, the case for man’s primate

origins has been bolstered a thousandfold. Today it is impossible to seriously refute this point: We are anatomically, neurologically, genetically, physiologically apes. Anyone who has ever been struck by the uncanny near-humanness of the great apes at the zoo has felt the truth of this.

I find it odd how some people are so ardently drawn to either-or dichotomies. “Are apes self-aware *or* are they automata?” “Is life meaningful *or* is it meaningless?” “Are humans ‘just’ animals *or* are we exalted?” As a scientist I am perfectly comfortable with settling on categorical conclusions — when it makes sense. But with many of these supposedly urgent metaphysical dilemmas, I must admit I don’t see the conflict. For instance, why can’t we be a branch of the animal kingdom *and* a wholly unique and gloriously novel *phenomenon* in the universe?

I also find it odd how people so often slip words like “merely” and “nothing but” into statements about our origins. Humans are apes. So too we are mammals. We are vertebrates. We are pulpy, throbbing colonies of tens of trillions of cells. We are all of these things, but we are not “merely” these things. And we are, in addition to all these things, something unique, something unprecedented, something transcendent. We are something truly new under the sun, with uncharted and perhaps limitless potential. We are the first and only species whose fate has rested in its own hands, and *not* just in the hands of chemistry and instinct. On the great evolutionary stage we call Earth, I would argue there has not been an upheaval as big as us since the origin

of life itself. When I think about what we are and what we may yet achieve, I can't see any place for snide** little "merelies."

Any ape can reach for a banana, but only humans can reach for the stars. Apes live, contend, breed, and die in forests — end of story. Humans write, investigate, create, and quest. We splice genes, split atoms, launch rockets. We peer upward into the heart of the Big Bang and delve deeply into the digits of pi. Perhaps most remarkably of all, we gaze inward, piecing together the puzzle of our own unique and marvelous brain. It makes the mind reel. How can a three-pound mass of jelly that you can hold in your palm imagine angels, contemplate the meaning of infinity, and even question its own place in the cosmos? Especially awe inspiring is the fact that any single brain, including yours, is made up of atoms that were forged in the hearts of countless, far-flung stars billions of years ago. These particles drifted for eons and light-years until gravity and chance brought them together here, now. These atoms now form a conglomerate*** — your brain — that can not only ponder the very stars that gave it birth but can also think about its own ability to think and wonder about its own ability to wonder. With the arrival of humans, it has been said, the universe has suddenly become conscious of itself. This, truly, is the greatest mystery of all.

*Benjamin Disraeli : British statesman and writer (1804-81)

**snide : unkind, cynical

***conglomerate : a group of different things gathered together

We like to think of ourselves as rational creatures. We watch our backs, weigh the odds, pack an umbrella. But both neuroscience and social science suggest that we are more optimistic than realistic. On average, we expect things to turn out better than they wind up being. People hugely underestimate their chances of getting divorced, losing their job or being diagnosed with cancer; expect their children to be extraordinarily gifted; envision themselves achieving more than their peers; and overestimate their likely life span (sometimes by 20 years or more).

The belief that the future will be much better than the past and present is known as the optimism bias. It abides in every race, region and socioeconomic bracket. Schoolchildren playing when-I-grow-up are rampant optimists, but so are grown-ups: A 2005 study found that adults over 60 are just as likely to see the glass half full as young adults.

You might expect optimism to erode under the tide of news about violent conflicts, high unemployment, tornadoes and floods and all the threats and failures that shape human life. Collectively we can grow pessimistic — about the direction of our country or the ability of our leaders to improve education and reduce crime. But private optimism, about our personal future, remains incredibly resilient. A survey conducted in 2007 found that while 70 % thought families in general were less successful than in their parents' day, 76 % of respondents were optimistic about the future

of their own family.

Overly positive assumptions can lead to disastrous miscalculations — make us less likely to get health checkups, apply sunscreen or open a savings account, and more likely to bet the farm on a bad investment. But the bias also protects and inspires us: It keeps us moving forward rather than to the nearest high-rise ledge*. Without optimism, our ancestors might never have ventured far from their tribes and we might all be cave dwellers, still huddled together and dreaming of light and heat.

To make progress, we need to be able to imagine alternative realities — better ones — and we need to believe that we can achieve them. Such faith helps motivate us to pursue our goals. Optimists in general work longer hours and tend to earn more. Economists at Duke University found that optimists even save more. And although they are not less likely to divorce, they are more likely to remarry.

Even if that better future is often an illusion, optimism has clear benefits in the present. Hope keeps our minds at ease, lowers stress and improves physical health. Researchers studying heart-disease patients found that optimists were more likely than nonoptimistic patients to take vitamins, eat low-fat diets and exercise, thereby reducing their overall coronary risk. A study of cancer patients revealed that pessimistic patients under the age of 60 were more likely to die within eight months than nonpessimistic patients of the same initial health, status and age.

In fact, a growing body of scientific evidence points to the

conclusion that optimism may be hardwired by evolution into the human brain. The science of optimism, once scorned as an intellectually suspect province of pep rallies** and smiley faces, is opening a new window on the workings of human consciousness. What it shows could fuel a revolution in psychology, as the field comes to grips with accumulating evidence that our brains aren't just stamped by the past. They are constantly being shaped by the future.

*ledge : a narrow horizontal surface projecting from a wall, cliff, or other surface

**pep rally : a meeting at a school before a sports event, when cheerleaders lead the students in encouraging their team to win

【 1 9 】 2013

Overwhelmed by more information than we can possibly hold in our heads, we're increasingly handing off the job of remembering to search engines and smart phones. Google* is even reportedly working on eyeglasses that could one day recognize faces and supply details about whoever you're looking at. But new research shows that outsourcing our memory — and expecting that information will be continually and instantaneously available — is changing our cognitive habits.

Research conducted by Betsy Sparrow, an assistant professor

of psychology at Columbia University, has identified three new realities about how we process information in the Internet age. First, her experiments showed that when we don't know the answer to a question, we now think about where we can find the nearest Web connection instead of the subject of the question itself. For example, the query "Are there any countries with only one color in their flag?" prompted study participants to think not about flags but about computers.

A second revelation: when we expect to be able to find information again later on, we don't remember it as well as when we think it might become unavailable. Sparrow's subjects were asked to type facts into a computer — for example, "The space shuttle *Columbia* disintegrated during re-entry over Texas in February 2003." Half were told that their work would be saved; the rest were told that their words would be erased. Those who believed that the computer would store the information recalled details less well on their own. Sparrow compares their situation to one we all experience in the hyperconnected real world: "Since search engines are continually available to us, we may often be in a state of not feeling we need to encode the information internally. When we need it, we will look it up." Sound familiar?

The researchers' final observation: the expectation that we'll be able to locate information down the line leads us to form a memory not of the fact itself but of where we'll be able to find it. "We are learning what the computer 'knows' and when we should attend to where we have stored information in our computer-based

memories,” Sparrow and her colleagues concluded in their report. “We are becoming symbiotic with our computer tools, growing into interconnected systems.”

Before you grow nervous about turning into a cyborg, however, you should know that this new symbiosis with our digital devices is really just a variant of a much more familiar phenomenon, what psychologists call transactive** memory. This is the unspoken arrangement by which groups of people give out memory tasks to each individual, with information to be shared when needed. In a marriage, one spouse might remember the kids’ after-school appointments while the other keeps track of the recycling-pickup schedule. In a workplace team, one member may be the designated number cruncher*** while a colleague is charged with remembering client preferences. The way we delegate to our computers is simply an extension of this principle — an instance of transactive memory carried out on a very grand scale.

But this handoff comes with a downside. Skills like critical thinking and analysis must develop in the context of facts: we need something to think and reason about, after all. And these facts can’t be Googled as we go; they need to be stored in the original hard drive, our long-term memory. Especially in the case of children, “factual knowledge must precede skill,” says Daniel Willingham, a professor of psychology at the University of Virginia — meaning that the days of drilling the multiplication table and memorizing the names of the Presidents aren’t over quite yet. Adults, too, need to recruit a supply of stored knowledge in order

to situate and evaluate new information they encounter. You can't Google context.

*Google : a major corporation which provides Internet-related products and services.

**transactive : relating to exchanges or interactions between people.

***number cruncher : people whose jobs involve dealing with numbers or mathematical calculations.

【 2 0 】 2013

Right from an early age, even before they can talk, people find that helping others is inherently rewarding, and they learn to be sensitive to who is helpful and who is not. Regions of the brain activated by helping are the same as those activated when people process other pleasurable rewards.

Anyone who assumes that babies are just little egoists who enter the world needing to be socialized so that they can learn to care about others is overlooking other tendencies as species-typical. Humans are born predisposed to care how they relate to others. A growing body of research is persuading neuroscientists that Baruch Spinoza's* seventeenth-century proposal better captures the full range of tensions humans grow up with. "The endeavor to live in a shared, peaceful agreement with others is an extension of the endeavor to preserve oneself." Emerging evidence is drawing

psychologists and economists alike to conclude that “our brains are wired to cooperate with others” as well as to reward or punish others for mutual cooperation.

Perhaps not surprisingly, helpful urges are activated most readily when people deal with each other face-to-face. Specialized regions of the human brain are given over to interpreting other people’s vocalizations and facial expressions. Right from the first days of life, every healthy human being is avidly monitoring those nearby, learning to recognize, interpret, and even imitate their expressions. An innate capacity for empathizing with others becomes apparent within the first six months. By early adulthood most of us will have become experts at reading other people’s intentions. We are so attuned to the inner thoughts and feelings of those around us that even professionals trained *not* to respond emotionally to the suffering of others find it difficult not to be moved. Therapists face particular challenges in this respect. Empathy, the stock-in-trade of psychotherapists because it really does produce better results, turns out to be their worst nightmare as well. People who deal day-in-and-day-out with the troubles of others face such occupational hazards as “vicarious** traumatization” and “compassion fatigue,” or face the threat of “catching” a client’s depression.

New discoveries by evolutionarily minded psychologists, economists, and neuroscientists are propelling the cooperative side of human nature to center stage. New findings about how irrational, how emotional, how caring, and even how selfless

human decisions can be are transforming disciplines long grounded in the premise that the world is a competitive place where to be a rational actor means being a selfish one. Researchers from diverse fields are converging*** on the realization: while humans can indeed be very selfish, in terms of empathic responses to others and our eagerness to help and share with them, humans are also quite unusual, notably different from other apes.

*Baruch Spinoza : A Dutch philosopher (1632-77).

**vicarious : experienced in the imagination through the feelings or actions of another person.

***converge : meet or join at a particular point.

【 2 1 】 2014

The miraculous piece of human intelligence that enables us to solve various problems is what we call common sense. Common sense is so ordinary that we tend to notice it only when it's missing, but it is absolutely essential to functioning in everyday life. Common sense is how we know what to wear when we go to work in the morning, how to behave on the street or the subway, and how to maintain harmonious relationships with our friends and coworkers. It tells us when to obey the rules, when to quietly ignore them, and when to stand up and challenge the rules themselves. It is the essence of social intelligence, and is also deeply embedded in our legal system, in political philosophy, and

in professional training.

For something we refer to so often, however, common sense is surprisingly hard to pin down. Roughly speaking, it is the loosely organized set of facts, observations, experiences, insights, and pieces of received wisdom that each of us accumulates over a lifetime, in the course of encountering, dealing with, and learning from, everyday situations. But it can also refer to more specialized knowledge, as with the everyday working knowledge of a professional, such as a doctor, a lawyer, or an engineer, that develops over years of training and experience.

We can identify two features of common sense that seem to differentiate it from other kinds of human knowledge, like science or mathematics. The first of these features is that, unlike formal systems of knowledge, which are fundamentally theoretical, common sense is overwhelmingly *practical*, meaning that it is more concerned with providing answers to questions than worrying about how it came by the answers. From the perspective of common sense, it is good enough to know that something is true, or that it is the way of things. One does not need to know why in order to benefit from the knowledge, and arguably one is better off not worrying about it too much. In contrast with theoretical knowledge, in other words, common sense does not reflect on the world, but instead attempts to deal with it simply “as it is.”

The second feature is that while the power of formal systems resides in their ability to organize their specific findings into logical categories described by general principles, the power of

common sense lies in its ability to deal with every concrete situation on its own terms. Whereas a formal system of knowledge would try to derive an appropriate behavior in various situations from a single, more general “law,” common sense just “knows” what the appropriate thing to do is in any particular situation, without knowing how it knows it. It is largely for this reason, in fact, that commonsense knowledge has proven so hard to replicate in computers — because, in contrast with theoretical knowledge, it requires a relatively large number of rules to deal with even a small number of special cases. Let’s say, for example, that you wanted to program a robot to navigate the subway. It seems like a relatively simple task. But as you would quickly discover, even a single component of this task such as the “rule” against asking for another person’s subway seat turns out to depend on a complex variety of other rules — about seating arrangements on subways in particular, about polite behavior in public in general, and about life in crowded cities — that at first glance seem to have little to do with the rule in question. In order to program a robot to imitate even a limited range of human behavior, you would have to, in a sense, teach it *everything* about the world. As soon as it encountered a situation that was slightly different from those you had taught it to handle, it would have no idea how to behave.

People who lack common sense are a bit like the hapless robot in that they never seem to understand what it is that they should be paying attention to, and they never seem to understand what it is that they don’t understand. And for exactly the same reason that

programming robots is hard, it's surprisingly hard to explain to someone lacking in common sense what it is that they're doing wrong. You can take them back through various examples of when they said or did the wrong thing, and perhaps they'll be able to avoid making exactly those errors again. But as soon as anything is different, they're effectively back to square one*.

*square one : the situation from which you started to do something

【 2 2 】 2014

No wonder babies sleep so much. They have a lot of hard work ahead of them. Infants come equipped with a set of basic abilities for learning. But that still leaves a lot of items on their to-do list. In the first year of life, babies must lay the foundations for all their adult abilities, from language to locomotion. Their brains are changing more quickly at this age than they ever will again. Many of those changes help babies learn about the specific environment into which they have been born.

People can live in an astounding variety of places, from the frozen tundra to the sweltering desert, and in a vast array of social systems as well. Growing up in London or Barcelona is a very different experience from growing up in a subsistence village* in the Amazon, but babies come into both of those situations with nearly all the same genes.

Unlike many animals, people are not hardwired to be a good fit to their environment at birth. Instead, babies arrive equipped with the skills required to adapt flexibly to a wide range of conditions, which has allowed people to survive all over the world. The benefits of that approach are enormous, and so are the costs: children need a lot of care for a long time before they become independent. This high-risk, high-reward reproductive strategy affects the shape of most people's lives for decades, first as children and then as parents.

Babies are driven to explore and test their ideas about the world — which is why they seem to be getting into things all the time — and they love making things happen. When a baby learns to push a bowl from her high chair to make a crashing mess, you can see the glee as she triumphantly proceeds to do it again and again. Being effective in the world is enormously rewarding for children and adults alike. Infants, though, sometimes get confused about how they caused something to happen, so you can see them trying to talk an object into behaving. This confusion between physical and psychological causality usually disappears by the first birthday.

Just as babies have been shaped by evolution to be very effective learners, adults have become equally effective teachers. It may look like a game of peekaboo**, but there's serious stuff going on here. Babies are extremely good at getting what they need from their adult carers — not only food and shelter, but also information and examples. As a mother coos to her baby that he's

such a good boy, he is learning about language, relationships, and much more.

Because of innate abilities of the brain, even newborns are not passive recipients of adult instruction. Instead, babies actively seek out the information that is most useful to them at a particular stage of development, and their behaviour reliably elicits the kind of help that they need from adults. For instance, many people speak to babies in motherese — a high-pitched, sing-song, and slow version of regular language with elongated vowel*** sounds. Babies prefer to hear motherese and interact more intensely with people who speak this way, as most adults and older children do instinctively. It is probably not a coincidence that the properties of motherese, including clear pronunciation and pauses between words, are also very well suited for helping babies learn about language.

*a subsistence village : a village where people just have enough food or money to stay alive

**peekaboo : a game you play to amuse young children, in which you hide your face and then show it again

***vowel : sound such as the ones represented in writing by the letters ‘a’, ‘e’, ‘i’, ‘o’ and ‘u’, which you pronounce with your mouth open, allowing the air to flow through it

【 2 3 】 2015

Deception guilt refers to a feeling about lying, not the legal issue of whether someone is guilty or innocent. Deception guilt must also be distinguished from feelings of guilt about the content of a lie. Suppose in *The Winslow Boy** Ronnie actually had stolen the postal money order. He might have had guilty feelings about the theft itself — judged himself to be a terrible person for what he did. If Ronnie had concealed his theft from his father he would also have felt guilty about lying; that would be deception guilt. It is not necessary to feel guilty about the content of a lie to feel guilty about lying. Suppose Ronnie had stolen from a boy who had cheated to defeat Ronnie in a school contest. Ronnie might not feel guilty about stealing from such a nasty schoolmate; it might seem like appropriate revenge. But he could still feel deception guilt about concealing his theft from the schoolmaster or his father.

Deception guilt can vary in strength. It may be very mild, or so strong that the lie will fail because the deception guilt produces leakage or deception clues. When it becomes extreme, deception guilt is a torturing experience, undermining the sufferer's most fundamental feelings of self-worth. Relief from such severe deception guilt may motivate a confession despite the likelihood of punishment for misdeeds admitted. In fact, the punishment may be just what is needed, and why the person confesses, to ease the tortured feelings of guilt.

When the decision to lie is first made, people do not always accurately anticipate how much they may later suffer from deception guilt. Liars may not realize the impact of being thanked

by their victims for their seeming helpfulness, or how they will feel when they see someone else blamed for their wrongdoings. While such scenes typically arouse guilt, for others it is catmint**, the spice that makes a lie worth undertaking. Another reason why liars underestimate how much deception guilt they will feel is that it is only with the passage of time that a liar may learn that one lie will not suffice, that the lie has to be repeated again and again, often with inventing further stories in order to protect the original deceit.

Shame is closely related to guilt, but there is a key qualitative difference. No audience is needed for feelings of guilt, no one else need know, for the guilty person is his own judge. Not so for shame. The humiliation of shame requires disapproval or ridicule by others. If no one ever learns of a misdeed there will be no shame, but there still might be guilt. Of course, there may be both. The distinction between shame and guilt is very important, since these two emotions may tear a person in opposite directions. The wish to relieve guilt may motivate a confession, but the wish to avoid the humiliation of shame may prevent it.

Whenever the deceiver does not share social values with the victim, there won't be much deception guilt. A professional criminal does not feel guilt about deceiving an outsider. The same principle is at work to explain why a diplomat or spy does not feel guilty about misleading the other side. Values are not shared. The liar is doing good, for his side.

Lying is *authorized* in these cases — each of these

individuals appeals to a well-defined social norm that legitimates deceiving an opponent. There is little guilt about such authorized deceptions when the targets are from an opposing side and hold different values. There also may be authorization to deceive targets who are not opponents, who share values with the deceiver. Physicians may not feel guilty about deceiving their patients if they think it is for the patient's own good. Giving a patient a placebo, a sugar pill identified as a useful drug, is an old, time-honored medical deceit. If the patient feels better, or at least stops hassling the doctor for an unneeded drug that might actually be harmful, many physicians believe that the lie is justified.

* *The Winslow Boy* : an English play (1946) by Terence Rattigan

**catmint : an aromatic herb of the mint family with a smell attractive to cats

【 2 4 】 2015

We are very familiar with the idea that humans are everywhere; that wherever you go in the world you will probably find people there already. We are an unusual species in that we have a near-global distribution. And although people around the world may look quite different from each other, and speak different languages, they can nevertheless recognise each other as distant cousins.

But where and when did our species first appear? What are

the essential characteristics of our species? Who are we? What does it mean to be human? The answers to these questions now seem to lie firmly within the grasp of a scientific approach to the world and our place within it. By peering deep into our past and dragging clues out into the light, science can now provide us with some of the answers to the questions that people have always asked.

In light of the structure and function of the body, we are certainly apes. For example, our arm bones are incredibly similar to those of our nearest relations, chimpanzees. But there are obviously things that mark us out as a species of African apes that has evolved in ways that enabled our ancestors to survive, thrive and expand across the whole world. There are aspects of anatomy that are entirely unique to us; unlike our arms, our spines, pelvis and legs are *very* different from those of our chimp cousins, and no one would mistake a human skull for that of another African ape. It has a very distinctive shape, not least because we have such enormous brains for the size of our bodies. And we use our big brains in ways that no other species appears to.

We make tools and manipulate our environments to an extent that no other animal does. Although our species evolved in tropical Africa, this ability to control the interface between us and our surroundings means that we are not limited to a particular environment. We can reach and survive in places that should seem quite alien to an African ape. We can create coverings for our bodies that help to keep us cool in very hot climates and warm in

freezing temperatures. We make shelters and use fire for warmth and protection. We create things that can carry us across rivers and even oceans. We communicate, not just through complicated spoken languages but through objects and symbols that allow us to create complex societies and pass on information down the ages. When did these particular attributes appear? This is a key question for anyone seeking to define our species — and to track the presence of our ancestors through the traces of their behaviour.

The amazing thing is — it is *possible* to find those traces, those faint echoes of our ancestors from thousands and thousands of years ago. Sometimes it could be an ancient hearth, perhaps a stone tool, that shows us where and how our forebears lived. Occasionally we find human remains — preserved bones or fossils that have somehow avoided the processes of rot and decay and fragmentation to be found by distant descendants grubbing around in caves and holes in the ground, in search of the ancestors.

I've always been intrigued by this search, by the history that can be reconstructed from the few clues that have been left behind. And at this point in time, we are very lucky to have evidence emerging from several different fields of science, coming together to provide us with a compelling story, with a better understanding of our real past than any humans have ever had before. From the study of bones, stones and the genes within our living bodies comes the evidence of our ancestors, of who we are, of where we came from — and of how we ended up all over the world.

【 2 5 】 2016

One of the most provocative YouTube videos in the past two years begins mundanely enough: A one-year-old girl plays with an iPad, sweeping her fingers across its touch screen and shuffling groups of icons. In following scenes, she appears to pinch, swipe and prod the pages of paper magazines as though they, too, are screens. For the girl's father, the video is evidence of a generational transition. In an accompanying description, he writes, "Magazines are now useless and impossible to understand, for digital natives*." Whether or not his daughter truly expected the magazines to behave like an iPad, this video brings into focus an important question that is relevant to all of us: How exactly does the technology we use to read change the way we read?

Since at least the 1980s researchers have published more than one hundred studies exploring differences in how people read on paper and on screens. Before 1992 most studies concluded that people read stories and articles on screens more slowly and remember less about them. Recent surveys suggest, however, that although most people still prefer paper, attitudes are changing as tablets and e-reading technology improve and reading digital texts for facts and fun becomes more common.

Even so, laboratory experiments, polls and consumer reports indicate that digital devices prevent people from efficiently navigating long texts, which may subtly inhibit reading comprehension. Compared with paper, screens may also drain

more of our mental resources while we are reading and make it a little harder to remember what we read when we are done.

Understanding how reading on paper differs from reading on screens requires some explanation of how the brain interprets written language. Since we are not born with brain circuits dedicated to reading, the brain improvises a brand-new circuit for reading by weaving together various ribbons of neural tissue devoted to other abilities. Some of these repurposed brain regions specialize in object recognition. So, although letters and words are symbols representing sounds and ideas, the brain also regards them as physical objects. When we read and write, we recognize letters by their particular arrangements of lines, curves, and hollow spaces.

Beyond this, the human brain may also perceive a text in its entirety as a kind of physical landscape. When we read, we construct a mental representation of the text. The exact nature of such representations remains unclear, but some researchers think they are similar to the mental maps we create of terrain — such as mountains and trails — and of indoor physical spaces, such as apartments and offices. Both anecdotally and in published studies, people report that when trying to locate a particular passage in a book, they often remember where in the text it appeared.

In most cases, paper books have more obvious topography than on-screen text. An open paper book presents a reader with two clearly defined domains — the left- and right-hand pages — and a total of eight corners with which to orient oneself. You can

focus on a single page of a paper book without losing awareness of the whole text. You can even feel the thickness of the pages you have read in one hand and the pages you have yet to read in the other. Turning the pages of a paper book is like leaving one footprint after another on a trail — there's a rhythm to it and a visible record of how far one has traveled. All these features not only make the text in a paper book easily navigable, they also make it easier to form a coherent mental map of that text.

In contrast, most digital devices interfere with intuitive navigation of a text and inhibit people from mapping the journey in their mind. A reader of digital text might scroll through a seamless stream of words, tap forward one page at a time, or use the search function to immediately locate a particular phrase — but it is difficult to see any one passage in the context of the entire text. As an analogy, imagine if Google Maps allowed people to navigate street by individual street, as well as to teleport to any specific address, but prevented them from zooming out to see a neighborhood, state or country. Likewise, glancing at a progress bar gives a far more vague sense of place than feeling the weight of read and unread pages. And although e-readers and tablets replicate pagination, the displayed pages are ephemeral**. Once read, those pages vanish. Instead of hiking the trail yourself, you watch the trees, rocks and moss pass by in flashes, with no perceptible trace of what came before and no easy way to see what lies ahead.

*digital natives : people who have been interacting with digital technologies from a very early age, surrounded by smartphones, Kindles, iPads, etc.

**ephemeral : lasting for a very short time

【 2 6 】 2016

Asian cholera first came to Britain in 1831, claiming more than 50,000 lives. A second epidemic killed a similar amount in 1848, a devastating figure for a country being told by its government that the new Public Health Act, passed in the same year, would transform the nation's sanitation. But cholera would prove a stubborn foe: By the time the third epidemic began to depopulate London's Soho at the end of summer in 1854, there was still widespread disagreement about its cause. Most believed that cholera was miasmatic (caused by airborne infection), but several leading epidemiologists had begun to suspect otherwise.

Dr. John Snow, in his 1849 pamphlet *On the Mode of Communication of Cholera*, dismissed the idea that there was just something in the air. He suggested cholera was caused either by the human consumption of contaminated food or water, or by infested clothes or bed linen. He suspected a cellular structure to the cholera organism, but as he had not been able to show it beneath a microscope he proceeded largely on instinct.

In late-August 1854 Snow was examining how the water supply routes from the Thames may have affected a serious

cholera outbreak in south London when he learnt that new cases had been reported just a few hundred yards from where he lived in Sackville Street, Piccadilly. He used to live even nearer, in Frith Street, where there had already been several deaths, and he believed that his knowledge of the area, and contact with local residents, might yield the clues he needed to support his theory. He did what doctors still did in those days: He made house calls. It was a brave endeavour: In his efforts to match human illness to human behaviour he appeared to put himself at grave risk, for if cholera was airborne, this inquisitive doctor would surely be one of its victims.

In the first week of his investigations more than five hundred Soho residents would die. People began falling ill on 31st August, with a peak in fatalities occurring two days later. But by the third day, Snow believed he had found his cause: the public water pump where Broad Street met Cambridge Street. This was not only the main water supply for those living nearby, but also a common stop for passing traders and children.

Snow tested the water from this pump on 3rd September, but his results were inconclusive: He detected few impurities with the naked eye, although when he looked again the following day, he saw an increase in “small white, flocculent particles.” One resident also told him that the water had changed its taste. Seeing no other possible cause, and perhaps fearing that he was running out of time, he requested a list of the dead from the General Register Office. Eighty-nine people had died from cholera in the week

ending 2nd September, and as Snow walked around with his list he immediately saw the pattern he had anticipated: “Nearly all the deaths had taken place within a short distance of the pump.”

As Snow continued walking he found further confirmation of his theory. Only ten deaths had occurred near another water pump, and five relatives of the victims told him that they always drew water from Broad Street as they “preferred” it. Two out of five of the remaining cases were children who went to school near Broad Street. Snow argued that the outbreak couldn’t be supported by the miasmatic theories (which associated disease directly with poverty) when he found that a nearby workhouse* containing hundreds of people was not affected by cholera; it turned out they drew their water from their own well. The evidence now seemed overwhelming. On the evening of 7th September Snow met the local board of guardians and presented them with his findings. “In consequence of what I said, the handle of the pump was removed on the following day.”

*workhouse : a public institution in UK where very poor people could live and work in return for food

【 2 7 】 2017

Climate change has been labelled the greatest challenge of our time. But it could also be our greatest opportunity because it gives us the chance to change the way we think, the way we act and the way we work together. But to seize that opportunity we need to

overcome barriers within our own minds. These psychological obstacles have the power to block our ability to think about our future, leading us to be “stuck” in the here and now.

In a paper forthcoming in the *Journal of Environmental Psychology* my colleagues Rachel McDonald, Hui Yih Chai and I explore the construct* of psychological distance as a means of understanding our reactions to climate change. Psychological distance is a well-established construct referring to the extent to which an object is removed from the self. It might seem strange to think of climate change as an “object” — but in this context it refers to all of the thoughts, feelings and reactions we might have when we think about the problem of climate change.

Psychological distance has four distinct dimensions. Objects can be psychologically distant in terms of certainty (hypothetical distance), time (temporal distance), space (spatial distance) and people (social distance). Thus psychological distance leads us to think about if something is going to happen, when it might happen, where it might happen, and to whom it might happen.

Is climate change happening? A large body of literature now documents the efforts of various industries and lobby groups in raising doubt about the basic science of global warming. The fact that 97% of currently active climate scientists claim that the globe is warming, largely due to human activity, appears hardly to discourage these obstinate deniers. This seed of doubt can be enough, for some of us, to dismiss climate change as nothing to worry about.

When is climate change going to happen? Many climate scientists argue the effects of serious climate change are already being seen and felt. But it can be hard for us to distinguish between short-term fluctuations in the weather and long-term changes in the climate. The imperfection of memory and the difficulty in picking up signals from noise can make climate change appear a long way off.

Where is climate change going to happen? Even if we think climate change is real and will happen at some point, we can still attempt to psychologically distance ourselves by imagining it will only happen in other (far-off) places — such as the low-lying Pacific islands, or the Arctic Circle. Such reasoning makes us blind to the interconnectedness of a global phenomenon like climate change. Out of sight might be out of mind, but it does not diminish the reality of the widespread impacts of climate change.

Will climate change happen to me? If one accepts the reality, imminence and relative locality of climate change impacts, one might still distance oneself personally from those impacts. That is, treat them as *socially distant*. “It won’t happen to me” — perhaps I’ll be able to move, or build a wall, or buy a better air conditioner. This kind of thinking can again distance us from the required sense of urgency and the need to act now to reduce CO₂ emissions.

Closing the gap — overcoming psychological distance. Our analysis suggests a fine line between “bringing climate change home” and invoking demotivating emotional reactions from making climate change *too* psychologically close. Fear can lead to

avoidance; too much doom and gloom can lead to disengagement. One solution appears to be getting us to think of our future selves, our legacy. Recent work by Elke Weber and colleagues at Columbia University shows how inviting people to think about future generations leads to stronger belief in climate change, and greater environment-friendly intentions. To seize the opportunities climate change offers we must first dispel any uncertainty about its reality and then focus on the things we can do *now*, not for our immediate gain, but for the benefit of our future selves.

【 2 8 】 2017

The “secret of a good memory” is the secret of forming diverse and multiple associations with every fact we care to retain. But this forming of associations with a fact is nothing but *thinking about* the fact as much as possible. Briefly, then, of two men with the same outward experiences and the same mental capacities, *the one who thinks over his experiences most*, and weaves them into systematic relations with each other, *will be the one with the best memory*. We see examples of this on every hand. Most men have a good memory for facts connected with their own pursuits. The college athlete who remains a dunce* at his books will astonish you by his knowledge of men’s “records” in various feats and games, and will be a walking dictionary of sporting statistics. The reason is that he is constantly going over these things in his mind, and

comparing and making series of them. They form for him not so many odd facts, but a concept-system — so they stick. Thus the merchant remembers prices, the politician other politicians' speeches and votes, in such an amount as amazes outsiders, but this is easily explained by the amount of thinking they devote to these subjects. The great memory for facts which a Darwin and a Spencer reveal in their books is not incompatible with their having a brain with only a middling degree of native retentiveness. Let a man early in life set himself the task of confirming such a theory as that of evolution, and facts will soon cluster and cling to him like grapes to their stem. Their relations to the theory will hold them tight, and the more of these the mind is able to discern, the more substantial the knowledge will become. Meanwhile the theorist may have little, or if any, loose memory. Unutilizable facts may be unnoted by him and forgotten as soon as heard.

In a system, every fact is connected with every other by some thought-relation. The consequence is that every fact is retained by the combined suggestive power of all the other facts in the system, and forgetfulness is almost impossible.

The reason why *cramming* is such a bad mode of study is now made clear. By cramming I mean that way of preparing for examinations by intensively learning "points" by heart during the preceding few hours or days, little or no work having been performed in the previous course of the term. Things learned thus in a few hours, on one occasion, for one purpose, cannot possibly have formed many associations with other things in the mind.

Their brain-processes are led into by few paths, and are relatively little liable to be awakened again. Speedy forgetfulness is the almost inevitable fate of all that has been learned in this simple way. On the contrary, if the same materials are associated with other external incidents and considered in various relations, they grow into such a system, and lie open to so many paths of approach, that they remain permanent possessions. This is why habits of continuous application should be enforced in educational processes. Of course there is no evil in cramming in itself: if it led to the desired end of secure learning, it would be infinitely the best method of study. But it does not; and students themselves should understand the reason why.

*a dunce : a person who is slow at learning; a stupid person

【 2 9 】 2018

Thought, or reflection, is the mental act of discerning the relation between what we try to do and what happens in consequence. No experience having a meaning is possible without some element of thought. But we may contrast two types of experience according to the proportion of reflection found in them. All our experiences have a phase of “cut and try” in them — what psychologists call the method of trial and error. We simply do something, and when it fails, we do something else, and keep on trying till we hit upon something which works, and then we adopt that method as a rule-of-thumb*¹ measure in subsequent

procedure. Some experiences have very little else in them than this process. In these cases, we see *that* a certain way of acting and a certain consequence are connected, but we do not see *how* they are. We do not see the details of the connection; the links are missing. Our discernment is very gross.

In other cases we push our observation farther. We analyze to see just what lies between so as to bind together cause and effect, activity and consequence. This extension of our insight makes foresight more accurate and comprehensive. The action which depends simply upon the trial and error method is at the mercy of circumstances; they may change so that the act performed does not operate in the way it was expected to. But if we know in detail upon what the result depends, we can look to see whether the required conditions are there. This method extends our practical control. For if some of the conditions are missing, we may, if we know what the needed conditions for an effect are, set to work to supply them; or, if they are likely to produce undesirable effects, we may eliminate some of the superfluous*² causes and economize effort.

In discovery of the detailed connections of our activities and what happens in consequence, the thought implied in cut and try experience is made explicit. Its quantity increases so that its proportionate value is very different. Hence the quality of the experience changes; the change is so significant that we may call this type of experience “reflective”. The deliberate cultivation of this phase of thought constitutes “thinking”. Thinking, in other

words, is the intentional endeavor to discover specific connections between something which we do and the consequences which result, so that the two become continuous. The occurrence is now understood; it is explained; it is reasonable, as we say, that the thing should happen as it does.

Thinking is thus equivalent to an explicit rendering of the intelligent element in our experience. It makes it possible to act with an end in view. It is the condition of our having aims. As soon as an infant begins to expect he begins to use something which is now going on as a sign of something to follow; he is, in however simple a fashion, judging. For he takes one thing as evidence of something else, and so recognizes a relationship. Any future development, however elaborate it may be, is only an extending and a refining of this simple act of inference. All that the wisest man can do is to observe what is going on more widely and more closely and then select more carefully from what is noted just those factors which point to something to happen. The opposites to thoughtful action are routine and capricious*³ behavior. The former accepts what has been customary as a full measure of possibility and omits to take into account the connections of the particular things done (it says, in effect, “let things continue just as I have found them in the past”). The latter makes the momentary act a measure of value, and ignores the connections of our personal action with the energies of the environment (it says, virtually, “things are to be just as I happen to like them at this instant”). Both refuse to acknowledge responsibility for the future

consequences which flow from present action. Reflection is the acceptance of such responsibility.

*¹rule-of-thumb : based on practice rather than theory

*²superfluous : more than sufficient or required

*³capricious : likely to change one's mood or behavior unexpectedly

【 3 0 】 2018

Humans are unlikely to ever blow out more than 125 candles on their birthday cake, according to research that suggests that our lifespan has already hit its natural limit.

The oldest human who ever lived, according to official records, was 122-year-old Frenchwoman Jeanne Louise Calment, who died in 1997. Now a team of American researchers suggests she is unlikely to lose the top spot any time soon, as their research shows that though more people reach old age each year, the ceiling for human lifespan appears to be stuck at around 115 years. “The chances are very high that we have really reached our maximum allotted lifespan for the first time,” said Jan Vijg, co-author of the research.

Some scientists have previously claimed that the first person to reach 1,000 years old is likely to be alive today. But the new study suggests that is highly unlikely. The upshot, says Vijg, is that people should focus on enjoying life and staying healthy for as long as possible; “That’s where we have to invest our money.”

The notion of extending the human lifespan has captured imaginations for millennia. Among scientists, enthusiasm for the idea has grown in recent years with a host of Silicon Valley companies springing up to join academic institutions in making various attempts to work on issue of longevity.

But the new study describes how analysis of records from a number of international databases suggests there is a limit to human lifespan, and that we have already hit it. Using data for 41 countries and territories from the Human Mortality Database, the team found that life expectancy at birth has increased over the last century. That is due to a number of factors, including advances in childbirth and maternity care, clean water, the development of antibiotics and vaccines and other health measures. But while the proportion of people surviving to 70 and over has risen since 1900, the rate of improvements in survival differ greatly between levels of old age. Large gains are seen for ages 70 and up, but for ages 100 or more the rate of improvement drops rapidly. “For the oldest old people, we are still not very good at reducing their mortality rates,” said Vijg.

The researchers also found that the maximum reported age at death rapidly increased between 1970 and the early 1990s, rising by around 0.15 years every year, but it has remained stable at around 115 years since the mid-90s. The apparent limit to human lifespan, the authors say, is not due to a set of biological processes specifically acting to call time on*¹ life. Rather, it is a byproduct of a range of genetic programmes that control processes such as

growth and development.

Henne Holstege from VU University, Amsterdam, who works on ageing of centenarians*², says the new study suggests “there seems to be a wall of mortality that modern medicine cannot overcome”. “If you die from heart disease at 70, then the rest of your body might still be in relatively good health. So, a medical intervention to overcome heart disease can significantly prolong your lifespan,” she said. “However, in centenarians not just the heart, but all bodily systems, have become aged and frail. If you do not die from heart disease, you die from something else.” Medical interventions, she says, cannot solve the problem of overall decline, with the only promising approach lying in slowing down the ageing process itself. But, she added, “It is however not yet clear if and how this can be accomplished.”

*¹call time on ... : decide that it is time to end ...

*²centenarian : a person who is 100 years old or older

【 3 1 】 2019

Regret is an emotion, and it is also a punishment that we administer to ourselves. The fear of regret is a factor in many of the decisions that people make (“Don’t do this, you will regret it” is a common warning), and the actual experience of regret is familiar. According to some psychologists, regret is “accompanied by feelings that one should have known better, by thoughts about

the opportunities lost, and by wanting to undo the event and to get a second chance.” Intense regret is what you experience when you can most easily imagine yourself doing something other than what you did.

Regret is one of the counterfactual emotions that are triggered by the availability of alternatives to reality. After every plane crash there are special stories about passengers who “should not” have been on the plane; they were, for example, supposed to fly a day earlier but had had to postpone. The common feature of such stories is that they involve unusual events — and unusual events are easier than normal events to undo in imagination. An abnormal event activates the idea of the event that would have been normal under the same circumstances.

To appreciate the link of regret to normality, consider the following scenario: *Mr. Brown almost never picks up hitchhikers, while Mr. Smith frequently does. Yesterday each gave a man a ride and was robbed.* Who of the two will experience greater regret? The results are not surprising: 88% of respondents said Mr. Brown, 12% said Mr. Smith.

Regret is not the same as blame. Other participants were asked another question about the same incident: Who will be criticized most severely by others? The results: Mr. Brown 23%, Mr. Smith 77%.

Regret and blame are both evoked by a comparison to a norm, but the relevant norms are different. The emotions experienced by Mr. Brown and Mr. Smith are dominated by what they usually do

about hitchhikers. Taking a hitchhiker is an abnormal event for Mr. Brown, and most people therefore expect him to experience more intense regret. A judgmental observer, however, will compare both men to conventional norms of reasonable behavior and is likely to blame Mr. Smith for habitually taking unreasonable risks. We are tempted to say that Mr. Smith deserved his fate and that Mr. Brown was unlucky. But Mr. Brown is the one who is more likely to be kicking himself, because he acted out of character in this one instance.

Decision makers know that they are prone to regret, and the anticipation of that painful emotion plays a part in many decisions. Consider the following example: *Paul owns shares in company A. Considering switching to stock in company B, he decided against it. George owned shares in company B, but switched to stock in company A. It turns out that both men would have been better off by \$1,200 if they had had stock in company B.* Who feels greater regret? The results are clear-cut: 8% of respondents said Paul, 92% said George. This is curious, because the situations of the two investors are objectively identical. The only difference is that George got to where he is by acting, whereas Paul got to the same place by failing to act.

This short example illustrates that people expect to have stronger emotional reactions (including regret) to an outcome that is produced by action than to the same outcome when it is produced by inaction. This has been verified in the context of gambling: people expect to be happier if they gamble and win than

if they refrain from gambling and get the same amount. The asymmetry is at least as strong for losses, and it applies to blame as well as to regret.

The asymmetry in the risk of regret favors conventional and risk-avoiding choices. The bias appears in many contexts. Even life-or-death decisions can be affected. Imagine a physician with a gravely ill patient. One treatment fits the normal standard of care; another is unusual. The physician has some reason to believe that the unconventional treatment improves the patient's chances, but the evidence is inconclusive. The physician who prescribes the unusual treatment faces a substantial risk of regret, blame, and perhaps lawsuits. It will be easier to imagine the normal choice; the abnormal choice will be easy to undo. True, a good result will contribute to the reputation of the physician who dared, but the potential benefit is smaller than the potential cost because success is generally a more normal outcome than is failure.

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One of the typical features of the new science of learning is its emphasis on learning with understanding. Intuitively, understanding is good, but it has been difficult to study from a scientific perspective. At the same time, students often have limited opportunities to understand or make sense of topics because many areas of curriculum have emphasized memory rather than understanding. Textbooks are filled with facts that

students are expected to memorize, and most tests assess students' abilities to remember the facts. When studying about veins and arteries, for example, students may be expected to remember that arteries are thicker than veins, more elastic, and carry blood from the heart; veins carry blood back to the heart. A test item for this information may look like the following:

Select the best of the answer choices given.

1. Arteries
 - a. Are more elastic than veins
 - b. Carry blood that is pumped from the heart
 - c. Are less elastic than veins
 - d. Both a and b
 - e. Both b and c

The new science of learning does not deny that facts are important for thinking and problem solving. Research on expertise in areas such as chess, history, science, and mathematics demonstrates that experts' abilities to think and solve problems depend strongly on a rich body of knowledge about subject matter. However, the research also shows clearly that "usable knowledge" is not the same as a mere list of disconnected facts. Experts' knowledge is connected and organized around important concepts; it is "conditionalized" to specify the contexts in which it is applicable; it supports understanding and transfer (to other contexts) rather than only the ability to remember.

For example, people who are knowledgeable about veins and arteries know more than the facts noted above: they also understand why veins and arteries have particular properties. They know that blood pumped from the heart exits in spurts and that the elasticity of the arteries helps accommodate pressure changes. They know that blood from the heart needs to move upward (to the brain) as well as downward and that the elasticity of an artery permits it to function like a one-way valve that closes at the end of each spurt and prevents the blood from flowing backward. Because they understand relationships between the structure and function of veins and arteries, knowledgeable individuals are more likely to be able to use what they have learned to solve novel problems — to show evidence of transfer. For example, imagine being asked to design an artificial artery — would it have to be elastic? Why or why not? An understanding of reasons for the properties of arteries suggests that elasticity may not be necessary — perhaps the problem can be solved by creating a conduit* that is strong enough to handle the pressure of spurts from the heart and also function like a one-way valve. An understanding of veins and arteries does not guarantee an answer to this design question, but it does support thinking about alternatives that are not readily available if one only memorizes facts.

*conduit : a pipe or channel through which a liquid passes