新英文杂志

每周精选

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BIG THINK

扫码听音频 新英文课堂

Health

March 1, 2022 | 928words | ★★★☆☆

How masturbation boosts your immune system

n.手淫，自慰

Can an orgasm a day really keep the doctor away?

n.性高潮

性唤起

Sexual arousal and orgasm increase the number of white blood cells in the body, making it easier to fight infection and illness.

n.唤起；(尤指性欲的)激起

1 Orgasms are a very common human phenomenon. The physical and mental health benefits of orgasms have been researched frequently, yet there is still so much to be learned about how our bodies and brains react to the chemicals and hormones released during and after experiencing this type of sexual release.

n.激素，荷尔蒙

"The amount of speculation versus actual data on both the function and value of orgasm is remarkable," explains Julia Heiman, director of the Kinsey Institute for Research in Sex,

prep.与...相比

金赛性、性别与生殖研究中心

Gender, and Reproduction.

2 Masturbation causes a rush of dopamine, which is a chemical that is associated with our ability to feel pleasure. Along with the rush of dopamine that is released during an orgasm, there is also a release of a hormone called oxytocin, which is commonly referred to as the "love hormone."

n.(情绪等)激增，释放 n.多巴胺 n.催产素 refer to sb/sth as sth:提及，谈及，说起

This concoction of chemicals does more than just boost our mood, it also can play a key role in decreasing stress and promoting relaxation. Oxytocin decreases cortisol, which is a stress hormone that is usually present (in high volumes) during times of anxiety, fear, panic, or distress.

n.(古怪或少见的)混合物，调和物 应激激素 n.皮质醇

3 According to BDSM and fetish researcher Dr. Gloria Brame, an orgasm is the biggest non-drug induced blast of dopamine that we can experience. By boosting the oxytocin and dopamine levels and subsequently decreasing our cortisol levels, the brain is placed in a more relaxed, euphoric, and calm state.

n.迷恋，癖 v.诱发(某种身体反应) a.极度兴奋的

Masturbation boosts your immune system

4 How do those effects on the brain from reaching orgasm translate to boosting our immune system and making our body healthier?

v.(使)转变，变为

The increase of oxytocin and dopamine that causes a decrease in cortisol levels can help boost our immune system because cortisol (well-known for being a stress-inducing hormone) actually helps maintain your immune system if released in small doses.

激素治疗

5 According to Dr. Jennifer Landa, a hormone-therapy specialist, masturbation can produce the right kind of environment for a strengthened immune system to thrive. A study conducted by the Department of Medical Psychology at the University Clinic of Essen (in Germany) showed similar results. A group of 11 volunteers were asked to participate in a study that would look at the effects of orgasm through masturbation on the white blood cell count and immune system.

白细胞计数 思考，考虑

6 During this experiment, the white blood cell count of each participant was analyzed through measures that were taken 5 minutes before and 45 minutes after reaching a self-induced orgasm. The results confirmed that sexual arousal and orgasm increased the number of white blood cells, particularly the natural killer cells that help fight off infections.

n.量，测量 a.自己造成的 自然杀伤细胞 抵抗，击退

The findings confirm that our immune system is positively affected by sexual arousal and self-induced orgasm and promote even more research into the positive impacts of sexual arousal and orgasm.

Masturbation can ease and prevent pain

7 The benefits of masturbation have long been debated, but the more research that is done on the topic, the more we understand that there are many positive reactions that happen in our bodies and brains when we orgasm.

v.经历性高潮

Orgasms can help prevent or mitigate pain, which boosts the immune system, preventing cold and flu symptoms. According to neurologist and headache specialist Stefan Evers, about one in three patients experience relief from migraine attacks by experiencing sexual activity or orgasm. Evers and his team conducted an experiment with 800 migraine patients and 200 patients who suffered from cluster-headaches to see how their experiences with sexual activity impacted their pain levels.

v.使缓和，使减轻 n.偏头痛 n.突然发作 丛集性头痛

8 The study showed that 60% of migraine sufferers experienced pain relief after participating in sexual activity that resulted in orgasm. Of the cluster-headache sufferers, about 50% said their headaches actually worsened after sexual arousal and orgasm.

Evers suggested that the people who did not experience pain relief from migraines of headaches during their sexual activity did not release as large amounts of endorphins as those who did experience pain relief. According to rheumatologist Dr. Harris McIlwain, people who suffer from chronic pain have immune systems that are simply not functioning at full capacity – therefore, alleviating pain (through orgasm, as an example) can help boost the immune system.

n.内啡肽(有镇痛作用) n.风湿病学专家 n.生产量，生产能力

9 Orgasms can also promote relaxation and make it easier to fall asleep. Serotonin (n.血清素，五羟色胺), oxytocin, and norepinephrine (n.去甲肾上腺素) are all hormones that are released during sexual arousal and orgasm, and all three are known for counteracting (v.抵制，抵消，抵抗) stress hormones and promoting relaxation, which makes it much easier for you to fall asleep.

10 There are several studies showing that serotonin and norepinephrine help our body cycle (v.循环) through REM (快速动眼睡眠) and deep non-REM (非快眼动睡眠) sleeping cycles. During these sleep cycles, the immune system releases proteins called cytokines (n.细胞因子), which target infection and inflammation (n.发炎，炎症). This is a critical part of our immune response. Cytokines are both produced and released throughout our bodies while we sleep, which proves the importance of a good sleep schedule to a healthy immune system.

Masturbation promotes a high-functioning immune system

11 The immune system is a balanced network of cells and organs that work together to defend you against (防御，保护，保卫) infections and diseases by stopped threats like bacteria and viruses from entering your system. While there are many things we need to do to keep our immune systems functioning at optimal levels, masturbation (or other means of achieving orgasm) has proven to have positive effects on the immune system as a whole (作为一个整体，总体上).

12 Just as bad habits (such as an inconsistent (a.反复无常的，没有常性的) sleep schedule or harmful chemicals in your body) can slow your immune system, positive habits (such as a healthy sleep schedule and active (a.定期进行的，活跃的) sex life) can help boost your immune system. ■

The Guardian

Opinion

5 Aug 2022 | 613 words | ★★★☆☆ ›

Accelerating global heating: follow the science

A new database of extreme weather studies makes clear how far policymaking is lagging behind the reality of climate chaos

A wildfire in Mafra, Portugal, last month. ‘Studies shows intense heatwaves, hurricanes, droughts and floods have been made far more likely by greenhouse gas emissions.’

The scientists behind a new database of more than 400 extreme weather attribution studies have performed an essential service. This piece of work, drawing together every study of this type, ought to galvanise a greater sense of urgency around policymaking and campaigning. It shows that intense heatwaves, hurricanes, droughts and floods have all been made far more likely by greenhouse gas emissions, which trap the sun’s heat and put more energy into weather systems. And it spells out the alarming unpredictability as well

as the extent of global heating's consequences.

Until the early 2000s, when the first attribution studies were published, it was harder to link CO_2 in the atmosphere with global heating's tangible effects. Thanks to a growing body of research, now we know. The record-breaking "heat dome" over north-western Canada and the US last summer would have been almost impossible without human-caused climate change. The same is true of heatwaves across the northern hemisphere in 2018, and in Asia in 2016.

Wildfires in Siberia in 2020 were made 80% more likely by global heating, while 90% of marine heatwaves are human-caused. An increased mortality rate is evident on every continent, with scientists estimating 100,000 deaths each year. Heating was a factor in the California drought of 2012-14 and the super-typhoon Haiyan in the Philippines. While extreme weather in China has been studied, far less research has been conducted in Africa and South America. Yet again, those parts of the world that are most exposed to climate change find themselves with the fewest resources to help them understand and address it.

"Beauty is truth, truth beauty," wrote the poet John Keats just over 200 years ago. When it comes to climate, truth can feel closer to terror these days. But scientists and leaders, including the UN secretary general, António Guterres, the former UN climate chief, Christiana Figueres, and the Cop26 president, Alok Sharma, are right to insist that the reality must be faced. Indeed, this is the only way to avoid the most catastrophic and tragic outcomes. In a new book, Hothouse Earth, Prof Bill McGuire argues that we have reached a stage when minimising dangers should be regarded as "climate appeasement".

Like the historical responsibility for carbon emissions, attitudes and experiences in the present crisis are unevenly and unjustly shared out. Billions of people around the world, and above all in the global south, are caught up day-to-day in a struggle for survival. This doesn't mean they don't recognise global heating; subsistence farmers and fishers are more directly exposed to environmental damage than anyone else. But western governments, businesses and people who are relatively shielded from global heating's worst effects

should recognise this as the privilege that it is.

With this year's Cop27 in Egypt fast approaching, western governments must follow through on their pledges of climate finance to enable a green transition in the developing world. The purpose of attribution science is not simply to warn the world about what is happening, but to aid preparations for what has not happened yet. The most alarming global trend, apart from still-rising emissions that mean we are on course for 2.5C of heating, is the unexpected speed with which it is already causing chaos. Given what we now know about the impact of 1C of warming, it is no exaggeration to say that this trajectory is not only suicidal but murderous.

But alternatives exist, and insisting on this point has never been more important. Ms Figueres, who delivered the Paris agreement, called this week for a "sprint toward the light". The alarming findings of attribution scientists can give rise to desperation – but must not be allowed to extinguish determination and hope. ■

POPULAR SCIENCE

扫码听音频 新英文课堂

Health

AUG 9, 2022 | 428 words | ★★★☆☆ ›

Are participation trophies good for kids?

There are pros and cons 利与弊 to handing out 分发，散发 medals to children who haven't actually won anything.

honor sb. for sth.

1 AT THE END of many sports tournaments and spelling bees 单词拼写比赛, all the contestants are honored v.给...荣誉，表彰，表扬 for their effort—even the kid who sat in the outfield n.(棒球、板球等体育运动的)外场 picking dandelions n.蒲公英 or got tongue-tied a.(因感到紧张等)张口结舌的 at the mic abbr.麦克风. But in a world where not everyone can be a winner, does getting a consolation prize 安慰奖，鼓励奖 actually boost a child's self-esteem?

2 Participation awards have been around ad.存在着 for at least 100 years, but lately they have come under fire 受到严厉(猛烈)批评(用于新闻报道)—perhaps most notably when Pittsburgh Steelers 匹兹堡钢人 linebacker n.(美式橄榄球的)线卫，中后卫 James Harrison returned his sons' trophies in 2015—for creating entitled a.(认为天生应该)有特权或特殊待遇 youth who lack drive n.干劲，魄力. Yet that's exactly the opposite of what these medals do for little ones, says Illinois 伊利诺伊州-based psychologist

and parenting coach Emily Pagone.

3 When toddlers, preschoolers, and kindergartners compete, they don't know the expectations adults have for them, Pagone says. Offering them a trophy or medal as a form of positive reinforcement can highlight the skills that the losers demonstrated and reinforce the sportsmanship that all the players displayed.

n.学步的儿童 n.幼儿园学童 正强化 n.体育精神

4 But what really makes a participation award worthwhile is the conversation that comes with it. "As the caregivers around the children acknowledge their abilities, talents, and strengths, that's the compass for how children learn about the expectations of the situation," Pagone says. Pointing out what kids do well can also build their self-confidence.

n.(小孩或病人的)看护者，护理员 n.指南针，罗盘

5 Still, there is one problem with this system: It creates a feedback loop of external validation and extrinsic motivation, driven by superficial perks and praise. It's valuable for students to play soccer not only because they're seeking tokens to decorate their rooms, but also because they enjoy the sport. They won't always get prizes for doing their best, so it's crucial to build an inner desire to push through in challenging times.

反馈回路 n.验证 a.外来的，无直接联系的 n.(工资以外的)额外收入(待遇),津贴 n.象征，标志；纪念品 (在困难、挫折的情况下)继续进步，继续前进

6 For this reason, Pagone recommends transitioning away from participation awards around kindergarten or first grade. But not all experts agree that's best. Positive reinforcement can also benefit older kids and adults, keeping them coming back to their hobby even after a tough practice or season, says Kelly LaPorte, clinical director of Naperville Counseling Center in Illinois. That lesson of celebrating the effort and not just the outcome remains important throughout a person's life.

v.过渡，转变 n.(每年某事通常发生的)季节 a.临床的 v.赞扬，赞美

7 Trophies and medals for preteens and teens should also be paired with conversations—particularly to prepare them to deal with loss. Sometimes this means letting them take a five-minute walk to calm down after a match. Other times it just requires allowing them to vent or asking them about their feelings. A "perfect world" would include participation awards for kids, LaPorte says, and postgame reflections with caregivers and coaches. ■

n.十一二岁的儿童 v.配对，搭配 v.发泄，宣泄(怒火、仇恨等) a.赛后的，赛后发生的 n.深思，仔细考虑

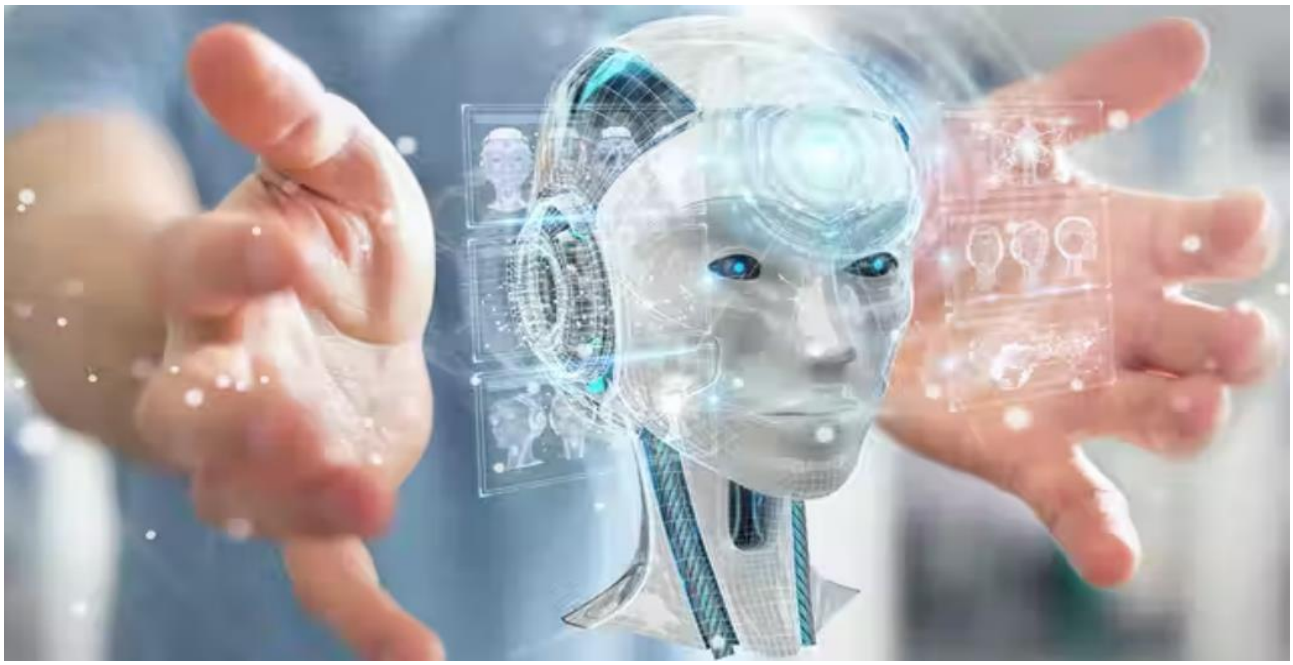
THE CONVERSATION

Global

July 19, 2022 | 865 words | ★★★☆☆ ›

Push for AI innovation can create dangerous products

Companies develop AI to gain an advantage over their competition, but this results in flawed products entering the market.



This past June, the U.S. National Highway Traffic Safety Administration announced a probe into Tesla's autopilot software. Data gathered from 16 crashes raised concerns over the possibility that Tesla's AI may be programmed to quit when a crash is imminent. This way, the car's driver, not the manufacturer, would be legally liable at the moment of impact.

It echoes the revelation that Uber's self-driving car, which hit and killed a woman, detected her six seconds before impact. But the AI was not programmed to recognize pedestrians outside of designated crosswalks. Why? Because jaywalkers are not legally there.

Some believe these stories are proof that our concept of liability needs to change. To them, unimpeded continuous innovation and widespread adoption of AI is what our society needs most, which means protecting innovative corporations from lawsuits. But what if, in fact, it's our understanding of competition that needs to evolve instead?

If AI is central to our future, we need to pay careful attention to the assumptions around harms and benefits programmed into these products. As it stands, there is a perverse incentive to design AI that is artificially innocent.

A better approach would involve a more extensive harm-reduction strategy. Maybe we should be encouraging industry-wide collaboration on certain classes of life-saving algorithms, designing them for optimal performance rather than proprietary advantage.

Every fix creates a new problem

Some of the loudest and most powerful corporate voices want us to trust machines to solve complex societal problems. AI is hailed as a potential solution for the problems of cross-cultural communication, health care and even crime and social unrest.

Corporations want us to forget that AI innovations reflect the biases of the programmer. There is a false belief that as long as the product design pitch passes through internal legal and policy constraints, the resulting technology is unlikely to be harmful. But harms emerge in all sorts of unexpected ways, as Uber's design team learned when their vehicle encountered a jaywalker for the first time.

What happens when the nefarious implications of an AI are not immediately recognized? Or when it is too difficult to take the AI offline when necessary? Which is what happened when Boeing hesitated to ground the 737 Max jets after a programming glitch was found to cause crashes — and 346 people died as a result.

We must constantly reframe technological discussions in moral terms. The work of

technology demands discrete, explicit instructions. Wherever there is no specific moral consensus, individuals simply doing their job will make a call, often without taking the time to consider the full consequences of their actions.

Moving beyond liability

At most tech companies, a proposal for a product would be reviewed by an in-house legal team. It would draw attention to the policies the design folks need to consider in their programming. These policies might relate to what data is consumed, where the data comes from, what data is stored or how it is used (for example anonymized, aggregated or filtered). The legal team's primary concern would be liability, not ethics or social perceptions.

Research has called for taking an approach that considers insurance and indemnity (responsibility for loss compensation) to shift liability and allow stakeholders to negotiate directly with each other. They also propose moving disputes over algorithms to specialized tribunals. But we need bolder thinking to address these challenges.

Instead of liability, a focus on harm reduction would be more helpful. Unfortunately, our current system doesn't allow companies to easily co-operate or share knowledge, especially when anti-trust concerns might be raised. This has to change.

An investigation by the National Highway Traffic Safety Administration found that Tesla's autopilot function turned off in advance of an imminent collision.

Re-thinking the limits of competition

These problems demand large-scale, industry-wide efforts. The misguided pressures of competition pushed Tesla, Uber and Boeing to release their AI too soon. They were overly concerned with the costs of legal liability and lagging behind competitors.

My research proposes the somewhat counter-intuitive idea that the ethical positions a corporation takes should be a source of competitive parity in its industry, not a competitive advantage. In other words, a company should not stand out for finding ethical ways to run its business. Ethical commitments should be the minimum expectation required of all who compete.

Companies should compete on variables like comfort, customer service or product life, not on whose autopilot algorithm is less likely to kill. We need an issues-based exemption to competition, one that is centred around a particular technological challenge, like autonomous driving software, and guided by a shared desire to reduce harm.

What would this look like in practice? The truth is that more than 50 per cent of Fortune 500 companies already use open-source software for mission-critical work. And their ability to compete has not been stifled by giving up on proprietary algorithms.

Imagine if the motivation to reduce harm became a core target function of technology leaders. It would end the incentive individual firms currently have to design AI that is artificially innocent. It would shift their strategic priorities away from always preventing imitation and towards encouraging competitors to reduce harm in similar ways. And it would grow the pie for everyone, as customers and governments would be more trusting of technology-driven revolutions if innovators were seen as putting harm reduction first. ■

FAST COMPANY

Impact

August 10, 2022 | 764 words | ★★★☆☆ ›

The worst idea in food? Expiration dates

Food labels with hard expiration dates are rarely necessary, poorly designed, and cause excess food waste. So supermarkets are beginning to remove them.

Before ending up on a European supermarket shelf, an avocado has effectively emitted 1.3 kilograms of carbon into the atmosphere. Its production alone consumes 60 gallons of water. Despite this, the fruit will often be discarded as household waste.

Wastage occurs at each stage of the food supply chain, but household food waste is one of the most significant. British households waste an estimated 6.7 million tonnes of food each year, amounting to approximately 32% of all purchased food items.

Household food waste is also notoriously difficult to manage. Studies show that consumers often both fail to understand the environmental consequences of food waste, and are rarely held accountable for it.

HOUSEHOLD FOOD WASTE IS THE RESULT OF MISMANAGEMENT

Much of this wastage is avoidable and the food may have been eaten had it been better managed. This has prompted Waitrose to join a growing number of food retailers in removing date labelling, such as the “use-by” or “best-before” date, from some fresh food items in an attempt to reduce household food waste.

Past studies have confirmed the importance of date labelling on consumers’ decision making. Almost 60% of western European consumers surveyed said they “always” check date labels while purchasing a food item or preparing a meal.

But the routine application of date labelling has long come under criticism. A recent study attributed consumers’ failure to understand the application of date labelling to an increased likelihood of irrational decision making. Indeed, research has shown that consumers commonly reject edible, but date-expired food, rejecting up to 56.7% of such food on average.

The Institute of Food Technologists additionally question whether date labels are an accurate measure of food safety anyway, as post-packaging temperature control cannot be assured.

The removal of date labelling is therefore a promising start. Without date labels, often dubious information that may interfere with the consumers perception of what is edible, is removed. Instead, consumers are encouraged to sense-check fresh food items.

In the case of an avocado, the advice given to consumers is that when ripe, it should have a “pleasant and slightly sweet aroma”, whilst the skin should be “dark green or brown”. Information is also provided on how an avocado should look, taste, and feel when “overripe”.

It is hoped that a better informed consumer will be less likely to blindly discard food due to a lapsed date.

The Waste and Resources Action Programme (WRAP) predict that approximately 50,000 tonnes of food waste could be avoided each year in the UK if date labels were removed from just apples, bananas, potatoes, cucumber and broccoli.

SHOULD RETAILERS BE DOING MORE?

Despite growing momentum in date label removal, industry stakeholders remain insistent that retailers are duty-bound to do more.

Some research suggests that retailers should also explore alternative ways of expressing labelling to better meet consumers' informational needs. Re-scripted date labels such as "best before, often good after" may encourage the acceptance of "date-expired" foods in the knowledge that the item remains safe to consume.

Encouraging people to buy appropriate amounts of food items is also an effective way of reducing food waste. Supermarkets are being placed under increasing pressure to sell loose products. WRAP forecast considerable waste reductions should this be implemented nationwide.

CHANGING THE BEHAVIOR OF CONSUMERS

Gradually changing ingrained consumer behavior, through long-term awareness campaigns is often considered key to reducing food waste. Commercial campaigns and targeted community outreach programs can contribute to a greater understanding of the science behind date labels. They can also encourage consumers to source food locally and participate in urban farming schemes.

A pilot study at the University of Sussex analyzed fruit and vegetable yields from 34 urban allotments. They found that urban growers were able to grow one kilogram of fruit and vegetables per square meter, a yield within the range of a conventional farm.

Changing consumers' perceptions through innovative social and commercial initiatives, also represent increasingly popular food waste reduction strategies. Downloadable meal planning and smart shopping tips both encourage responsible shopping practices.

Fresh food box schemes which supply precise quantities of ingredients for specific dishes also substantially reduces household food waste. The Wuppertal Institute reports that HelloFresh meals generate 51% less food waste than non-HelloFresh meals.

While the removal of date labels indicates a growing desire to reduce food waste, it is effective only if consumers are supported with better information and encouraged to simultaneously adopt more sustainable shopping practices. While changing dietary culture and consumer behaviours towards greater sustainability is an arduous process, it is a necessary one as we transition towards greater responsibility in food waste management. ■

The Economist

Science & technology

Aug 11th 2022 | 709 words | ★★★★☆ ›

The brain at work

How thinking hard makes the brain tired

A neurometabolic account

Physical labour is exhausting. A long run or a hard day's sweat depletes the body's energy stores, resulting in a sense of fatigue. Mental labour can also be exhausting. Even resisting that last glistening chocolate-chip cookie after a long day at a consuming desk job is difficult. Cognitive control, the umbrella term encompassing mental exertion, self-control and willpower, also fades with effort. But unlike the mechanism of physical fatigue, the cause of cognitive fatigue has been poorly understood.

Previous accounts were incomplete. One of the most widely known, the biological one,

draws from what is known about muscular fatigue. It posits that exerting cognitive control uses up energy in the form of glucose. At the end of a day spent intensely cogitating, the brain is metaphorically running on fumes. The problem with this version of events is that the energy cost associated with thinking is minimal. One analysis of previous studies suggests that cognitively overworked and "depleted" brains use less than one-tenth of a Tic-Tac's worth of additional glucose.

If cognitive fatigue is not caused by a lack of energy, then what explains it? A team of scientists led by Antonius Wiehler of Pitié-Salpêtrière University Hospital, in Paris, looked at things from what is termed a neurometabolic point of view. They hypothesise that cognitive fatigue results from an accumulation of a certain chemical in the region of the brain underpinning control. That substance, glutamate, is an excitatory neurotransmitter that abounds in the central nervous systems of mammals and plays a role in a multitude of activities, such as learning, memory and the sleep-wake cycle.

In other words, cognitive work results in chemical changes in the brain, which present behaviourally as fatigue. This, therefore, is a signal to stop working in order to restore balance to the brain. In their new paper in *Current Biology*, the researchers describe an experiment they undertook to explain how all this happens.

To induce cognitive fatigue, a group of participants were asked to perform just over six hours of various tasks that involve thinking. Half were assigned easy things to do and half hard ones. For example, in one task, letters were displayed on a computer screen every second or so. Those in the easy group had to remember whether the current letter matched the previous letter or, for the hard group, the one shown three letters earlier.

Periodically, throughout the experiment, participants were asked to make decisions that could reveal their cognitive fatigue. They might be asked whether they would want to earn €50 ($52) for cycling on an exercise bike for 30 minutes at power level six (a high-cost, high-reward task) or €37 for 30 minutes at power level two (low-cost, low-reward). Participants who were assigned the more challenging cognitive-control tasks were more

likely to opt for the low-cost, low-reward options, especially towards the end of the six hours. In addition, the hard-task participants invested less effort in making that decision. Their eyes were the clue. The pupil initially constricts when participants are shown the two options. The time it takes for the pupil to subsequently dilate reflects the amount of mental exerted. The pupil-dilation times of participants assigned hard tasks fell off significantly as the experiment progressed.

During the experiment the scientists used a technique called magnetic-resonance spectroscopy to measure biochemical changes in the brain. In particular, they focused on the lateral prefrontal cortex, a region of the brain associated with cognitive control. If their hypothesis was to hold, there would be a measurable chemical difference between the brains of hard- and easy-task participants. And indeed, that is what they found. Their analysis indicated higher concentrations of glutamate in the synapses of a hard-task participant's lateral prefrontal cortex. Thus showing cognitive fatigue is associated with increased glutamate in the prefrontal cortex. Dr Wiehler speculates that this is the result of a mechanism in the brain that is computing a sort of cost-benefit analysis, with fatigue and increased glutamate adding to the cost of mental effort.

There may well be ways to reduce the glutamate levels, and no doubt some researchers will now be looking at potions that might hack the brain in a way to artificially speed up its recovery from fatigue. Meanwhile, the best solution is the natural one: sleep. ■

Bloomberg

Opinion

May 18, 2022 | 559 words | ★★★☆☆ ›

Is Carbon Removal Finally Getting Serious?

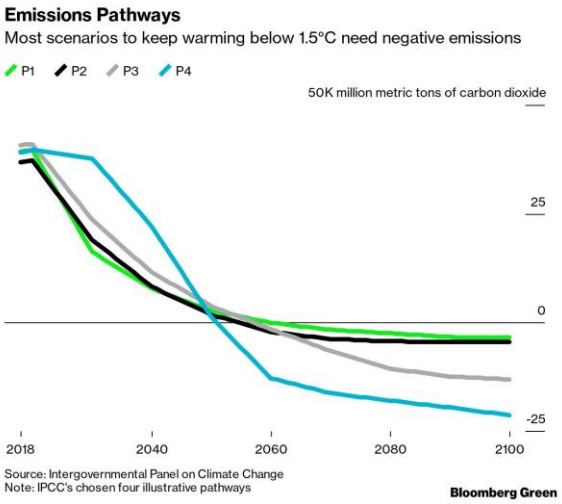
In a field long plagued by hype and high costs, new startups are showing real promise.

The question is whether they can scale up in time.

It's a start.

Fitfully, fretfully, the world is beginning to decarbonize. Fossil-fuel demand is likely to peak in the next few years. Solar and wind energy are growing ever cheaper. Related technology, such as battery storage, has improved dramatically. In its most recent report, the Intergovernmental Panel on Climate Change cited "signs of progress" — by its standards, an expression of effusive optimism.

Unfortunately, this progress won't be enough on its own. Averting the worst-case climate scenarios will likely require not just reducing emissions but also removing huge quantities of carbon from the atmosphere — some 21.5 billion tons of it by 2050, according to BloombergNEF. As things stand, carbon removal is costly, inefficient and difficult to scale. Yet promising new technologies provide reason for optimism. Governments can do more to help them succeed.



As Bloomberg Businessweek recently reported, startups are pitching intriguing new ideas. Climeworks wants to trap carbon in a specialized filter, mix it with water, and pump it safely underground. Verdox Inc. hopes to capture emissions using an inventive electrochemical process. Meanwhile, Heirloom Carbon Technologies plans to heat up carbonate minerals to accelerate their natural absorption of carbon dioxide. Others hope to use kelp, bio-oil, advanced reforestation techniques and more.

All these efforts face an acute problem: No one wants to buy this stuff. Philanthropists and government agencies have long offered prizes for various carbon-removal benchmarks. And inchoate efforts are underway to turn stored carbon dioxide into something economically useful. Yet none of these efforts amounts to a sustainable business.

That, too, may be about to change. In April, a group of tech companies committed to $925 million in advance market purchases of removed carbon over the next nine years. Known as Frontier, the effort will prioritize projects that can store carbon for 1,000 years and have a plausible path to remove half a gigaton a year by 2040, at less than $100 per ton.

This approach has several advantages. Unlike a prize, market commitments could lead to viable business models, encouraging scientists, entrepreneurs, lenders and investors to

enter the field in pursuit of profit. Setting simple qualification parameters should also allow for maximal competition among ideas, methods and technologies, and hence reward creativity and innovation.

In time, Frontier expects more companies and philanthropies will help expand this market. But governments too should take notice: A major public market commitment could have a huge impact. It would signal demand without requiring policy makers to commit to any particular technology. At the same time, it could turbocharge competition by offering higher prices for greater efficiencies.

A similar model worked wonders for vaccines. In 2007, a group of governments joined forces with the Gates Foundation and pledged $1.5 billion in advance commitments for pneumococcal vaccines for low-income countries. With a market established, pharmaceutical companies competed to provide 10-year supplies of a given shot on set terms. The effort led to three new vaccines, helped 150 million kids get immunized, and saved perhaps 700,000 lives.

The carbon conundrum is no less urgent. In time, companies may devise cleverer ways to commercialize removed carbon, rendering advance commitments moot. Perhaps the $12 billion Congress pledged to the technology in last year's infrastructure bill will lead to a breakthrough. Maybe green-energy investment will yield much faster emissions reductions than expected. But for now, an all-of-the-above approach makes sense — and harnessing the magic of competition can only help. ■