

# Long read: Cultural evolution, Covid-19, and preparing for what's next

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In 2015, in the wake of the West African Ebola epidemic, Bill Gates issued a warning (summarised in a TED Talk): Of the killers that could claim 10 million or more lives, the most likely was an epidemic. After any event, it is easy to point to those who predicted it, ignoring all those who predicted other possible futures or warned us of other possible dangers—the classic problem of selection bias. But it is also true that the Covid-19 pandemic caught us with our proverbial pants down. The pandemic thrusts many puzzles of scientific importance into practical public relevance: Why are institutions failing, even at a personnel level, with prime ministers succumbing to the sickness? Why are some governments doing better than others? Why are people in some countries ignoring advice, such as social distancing, until enforced or until they have direct experience with the illness, while rates of compliance are much higher in other countries? Why do many countries seem slow to learn the lessons offered by other countries? And behind all these, are we making optimal trade-offs on the short- and long-term costs of our decisions?

To some of these questions, the scientific community has quickly responded with working papers ranging from epidemiological models of the effects of different response strategies to large behavioural science reviews of relevant evidence. Here I attempt to put this pandemic into the context of human and cultural evolution, discuss what we can learn and how we may better prepare for challenges that lay ahead.

At the heart of our ability to prepare or react appropriately to events such as a pandemic are the protocols, rules, and norms of our institutions and the beliefs and behaviours of individuals. How we behave is shaped by millions of years of genetic evolution, thousands of years of cultural evolution, and our short lifetime of experience. For example: Genetically evolved protective behaviours such as instinctive disgust that may form part of a behavioural immune system. Culturally evolved predispositions that are often clustered as collectivism, authoritarianism, or a tendency to conform. Culturally evolved adaptive norms of behaviour and belief, codified into rules and taboos, laws and constitutions—our institutions. And our short lifetime of experience, learned through rewards and punishment. *Dual Inheritance Theory* and cultural evolution offer theoretical frameworks for thinking about the interplay between these forces.

*“when we face a novel challenge that does not exist in the memories of anyone alive nor in the protocols, rules, and taboos of our institutions, we flounder.”*

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### **The role of causal understanding in behaviour**

One key insight from cultural evolution is that our behaviour is rarely a function of causal understanding. Cultural evolution explains how our species creates and thrives in a world too complicated for any of us to understand. For at least the last 50,000 years and probably longer, we have lived in a world of accumulated technology, know-how, and ways of thinking that surpass the abilities of even the smartest among us—cumulative culture. Our lack of causal understanding is masked by an illusion of explanatory depth: we assume we understand and have reasonable causal models for our beliefs, behaviours, and technology. That illusion is shattered only when we're asked to explain specifics. For example, you may have some sense that you understand: (a) how a flushing toilet works, until you're asked how the water flushes everything away and returns to the same level; (b) how a wine bottle works, until you're asked why it has a punt on the bottom; or (c) why you should complete your course of antibiotics, until you're asked why since not all bacteria will die, surely that would not just increase the selection pressure evolving more antibiotic resistant bacteria. All of this is to quickly illustrate that the world is not only complicated, but even more complicated than our psychology allows us to believe. Instead, our beliefs and behaviours are shaped by our incentives and by those around us. We prefer to believe things that align with our self-interest and we internalise the beliefs and copy the behaviours of those who are successful or those who others copy. As this process filters beliefs and behaviours over generations, most people acquire the accumulated package of past successes, and so conforming to the majority also becomes a successful strategy.

We often believe without direct experience—many WEIRD (western educated industrialised rich and democratic) citizens believe that germs and not spirits make them sick, despite never having seen a germ and only possessing a vague understanding of viruses and bacteria. Sometimes we believe things that violate our direct experience—

many WEIRD citizens believe the Earth is a spheroid rotating around a star, despite their direct experience of a flat Earth with a sun tracing the sky from East to West. The point is not that these beliefs are wrong, but that they are vicariously acquired without a deep understanding by most people. We hold these beliefs and act in corresponding ways (such as washing our hands) because the people around us that seem the smartest and most successful, and indeed, most people, also hold these beliefs. We do not hold these beliefs because we have direct access to the truth or are able to verify them. A child born to Guarani parents in South America may acquire very different beliefs about spirits causing illness or a flat Earth covered by concentric planes, but the WEIRD child and the Guarani child acquire their different beliefs and behaviour through the same human social learning psychology.

But as experiments and ethnographic work reveal, we typically do not need to understand causal relationships to benefit from a well-functioning package of appropriate beliefs and behaviours, prescriptions and proscriptions. We can instead rely on what others around us believe and do, or turn to our institutions for guidance. Institutions are adaptive beliefs and behaviours codified and hardened into protocols, rules and taboos, sometimes written down as laws and constitutions. But ultimately these are all a product of past experiences—we do not readily innovate novel solutions, because we do not typically rely on causal understanding. And so, when we face a novel challenge that does not exist in the memories of anyone alive nor in the protocols, rules, and taboos of our institutions, we flounder.

There are, of course, other aspects of our genetically and culturally evolved psychology that challenge our intuitive understanding of a pandemic. For example, our lack of intuitions for exponential functions may help explain why citizens and even leaders in many countries underestimate the danger posed by the novel coronavirus until numbers are too high to manage. Exponential growth is not intuitive as revealed by (a) item 3 from the Cognitive Reflection Test, “In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?” [answer below]; (b) the classic story of the court advisor who lost his head by requesting a chessboard with a grain of wheat on the first square and doubling the grains on every subsequent square [answer below]; or (c) the magic of compound interest, allegedly summarised by Benjamin Franklin as “Money makes money. And the money that money makes, makes money”.

*“collectivist cultures may have evolved a suite of behaviours that are well adapted to epidemics”*

Curiously, the non-intuitiveness of exponential functions may be a WEIRD phenomenon. WEIRD kindergarteners and the indigenous Mundurucu Amazonians with no formal education both place numbers on a number line logarithmically, with 3 estimated as halfway to 10. By fourth grade, WEIRD children use a linear number line estimating 5 as

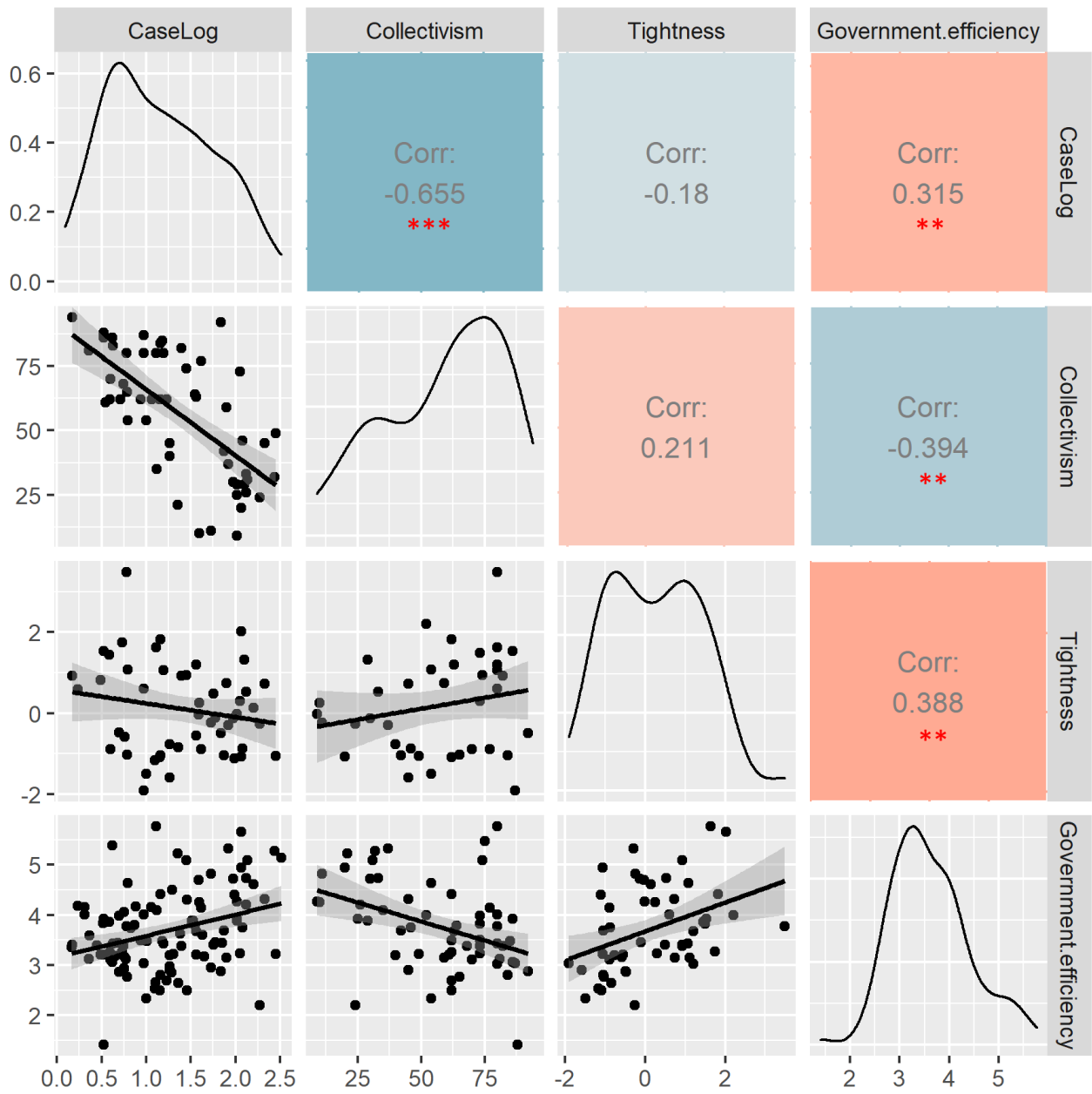
halfway to 10. It is also worth noting that epidemics, like many growth functions in biology, follow a logistical growth function, which initially grows exponentially and then slows down, creating an S-shape.

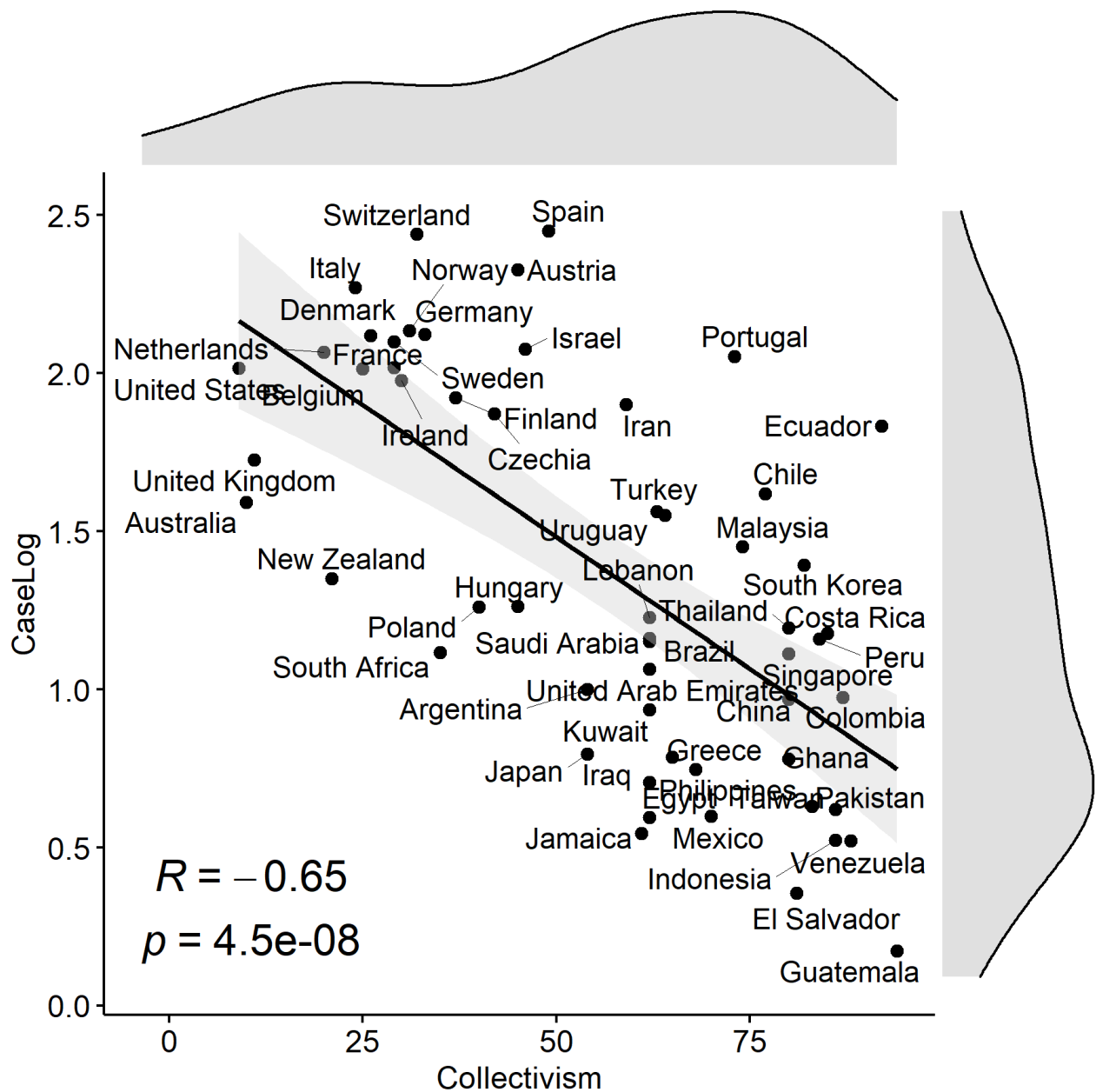
But just as we do not need to truly understand germ theory to benefit from it—instead vicariously acquiring the belief in germs and benefits from corresponding behaviours (washing your hands after toilet use or before eating) because those around us believe it and act in ways that are consistent with a sincere belief in germs. We can benefit from pandemic-appropriate behaviours without understanding exponential functions. But this requires those adaptive beliefs and behaviours to be embedded in the population, which in turn requires past exposure to similar challenges.

### **The role of culture in behaviour**

A recent analysis suggests that countries with efficient governments and tight, norm-enforcing cultures have the slowest rate of increase in Covid-19 cases adjusted for population size and the fewest deaths controlling for GDP per capita, inequality, and median age, weighting for time. Together, these explain 41% of the variance. Put another way, societies with institutions that advocate behaviours that reduce caseloads and citizens who conform to those behaviours are successful in managing this outbreak. Countries with institutions with behaviours that do not reduce caseloads and citizens who conform, and countries with institutions who advocate appropriate behaviours, but citizens who do not conform have worse outcomes. In addition to general government efficiency and a tendency to enforce norms, past research has implicated a package of behaviours classed as “collectivism” as having evolved as an adaptation to material insecurity, including pathogen prevalence, and other pressures that required avoiding individualistic behaviours that threatened the group welfare or challenges that required collective action. That is, collectivist cultures may have evolved a suite of behaviours that are well adapted to epidemics: less mouth-to-mouth romantic kissing and physical affection in general, more vigilance of others, even in-group members, social learning, conformity, obedience to authority, avoidance orientation, and so on. Indeed, a quick and dirty re-analysis of Gelfand et al’s models replacing tightness with collectivism, shows that collectivism alone predicts 36% of the variance, and together with the controls, predicts 48% of the variance (see Table 1). The effects are robust to the inclusion of fixed effects for regional identifiers (continents; see Table 2). The relationships between these variables is plotted in Figure 1. We include these analyses of the available data, but for a number of reasons we should be skeptical of both the preliminary analysis presented here and the Gelfand et al. paper on which it is based (e.g. countries may differ in the accuracy of their case data, the model itself ignores the epidemiological processes, assumption checks have not been performed, etc).

**Figure 1. Top: Correlation between collectivism and log of case trajectory adjusted for population size. Bottom: Correlation between collectivism and log of case trajectory adjusted for population size. Data to March 30, 2020.**





Please see the regression tables [here](#). Code available [here](#).

*“a higher value on individual freedom... may lead to inaction until the epidemic touches the individual’s own life”*

During non-epidemic times, there may be a cost to collectivist strategies, such as innovations that are more incremental than revolutionary, but collectivist societies are well suited to managing epidemics that require coordination. In contrast, in many individualist countries, governments may struggle to keep people away from bars and beaches. In these countries, people are still relying on social learning cues, which may lead to, for example, toilet paper shortages. But a higher value on individual freedom plus approach orientation may lead to inaction until the epidemic touches the individual’s own life (such as sickness or death of those they know), by which time social controls are far less effective. People have made people sick. And the people that people

made sick, made people sick. Without counteracting cultural pressures, the incentives are aligned with ignoring advice that jeopardises enjoyment and livelihood, which can lead to the perfect conditions for cognitive dissonance.

Moreover, individualist societies are also individualist, because they are fairly fault tolerant. These conditions lead to more approach-oriented entrepreneurs, which means more revolutionary innovation even when most businesses fail. In many WEIRD societies, people have been able to make mistakes and ignore advice and still turn out relatively ok. Other societies are nations of Tiger Mums and citizens who are more avoidant in orientation, more reliant on those around them and more conformist to each other and to authorities. You stick to the successful script because the bottom of your society is not just barely surviving, it is not surviving at all. These societies are more resistant to change, but when they change, the change may be faster. The WEIRD strategy works in a fault-tolerant society, like stock pickers in a bull market who feel overconfident in their own abilities. But like those same stock pickers in a bear market, the strategy works until it doesn't. Similarly, our institutions are fairly well functioning under normal circumstances—the circumstances to which their procedures and protocols have evolved. But there is no reason to believe institutions will function well under novel circumstances.

### **Problems and solutions**

We are in unknown territory and there are important scientific questions that are also now of urgent practical importance. The need to make decisions under novel circumstances underscores the importance of mechanistic, causal models and theory from first principles in addition to evidence and strong tests of theory. It can be difficult to know the bounds of atheoretical evidence—for example, “behavioural fatigue” was cited as a reason to delay social distancing in the United Kingdom, but we cannot know how tolerant people are of a lockdown during a pandemic unless we have a good theoretical understanding of what drives their tolerance. We cannot look to evidence alone, such as cases and deaths in other countries, without also mechanistically understanding the epidemiology and behaviour, and the circumstances and policies leading to their curves. Even if the evidence were reliable, to look to the evidence alone would be like predicting the position of a planet based on where it was last time—you need both the mechanics and the data.

In the cacophony of opinions on the COVID-19 crisis, how do people deploy their many social learning strategies to decide whom to listen to? How do we identify who has relevant expertise if we're listening to experts at all? Are the learning strategies themselves learned? What is the role of trust, costly and sincerity displays? And how does a psychology evolved for vicarious information acquisition with little direct access to the truth, nor sufficient causal models, interact with a world in which evidence is easily manufactured and electronically disseminated? How do we decide which fact checkers to trust and how do we know what is and isn't so?

*“... anyone not working at the forefront of the data and models is guessing based on gut feeling, self-motivated reasoning, and/or a socially-acquired sense for the right answer...”*

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There is a lot we do not know and important trade-offs to be discussed at both a population and individual level. For example, there are decisions about how much loss of life is tolerable and that answer may differ between societies and between people within societies. The virus poses a different probabilistic danger to different demographics and a significant lockdown comes with a significant cost borne by all, but particularly the young—those beginning or building their livelihoods. Even putting the question of preferences aside for a moment, optimising for lives saved (or some kind of quality-adjusted life years) is a complicated trade-off on the demographic adjusted death rate and potential lifelong harm, under different levels of burden on the healthcare system, (including inability to treat other treatable illnesses due to lack of capacity) against the economic cost of a lockdown.

Beyond money, that economic cost includes well-being spillovers such as increased divorces, depression, and domestic violence in the short term and the effects of a recession or depression in the long term, all of which affect the death rate (or quality-adjusted life years). And, of course, the tradeoff may be different for different people. A lockdown may be worse than the risk of the coronavirus for young, healthy, low-income people who cannot work from home, but the reverse may be true for older, sicker, high-income people who can. In poorer countries, people may die of hunger before they die of the disease.

But decisions need to be made under incomplete data and no decision will be optimal for everyone. The current consensus is that a lockdown is preferable overall, but that answer will change as more relevant information emerges (e.g. actual death rate, how the virus operates, probability of a successful vaccine, ongoing cost of the lockdown, and so on).

Opinions abound, but anyone not working at the forefront of the data and models is guessing based on gut feeling, self-motivated reasoning, and/or a socially-acquired sense for the right answer, because even those at the forefront of the models and information are working with an incomplete dataset. Even as scientists, it's worth remembering that we each understand a small sliver of the world. We all suffer from the knowledge illusion and Gell-Mann amnesia: we read a popular article reporting on a topic close to our area of expertise and are exasperated or amused at the many errors. But when we click on the next link about other topics, we assume they're somehow more accurate. With the opening of the next tab, we've forgotten the experience. Making correct decisions will require our collective expertise.

## **Thinking with our collective brains**



Evolution can take place through the competition between different cultural traits, clustered in cultural-groups (note these are groups of cultural traits embodied by people rather than groups of people—people belong to multiple overlapping and embedded cultural-groups). Different countries, states, or cities are like laboratories testing different strategies, which can be copied if successful. When we let fields of flowers bloom, we can see which fields and which flowers fare best. But sharing of accurate information is critical to evolving appropriate rules and behaviours. These can be impeded when lower-scales of cooperation (such as the city, state, or nation) undermine higher scales (such as the state, nation, or world respectively)—alignment of incentives at different scales is critical.

But evolution can be slow, and rapid response requires a more directed approach, even if we benefit from trying many different directed approaches. Understanding the behaviour of the virus and potential human costs requires epidemiologists and others in the medical community. Understanding the economic costs, including how these translate to human costs, requires epidemiologists to work with economists. Analysing the data in ways that reveal reliability and insights requires them to work with data scientists. Translating those trade-offs into appropriate behaviour and conveying that to the public requires them to work with public health and behavioural scientists. And bridging the misunderstandings between disciplines requires those who work at the intersection of disciplines to work as translators. Only by creating conditions in which diverse cultural-groups can attempt different strategies that search through the space of solutions, but also creating conditions in which accurate data, strategies, failures and solutions are shared, can we hope to maximise the potential of our collective brains.

*“... populists and parochial isolationists always exist, but may find themselves handed a microphone during times of slowed growth or resource scarcity.”*

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### **Challenges ahead**

We have lived in one of the most peaceful and prosperous periods in history, but understanding the mechanisms for this long peace is crucial to knowing if that peace will persist. For example, if peace is a product of a civilising process launched by a discovery of Enlightenment values, then ensuring that these values are continued to be passed down may be sufficient to ensuring that the long peace continues. On the other hand, Enlightenment thinkers like Kant gave us ideas like “Freedom is the alone unoriginated birthright of man, and belongs to him by force of his humanity”, but also ideas like “Humanity is at its greatest perfection in the race of the whites”. By what process do we retain and celebrate the former, but reject and repudiate the latter?

An alternative cultural evolutionary explanation is one that requires little knowledge of the effects of different beliefs, but instead allows for successful beliefs to persist through selective learning from successful believers. One mechanism that would create a downward trend in violence is a process of cultural-group selection whereby people

cooperate within larger groups as they discover new mechanisms of cooperation. And discovering these mechanisms and sustaining cooperation may require sufficient resources that larger more cooperative groups can access by working together. For example, increased resource availability, fuelled by the fossilised energy released from burning millions of years' worth of dead organisms, could create the necessary conditions for shoving us into a positive-sum world. But by this account, there is peace *within* larger cultural-groups, but there is not necessarily peace *between* these larger cultural-groups. That is, cultural-group selection predicts a downward trend in violence, interrupted by occasional large spikes: when the scale of cooperation is greater, so too is the potential scale of conflict. Rather than tribes against tribes or even nations against nations, we have coalitions of nation-states against coalitions of other nation-states, each bound by a common religious and cultural history. Cultural-group selection makes a different prediction: the world is more peaceful, but also more dangerous.

Cultural-group selection can help explain how lower scales of cooperation are suppressed, such that higher scales can flourish. For example, institutions supporting larger-scale cooperation can arise and outcompete lower scales of, for example, kin-based cooperation, when there are sufficient resources to be gained and shared by the larger institution. Slowed growth or limited resources would threaten this progress and lead to lower scales of cooperation.

Indirect evidence for this logic comes from studies using the “joy of destruction”, whereby participants are offered an endowment that they can use to remove money from another’s endowment at some cost to themselves (e.g. pay \$2 to remove \$4 from another player). Under positive-sum conditions, there is no rationality to this decision—you can outcompete others by working harder and accessing more of the plentiful resources; another’s success can be predictive of your success if you copy their successful strategy. However, destruction can be adaptive under zero-sum conditions, where another’s success is predictive of your failure; they have taken a piece of a limited pie which is no longer available to you.

Consistent with these theories, rates of destruction are much higher in a low yield, low-rainfall region of Namibia relative to a high yield, high-rainfall region, and higher on average in Namibia than rates in Ukraine or the Netherlands. And indeed, during a crisis, we can see these dynamics in the behaviour of some countries competing for a limited resource (e.g. the number of N95 masks is effectively zero-sum). The competition for masks and other medical supplies has been described as a modern day Wild West and indeed even the West will become wilder under resource constraints, when mumbling and grumbling becomes something more. From a cultural evolutionary perspective, there is always variation in beliefs, but who gets selected can depend on the circumstances. For example, populists and parochial isolationists always exist, but may find themselves handed a microphone during times of slowed growth or resource scarcity.

Assuming no mutation in SARS-CoV-2, there are many features that make it more tractable: The disease is not spreading through the water supply or through the air (except through droplets that linger), and many parents are no doubt grateful that children, for the most part, are not dying. But as bad as this current crisis is, the next pandemic with traits in the Goldilocks' zone of spreading quickly, but killing slowly, may be even more difficult to manage. Our current crisis is a pandemic whose implications will be felt for years. But just as Gates' warned us of the well-understood inevitable threat epidemics pose, there are other well-understood, inevitable challenges on the horizon. With any luck, our lack of preparation for Covid-19 will serve as a warning to better prepare and a lesson that the unimaginable but scientifically inevitable can become very real very quickly.

*"... preparation and adaptation to a climate-changed world with all the challenges it entails becomes increasingly important."*

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### **What's next**

The latest climate change report promises fires, floods, famine, and disease. Despite some progress on mitigation, we've continued to fly past supposed safe limits. Even though our consumption of beef per person has decreased, our technology is more energy efficient than ever before, and renewable sources of energy continue to replace fossil fuels, atmospheric CO2 concentration needed to remain below 350 ppm to prevent a tipping point. We passed 400 ppm in 2015 and CO2 continues to rise to levels unseen in millions of years: 415 ppm in 2019. If there were a doomsday clock for the climate, we're well past midnight. And thus, while a focus on mitigation by slowing the economy to save the planet is still worthwhile, preparation and adaptation to a climate-changed world with all the challenges it entails becomes increasingly important.

An inconvenient truth about climate change is that while overall the planet will be worse off, there will be winners and losers. Some places will become more liveable (e.g. parts of Canada) and others far less liveable (e.g. Bangladesh and most of the Middle East). People moving from less liveable areas to more liveable areas will become more common, and movements may be sudden, due to crises. Mass movements of people have geopolitical implications. When millions of Bangladeshis find themselves under water, they're going to need to move in masses toward neighbouring regions. Can India handle millions streaming into their borders? How will that affect Pakistan and then the Middle East and then Europe? Such sudden surges place increased pressure on already stressed infrastructure; a challenge even to polities with well-functioning institutions like Europe. Moreover, as places become warmer, disease vectors such as mosquitos multiply and spread in a now larger liveable area, increasing disease, which can also spread with the movement of people. And long-forgotten diseases may re-emerge as permafrost melts.

A recent and consequential conflict that some have argued was catalysed by climate

change is the Syrian civil war that began in 2011. Syria's most intense drought took place between 2006 and 2011. As farms failed, rural workers found themselves without food and without work, and so moved to the major cities. The physical and institutional infrastructure was not prepared for masses of people streaming in, which may have led to discontent, protests, and riots. It would be superficial to attribute the Syrian civil war to droughts alone, ignoring the demographics, geopolitics and wider Arab Spring. Climate change was at best a catalyst. The implications of this war will be felt by Europe for some time—it takes time to assimilate masses of people, and in the meantime, already stressed hospitals, schools, and other infrastructure are put under stress, leading to aggrieved locals. When resources seem limited, zero-sum biases can be triggered and mumblings and grumblings that always existed can become anti-social action.

It's easier to be nice when there's lots to go around. Imagine trying to find a parking spot. If you arrive at a spot around the same time as another car and there's plenty of open spaces, you might graciously allow them to take the spot. But if everything is full and you've been driving around for 30 minutes looking for a spot, your behaviour may functionally change. As good public schools become even harder to get into, as wait times at hospitals increase, local populations can become understandably resentful of these new pressures, and more resentful still when resources are devoted to helping newcomers. Are our physical, institutional, and cultural infrastructure prepared for these challenges?

Democracy too is easier when everyone is on the same page. When people are mostly in agreement with one another, the debates are at the margins—for example, if we agree on socialised healthcare, we can vote for who can best implement it. But when groups are vastly different to one another, they're forced to argue over fundamental principles. Rather than picking the best person, voters pick people who agree with them—someone who represents their tribe and their views, which inevitably leaves members of the other groups unhappy. Some evidence suggests the relationship between diversity and conflict is U-shaped: Conflict is lowest in highly homogenous places where people mostly agree with one another and in highly diverse places where people don't have sufficient numbers to form a critical mass of competing cultural-groups. Conflict is most likely when you have large internally cooperative groups who disagree with the other large internally cooperative groups.

A post-climate change world might require us to exploit new, more powerful, sources of energy; it might require us to get even more energy efficient; or it might require us to get better at climate engineering. But our ability to develop and implement these technical solutions is contingent on well-functioning institutions of governance and administration and their invisible normative cultural support pillars (e.g. belief in rule of law). Solutions for surviving in a climate-changed world will depend on our ability to coordinate, cooperate and collaborate at a larger scale than we have yet achieved. So, preparing for a post-climate change world also requires us to better understand human behaviour, cooperation, and cultural evolution—cooperation is challenged when resources are

scarce. Despite vast progress in climate change mitigation, we're now faced with future scenarios that range from bad to worse. Even the relatively good outcomes can lead to chaos if we're not prepared for how to live together successfully on our post-climate changed planet.

Our psychology leads us to overestimate our understanding of the world, which is usually not a problem because as individuals we do not need causal models for everything we benefit from. But good decision-making under novel circumstances does require causal understanding unless solutions already exist in the society. Thus understanding how societies evolve and innovate is critical. This pandemic has reminded us that in a highly connected, globalised world, a wet market in Wuhan can grind the world economy to a halt. In our connected age, other people's problems are our problems, but their solutions might also be our solutions.

*Answers:*

*[a] The answer is 47. At that rate of growth, another day would cover another lake. And in case you're feeling confident because you got the answer right, how much of the lake was covered on day 24?*

*[b] The answer is 18,446,744,073,709,551,615, which is more grains of wheat than there are stars in our galaxy (400 billion as an upper estimate). In fact, that's around 46 million Milky Ways worth of stars.*



*Notes:*

- *This blog post expresses the views of its author(s), not the position of LSE Business Review or the London School of Economics.*
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