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## Unit 1

### TEXT A

#### When Teaching Critical Thinking Backfires

John Horgan

*As the fall semester ends, I'm brooding once again over the contradictions of teaching "critical thinking," especially as applied to science. Below is an edited version of an essay I wrote for The Chronicle of Higher Education when I was in a similar mood.*

—John Horgan

1. Don't always believe what scientists and other authorities tell you! Be skeptical! Think critically! That's what I tell my students, *ad nauseam*. And some learn the lesson too well.
2. I want to give my students the benefit of my hard-won knowledge of science's fallibility. Early in my career, I was a conventional science writer, easily impressed by scientists' claims. Fields such as physics, neuroscience, genetics and artificial intelligence seemed to be bearing us toward a future in which bionic superhumans would zoom around the cosmos in warp-drive spaceships. Science was an "endless frontier," as physicist Vannevar Bush, a founder of the National Science Foundation, put it in 1945.
3. Doubt gradually undermined my faith. Scientists and journalists, I realized, often presented the public with an overly optimistic picture of science. By relentlessly touting scientific "advances"—from theories of cosmic creation and the origin of life to the latest treatments for depression and cancer—and by overlooking all the areas in which scientists were spinning their wheels, we made science seem more potent and fast-moving than it really is.
4. Now, I urge my students to doubt the claims of physicists that they are on the verge of explaining the origin and structure of the cosmos. Some of these optimists favor string and multiverse theories, which cannot be confirmed by any conceivable experiment. This isn't physics any more, I declare in class, it's science fiction with equations!
5. I give the same treatment to theories of consciousness, which attempt to explain how a three-pound lump of tissue—the brain—generates perceptions, thoughts, memories, emotions and self-awareness. Some enthusiasts assert that scientists will soon reverse-engineer the brain so thoroughly that they will be able to build artificial brains much more powerful than our own.
6. Balderdash! I tell my classes (or words to that effect). Scientists have proposed countless theories about how the brain absorbs, stores and processes information, but researchers really have no idea how the brain works. And artificial-intelligence advocates have been promising for decades that robots will soon be as smart as HAL or R2-D2. Why should we believe them now?
7. Maybe, just maybe, I suggest, fields such as particle physics, cosmology and neuroscience are bumping up against insurmountable limits. The big discoveries that can be made have been made. Who says science has to solve every problem?
8. Lest my students conclude that I'm some solitary crank, I assign them articles by other skeptics, including a dissection of epidemiology and clinical trials by journalist Gary Taubes in *The New York Times*. He advises readers to doubt dramatic claims about the benefits of some new drug or diet, especially if the claim is new. "Assume that the first report of an

association is incorrect or meaningless,” Taubes writes, because it probably is. “So be skeptical.”

9. To drive this point home, I assign articles by John Ioannidis, an epidemiologist who has exposed the flimsiness of most peer-reviewed research. In a 2005 study, he concluded that “most published research findings are false.” He and his colleagues contend that “the more extreme, spectacular results (the largest treatment effects, the strongest associations, or the most unusually novel and exciting biological stories) may be preferentially published.” These sorts of dramatic claims are also more likely to be wrong.

10. The cherry on this ice-cream sundae of doubt is a critique by psychologist Philip Tetlock of expertise in soft sciences, such as politics, history, and economics. In his 2005 book *Expert Political Judgment*, Tetlock presents the results of his 20-year study of the ability of 284 “experts” in politics and economics to make predictions about current affairs. The experts did worse than random guessing, or “dart-throwing monkeys,” as Tetlock puts it.

11. Like Ioannidis, Tetlock found a correlation between the prominence of experts and their fallibility. The more wrong the experts were, the more visible they were in the media. The reason, he conjectures, is that experts who make dramatic claims are more likely to get air time on CNN or column inches in *The Washington Post*, even though they are more likely to be wrong.

12. For comic relief, I tell my students about a maze study, cited by Tetlock, that pitted rats against Yale undergraduates. Sixty percent of the time, researchers placed food on the left side of a fork in the maze; otherwise the food was placed randomly. After figuring out that the food was more often on the left side of the fork, the rats turned left every time and so were right 60 percent of the time. Yale students, discerning illusory patterns of left-right placement, guessed right only 52 percent of the time. Yes, the rats beat the Yalies! The smarter you are, the more likely you may be to “discover” patterns in the world that aren’t actually there.

13. So how do my students respond to my skeptical teaching? Some react with healthy pushback, especially to my suggestion that the era of really big scientific discoveries might be over. “On a scale from toddler knowledge to ultimate enlightenment, man’s understanding of the universe could be anywhere,” wrote a student named Matt. “How can a person say with certainty that everything is known or close to being known if it is incomparable to anything?”

14. Other students embrace skepticism to a degree that dismays me. Cecelia, a biomedical-engineering major, wrote: “I am skeptical of the methods used to collect data on climate change, the analysis of this data, and the predictions made based on this data.” Pondering the lesson that correlation does not equal causation, Steve questioned the foundations of scientific reasoning. “How do we know there is a cause for anything?” he asked.

15. In a similar vein, some students echoed the claim of radical postmodernists that we can never really know anything for certain, and hence that almost all our current theories will probably be overturned. Just as Aristotle’s physics gave way to Newton’s, which in turn yielded to Einstein’s, so our current theories of physics will surely be replaced by radically different ones.

16. After one especially doubt-riddled crop of papers, I responded, “Whoa!”(or words to that effect). Science, I lectured sternly, has established many facts about reality beyond a reasonable doubt, embodied by quantum mechanics, general relativity, the theory of evolution, the genetic code. This knowledge has yielded applications—from vaccines to computer chips—that have transformed our world in countless ways. It is precisely because science is such a powerful mode of knowledge, I said, that you must treat new pronouncements skeptically, carefully distinguishing

the genuine from the spurious. But you shouldn't be so skeptical that you deny the possibility of achieving any knowledge at all.

17. My students listened politely, but I could see the doubt in their eyes. We professors have a duty to teach our students to be skeptical. But we also have to accept that, if we do our jobs well, their skepticism may turn on us.

Source: John Horgan, "When Teaching Critical Thinking Backfires", in *Scientific America*, December 14, 2015 (<https://blogs.scientificamerican.com/cross-check/when-teaching-critical-thinking-backfires/>).

## TEXT B

### Young Minds in Critical Condition

Michael S. Roth

1. It happens every semester. A student triumphantly points out that Jean-Jacques Rousseau is undermining himself when he claims "the man who reflects is a depraved animal," or that Ralph Waldo Emerson's call for self-reliance is in effect a call for reliance on Emerson himself. Trying not to sound too weary, I ask the student to imagine that the authors had already considered these issues.
2. Instead of trying to find mistakes in the texts, I suggest we take the point of view that our authors created these apparent "contradictions" in order to get readers like us to ponder more interesting questions. How do we think about inequality and learning, for example, or how can we stand on our own feet while being open to inspiration from the world around us? Yes, there's a certain satisfaction in being critical of our authors, but isn't it more interesting to put ourselves in a frame of mind to find inspiration in them?
3. Our best college students are very good at being critical. In fact, being smart, for many, means being critical. Having strong critical skills shows that you will not be easily fooled. It is a sign of sophistication, especially when coupled with an acknowledgment of one's own "privilege."
4. The combination of resistance to influence and deflection of responsibility by confessing to one's advantages is a sure sign of one's ability to negotiate the politics of learning on campus. But this ability will not take you very far beyond the university. Taking things apart, or taking people down, can provide the satisfactions of cynicism. But this is thin gruel.
5. The skill at unmasking error, or simple intellectual one-upmanship, is not totally without value, but we should be wary of creating a class of self-satisfied debunkers—or, to use a currently fashionable word on campus, people who like to "trouble" ideas. In overdeveloping the capacity to show how texts, institutions or people fail to accomplish what they set out to do, we may be depriving students of the chance to learn as much as possible from what they study.
6. In campus cultures where being smart means being a critical unmasker, students may become too good at showing how things can't possibly make sense. They may close themselves off from their potential to find or create meaning and direction from the books, music and experiments they encounter in the classroom.

7. Once outside the university, these students may try to score points by displaying the critical prowess for which they were rewarded in school, but those points often come at their own expense. As debunkers, they contribute to a cultural climate that has little tolerance for finding or making meaning—a culture whose intellectuals and cultural commentators get “liked” by showing that somebody else just can’t be believed. But this cynicism is no achievement.
8. Liberal education in America has long been characterized by the intertwining of two traditions: of critical inquiry in pursuit of truth and exuberant performance in pursuit of excellence. In the last half-century, though, emphasis on inquiry has become dominant, and it has often been reduced to the ability to expose error and undermine belief. The inquirer has taken the guise of the sophisticated (often ironic) spectator, rather than the messy participant in continuing experiments or even the reverent beholder of great cultural achievements.
9. Of course critical reflection is fundamental to teaching and scholarship, but fetishizing disbelief as a sign of intelligence has contributed to depleting our cultural resources. Creative work, in whatever field, depends upon commitment, the energy of participation and the ability to become absorbed in works of literature, art and science. That type of absorption is becoming an endangered species of cultural life, as our nonstop, increasingly fractured technological existence wears down our receptive capacities.
10. In my film and philosophy class, for example, I have to insist that students put their devices away while watching movies that don’t immediately engage their senses with explosions, sex or gag lines. At first they see this as some old guy’s failure to grasp their skill at multitasking, but eventually most relearn how to give themselves to an emotional and intellectual experience, one that is deeply engaging partly because it does not pander to their most superficial habits of attention. I usually watch the movies with them (though I’ve seen them more than a dozen times), and together we share an experience that becomes the subject of reflection, interpretation and analysis. We even forget our phones and tablets when we encounter these unexpected sources of inspiration.
11. Liberal learning depends on absorption in compelling work. It is a way to open ourselves to the various forms of life in which we might actively participate. When we learn to read or look or listen intensively, we are, at least temporarily, overcoming our own blindness by trying to understand an experience from another’s point of view. We are not just developing techniques of problem solving; we are learning to activate potential, and often to instigate new possibilities.
12. Yes, hard-nosed critical thinking is a useful tool, but it also may become a defense against the risky insight that absorption can offer. As students and as teachers we sometimes crave that protection; without it we risk changing who we are. We risk seeing a different way of living not as something alien, but as a possibility we might be able to explore, and even embrace.
13. Liberal education must not limit itself to critical thinking and problem solving; it must also foster openness, participation and opportunity. It should be designed to take us beyond the campus to a life of ongoing, pragmatic learning that finds inspiration in unexpected sources, and increases our capacity to understand and contribute to the world — and reshape it, and ourselves, in the process.

Source: Michael S. Roth, “Young Minds in Critical Condition”, *The New York Times* May 10, 2014.

## Unit 2

### TEXT A

#### The Lesson of Economics

Henry Hazlitt

1. Economics is haunted by more fallacies than any other study known to man. This is no accident. The inherent difficulties of the subject would be great enough in any case, but they are multiplied a thousand-fold by a factor that is insignificant in, say, physics, mathematics or medicine—the special pleading of selfish interests. While every group has certain economic interests identical with those of all groups, every group has also, as we shall see, interests antagonistic to those of all other groups. While certain public policies would in the long run benefit everybody, other policies would benefit one group only at the expense of all other groups. The group that would benefit by such policies, having such a direct interest in them, will argue for them plausibly and persistently. It will hire the best buyable minds to devote their whole time to presenting its case. And it will finally either convince the general public that its case is sound, or so befuddle it that clear thinking on the subject becomes next to impossible.
2. In addition to these endless pleadings of self-interest, there is a second main factor that spawns new economic fallacies every day. This is the persistent tendency of men to see only the immediate effects of a given policy, or its effects only on a special group, and to neglect to inquire what the long-run effects of that policy will be not only on that special group but on all groups. It is the fallacy of overlooking secondary consequences.
3. In this lies the whole difference between good economics and bad. The bad economist sees only what immediately strikes the eye; the good economist also looks beyond. The bad economist sees only the direct consequences of a proposed course; the good economist looks also at the longer and indirect consequences. The bad economist sees only what the effect of a given policy has been or will be on one particular group; the good economist inquires also what the effect of the policy will be on all groups.
4. The distinction may seem obvious. The precaution of looking for all the consequences of a given policy to everyone may seem elementary. Doesn't everybody know, in his personal life, that there are all sorts of indulgences delightful at the moment but disastrous in the end? Doesn't every little boy know that if he eats enough candy he will get sick? Doesn't the fellow who gets drunk know that he will wake up next morning with a ghastly stomach and a horrible head? Doesn't the dipsomaniac know that he is ruining his liver and shortening his life? Doesn't the Don Juan know that he is letting himself in for every sort of risk, from blackmail to disease? Finally, to bring it to the economic though still personal realm, do not the idler and the spendthrift know, even in the midst of their glorious fling, that they are heading for a future of debt and poverty?
5. Yet when we enter the field of public economics, these elementary truths are ignored. There are men regarded today as brilliant economists, who deprecate saving and recommend squandering on a national scale as the way of economic salvation; and when anyone points to what the consequences of these policies will be in the long run, they reply flippantly, as might the prodigal son of a warning father: "In the long run we are all dead." And such shallow wisecracks

pass as devastating epigrams and the ripest wisdom.

6. But the tragedy is that, on the contrary, we are already suffering the long-run consequences of the policies of the remote or recent past. Today is already the tomorrow which the bad economist yesterday urged us to ignore. The long-run consequences of some economic policies may become evident in a few months. Others may not become evident for several years. Still others may not become evident for decades. But in every case those long-run consequences are contained in the policy as surely as the hen was in the egg, the flower in the seed.

7. From this aspect, therefore, the whole of economics can be reduced to a single lesson, and that lesson can be reduced to a single sentence. *The art of economics consists in looking not merely at the immediate but at the longer effects of any act or policy; it consists in tracing the consequences of that policy not merely for one group but for all groups.*

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8. Nine-tenths of the economic fallacies that are working such dreadful harm in the world today are the result of ignoring this lesson. Those fallacies all stem from one of two central fallacies, or both: that of looking only at the immediate consequences of an act or proposal, and that of looking at the consequences only for a particular group to the neglect of other groups.

9. It is true, of course, that the opposite error is possible. In considering a policy we ought not to concentrate *only* on its long-run results to the community as a whole. This is the error often made by the classical economists. It resulted in a certain callousness toward the fate of groups that were immediately hurt by policies or developments which proved to be beneficial on net balance and in the long run.

10. But comparatively few people today make this error; and those few consist mainly of professional economists. The most frequent fallacy by far today, the fallacy that emerges again and again in nearly every conversation that touches on economic affairs, the error of a thousand political speeches, the central sophism of the “new” economics, is to concentrate on the short-run effects of policies on special groups and to ignore or belittle the long-run effects on the community as a whole. The “new” economists flatter themselves that this is a great, almost a revolutionary advance over the methods of the “classical,” or “orthodox,” economists, because the former take into consideration short-run effects which the latter often ignored. But in themselves ignoring or slighting the long-run effects, they are making the far more serious error. They overlook the woods in their precise and minute examination of particular trees. Their methods and conclusions are often profoundly reactionary. They are sometimes surprised to find themselves in accord with seventeenth-century mercantilism. The fall, in fact, into all the ancient errors (or would, if they were not so inconsistent) that the classical economists, we had hoped, had once and for all got rid of.

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11. It is often sadly remarked that the bad economists present their errors to the public better than the good economists present their truths. It is often complained that demagogues can be more plausible in putting forward economic nonsense from the platform than the honest men who try to show what is wrong with it. But the basic reason for this ought not to be mysterious. The reason is that the demagogues and bad economists are presenting half-truths. They are speaking only of the



immediate effect of a proposed policy or its effect upon a single group. As far as they go they may often be right. In these cases the answer consists in showing that the proposed policy would also have longer and less desirable effects, or that it could benefit one group only at the expense of all other groups. The answer consists in supplementing and correcting the half-truth with the other half. But to consider all the chief effects of a proposed course on everybody often requires a long, complicated, and dull chain of reasoning. Most of the audience finds this chain of reasoning difficult to follow and soon becomes bored and inattentive. The bad economists rationalize this intellectual debility and laziness by assuring the audience that it need not even attempt to follow the reasoning or judge it on its merits because it is only “classicism” or “laissez faire” or “capitalist apologetics” or whatever other term of abuse may happen to strike them as effective.

12. We have stated the nature of the lesson, and of the fallacies that stand in its way, in abstract terms. But the lesson will not be driven home, and the fallacies will continue to go unrecognized, unless both are illustrated by examples. Through these examples we can move from the most elementary problems in economics to the most complex and difficult. Through them we can learn to detect and avoid first the crudest and most palpable fallacies and finally some of the most sophisticated and elusive. To that task we shall now proceed.

Source: Henry Hazlitt, *Economics in One Lesson*, New York: Three Rivers Press, 1979, pp. 15-19.

## TEXT B

### The Belt and Road Initiative

1. More than two millennia ago the diligent and courageous people of Eurasia explored and opened up several routes of trade and cultural exchanges that linked the major civilizations of Asia, Europe and Africa, collectively called the Silk Road by later generations. For thousands of years, the Silk Road Spirit—“peace and cooperation, openness and inclusiveness, mutual learning and mutual benefit”—has been passed from generation to generation, promoted the progress of human civilization, and contributed greatly to the prosperity and development of the countries along the Silk Road. Symbolizing communication and cooperation between the East and the West, the Silk Road Spirit is a historic and cultural heritage shared by all countries around the world.
2. In the 21st century, a new era marked by the theme of peace, development, cooperation and mutual benefit, it is all the more important for us to carry on the Silk Road Spirit in face of the weak recovery of the global economy, and complex international and regional situations.
3. When Chinese President Xi Jinping visited Central Asia and Southeast Asia in September and October of 2013, he raised the initiative of jointly building the Silk Road Economic Belt and the 21st-Century Maritime Silk Road (hereinafter referred to as the Belt and Road), which have attracted close attention from all over the world. Accelerating the building of the Belt and Road can help promote the economic prosperity of the countries along the Belt and Road and regional economic cooperation, strengthen exchanges and mutual learning between different civilizations, and promote world peace and development. It is a great undertaking that will benefit people

around the world.

4. The Belt and Road Initiative is a systematic project, which should be jointly built through consultation to meet the interests of all, and efforts should be made to integrate the development strategies of the countries along the Belt and Road. The Chinese government has drafted and published the Vision and Actions on Jointly Building Silk Road Economic Belt and 21st-Century Maritime Silk Road to promote the implementation of the Initiative, instill vigor and vitality into the ancient Silk Road, connect Asian, European and African countries more closely and promote mutually beneficial cooperation to a new high and in new forms.

5. Countries along the Belt and Road have their own resource advantages and their economies are mutually complementary. Therefore, there is a great potential and space for cooperation. They should promote policy coordination, facilities connectivity, unimpeded trade, financial integration and people-to-people bonds as their five major goals, and strengthen cooperation in the following key areas:

#### Policy coordination

6. Enhancing policy coordination is an important guarantee for implementing the Initiative. We should promote intergovernmental cooperation, build a multilevel intergovernmental macro policy exchange and communication mechanism, expand shared interests, enhance mutual political trust, and reach new cooperation consensus. Countries along the Belt and Road may fully coordinate their economic development strategies and policies, work out plans and measures for regional cooperation, negotiate to solve cooperation-related issues, and jointly provide policy support for the implementation of practical cooperation and large-scale projects.

#### Facilities connectivity

7. Facilities connectivity is a priority area for implementing the Initiative. On the basis of respecting each other's sovereignty and security concerns, countries along the Belt and Road should improve the connectivity of their infrastructure construction plans and technical standard systems, jointly push forward the construction of international trunk passageways, and form an infrastructure network connecting all sub-regions in Asia, and between Asia, Europe and Africa step by step. At the same time, efforts should be made to promote green and low-carbon infrastructure construction and operation management, taking into full account the impact of climate change on the construction.

8. With regard to transport infrastructure construction, we should focus on the key passageways, junctions and projects, and give priority to linking up unconnected road sections, removing transport bottlenecks, advancing road safety facilities and traffic management facilities and equipment, and improving road network connectivity. We should build a unified coordination mechanism for whole-course transportation, increase connectivity of customs clearance, reloading and multimodal transport between countries, and gradually formulate compatible and standard transport rules, so as to realize international transport facilitation. We should push forward port infrastructure construction, build smooth land-water transportation channels, and advance port cooperation; increase sea routes and the number of voyages, and enhance information technology cooperation in maritime logistics. We should expand and build platforms and mechanisms for comprehensive civil aviation cooperation, and quicken our pace in improving aviation

infrastructure.

9. We should promote cooperation in the connectivity of energy infrastructure, work in concert to ensure the security of oil and gas pipelines and other transport routes, build cross-border power supply networks and power-transmission routes, and cooperate in regional power grid upgrading and transformation.

10. We should jointly advance the construction of cross-border optical cables and other communications trunk line networks, improve international communications connectivity, and create an Information Silk Road. We should build bilateral cross-border optical cable networks at a quicker pace, plan transcontinental submarine optical cable projects, and improve spatial (satellite) information passageways to expand information exchanges and cooperation.

Unimpeded trade

11. Investment and trade cooperation is a major task in building the Belt and Road. We should strive to improve investment and trade facilitation, and remove investment and trade barriers for the creation of a sound business environment within the region and in all related countries. We will discuss with countries and regions along the Belt and Road on opening free trade areas so as to unleash the potential for expanded cooperation.

12. Countries along the Belt and Road should enhance customs cooperation such as information exchange, mutual recognition of regulations, and mutual assistance in law enforcement; improve bilateral and multilateral cooperation in the fields of inspection and quarantine, certification and accreditation, standard measurement, and statistical information; and work to ensure that the WTO Trade Facilitation Agreement takes effect and is implemented. We should improve the customs clearance facilities of border ports, establish a “single-window” in border ports, reduce customs clearance costs, and improve customs clearance capability. We should increase cooperation in supply chain safety and convenience, improve the coordination of cross-border supervision procedures, promote online checking of inspection and quarantine certificates, and facilitate mutual recognition of Authorized Economic Operators. We should lower non-tariff barriers, jointly improve the transparency of technical trade measures, and enhance trade liberalization and facilitation.

13. We should expand trading areas, improve trade structure, explore new growth areas of trade, and promote trade balance. We should make innovations in our forms of trade, and develop cross-border e-commerce and other modern business models. A service trade support system should be set up to consolidate and expand conventional trade, and efforts to develop modern service trade should be strengthened. We should integrate investment and trade, and promote trade through investment.

14. We should speed up investment facilitation, eliminate investment barriers, and push forward negotiations on bilateral investment protection agreements and double taxation avoidance agreements to protect the lawful rights and interests of investors.

15. We should expand mutual investment areas, deepen cooperation in agriculture, forestry, animal husbandry and fisheries, agricultural machinery manufacturing and farm produce processing, and promote cooperation in marine-product farming, deep-sea fishing, aquatic product processing, seawater desalination, marine bio-pharmacy, ocean engineering technology, environmental protection industries, marine tourism and other fields. We should increase

cooperation in the exploration and development of coal, oil, gas, metal minerals and other conventional energy sources; advance cooperation in hydropower, nuclear power, wind power, solar power and other clean, renewable energy sources; and promote cooperation in the processing and conversion of energy and resources at or near places where they are exploited, so as to create an integrated industrial chain of energy and resource cooperation. We should enhance cooperation in deep-processing technology, equipment and engineering services in the fields of energy and resources.

16. We should push forward cooperation in emerging industries. In accordance with the principles of mutual complementarity and mutual benefit, we should promote in-depth cooperation with other countries along the Belt and Road in new-generation information technology, biotechnology, new energy technology, new materials and other emerging industries, and establish entrepreneurial and investment cooperation mechanisms.

17. We should improve the division of labor and distribution of industrial chains by encouraging the entire industrial chain and related industries to develop in concert; establish R & D, production and marketing systems; and improve industrial supporting capacity and the overall competitiveness of regional industries. We should increase the openness of our service industry to each other to accelerate the development of regional service industries. We should explore a new mode of investment cooperation, working together to build all forms of industrial parks such as overseas economic and trade cooperation zones and cross-border economic cooperation zones, and promote industrial cluster development. We should promote ecological progress in conducting investment and trade, increase cooperation in conserving eco-environment, protecting biodiversity, and tackling climate change, and join hands to make the Silk Road an environment-friendly one.

18. We welcome companies from all countries to invest in China, and encourage Chinese enterprises to participate in infrastructure construction in other countries along the Belt and Road, and make industrial investments there. We support localized operation and management of Chinese companies to boost the local economy, increase local employment, improve local livelihoods, and take social responsibilities in protecting local biodiversity and eco-environment.

#### Financial integration

19. Financial integration is an important underpinning for implementing the Belt and Road Initiative. We should deepen financial cooperation, and make more efforts in building a currency stability system, investment and financing system and credit information system in Asia. We should expand the scope and scale of bilateral currency swap and settlement with other countries along the Belt and Road, open and develop the bond market in Asia, make joint efforts to establish the Asian Infrastructure Investment Bank and BRICS New Development Bank, conduct negotiation among related parties on establishing Shanghai Cooperation Organization (SCO) financing institution, and set up and put into operation the Silk Road Fund as early as possible. We should strengthen practical cooperation of China-ASEAN Interbank Association and SCO Interbank Association, and carry out multilateral financial cooperation in the form of syndicated loans and bank credit. We will support the efforts of governments of the countries along the Belt and Road and their companies and financial institutions with good credit-rating to issue Renminbi bonds in China. Qualified Chinese financial institutions and companies are encouraged to issue bonds in both Renminbi and foreign currencies outside China, and use the funds thus collected in

countries along the Belt and Road.

20. We should strengthen financial regulation cooperation, encourage the signing of MOUs on cooperation in bilateral financial regulation, and establish an efficient regulation coordination mechanism in the region. We should improve the system of risk response and crisis management, build a regional financial risk early-warning system, and create an exchange and cooperation mechanism of addressing cross-border risks and crisis. We should increase cross-border exchange and cooperation between credit investigation regulators, credit investigation institutions and credit rating institutions. We should give full play to the role of the Silk Road Fund and that of sovereign wealth funds of countries along the Belt and Road, and encourage commercial equity investment funds and private funds to participate in the construction of key projects of the Initiative.

People-to-people bond

21. People-to-people bond provides the public support for implementing the Initiative. We should carry forward the spirit of friendly cooperation of the Silk Road by promoting extensive cultural and academic exchanges, personnel exchanges and cooperation, media cooperation, youth and women exchanges and volunteer services, so as to win public support for deepening bilateral and multilateral cooperation.

22. We should send more students to each other's countries, and promote cooperation in jointly running schools. China provides 10,000 government scholarships to the countries along the Belt and Road every year. We should hold culture years, arts festivals, film festivals, TV weeks and book fairs in each other's countries; cooperate on the production and translation of fine films, radio and TV programs; and jointly apply for and protect World Cultural Heritage sites. We should also increase personnel exchange and cooperation between countries along the Belt and Road.

23. We should enhance cooperation in and expand the scale of tourism; hold tourism promotion weeks and publicity months in each other's countries; jointly create competitive international tourist routes and products with Silk Road features; and make it more convenient to apply for tourist visa in countries along the Belt and Road. We should push forward cooperation on the 21st-Century Maritime Silk Road cruise tourism program. We should carry out sports exchanges and support countries along the Belt and Road in their bid for hosting major international sports events.

24. We should strengthen cooperation with neighboring countries on epidemic information sharing, the exchange of prevention and treatment technologies and the training of medical professionals, and improve our capability to jointly address public health emergencies. We will provide medical assistance and emergency medical aid to relevant countries, and carry out practical cooperation in maternal and child health, disability rehabilitation, and major infectious diseases including AIDS, tuberculosis and malaria. We will also expand cooperation on traditional medicine.

25. We should increase our cooperation in science and technology, establish joint labs (or research centers), international technology transfer centers and maritime cooperation centers, promote sci-tech personnel exchanges, cooperate in tackling key sci-tech problems, and work together to improve sci-tech innovation capability.

26. We should integrate existing resources to expand and advance practical cooperation between countries along the Belt and Road on youth employment, entrepreneurship training, vocational

skill development, social security management, public administration and management and in other areas of common interest.

27. We should give full play to the bridging role of communication between political parties and parliaments, and promote friendly exchanges between legislative bodies, major political parties and political organizations of countries along the Belt and Road. We should carry out exchanges and cooperation among cities, encourage major cities in these countries to become sister cities, focus on promoting practical cooperation, particularly cultural and people-to-people exchanges, and create more lively examples of cooperation. We welcome the think tanks in the countries along the Belt and Road to jointly conduct research and hold forums.

28. We should increase exchanges and cooperation between nongovernmental organizations of countries along the Belt and Road, organize public interest activities concerning education, healthcare, poverty reduction, biodiversity and ecological protection for the benefit of the general public, and improve the production and living conditions of poverty-stricken areas along the Belt and Road. We should enhance international exchanges and cooperation on culture and media, and leverage the positive role of the Internet and new media tools to foster harmonious and friendly cultural environment and public opinion.

Source: retrieved on March 30, 2015, at <http://english.gov.cn>.

## Unit 3

### TEXT A

#### 10 Solutions for Climate Change

David Biello

1. The enormity of global warming can be daunting and dispiriting. What can one person, or even one nation, do on their own to slow and reverse climate change? But just as ecologist Stephen Pacala and physicist Robert Socolow, both at Princeton University, came up with 15 so-called “wedges” for nations to utilize toward this goal—each of which is challenging but feasible and, in some combination, could reduce greenhouse gas emissions to safer levels—there are personal lifestyle changes that you can make too that, in some combination, can help reduce your carbon impact. Not all are right for everybody. Some you may already be doing or absolutely abhor. But implementing just a few of them could make a difference.

2. \_\_\_\_\_ (1) \_\_\_\_\_—The first challenge is eliminating the burning of coal, oil and, eventually, natural gas. This is perhaps the most daunting challenge as denizens of richer nations literally eat, wear, work, play and even sleep on the products made from such fossilized sunshine. And citizens of developing nations want and arguably deserve the same comforts, which are largely thanks to the energy stored in such fuels.

3. Oil is the lubricant of the global economy, hidden inside such ubiquitous items as plastic and

corn, and fundamental to the transportation of both consumers and goods. Coal is the substrate, supplying roughly half of the electricity used in the U.S. and nearly that much worldwide—a percentage that is likely to grow, according to the International Energy Agency. There are no perfect solutions for reducing dependence on fossil fuels (for example, carbon neutral biofuels can drive up the price of food and lead to forest destruction, and while nuclear power does not emit greenhouse gases, it does produce radioactive waste), but every bit counts.

4. So try to employ alternatives when possible—plant-derived plastics, biodiesel, wind power—and to invest in the change, be it by divesting from oil stocks or investing in companies practicing carbon capture and storage.

5. \_\_\_\_\_ (2) \_\_\_\_\_—Buildings worldwide contribute around one third of all greenhouse gas emissions (43 percent in the U.S. alone), even though investing in thicker insulation and other cost-effective, temperature-regulating steps can save money in the long run. Electric grids are at capacity or overloaded, but power demands continue to rise. And bad roads can lower the fuel economy of even the most efficient vehicle. Investing in new infrastructure, or radically upgrading existing highways and transmission lines, would help cut greenhouse gas emissions and drive economic growth in developing countries.

6. Of course, it takes a lot of cement, a major source of greenhouse gas emissions, to construct new buildings and roads. The U.S. alone contributed 50.7 million metric tons of carbon dioxide to the atmosphere in 2005 from cement production, which requires heating limestone and other ingredients to 1,450 degrees Celsius (2,642 degrees Fahrenheit). Mining copper and other elements needed for electrical wiring and transmission also causes globe-warming pollution.

7. But energy-efficient buildings and improved cement-making processes (such as using alternative fuels to fire up the kiln) could reduce greenhouse gas emissions in the developed world and prevent them in the developing world.

8. \_\_\_\_\_ (3) \_\_\_\_\_—Transportation is the second leading source of greenhouse gas emissions in the U.S. (burning a single gallon of gasoline produces 20 pounds of CO<sub>2</sub>). But it doesn't have to be that way.

9. One way to dramatically curtail transportation fuel needs is to move closer to work, use mass transit, or switch to walking, cycling or some other mode of transport that does not require anything other than human energy. There is also the option of working from home and telecommuting several days a week.

10. Cutting down on long-distance travel would also help, most notably airplane flights, which are one of the fastest growing sources of greenhouse gas emissions and a source that arguably releases such emissions in the worst possible spot (higher in the atmosphere). Flights are also one of the few sources of globe-warming pollution for which there isn't already a viable alternative: jets rely on kerosene, because it packs the most energy per pound, allowing them to travel far and fast, yet it takes roughly 10 gallons of oil to make one gallon of JetA fuel. Restricting flying to only critical, long-distance trips—in many parts of the world, trains can replace planes for short-to medium-distance trips—would help curb airplane emissions.

11. \_\_\_\_\_ (4) \_\_\_\_\_—The easiest way to cut back on greenhouse gas emissions is simply to

buy less stuff. Whether by forgoing an automobile or employing a reusable grocery sack, cutting back on consumption results in fewer fossil fuels being burned to extract, produce and ship products around the globe.

12. Think green when making purchases. For instance, if you are in the market for a new car, buy one that will last the longest and have the least impact on the environment. Thus, a used vehicle with a hybrid engine offers superior fuel efficiency over the long haul while saving the environmental impact of new car manufacture.

13. Paradoxically, when purchasing essentials, such as groceries, buying in bulk can reduce the amount of packaging—plastic wrapping, cardboard boxes and other unnecessary materials. Sometimes buying more means consuming less.

14. \_\_\_\_\_ (5) \_\_\_\_\_—A potentially simpler and even bigger impact can be made by doing more with less. Citizens of many developed countries are profligate wasters of energy, whether by speeding in a gas-guzzling sport-utility vehicle or leaving the lights on when not in a room.

15. Good driving—and good car maintenance, such as making sure tires are properly inflated—can limit the amount of greenhouse gas emissions from a vehicle and, perhaps more importantly, lower the frequency of payment at the pump.

16. Similarly, employing more efficient refrigerators, air conditioners and other appliances, such as those rated highly under the U.S. Environmental Protection Agency's Energy Star program, can cut electric bills while something as simple as weatherproofing the windows of a home can reduce heating and cooling bills. Such efforts can also be usefully employed at work, whether that means installing more efficient turbines at the power plant or turning the lights off when you leave the office.

17. \_\_\_\_\_ (6) \_\_\_\_\_—Corn grown in the U.S. requires barrels of oil for the fertilizer to grow it and the diesel fuel to harvest and transport it. Some grocery stores stock organic produce that do not require such fertilizers, but it is often shipped from halfway across the globe. And meat, whether beef, chicken or pork, requires pounds of feed to produce a pound of protein.

18. Choosing food items that balance nutrition, taste and ecological impact is no easy task. Foodstuffs often bear some nutritional information, but there is little to reveal how far a head of lettuce, for example, has traveled.

19. University of Chicago researchers estimate that each meat-eating American produces 1.5 tons more greenhouse gases through their food choice than do their vegetarian peers. It would also take far less land to grow the crops necessary to feed humans than livestock, allowing more room for planting trees.

20. \_\_\_\_\_ (7) \_\_\_\_\_—Every year, 33 million acres of forests are cut down. Timber harvesting in the tropics alone contributes 1.5 billion metric tons of carbon to the atmosphere. That represents 20 percent of human-made greenhouse gas emissions and a source that could be avoided relatively easily.

21. Improved agricultural practices along with paper recycling and forest management—balancing the amount of wood taken out with the amount of new trees growing—could quickly eliminate this significant chunk of emissions.



22. And when purchasing wood products, such as furniture or flooring, buy used goods or, failing that, wood certified to have been sustainably harvested. The Amazon and other forests are not just the lungs of the earth, they may also be humanity's best short-term hope for limiting climate change.

23. \_\_\_\_\_ (8) \_\_\_\_\_—Believe it or not, U.S. citizens spend more money on electricity to power devices when off than when on. Televisions, stereo equipment, computers, battery chargers and a host of other gadgets and appliances consume more energy when seemingly switched off, so unplug them instead.

24. Purchasing energy-efficient gadgets can also save both energy and money—and thus prevent more greenhouse gas emissions. To take but one example, efficient battery chargers could save more than one billion kilowatt-hours of electricity—\$100 million at today's electricity prices—and thus prevent the release of more than one million metric tons of greenhouse gases.

25. Swapping old incandescent light bulbs for more efficient replacements, such as compact fluorescents (warning: these light bulbs contain mercury and must be properly disposed of at the end of their long life), would save billions of kilowatt-hours. In fact, according to the EPA, replacing just one incandescent light bulb in every American home would save enough energy to provide electricity to three million American homes.

26. \_\_\_\_\_ (9) \_\_\_\_\_—There are at least 6.6 billion people living today, a number that is predicted by the United Nations to grow to at least nine billion by mid-century. The U.N. Environmental Program estimates that it requires 54 acres to sustain an average human being today—food, clothing and other resources extracted from the planet. Continuing such population growth seems unsustainable.

27. Falling birth rates in some developed and developing countries (a significant portion of which are due to government-imposed limits on the number of children a couple can have) have begun to reduce or reverse the population explosion. It remains unclear how many people the planet can comfortably sustain, but it is clear that per capita energy consumption must go down if climate change is to be controlled.

28. Ultimately, a one child per couple rule is not sustainable either and there is no perfect number for human population. But it is clear that more humans means more greenhouse gas emissions.

29. \_\_\_\_\_ (10) \_\_\_\_\_—Replacing fossil fuels may prove the great challenge of the 21st century. Many contenders exist, ranging from ethanol derived from crops to hydrogen electrolyzed out of water, but all of them have some drawbacks, too, and none are immediately available at the scale needed.

30. Biofuels can have a host of negative impacts, from driving up food prices to sucking up more energy than they produce. Hydrogen must be created, requiring either reforming natural gas or electricity to crack water molecules. Biodiesel hybrid electric vehicles (that can plug into the grid overnight) may offer the best transportation solution in the short term, given the energy density of diesel and the carbon neutral ramifications of fuel from plants as well as the emissions of electric engines. A recent study found that the present amount of electricity generation in the U.S. could provide enough energy for the country's entire fleet of automobiles to switch to plug-in hybrids,

reducing greenhouse gas emissions in the process.

31. But plug-in hybrids would still rely on electricity, now predominantly generated by burning dirty coal. Massive investment in low-emission energy generation, whether solar-thermal power or nuclear fission, would be required to radically reduce greenhouse gas emissions. And even more speculative energy sources—hyper-efficient photovoltaic cells, solar energy stations in orbit or even fusion—may ultimately be required.

32. The solutions above offer the outline of a plan to personally avoid contributing to global warming. But should such individual and national efforts fail, there is another, potentially desperate solution:

33. \_\_\_\_\_ (11) \_\_\_\_\_—Climate change represents humanity’s first planet-wide experiment. But, if all else fails, it may not be the last. So-called geoengineering, radical interventions to either block sunlight or reduce greenhouse gases, is a potential last resort for addressing the challenge of climate change.

34. Among the ideas: releasing sulfate particles in the air to mimic the cooling effects of a massive volcanic eruption; placing millions of small mirrors or lenses in space to deflect sunlight; covering portions of the planet with reflective films to bounce sunlight back into space; fertilizing the oceans with iron or other nutrients to enable plankton to absorb more carbon; and increasing cloud cover or the reflectivity of clouds that already form.

35. All may have unintended consequences, making the solution worse than the original problem. But it is clear that at least some form of geoengineering will likely be required: capturing carbon dioxide before it is released and storing it in some fashion, either deep beneath the earth, at the bottom of the ocean or in carbonate minerals. Such carbon capture and storage is critical to any serious effort to combat climate change.

Source: David Biello, “10 Solutions for Climate Change” in *Scientific America*, November 26, 2007 (<https://www.scientificamerican.com/article/10-solutions-for-climate-change/>).

## TEXT B

### The Climate Emergency: 2020 in Review

*Despite some promising developments, the need for action has grown even more urgent*

William J. Ripple, Christopher Wolf, Thomas M. Newsome, Phoebe Barnard, William R. Moomaw

1. The climate emergency has arrived and is accelerating more rapidly than most scientists anticipated, and many of them are deeply concerned. The adverse effects of climate change are much more severe than expected, and now threaten both the biosphere and humanity. There is mounting evidence linking increases in extreme weather frequency and intensity to climate change. The year 2020, one of the hottest years on record, also saw extraordinary wildfire activity in the

Western United States and Australia, a Siberian heat wave with record high temperatures exceeding 38 degrees C (100.4 degrees Fahrenheit) within the Arctic circle, a record low for October Arctic sea ice extent of 2.04 million square miles, an Atlantic hurricane season resulting in more than \$46 billion in damage, and deadly floods and landslides in South Asia that displaced more than 12 million people.

2. Every effort must be made to reduce emissions and increase removals of atmospheric carbon in order to restore the melting Arctic and end the deadly cycle of damage that the current climate is delivering. Scientists now find that catastrophic climate change could render a significant portion of the Earth uninhabitable consequent to continued high emissions, self-reinforcing climate feedback loops and looming tipping points. To date, 1,859 jurisdictions in 33 countries have issued climate emergency declarations covering more than 820 million people.

3. In January 2020, we warned of untold human suffering in a report titled World Scientists' Warning of a Climate Emergency with more than 11,000 scientist signatories from 153 countries at time of publication. As an Alliance of World Scientists, we continue to collect signatures from scientists, with now more than 13,700 signatories. In our paper, we presented graphs showing vital signs of very troubling climate change trends with little progress by humanity. Based on these trends and scientists' moral obligation to "clearly warn humanity of any catastrophic threat" and to "tell it like it is," we declared a climate emergency and proposed policy suggestions. We called for transformative change with six steps involving energy, short-lived air pollutants, nature, food, economy and population. A short video discussion by thought leaders on the six steps is now available.

4. Here, we investigate progress for these six steps during 2020. We have seen a few promising developments on energy, nature and food. Impressively, the European Union is on track to meet its emissions reduction goal for 2020 and become zero net carbon by 2050; however, this goal will still increase temperatures from the damaging levels of today. We are also encouraged by the recent trend of governments committing to zero net carbon, including China by 2060 and Japan by 2050. Similar pledges have been made by the United Kingdom, many subnational governments and some corporations, although there is mounting evidence that a 2050 or later target may be inadequate and net zero carbon should be reached much earlier, for example, by 2030.

5. U.S. President-elect Joe Biden has pledged that the U.S. will rejoin the Paris agreement and proposed a \$2 trillion climate plan to phase down fossil fuels by expanding renewable energy capacity while creating jobs, reducing pollution and investing in historically disadvantaged communities. It is critically important to significantly reduce CO<sub>2</sub> emissions while simultaneously increasing carbon accumulation by forests, mangroves, wetlands and other ecosystems. Progress for nature came in the form of the Bonn Challenge to restore forest and other ecosystems, but much more investment is needed in natural climate solutions. Global meat consumption, which must be reduced for climate mitigation, is expected to decline 3 percent this year, largely as a result of COVID-19. While likely a temporary decline, this coincides with increasingly popular meat substitutes; annual U.S. sales are projected to reach \$1 billion in 2020.

6. Although lockdowns associated with the COVID-19 pandemic resulted in a decrease in CO<sub>2</sub> emissions of 7 percent in 2020, this reduction is unlikely to be long-lived because there has been no major concurrent shift in the way we produce energy. This drop in emissions was a tiny blip compared to the cumulative buildup of greenhouse gases, which has led to all five of the hottest years on record occurring since 2015. In fact, atmospheric concentrations of

CO<sub>2</sub> continued to rise rapidly in 2020 reaching a record high in September. COVID-19 also led to a one year postponement of the COP26 United Nations climate change conference, after the 2019 failure of the COP25 conference to make meaningful progress. We are concerned that no major industrialized country is on track to limit warming to 1.5 degrees C, the target of the Paris Agreement. Instead, the actions of many wealthy countries—including the U.S. —are consistent with greater than three degrees C warming. Unfortunately, progress in 2020 has also been limited in the areas of short-lived air pollutants, the economy and population.

7. As we move into 2021 and beyond, we need a massive-scale mobilization to address the climate crisis, including much more progress on the six steps of climate change mitigation. Key actions for each step include the following:

8. Swiftly phasing out fossil fuels is a top priority. This can be achieved through a multipronged strategy based on rapidly transitioning to low-carbon renewables such as solar and wind power, implementing massive conservation practices, and imposing carbon fees high enough to curtail the use of fossil fuels.

9. Quickly cutting emissions of methane, black carbon (soot), hydrofluorocarbons and other short-lived climate pollutants is vital. It can dramatically reduce the short-term rate of warming, which may otherwise be difficult to affect. Specific actions to address short-lived pollutants include reducing methane emissions from landfills and the energy sector (methane), promoting improved clean cookstoves (soot) and developing better refrigerant options and management (hydrofluorocarbons).

10. We must restore and protect natural ecosystems such as forests, mangroves, wetlands and grasslands, allowing these ecosystems to reach their ecological potential for sequestering carbon dioxide. The logging of the Amazon, tropical forests in Southeast Asia, and other rainforests including the proposed cutting in the Tongass National Forest of Alaska is especially devastating to the climate. Creation of new protected areas, including strategic forest carbon reserves, should be a top priority. Payment for ecosystem services programs offer an equitable way for wealthier nations to help protect natural ecosystems.

11. A dietary shift toward eating more plant-based foods and consuming fewer animal products, especially beef, would significantly reduce emissions of methane and other greenhouse gases. It would also free up agricultural lands for growing human food and, potentially, reforestation (“Nature” step). Relevant policy actions include minimizing tillage to maximize soil carbon, cutting livestock subsidies and supporting research and development of environmentally friendly meat substitutes. Reducing food waste is also critical, given that at least one third of all food produced is wasted.

12. We must transition to a carbon-free economy that reflects our dependence on the biosphere. Exploitation of ecosystems for profit absolutely must be halted for long-term sustainability. While this is a broad, holistic step involving ecological economics, there are specific actions that support this transition. Examples include cutting subsidies to and divesting from the fossil fuel industry.

13. The global human population, growing by more than 200,000 people per day, must be stabilized and gradually reduced using approaches that ensure social and economic justice such as supporting education for all girls and women, and increasing the availability of voluntary family planning services.

14. These steps synergize with each other and together ensure a sustainable future. They also have many co-benefits beyond climate mitigation. For example, stabilizing human population size

can improve climate adaptation capacity in the event of declining crop yields. Similarly, plant-rich diets offer significant benefits for human health.

15. In December 2020, U.N. Secretary-General Antonio Guterres pleaded for every nation to declare a “climate emergency.” Thus, we call for the U.S. government to proclaim a climate emergency with either Joe Biden declaring a national climate emergency through an executive order or Congress passing major climate mitigation funding and a declaration of a climate emergency (H.Con.Res.52, S.Con.Res.22) that has been buried in a Congressional committee throughout 2020. One year ago, we were troubled about poor progress on mitigating climate change. We are now alarmed by the failure of sufficient progress during 2020.

16. However, there are glimmers of hope. Young people in more than 3,500 locations continued global climate strikes calling for urgent action. The Black Lives Matter movement has brought deep social injustice and inequality to the surface of our social and economic systems. Rapid progress in each of the six steps can be achieved when they are framed from the start in the context of climate justice, as climate change is a deeply moral issue. But this is only possible when those who face the greatest climate risks help shape the response, including Indigenous peoples, women, youth, people of color and low-income people. Aggressive transformative change, if framed holistically and equitably, will accelerate broad-based restorative action and avert the worst of the climate emergency. The survival of our society as we know it depends upon this unprecedented change.

Source: Retrieved on January 6, 2021, at <https://www.scientificamerican.com/article/the-climate-emergency-2020-in-review/>.

## Unit 4

### TEXT A

#### Is Language an Adaptation?

Steven Pinker

1. In the biologist’s sense of the word, an “adaptation” is a trait whose genetic basis was shaped by natural selection (as opposed to the everyday sense of a trait that is useful to the individual). What are the alternatives to the theory that language is an adaptation? And what are the reasons for believing it might be one?

##### *Is Language a Distinct Part of the Human Phenotype?*

2. One alternative is that language is not an adaptation itself, but a manifestation of more general cognitive abilities, such as “general intelligence”, “a symbolic capacity”, “cultural learning”, “mimesis”, or “hierarchically organized behavior”. If so, these more general cognitive capacities would be the adaptation. These alternatives are difficult to evaluate, because no one has spelled out a mechanistic theory of “general intelligence” or “cultural learning” that is capable of acquiring human language. Intelligence, learning, symbol comprehension, and so on do not

happen by magic but need particular mechanisms, and it is likely that different mechanisms are needed in different domains such as vision, motor control, understanding the physical and social worlds, and so on. The ability to acquire and use the cultural symbols called “language” may require learning mechanisms adapted to that job. Attempts to model the acquisition of language using general-purpose algorithms such as those in traditional artificial intelligence or connectionist neural networks have failed to duplicate the complexity of human language.

3. Though it is hard to know exactly what is meant by terms like “cultural learning” or “general intelligence,” one can see whether mastery of language in the human species resembles abilities that are unambiguously culturally acquired, like agricultural techniques, chess skill, knowledge of government, and mathematical expertise, or whether it looks more like a part of the standard human phenotype, like fear, humor, or sexual desire. Some very general properties of the natural history of language suggest that the latter is more accurate.

4. First, language is universal across societies and across neurological normal people within a society, unlike far simpler skills like farming techniques or chess. There may be technologically primitive peoples, but there are no primitive languages: the anthropologists who first documented the languages of technologically primitive societies a century ago were repeatedly astonished by their complexity and abstractness. And despite stereotypes to the contrary, the language of uneducated, working-class, and rural speakers has been found to be systematic and rule-governed, though the rules may belong to dialects that differ from the standard one.

5. Second, languages conform to a universal design. A language is not just any conceivable code that maps efficiently from sound to meaning. The design specifications listed in the preceding section—and, indeed, far more subtle and complex properties of grammar—can be found in all human languages.

6. A third kind of evidence is the ontogenetic development of language. Children the world over pass through a universal series of stages in acquiring a language. That sequence culminates in mastery of the local tongue, despite the fact that learning a language requires solving the daunting problem of taking in a finite sample of sentences (speech from parents) and inducing a grammar capable of generating the infinite language from which they were drawn. Moreover, children’s speech patterns, including their errors, are highly systematic, and can often be shown to conform to linguistic universals for which there was no direct evidence in parents’ speech.

7. A fourth kind of evidence also comes from the study of language acquisition. If children are thrown together without a pre-existing language that can be “culturally transmitted” to them, they will develop one of their own. One example comes from deaf communities, where complex sign languages emerge quickly and spontaneously. A recent study in Nicaragua has tracked the emergence of a complex sign language in little more than a decade, and has shown that the most fluent and creative users of the language were the children.

8. A fifth kind of evidence is that language and general intelligence, to the extent we can make sense of that term, seem to be doubly dissociable in neurological and genetic disorders. In aphasia and in the genetically caused developmental syndrome called Specific Language Impairment, intelligent people can have extreme difficulties speaking and understanding. Conversely, in a number of retardation syndromes, substantially retarded children may speak fluently and grammatically and do well on tests of grammatical comprehension and judgement. Few of these dissociations are absolute, with language or non-linguistic cognition completely spared or completely impaired. But the fact that the two kinds of abilities can dissociate

quantitatively and along multiple dimensions shows that they are not manifestations of a single underlying ability.

*Did Language Evolve by Means Other Than Natural Selection?*

9. A different alternative to the hypothesis that language is an adaptation is the possibility that it evolved by mechanisms other than natural selection, a hypothesis associated with Stephen Jay Gould and Noam Chomsky. On this view, language may have evolved all at once as the product of a macromutation. Or the genes promoting language may have become fixed by random genetic drift or by genetic hitchhiking (i.e. genes that were near other genes that were the real target of selection). Or it may have arisen as a by-product of some other evolutionary development such as a large brain, perhaps because of physical constraints on how neurons can be packed into the skull.

10. It is hard to evaluate this theory (though, as we shall see, not impossible), because there have been no specific proposals fleshing out the theory (e.g. specifying the physical constraint that makes language a neurobiological necessity). So what is the appeal of the non-selectionist theories?

11. One is a general misconception, spread by Gould, that natural selection has become an obsolete or minor concept in evolutionary biology, and that explanations in terms of by-products (what he called “spandrels”) or physical constraints are to be preferred in principle. This is a misconception because natural selection remains the only evolutionary force capable of generating complex adaptive design, in which a feature of an organism (such as the eye or heart) has a non-random organization that enables it to attain an improbable goal that fosters survival and reproduction. Moreover, natural selection is a rigorous concept which can be modelled mathematically or in computer simulations, measured in natural environments, and detected by statistical analyses of organisms’ genomes.

12. A second appeal of non-selectionist theories comes from a skepticism that language could have provided enough reproductive benefits to have been selected for. According to one objection, popular among linguists, language has arbitrary features that do not obviously contribute to communication. However, all communication systems have arbitrary features (such as the particular sequences of dots and dashes making up Morse code), because arbitrary ways of linking messages to signals are useful as long as they are shared by sender and recipient. Moreover, since a feature that eases the task of the speaker (by omitting information or reducing the complexity of the signal) will complicate the task of the listener (by making the message more ambiguous or vulnerable to noise), a shared code must legislate arbitrary conventions that do not consistently favor any single desideratum.

13. Another argument for non-selectionist theories is that grammar is more complicated than it needs to be to fulfil the communicative needs of a hunter-gatherer lifestyle. As one skeptic put it, “How does recursion help in the hunt for mastodons?” But as is pointed out, complex grammar is anything but a useless luxury: “It makes a big difference whether a far-off region is reached by taking the trail that is in front of the large tree or the trail that the large tree is in front of. It makes a difference whether that region has animals that you can eat or animals that can eat you.” Since selection can proceed even with small reproductive advantages (say, one per cent), the evolution of complex grammar presents no paradox.

14. A third misconception is that if language is absent from chimpanzees, it must have evolved by a single macromutation. This is seen as an argument for a macromutational theory by those

who believe that human language is qualitatively distinct from the communicative abilities of chimpanzees, and as an argument that human language cannot be qualitatively distinct from the communicative abilities of chimpanzees by those who believe that macromutations are improbable. But both arguments are based on a misunderstanding of how evolution works. Chimpanzees and bonobos are our closest living relatives, but that does not mean that we evolved from them. Rather, humans evolved from an extinct common ancestor that lived six to eight million years ago. There were many other (now-extinct) species in the lineage from the common ancestor to modern humans and, more important, many individuals making up the lineages that we group into species for convenience. Language could well have evolved gradually after the chimp/human split, in the 200,000-300,000 generations that make up the lineage leading to modern humans. Language, that is, could be an autapomorphy: a trait that evolved in one lineage but not its sister lineages.

15. The final appeal of the non-selectionist hypothesis is that language could only have been useful once it was completely in place: a language is useless if you are the only one to have evolved the ability to speak it. But this objection could be raised about the evolution of any communicative system, and we know that communication has evolved many times in the animal kingdom. The solution is that comprehension does not have to be in perfect synchrony with production. In the case of language, it is often possible to decode parts of an utterance in a language one has not completely mastered. When some individuals are making important distinctions that can be decoded by listeners only with cognitive effort, a pressure could thereby develop for the evolution of neural mechanisms that would make this decoding process become increasingly automatic and effortlessly learned. The process whereby environmentally induced responses set up selection pressures for such responses to become innate, triggering conventional Darwinian evolution that superficially mimics a Lamarckian sequence, is known as the Baldwin Effect.

16. Opposing these spurious arguments for the non-selectionist hypothesis is a strong *prima facie* reason to favor the selectionist one: the standard argument in evolutionary biology that only natural selection can explain the evolution of complex adaptive design. The information-processing circuitry necessary to produce, comprehend, and learn language requires considerable organization. Randomly organized neural networks, or randomly selected subroutines from an artificial intelligence library, do not give rise to a system that can learn and use a human language. As we saw, language is not just a set of symbolic labels for concepts, not just the use of linear order, not just the use of hierarchical structure, and not just a blurting out of a sequence of sounds. It is an integrated system containing a lexicon, several components of grammar, and interfaces to input-output systems, possibly with language-specific modifications of their own. And this complexity is not just there for show, but makes possible a remarkable ability: language's vast expressive power, rapid acquisition by children, and efficient use by adults.

17. As with other complex organs that accomplish improbable feats, the necessary circuitry for language is unlikely to have evolved by a process that is insensitive to the functionality of the end product, such as a single mutation, genetic drift, or arbitrary physical constraints. Natural selection is the most plausible explanation of the evolution of language, because it is the only physical process in which how well something works can explain how it came into existence.

Source: Pinker, S. (2003). "Language as an adaptation to the cognitive niche". In S. Kirby & Christiansen, M. (Eds.), *Language Evolution: States of the Art* (pp. 16-37). New York: Oxford University Press, pp. 21-26.



## TEXT B

### On Familiar Style (abridged)

William Hazlitt

1. The proper force of words lies not in the words themselves, but in their application. A word may be a find-sounding word, of an unusual length, and a very imposing from its learning and novelty, and yet in the connection in which it is introduced may be quite pointless and irrelevant. It is not pomp or pretension, but the adaptation of the expression to the idea, that clinches a writer's meaning: as it is not the size of glossiness of the materials, but their being fitted each to its place, that gives strength to the arch; or as the pegs and nails are as necessary to the support of the building as the larger timber, and more so than the mere showy, unsubstantial ornaments.
2. I hate anything that occupies more space than it is worth. I hate to see a load of band-boxes go along the street, and I hate to see a parcel of big words without anything in them. A person who does not deliberately dispose of all his thoughts alike in cumbrous draperies and flimsy disguises, may strike out twenty varieties of familiar every-day language, each coming somewhat nearer to the feeling he wants to convey, and at last not hit upon that particular and only one which may be said to be identical with the exact impression in his mind.
3. This would seem to show that Mr. Cobbet is hardly right in saying that the first word that occurs is always the best. It may be a very good one; and yet a better may present itself on reflection or from time to time. It should be suggested naturally, however, and spontaneously, from a fresh and lively conception of the subject. We seldom succeed by trying at improvement, or by merely substituting one word for another that we are not satisfied with, as we cannot recollect the name of a place or person by merely plaguing ourselves about it. We wander farther from the point by persisting in a wrong scent; but it start up accidentally in the memory when we least expect it, by touching some link in the chain of previous association.
4. There are those who hoard up and make a cautious display of nothing but rich and rare phraseology—ancient medals, obscure coins, and Spanish pieces of eight. They are very curious to inspect, but I myself would neither offer nor take them in the course of exchange. A sprinkling of archaisms is not amiss, but a tissue of obsolete expressions is more fit *for keep than wear*. I do not say I would not use any phrase that had been brought into fashion before the middle or the end of the last century, but I should be shy of using any that had not been employed by any approved author during the whole of that time.
5. Words, like clothes, get old-fashioned, or mean and ridiculous, when they have been for some time laid aside. Mr. Lamb is the only imitator of old English style I can read with pleasure; and he is so thoroughly imbued with the spirit of his authors that the idea of imitation is almost done away. There is an inward unction, a marrowy vein, both in the thought and feeling, an intuition, deep and lively, of his subject, that carries off any quaintness or awkwardness arising from an antiquated style and dress. The matter is completely his own, though the manner is assumed. Perhaps his ideas are altogether so marked and individual as to require their point and pungency to be neutralized by the affectation of a singular but traditional form of conveyance. [...]
6. It is as easy to write a gaudy style without ideas as it is to spread a pallet of showy colors or

to smear in a flaunting transparency. “What do you read?” “Words, words, words.”—“What is the matter?” “*Nothing*,” it might be answered. The florid style is the reverse of the familiar. The last is employed as an unvarnished medium to convey ideas; the first is resorted to as a spangled veil to conceal the want of them. When there is nothing to be set down but words, it costs little to have them fine. [...]

7. If some of us, whose “ambition is more lowly”, pry a little too narrowly into nooks and corners to pick up a number of “unconsidered trifles,” they never once direct their eyes or lift their hands to seize on any but the most gorgeous, tarnished, thread-bare, patchwork set of phrases, the left-off finery of poetic extravagance, transmitted down through successive generations of barren pretenders. If they criticize actors and actresses, a huddled phantasmagoria of feathers, spangles, floods of light, and oceans of sounds float before their morbid sense, which they paint in the style of Ancient Pistol. Not a glimpse can you get of the merits or defects of the performers: they are hidden in a profusion of barbarous epithets and willful rhodomontade. Our hypercritics are not thinking of these little *fantoccini* beings—

*That strut and fret their hour upon the stage—*

but of tall phantoms of words, abstractions, *genera* and species, sweeping clauses, periods that unite the Poles, forced alliterations, astounding antitheses—

*And on their pens Fustian sits plumed.*

8. [...] Such persons are in fact besotted with words, and their brains are turned with the glittering but empty and sterile phantoms of things. Personifications, capital letters, seas of sunbeams, visions of glory, shining inscriptions the figures of a transparency, Britannia with her shield, or Hope leaning on an anchor, make up their stock-in-trade. They may be considered hieroglyphical writers. Images stand out in their minds isolated and important merely in themselves, without any ground-work of feeling—there is no context in their imaginations. Words affect them in the same way, by the mere sound, that is, by their possible not by their actual application to the subject in hand. They are fascinated by first appearances, and have no sense of consequences. Nothing more is meant by them than meets the ear: they understand or feel nothing more than meet their eye. The web and texture of the universe, and of the heart of man, is a mystery to them: they have no faculty that strikes a chord in unison with it. They cannot get beyond the daubings of fancy, the varnish of sentiment. Objects are not linked to feelings, words to things, but images revolve in splendid mockery, words represent themselves in their strange rhapsodies.

9. The categories of such a mind are pride and ignorance—pride in outside show, to which they sacrifice everything, and ignorance of the true worth and hidden structure both of words and things. With a sovereign contempt for what is familiar and natural, they are the slaves of vulgar affectation—of a routine of high-flown phrases. Scorning to imitate realities, they are unable to invent anything, to strike out one original idea. They are not copyists of nature, it is true; but they are the poorest of all plagiarists, the plagiarists of words. All is far-fetched, dear bought, artificial, oriental in subject and allusion; all is mechanical, conventional, vapid, formal, pedantic in style and execution.

10. They startle and confound the understanding of the reader by the remoteness and obscurity to their illustrations; they soothe the ear by the monotony of the same everlasting round of circuitous metaphors. They are the mock-school in poetry and prose. They flounder about between fustian in expression and bathos in sentiment. They tantalize the fancy, but never reach the head nor touch

the heart. Their Temple of Fame is like a shadow structure raised by Dulness to Vanity, or like Cowper's description of the Empress of Russia's palace of ice, "as worthless as in show 'twas glittering"—

*It smiled, and it was cold!*

## Unit 5

### TEXT A

#### Why "De-growth" Shouldn't Scare Businesses

Thomas Roulet & Joel Bothello

1. The concept of degrowth dates back to the 1970s, when a group of French intellectuals led by the philosopher Andre Gorz proposed a simple idea: In response to mounting environmental and social problems, they suggested that the only real solution was to produce and consume less—to shrink our economies to cope with the carrying capacity of our planet. The proposal was considered by many at the time to be too radical. But with today's climate crisis, debates around degrowth have been reinvigorated, and many major figures such as Noam Chomsky, Yanis Varoufakis and Anthony Giddens have, to varying degrees, expressed support for the idea.
2. For others though—especially business leaders—degrowth is completely unthinkable, not least because of the anti-consumerist roots of the term. The prevailing view is that growth is an economic necessity, and any threat to that not only undermines business, but basic societal functioning. For instance, there is a warning about the dire social consequences of what is perceived to be a movement of "consumer shaming." Framed in these terms, the resistance of multinational CEOs and entrepreneurs alike is predictable, as is the reluctance of politicians to promote degrowth policies that would potentially prove unpopular with key constituents. The economist Tim Jackson provides a concise assessment: "Questioning growth is deemed to be the act of lunatics."
3. Critics of degrowth have also put forth other arguments that, at face value, seem valid: the economist Joseph Stiglitz argues, for instance, that since growth is unquestionably good for human development, we simply need a different kind of growth that is better for the environment, not less of it. Others argue that the philosophy of degrowth does not seriously account for technological innovation—specifically the idea that we can continue current growth patterns if we innovate products that are less resource-intensive and generate fewer waste by-products.
4. There are, however, problems with these perspectives. First, given the finite nature of our planet, infinite economic growth—even of a different variety—is a logical impossibility. Secondly, innovation and improvements produce, in many cases, unintended consequences. One of which is the Jevons paradox, where individuals compensate for efficiency through increased consumption. For instance, more energy-efficient refrigerators lead to more refrigerators in a home.
5. The third and most fundamental issue is that the degrowth movement has already begun: at a grassroots level, consumer demand is actively being transformed, despite political and corporate reticence. A recent YouGov poll in France highlights that 27% of respondents are seeking to

consume less—double the percentage from two years prior. The number of people eating less meat or giving it up altogether has been rising exponentially in recent years, too. Similarly, the movement of Flygskam (literally “flight shaming” in Swedish) has had early successes in reducing pollution: 10 Swedish airports have reported considerable declines in passenger traffic over the past year, which they attribute directly to Flygskam. In the apparel industry, fast fashion is still popular, but garment manufacturers are preparing for a backlash as consumers voice growing criticism of the ecological impact of clothing. Accounts such as these indicate how consumers in many contexts are increasingly conscious of the negative consequences of consumerism and are seeking to change their habits. We are witnessing the emergence of consumer-driven degrowth.

6. These stories also indicate how degrowth opens new opportunities: some companies and industries will certainly be disrupted, but others that are sufficiently prepared for such transitions will handily outmaneuver their competitors. For instance, Flygskam has been a boon for train travel, bolstered by a social media movement called Tågskryt (“train brag”). Meanwhile reduced meat consumption has been accompanied by an explosion in meat substitutes that produce one-tenth of the greenhouse gases compared to the real thing. Accordingly, degrowth reshuffles competitive dynamics within and across industries and, despite what many corporate leaders assume, offers new bases for competitive advantage.

7. Based on our examination of companies at the forefront of the degrowth movement, we’ve identified three of their strategies that can apply to larger incumbent firms. First, firms can pursue degrowth-adapted product design, involving the creation of products that have longer lifespans, are modular, or are locally produced. Fairphone, a social enterprise, eschews the built-in obsolescence of larger mobile device manufacturers and produces repairable phones that dramatically extend their longevity. Similarly, the start-up The 30 Year Sweatshirt sells high-quality, durable products that run counter to fast fashion principles. Although incumbents have yet to follow suit, such transformations are not without precedent: for example, the American auto industry was forced to move away from planned obsolescence, which was a common practice dating back to the 1920s, when Japanese competitors seized the market in the 1970s-80s with more reliable and fuel-efficient vehicles that were built to last.

8. Second, firms can engage in value-chain repositioning, where they exit from certain stages of the value chain and delegate some tasks to stakeholders. As an example, the vehicle manufacturer Local Motors created a proof-of-concept recyclable vehicle crafted with 50 individual parts printed onsite, compared with the roughly 25,000 parts required for a traditional vehicle. The company crowdsourced designs and crowdfunded the project from their potential consumers. Larger firms such as Lego have also taken advantage of this model, launching marketplaces for either creating new designs or trading used products. This way, the firm creates different ways to consume despite production limits. Firms that incorporate stakeholder engagement in their operations are thereby faster to adapt to degrowth when it becomes more mainstream.

9. Third, firms can lead through degrowth-oriented standard setting. This entails creation of a standard for the rest of the industry to follow. The apparel company Patagonia—that explicitly follows an “antigrowth” strategy—is the poster child for this philosophy, offering a worn-wear store and providing free repairs for not only their own products, but also for those of other garment manufacturers. In a similar vein, the automobile company Tesla released all its patents in 2014, seeking to catalyze the diffusion of electric vehicles. Such initiatives were not merely marketing ploys, but also strategies to standardize a practice or technological platform throughout

an industry—one in which companies like Patagonia or Tesla would have existing expertise.

10. These strategies illustrate potential ways that firms can adapt to consumer-driven degrowth. Firms may pursue more than one strategy (or all three) simultaneously: In 2016, for example, Google attempted to create a longer lasting phone with modular components, soliciting feedback from supply chain actors on how to create standardized parts for their handset. Although “Project Ara” was ultimately cancelled, it did reveal a common thread among the strategies. Effective and inclusive communication with stakeholders across the supply chain is crucial, but framing the project in a way that all those stakeholders can buy into requires considerable effort and adjustment through trial and error.

11. As we continue to grapple with climate change, we can expect consumers, rather than politicians, to increasingly drive degrowth by changing their consumption patterns. Firms should think in an innovative way about this consumer-driven degrowth as an opportunity, instead of resisting or dismissing the demands of this small but growing movement. Businesses that successfully do so will emerge more resilient and adaptable—instead of necessarily selling more, they will sell better, and grow in a way that satisfies consumers while respecting the environment.

Source: Thomas Roulet and Joel Bothello, “Why ‘De-growth’ Shouldn’t Scare Businesses”, *Harvard Business Review* (Feb 4, 2020), retrieved at <https://hbr.org/2020/02/why-de-growth-shouldnt-scare-businesses>

## TEXT B

### What Happens When Society Crumbles and Progress Stops

Richard Webb, Debora Mackenzie & John Horgan

The end of industrial civilization

1. Rome, the Maya, Bronze Age Greece: every complex society in history has collapsed. Will our industrial civilization be any different? Probably not. It all comes down to complexity and energy. Societies inevitably grow more complex as they chase prosperity and find solutions to the problems thrown up by success, and that comes at a cost: energy. Civilizations collapse, the thinking goes, when they can no longer generate enough juice to maintain existing complexity and solve new problems.

2. We got to where we are today because the industrial revolution exploited readily available high-quality anthracite coal. We then used that energy to tap progressively harder-to-access energy sources, driving our complexity to unprecedented heights. But unless we find a bounteous new source, we will one day overshoot what we can afford. Then complexity quickly unravels: political and economic institutions falter, production and trade diminish, global supply chains break. Technologies become impossible. States fragment. Lots of people die.

3. But there is hope. Except for small, isolated societies in which everyone died, no historical collapse has wiped the slate clean. All retained enough of their technologies and institutions to start afresh, and eventually do better. So could our descendants take what remains and build a new civilization? The problem is that this time, there might be nothing left. “Rome didn’t have nuclear weapons,” says Ian Morris at Stanford University in California. Collapsing societies undergo

dramatic shifts in power and wealth, which are always accompanied by violence, he says. “This could be the final collapse.”

4. Globalization could also make our meltdown different. When past societies fell, there were others left to carry on, says Thomas Homer-Dixon at the University of Waterloo in Canada. “If our one global civilization collapses there won’t be outside resources, capital and knowledge to reboot things.” For Ugo Bardi at the University of Florence in Italy, the chances of rebuilding depend on whether we can keep the electrical grid running. This isn’t just to keep the lights on, but to produce the materials required for industrial civilization—steel for machinery, potash for fertilizer, silicon for semiconductors and so on. With easily accessible fossil-fuel energy sources long exhausted, Bardi calculates that after a collapse we wouldn’t be able to recover enough energy to mine or smelt the materials we rely on unless we retain a working grid.

5. That means we can future-proof our energy supplies, but only if we act now. Generating fossil-fuel or nuclear energy requires substantial energy up front—if that system collapses we won’t have what it takes to crank it up again. Sun and wind, however, are free; we need only maintain the devices that capture them. Bardi calculates that if half our electricity came from renewables, the grid could generate enough energy to maintain us and, crucially, itself, through crises that would completely collapse our present system. But we would need to build it while we have the silicon and civil order, and that would require investment in renewables to be 50 times its current level. If not, says Bardi, “we don’t have enough anthracite to reinvent electricity or launch the industrial revolution again. So it will be agriculture: simple tools and dark nights.” Then again, climate instability might hinder farming, leaving hunting and gathering.

6. To do any better than that we will need to keep our key institutions, Homer-Dixon thinks, but that could be impossible amid severe climate change and conflict. When things settle down, all our records could be gone: even hard drives decay in a century or two. And in case you think we might be better off forgetting the knowledge that led to our civilization’s fall, think again: the more primitive the society, the more violent people were. Collapse will be no return to Eden. Time to start installing those solar cells.

#### The End of Economic Growth

7. If it’s shrinking or flaccid, you’re in trouble. You want it large and growing. We’re talking about gross domestic product—that vital symbol of a nation’s economic virility. On the face of it, the obsession with economic growth is fair enough. A bigger cake means more to share around, and that further increases GDP in a never-ending virtuous circle. Or does it?

8. The idea that economic growth has natural limits first came to public attention in 1972, with a report called *Limits to Growth* from the think tank Club of Rome. It argued that sooner or later, the world’s economies would demand more resources than the planet could supply. But things aren’t that simple, says environmental economist Cameron Hepburn of the University of Oxford. “We’ve had scare stories for 40 to 50 years about resources running out. They don’t come true and they won’t.” Where a resource has a price, he says, using too much forces the price up—and the economic burn drives us to find alternative ways of making things.

9. Innovation, then, is the key to sustained, sustainable growth. But innovation might be a finite resource too, says Robert Gordon of Northwestern University in Evanston, Illinois, author of *The Rise and Fall of American Growth*. Since the first throes of the industrial revolution, he argues,

economic growth has been propelled by consecutive technological revolutions: steam power, electricity and the internal combustion engine, and digital communications. But today it's not easy to see where the next big boosts are coming from. That might explain why GDP growth has been slowing in Western economies since the 1970s.

10. Hepburn thinks that view is unduly pessimistic. "I don't think humanity has lost its mojo," he says. Part of the problem is accountancy, he says: GDP, defined as the total value of goods and services an economy makes, is not a good way to measure economic strength in societies that are finding better ways to make things cheaper. He also sees a big productivity-boosting innovation shimmering on the horizon: cheap solar power. Anyway, would a world with no economic growth be so bad? The conventional doom-laden answer is yes. Zero growth brings political polarization, says Gordon: there's less money to finance schools and hospitals, and the gulf between the haves and have-nots widens. The growth of populist movements in Europe and the U.S. since the 2008 financial crash gives us a foretaste of what we can expect. Some pessimists even see the beginnings of parallels with political changes in the zero-growth 1930s that propelled the world to war.

11. The outlook doesn't have to be that gloomy, says Tim Jackson of the University of Surrey in Guildford, U.K., author of the 2009 book *Prosperity Without Growth*. Beyond a certain level of material development, our well-being need not rely on making and consuming ever more stuff. In this vision, prosperity does not have to be curtailed in a post-growth world: a sharing economy, greater emphasis on renovation and refurbishment rather than making new things, and more time spent on cultural activities are all ways of increasing value while maintaining social cohesion and without consuming more. That sounds utopian, and it would require revisiting assumptions that have underpinned economic thinking for a century or more. We might all end up the richer for it, though. "It's not a trivial thing to achieve by any means," says Jackson. "But we could have more fun with less stuff."

#### The End of Science

12. Twenty years ago, I asserted that science at its purest and grandest, the quest to understand the universe and our place in it, is ending. Scientists will produce no revelations as startling as natural selection, the genetic code, quantum mechanics, relativity or the big bang theory. Yes, they will keep extending, refining and applying their knowledge, but they won't discover anything to force radical revisions of our current maps of reality. Nor will they solve the deepest riddles of existence. Why is there something rather than nothing? How did life begin on Earth, and was it a once-in-eternity fluke? How does matter make mind? Since my book *The End of Science* was published in 1996, science has achieved nothing that contradicts my dismal forecast.

13. Take physics. The discovery of the Higgs boson and that of gravitational waves confirm the foundational paradigms of quantum mechanics and general relativity. Brilliant achievements, sure, but they don't fundamentally alter our view of the universe. In their desperation to go beyond what we know, physicists are still pursuing string and multiverse theories. But such ideas are as lacking in empirical evidence as they were 20 years ago; in fact, they are yet to yield any testable predictions. Stung by this complaint, some physicists have begun to argue that falsifiability—our best criterion for distinguishing science from pseudoscience—is overrated. Not a good sign.

14. Biology has fared better in recent years, spawning countless advances, from cloning and the

Human Genome Project to CRISPR, a powerful new gene-editing technique. But all fit neatly within the framework of DNA-based genetics and neo-Darwinism. There's nothing revelatory here.

15. Of all fields, neuroscience has the greatest potential for breakthroughs that could turn our world upside down. Imagine if researchers demonstrated conclusively that bacteria or iPhones are conscious, or have free will. That would shake things up. The U.S. and Europe are pouring money into giant brain-research projects. But the vexed question of how mental and physical states are related, known as the mind-body problem, remains as baffling today as when Descartes pondered it in the 17th century.

16. So are scientists starting to accept my end-of-science thesis? Hardly. Most reject it as vehemently now as they did 20 years ago. But rather than present reasoned arguments, they usually profess their faith in scientific progress and scoff at any mention of limits. That's fine with me, because my views have evolved since I started teaching at an engineering school. When my students resist my argument, as many do, I'm relieved. Get out there and prove me wrong, I say. If one of them cracks the neural code or finds extraterrestrial life, launching a whole new era of science, I would be more than happy to eat my words. I would be ecstatic.

Source: *New Scientist*, 4 June 2016, pages 29-35

## Unit 6

### TEXT A

#### Confucius (K'ung Tzu)

Yang Huanyin

1. Eminent teacher, philosopher and political theorist, and founder of its feudal system of education, Confucius is one of Ancient China's most famous figures, a man whose practical experience and deep thinking on the subject have left their mark on educational development in his own country and elsewhere. Revered in antiquity as the "Supreme Sage" and the "Model for Ten Thousand Generations", Confucius now enjoys universal acclaim; his remarkable and lasting contribution to teaching and education has ensured him a place in history, as well as in culture, in China and beyond. The influence of his pedagogy remains perceptible today.

#### Biographical note

2. Confucius (551-479 BC), whose patronymic was Qiu and given name Zhongni, was born at Quyi in the principality of Lu. Confucius took lifelong delight in learning as well as teaching, and lived to see his reputation as an accomplished polymath spread far and wide. In breaking the aristocratic monopoly of learning and setting up a private academy that was accessible to rich and poor alike, Confucius was moving with his times. "My teaching," he declared, "is open to everyone, without distinction." He was in his 30s when he first accepted disciples; he took in 3,000 in all, seventy-two of whom progressed to complete mastery of the "six arts". In scope,



enrolment and quality of teaching, the school of Confucius was unique for its age; both during and after its founder's lifetime and posthumously, it exerted a considerable influence in the political, economic, cultural, ethical and moral spheres. Confucius devoted his energies to this undertaking for almost half a century and his efforts were interrupted only by illness and death at the age of 72.

#### His views on education

3. In the course of this half century, Confucius, not content to give excellent training to a large number of students, constantly distilled his own teaching experience, thus developing his own educational doctrine.

4. The teacher's first task is to identify his audience. In this connection, Confucius stated that his lessons were destined for all men, without exception (*Analects*, Wei Ling gong). His pupils came from the lowest as well as the highest levels of society, and access to education was thereby broadened considerably. Opening the doors of learning more widely, he hastened the development of general education in Ancient China, thus contributing both to political reform and to the dissemination of culture. At the same time he helped to reveal the humanist character of Confucian teaching, which was to have an unquestionable influence on the private schools and academies of feudal society. This approach also helped to create the conditions whereby the emergent land-owner class could accede to the authority conferred by learning and produce talented men from its midst.

#### Role and objectives of education

5. Starting from the political principle that virtue was a prerequisite of government, and the psychological observation that "by nature, men are much alike; their practices set them apart" (*Analects*, Yang Huo), Confucius demonstrated that education plays a fundamental role in the development of society and of individuals alike. Not only does it offer a means of ensuring the supremacy of virtue; it can also alter human nature and improve it in qualitative terms. By raising individual moral standards, it renders society in its entirety more virtuous: the kingdom is well administered, orderly and law-abiding, to the extent that all within it follow the path of righteousness. Confucius was at the origin of that concern for education, which gradually became one of the great traditions of China's feudal society.

6. Another of a teacher's tasks is to determine what type of person he is to form. Denouncing the favoritism and the passing of office from one generation of nobles to the next that prevailed during his time, Confucius recommended appointment according to merit and 'promotion of the ablest' (*Analects*, Zi Lu). He considered that the goal of education was to produce capable individuals (*xiancai*)—whom he also called *shi* (gentlemen) or *junzi* (men of quality)—who "combined competence with virtue" and whose subsequent careers in administration and government would bring about the ideal of a kingdom managed with integrity. The Chinese people have, to this day, kept faith with these two traditions; character development aimed at competence together with moral integrity; and appointment according to merit.

#### Content

7. In conformity with these objectives, Confucius determined that the twin pillars of education should be moral instruction, which would have priority, and the imparting of knowledge.

8. Moral instruction, which had to take pride of place, since what was needed were individuals

of outstanding virtue who would assist the prince in governing with integrity, thus became the basis of Confucian teaching. In deference to the interests of the feudal landowning class, Confucius reshaped the moral concepts of the past, and proclaimed a series of new rules designed to put an end to the political chaos and moral decadence of the times. His ethics, philosophy and politics are indissociable, the first of these being characterized by a rare vitality which was the driving force of feudal morality and civilization for more than two millennia and which was centered on “humanity” or “benevolence” (*ren*), which also signifies love for one’s neighbor. This virtue manifests itself in all types of relations between human beings and contains the germ of other qualities: filial piety (*xiao*), respect for the elderly (*ti*), loyalty (*zhong*), respectfulness (*gong*), magnanimity (*kuan*), fidelity (*xin*), diligence (*min*), altruism (*hui*), affability (*wen*), kindness (*liang*), frugality (*jian*), tolerance (*rang*), indulgence (*shu*), wisdom (*zhi*) and courage (*yong*). In order that all these precepts might serve to enhance the responsibility of individuals and society alike, Confucius stressed that each man should cultivate virtue and should receive a moral education. Moral education was thus for Confucius the means whereby his ideas concerning virtue might be materialized.

9. However, Confucius was equally concerned with the intellectual development of his disciples, that is to say, with the inculcation of culture, abilities and skills. In order to instill the moral values of feudal society in them, the basics of an all-round culture and the capacities required to exercise official responsibilities, he drafted six manuals which were considered to be the foundation of teaching and learning: the *Book of Odes* (*Shi*); the *Book of History* (or *Documents*) (*Shu*); the *Book of Rites* (*Li*); the *Book of Music* (*Yue*); the *Book of Changes* (*Yi*); and the *Spring and Autumn Annals* (*Chunqiu*). These didactic works, including philosophy, history, politics, economics, culture and musicianship, constituted the first relatively comprehensive teaching manuals in Chinese history.

10. Besides the six classics, which were designed to provide a general culture, Confucius’ teaching also covered the six arts (rites, musicianship, archery, chariot-driving, calligraphy and mathematics), the purpose of which was to impart skills and know-how through practice; according to Confucius, study of the six classics, coupled with mastery of the six arts, would inculcate sound moral sense and a solid cultural grounding that were necessary for the competent exercise of public office.

11. Rooted in political and moral principles, Confucian education is concerned solely with what constitutes the makings of the “man of quality” and with the tools that the official must master. Natural sciences are hardly touched upon; trade and agriculture are completely ignored. Another outstanding feature of the educational theory and practice of Confucius and the feudal teachers who succeeded him is disdain for manual labor and those engaged in it. Except for a few minor alterations, the content of education continued to reflect the options and priorities established by Confucius throughout the feudal period.

#### Teachers

12. Confucius had a great deal to say on this subject. Considered to be a remarkable teacher himself, he was revered throughout feudal society and served as a model for countless generations of his successors.

13. He believed that a good teacher should first and foremost be passionately and conscientiously committed to his work. His own knowledge must be broad in scope and fully mastered if his pupil

was to benefit from exposure to it. Confucius further believed that in order to elicit good results, the teacher must love his pupils, know them well, understand their psychological particularities, give thought to ways and means of facilitating their access to knowledge and, to that end, develop an effective methodology. The hallmark of a teacher's virtue, in Confucius' eyes, was tireless commitment through his lessons to his pupils' development.

14. The ethical code of education which Confucius elaborated, his own performance as a teacher and his attachment to the "mean" are still considered today as Confucius' finest and greatest contributions to the cause of learning.

#### Education and economics

15. Confucius was not unduly concerned with the links between education and economics, but he nevertheless maintained that prosperity should take precedence over education. An educated, vigorous and prosperous population was, to his mind, the sign of sound administration; in other words, not only was education important, but its development must be materially based on development of the economy. A State can be well administered only if its population is in good heart and if its prosperity permits steadily increasing access to education. This concept of educational economics reflects an embryonic materialism.

#### Educational philosophy

16. In this domain, Confucius, wittingly or unwittingly, applied some of the basic tenets of psychology to the solution of concrete problems with which he was confronted, and he formulated a number of observations in the domains of what we now refer to as differential psychology, learning psychology, moral psychology and teaching psychology. As regards the educational process itself, his remarks concerning the differences between his disciples—differences of intelligence, aptitude, character, aspiration, interest and taste—reflected an attentive attitude that led him to put forward a number of pedagogical principles.

17. Confucius had elaborated a conceptual framework that was in keeping with the interests of the land-owning class in the China of his day, and he began to put his ideas into practice. His pioneering work, occurring as it did at a time when the old slave-owning system was being replaced by a feudal one, obviously had a revolutionary impact, and assured for Confucius a key place in the history of education in China, without which its development could not be properly understood.

#### The influence of Confucius

18. If Confucius' thought had a profound influence on the development of Chinese society, and particularly that of its education and moral science, at different times and under a variety of circumstances, it also left its mark on a great number of Eastern and Western countries, which it reached through a wide variety of channels. Confucius and his doctrine do not belong only to China; he is acknowledged throughout the world as a major figure of universal civilization and culture.

19. From the time it began to spread, Confucian thought deeply influenced the political, economic and cultural, and to an even greater extent the educational and ethical, development of the countries which it reached. He was taken as a model by successive generations, and the supreme incarnation of virtue, an object of veneration for teachers, pupils and society as a whole.

In all these countries, as in China, the Confucian classics served as didactic models during the feudal period, education being based on respect for Confucius and the reading of his canonical works.

20. Today, Confucius still has an important place in the education system of countries of the region. In the other Asian countries, the past and present influence of Confucianism on education, although less far-reaching, is nevertheless to a greater or lesser extent perceptible, pointing inevitably to the conclusion that no other teacher has been as influential as Confucius in this part of Asia.

21. As a result of his outstanding qualities as a teacher, Confucius is regarded in many countries as a model for members of the profession. In China, his birthday was celebrated as a holiday—an occasion marked by commemorative events and ceremonies to honor especially meritorious teachers, and to encourage others to draw inspiration from the virtues of the great educator.

Source: adapted from UNESCO (1993). *Prospects: the Quarterly Review of Comparative Education* (Paris, UNESCO: International Bureau of Education), Vol. XXIII, No. 1/2, pp. 211-219.

## TEXT B

### Mindfulness Makeover: How to “Just Be” No Matter What

Sarah Jeanne Browne

1. Stressed and struggling? If you are having a hard day, and you can't get out of your own head, mindfulness may be for you. You can't always turn the mind off. That's not what mindfulness is about. Mindfulness is a way to release mental tension and anxiety, savor the small things and turn turmoil into trust in the unknown. It's also a way to regain clarity along with a childlike wonder for life.

2. How do you break free from a negativity loop and fear-based thinking? Stillness, silence and meditative practices will get you there. Overthinking and negative thought patterns can be changed by becoming mindful. Deepak Chopra says, “Meditation is not a way of making your mind quiet. It is a way of entering into the quiet that is already there.” Go to the space between your thoughts and rest. Become mindful no matter what. In other words, a good place to start to get yourself grounded and regulated is a Mindfulness Makeover.

What is Mindfulness?

3. Mindfulness is intentional attention to the moment...it's a present state of mind. This can be achieved through meditation, or even while you are doing any activity. It's not escapism; it's emptying your mind of anything that does not serve you. It's watching your thoughts—becoming the observer to them. You don't have to do anything, just be present. Mindfulness aids you in letting go so you can live your life.

4. When you make room for simply being, you start to take in what's really important in life. You put down your defense mechanisms and your heart's armor to truly feel what matters most. That's why mindfully working through your problems can make such a difference. Things aren't always going to be easy. Sometimes, things are hard, and it's okay to acknowledge that they are

hard. Don't try to figure it all out. Let the answer come to you, rather than trying to force it. Surrender. That way, you are prepared and proactive about life.

### Benefits

5. There is something called an “amygdala hijack” coined by psychologist Daniel Goleman, in which during fight/flight responses of the brain kicking in, the amygdala is overactive and you overreact. The amygdala detects danger, and sometimes, identifies something as dangerous that really isn't. This is seen in trauma and PTSD patients. They rely on flight/fight/freeze responses, and the trauma response meant to be temporary for a dangerous moment can last. It can stay with the person easily triggered, even when the perceived threat is over. Mindfulness intercepts this response and creates higher emotional intelligence and controls your reactions.

6. “Mindfulness practices dampen activity in our amygdala and increase the connections between the amygdala and prefrontal cortex,” according to Greater Good Magazine. That means stress reduction in how the brain responds to stress. In other words, stress less! That means that if you are mindful, you are peaceful. There is also a study that after just one session of mindfulness meditation, anxiety decreases. This could happen even after only a few minutes!

7. According to John Teasdale, Ph.D., becoming mindful is about removing yourself from the rumination that causes negative thought patterns, which lead to depression. He says, “Being mindful is a way to weaken the grip of these thought streams.” He also notes that it's not difficult to be mindful. Rather, what's difficult for depressed people is to remember to be mindful. There is also mindfulness-based cognitive therapy (MBCT), and it blends therapeutic practices that you can also do with a therapist if you cannot achieve mindfulness on your own. If anything, MBCT helps you to know when you are depressed and identify the negative thoughts, knowing even if in that moment you cannot stop them, that they will pass. This aids in recovery.

8. Due to neuroplasticity, the brain adapts to the messages you send it, creating an “ability to function mindfully.” Found in fMRI scans, during mindfulness, the brain also increases activity in higher functioning abilities and reduces activity in the brain area addressing “stress and strong emotions” Memory and decision making is also improved.

9. Mindfulness not only helps with cognition. It boosts immunity and helps with chronic pain. It also lowers blood pressure. It decreases heart rate and blood pressure with daily practice. It aids in a good night's sleep, too. Take a mindful rest.

### Adopt a Mindful Mindset

10. Mantras can be helpful way to become mindful. An example is a radical acceptance mantra, “I accept what is.” This stops judgment and begins observation, so you can find gratitude and resilience in your mindfulness practice. If you accept something, you can also do something about it.

11. When you are mindful and accepting the present, you enter a stillness or doing nothing-ness. Give yourself the gift of doing nothing, leaning only into awareness of awareness itself. Be Awareness itself. When you look at things mindfully, you pay attention to what is true and what isn't. Your attachment to the outcome also starts to fade. You look at everything as an opportunity. You become like water, through following the path of least resistance and going with the flow, adapting accordingly.

12. It's easy to want to keep fighting or striving for more when the answer is right in front of you.

It's easy for it to never feel like you have enough. What is "enough?" When you cannot get full, get mindful. The quest to have enough is a trap that makes you think you have to acquire more to be worthwhile. You'll never get fulfilled that way. Less is the lesson here. Put it all down and focus on your true calling. Center yourself. That is true mindfulness.

#### Grounding for Mindfulness

13. Grounding is about focusing on the senses so you can be present. When you ground yourself, you find yourself. Grounding is a great mindfulness technique. It goes like this- 5, 4, 3, 2, 1 countdown:

Find 5 things you can see.

Find 4 things you can touch.

Find 3 things you can hear.

Find 2 things you can smell.

Find 1 thing you can taste.

14. You can ground yourself when you are walking down the street or stuck in traffic. You can ground yourself when you are having an emotional moment or distress. You can ground yourself when you are simply doing the dishes or cleaning your house. You can ground yourself when you have to say goodbye to someone you love, like a loss and the grief overwhelms you. And you can ground yourself when you don't know how to stop ruminating and overthinking, when your negative thought patterns continue to interrupt your day.

15. Grounding can also happen in the form of mantras that you repeat to yourself. When you make a grounding statement, you also pull yourself into a stronger awareness or intention of who you want to be. An example of a grounding statement is "I will be here now." If you repeat this to yourself, you draw yourself into the present. You figure out what you have been missing. You live for the moment, not worrying about the uncertainty of what is to come. Grounding is when you simply let go. You stop worrying. You check in with yourself. You say, "I'm doing alright because I can choose my response to this moment."

16. According to Insight Timer, research says that "the brain simply works better when relaxed." When you are calm and collected, you have a greater chance for success. You don't need to react to every thought or feeling. Grounding is just one way to hold space for yourself. When you are in harmony with yourself and the world around, there's nothing you can't do.

#### Open Awareness Meditation

17. In Matthew Sockolov's *Practicing Mindfulness: 75 Essential Meditations*, there is a meditation called an "Open Awareness Meditation." It starts much like grounding, and if you find yourself becoming distracted during it, you can actually ground yourself to bring back focus. With this meditation which is about opening yourself to the awareness of yourself as a whole, you do a body scan from head to toe becoming mindfully aware of the body, then become aware of sensations in the body. Next, you focus on what you can hear. Spend five minutes noting bodily sensations and sounds.

18. When you have done this, you then turn introspective. Open up so that you pay attention to the experience of the mind. "You may see thoughts, emotional experiences, or general mental states" according to Sockolov. This is an observer mentality. You take a step back and simply become a witness to within.

19. Lastly, pay attention to feelings that arise. What are they? Where do they come from? Does your mind react to them? If so, how? The mind's reaction is also made to be pulled into awareness. This meditation is for 25 minutes, but it's meant to be a mentality. You open up your inner world. You experience the mind, body, the soul all at once. And what do you do about it? Sit with it. Use your intrigue, your curiosity to motivate you to find meaning in it. Find some time for yourself, just to become aware.

#### Anchor Yourself with Breath

20. The most common way to become mindful is to anchor yourself with your breath. Psychology Today says that deep breathing stimulates the “vagus nerve—which can reduce stress, anxiety, anger, and inflammation by activating the ‘relaxation response’ of your parasympathetic nervous system.” You can do this with diaphragmatic breathing, or belly breathing. Sit in a comfortable position. Put your hand on your stomach, and when you breathe in, let your belly rise. Then, when you breathe out, let it sink. This is a simple way to activate the vagus nerve, slow your heart beat, interrupt the fight/flight response and find some solace in your slow abdominal breathing.

21. One technique is Rip Stretch Breathing. According to *Healthline*, you “stand up straight and arch your back.” Next, breathe out until all breath is out. Then, breathe in until you can't anymore. Hold your breath for 10 seconds. Finally, breathe out slowly through your mouth. You can do Simple Slow Breathing, where you just breathe deeply, by breathing in through your nose and out through your mouth. There are more breathing techniques to try. If you are trying to be mindful, try deep breathing and let yourself fill up and release all tension. Relax your shoulders, your jaw, your tension all through your body, which should help.

#### Other Mindfulness Tips and Techniques

22. Want more mindfulness techniques? Here are just a few:

- ✧ Guided Meditation: Mimi Page's *Reflection*. There are also apps like *Calm*, *Headspace* or the free app, *Insight Timer*.
- ✧ Walking Meditation: Walk outside, or anywhere, and let your thoughts just go.
- ✧ Mindful during the mundane: Be thankful during tasks. Find gratitude each step of the way as you complete something. Thank the sun for shining, for life itself and for things like the sheets you fold because they warm your body at night. Thank yourself for getting this far. And give mindful attention to each activity.
- ✧ Gratitude in general: If you are grateful for what you have, you pay mindful attention to it. Gratitude is a great way to remind yourself that you are alive, and that's what counts. Place your hand on your heart and feel this. Try it now. What better time to start than the present?

#### Conclusion

23. Mindfulness is recognizing the present truly is a gift. It's something that you give yourself. You pause for one moment, and take in what is good. You get grounded, you meditate, you become aware of what is around you and pull yourself out of your problems to get a better perspective.

Source: retrieved on February 21 2021, at

<https://www.forbes.com/sites/womensmedia/2021/01/21/mindfulness-makeover-how-to-just-be-no-matter-what/>

## Unit 7

### TEXT A

#### The Trees Are Talking

Pioneering research has revealed how social cooperation thrives in the forest.

Rebecca Giggs

1. Above all else in the plant kingdom, trees make good trellises for our self-regarding thoughts. Robert Frost knew this when he wrote “Two roads diverged in a yellow wood.” A woodland is the right spot to yield to reflection. Though the life of a tree has little in common with the life of a person, we are accustomed to approaching trees on personal, even introspective, terms. As *trunk* is a synonym for *torso*, as *branch* can be interchangeable with *limb*, trees of great variety (especially the old ones) give body to human concerns. We look to trees for their symbolism, and to have our own comparatively stunted existence put into perspective. High up in the Sierra Nevada mountains, bristlecone pines preside—seemingly more stone than wood, partly fossilized. Some rise from saplings at a tempo so slow that they endure through generations, even whole civilizations—thousands of years—living on the ephemeral sustenance that all trees rely on: light, water, a smattering of nutrients drawn from the soil. These ancient pines have been called sages and sentinels, as though it were their edict to stand watch over cycles of human progress and folly.

2. Yet have we ever really understood trees in the plural? Since the turn of the millennium, a remarkable recasting of our attention—away from the gravitas of individual trees and toward the question of what trees do together, as a collective—has been under way. What passes between trees, the nuance of their exchanges, and the seemingly delicate mechanism of their connections—that mystery has inspired a rich new realm of research, and along with it, a subgenre of literature dedicated to spreading a revised conception of the powers and processes that allow arboreal plants to thrive. The title of the German forester Peter Wohlleben’s hugely popular 2015 book, *The Hidden Life of Trees: What They Feel, How They Communicate—Discoveries From a Secret World*, sums up the paradigm shift and captures the tone of awed revelation shared by researchers and readers alike. What a tree *is*—tree botany in its essentials—feels utterly changed. Will our self-centered thoughts, as we stand in the never-silent forest, change too, and how?

3. Though we often talk of trees as though they were nature’s metronomes, observing the steady tick of time in their corrugated rings, research makes clear that a single tree is not all one age. In non-deciduous forests—those that don’t undergo a seasonal fall—the leaves on an individual tree have staggered life spans. The lifetime of a leaf offers clues to its function, and to the tree’s overall strategies for survival. On the coachwood, darker, larger leaves live longer; more nutrients go into their production, so retaining them makes sense. The foliage of other trees turns over quickly—perhaps because the tree has evolved to keep pace with high levels of insect defoliation. Trees possibly gain secondary benefits from herbivory. Leaves may, in effect, be sacrificed so as to bring “frass” (insect excrement) to enrich the ground around a tree’s base. Each leaf has its biography, its society, and an



obituary. If a tree was once understood as a mostly static living object, here we see it rippling with change, configured by its surroundings.

4. Fashioned by a host of extrinsic factors, a tree also exerts its influence in previously invisible ways. Leaves collect light, of course, and thereby beget the energy a tree needs for fresh growth, regeneration, and reproduction. But leaves, including their stems and buds, also emit airborne biochemicals. Some plant matter, having caught fire, releases smoke that signals to certain seeds that conditions are conducive to germination. Leaves assailed by grazers might effuse what some scientists call “wound hormones”—in certain trees, this response can convey more than the fact of injury. Studies done on other plants exposed to vapors from damaged leaves have shown that unharmed neighbors begin to ramp up production of defensive toxins, targeted to deter specific herbivores. A canopy is the lively and fluctuating expression of tree interaction and strategy, besides being a habitat for tree-living creatures.

5. Suzanne Simard, a preeminent forest ecologist who teaches at the University of British Columbia, goes underground to uncover camaraderie in tree plantations in *Finding the Mother Tree: Discovering the Wisdom of the Forest*. As Simard frames it, the trees she and her team study are engaged in a kind of mutual aid. Resources are rerouted from trees in the sunlight to those that grow in their shade, from trees that have surplus water to those that are dehydrated. Signals are telegraphed from bug-infested trees to adjacent, healthy trees. Saplings detached from the network fail to thrive. As an aged tree reaches its terminus, it might use mycorrhizal linkages to entrust sizable carbon stores to its young; these, Simard names “Mother Trees” (mothering here being tantamount to self-sacrifice). Rather than being competitive organisms, each tree invests in the well-being of the forest as a whole, via mycorrhizae.

6. Simard’s and other ecologists’ explorations have ushered in a new kind of tree, or a new vision of tree life, different from the tree life that poets have romanticized: the solitary, singular tree, a heavy anchor flung into the past, emblematic of fortitude or witness. This newfound tree is networked, sensitive, companionate, and communicative; it matters as part of a conjoined whole, the canopy or a mycorrhizal woodlot. It displays caretaking toward offspring and, far from being siloed in its own world, it engages in a dynamic exchange. Such findings make trees seem capable of so much more than we once imagined. The notion that plants “do” anything, outside of surging toward the light and siphoning water, would imply threshold competencies that have long been regarded as mental, or at the very least sensory. Biologists have traditionally held that the faculties required for communication belong to life-forms with brains, eyes, ears, nostrils, and tongues (at a minimum, skin), not to plant life. Can something made mostly of wood demonstrate an awareness of other organisms nearby? Can it be strategically responsive, and exhibit kinship, or a sense of self? Is a tree intelligent? In stories, trees that interact are declared anthropomorphic, because fellow feeling is considered a human trait. To speak of trees as social beings remains, in some quarters, heretical.

7. No wonder, though, that this account of a forest has also struck many as beguiling. The portrayal of resource-sharing in the woods sounds so benevolent, so wise, in a world where inequality continues to increase. While strife and delusion travel with terrifying speed in our networked, online existence, the spectacle of intricate, protective arboreal cooperation beckons as blissful, utopian. The discovery of a covert unity and nurturance among separate trees acquires a special resonance against the backdrop of the coronavirus pandemic. What looks lone and immobile is, in fact, linked and supportive. Squint, and qualities once deemed anthropomorphic begin to seem, well, vegetalmorphic.

8. Yet perhaps we haven't truly let go of trunk bias and the narcissism of seeing ourselves in trees. We are discrete beings and know no other way of life so intimately as we know our own. As social mammals, we make a virtue of parental ministrations where other life-forms appear to have no need for it. By choice, we seek dialogues; we enter into collective arrangements that many hold to be a common good; we tend to our communities. Trees do not make this choice; almost certainly they do not consider themselves *selves*. Indeed, some trees are, biologically speaking, monastic—secluded in small groves, they profit from dispersing their seeds into rivers to be carried far away by ocean currents. Others, such as the strangler fig, are innately parasitic. Tree flourishing doesn't necessarily entail solidarity. Tropical trees in high-diversity rain forests may not benefit from germinating near their "conspecifics" (their parents), because then a population of devouring insects, adapted to feed off one plant species, could more readily hop between adult and sapling. So mycorrhizal fostering of young trees would not be advantageous in a biodiverse environment: It would bond new trees to old in a proximity that increases the chance of defoliation, and also the spread of species-specific pathogens. What looks, to us, like ruthlessness and self-interest might best serve a tree's genetic inheritance in the long run.

9. Returning from a hike recently, I glimpsed red hemorrhaging from the base of a tree set back from the trail, and an instinct released a bleat of adrenaline within me so swiftly—*pain, there's pain*—that I stumbled on the path. I drew the brush aside and saw that the bleeding thing was a bloodwood tree, its vivid "blood" only sap. A tree has no nervous system, no pain receptors, no neurons, and very likely the bloodwood was only extruding a borer insect by inundating it with fluid. What any tree "feels," what it "wills" or "wants," is so far removed from our reality that even to use scare quotes is misleading. Plant intelligence remains staunchly nonhuman. And yet, in that moment, I could not stop sympathy from welling up, a response that felt more animal than cerebral. For a second, I touched the gleaming sap, glossy but solidifying in the air. It gave off no warmth. I thought then of fungi, a flickering presence in this landscape, appearing spasmodically as puffballs, conks, and earthstars, only to melt away back underground: hidden organisms, dainty, deathly. That a tree's durability might rest on such a fragile life raft seemed the most important message to hear.

Source: from *The Atlantic*, July/August, 2021, pp. 89-91.

## TEXT B

### The Death of the Trees

Thom Hartmann

1. I was in elementary school, we were taught that the oceans and the forests were the chief sources of oxygen for the planet. It turns out that, at least for those animals that breathe air, this is only partially correct. The oceans account for less than 8 percent of the atmosphere's oxygen, and that is dropping rapidly: there are now millions of acres of ocean that are dying from the dumping of toxic wastes or changes in water temperature, and they therefore have become net *consumers* of oxygen.

2. Trees, it turns out, are *the* major source of recycled oxygen for the atmosphere. They are our planet's lungs. A full-grown pine or hardwood tree has a leaf surface area that can

run from 0.25 acre to more than 3 acres, depending on the species. Rain forest trees have leaf surface areas that run as high as 40 acres per tree. Throughout this enormous surface area, sunlight is used as an energy source to drive the conversion of carbon dioxide into oxygen and plant matter (using the C, which is carbon). Trees literally breathe in the CO<sub>2</sub> through that enormous leaf area after we exhale it as biological waste, and they exhale oxygen as their own waste. Without trees our atmosphere would most likely become toxic to us; and because rain forest trees have such a massively larger leaf area than our common trees, the rain forests of the world provide much of the oxygen that you are breathing as you read this page. While this is common knowledge, it's really among the least important functions that trees play: other details about trees' role in our survival are less well known.

#### The Root System “Water Pump”

3. A rain forest tree will draw 3 million gallons of water up through its roots and release it into the atmosphere as water vapor during its lifetime. While it may seem that this would deplete the soil of water, actually the reverse is true: trees draw water *into* the soil, the first step in a complex cycle that prevents land from becoming desert.

4. Without forestland pumping millions of tons of water into an area's atmosphere, there's little moisture released into the air to condense into clouds and then fall again as rain. The result is that just downwind of the place that was once forest but is now denuded, the rains no longer fall and a process called *desertification* begins. This has happened over much of north and eastern Africa, leading to massive famines as the rains stop, crops fail, the topsoil is blown away, and what is left is desert. Most rainfall on nonforestland is either absorbed and becomes surface ground water or is transported along culverts, ditches, sewers, streams, and rivers, eventually reaching the ocean. On our continental landmasses, only *trees* effectively cycle large quantities of water back into the atmosphere. For comparison, think about the evaporation from a 40-acre lake. That may seem like a lot of water to be evaporating into the atmosphere, but those 40 acres equal the evaporative leaf surface of a *single* large tree.

5. As of this writing, more than 1,500 acres of land are becoming desert worldwide every hour, largely because of the destruction of upwind forests. The total amount of rain forest left on the planet is about the size of the continental United States, and every year an area the size of Florida is cut down and permanently destroyed.

#### Reseeded Saplings Can't Pull the Water Down

6. The timber industry's ads that show loggers planting seedlings after stripping trees from a forest are utterly misleading with regard to water. They may well be replacing trees, but they're creating a decades-long gap in the water cycle.

7. Another problem is that they're setting up an ecological disaster by planting the same species throughout a deforested area. When an entire forest is all made of the same species of tree, and they're all the same age, it becomes an irresistible treat for tree-eating caterpillars, beetles, and fungi, as we've seen in numerous forests in North America and Europe.

8. Taking thousands of tons of biomass (fully grown trees and habitat) out of a forest and replacing it with saplings that weigh a few ounces will do little for the downwind areas that need the atmospheric moisture to produce rainfall. Even by the time the trees regenerate, the ecological diversity and the natural fauna and flora of the region have been decimated, as the diversity of numerous plant species are replaced by the single-species seedlings used by the loggers. But it's not just the timber companies who are responsible for the destruction of the planet's forests.

#### Trees for Beef: Slashing Rain Forests So Americans Can Have a 99-Cent Burger

9. Recently, a friend of my son's complained to me that one of the giant fast-food hamburger chains was responsible for the destruction of many of the rain forests in the Americas. I didn't understand what he meant: the assumption I'd always had was that the rain forests were cut by timber companies eager to sell rare woods to Japan and Scandinavia for manufacture of furniture and specialty items. If the fast-food chains were killing off the rain forests, I thought, it must be because they were buying cheap wood for paper to wrap their burgers in, or that their plastic packaging was somehow damaging to the rain forests. It turns out, however, that I shared a common misconception, one that I'm sure the American fast-food industry is probably quite happy keeping intact.

10. While these rain forests that have taken centuries to grow are often logged and the wood is sold, they're just as often simply burned and not reseeded, particularly if they're in places where it's inconvenient to take the wood to market. The "free" wood is usually only an added bonus, a quick buck for a peasant farmer to use to buy some breeder cattle.

11. The most common reason why people are destroying most of the South and Central American rain forests is corporate greed: the American meat habit has provided an economic boom to multinational corporate ranchers, and it is the primary reason behind the destruction of the tropical rain forests of the Americas. Poor farmers and factory farmers alike engage in slash-and-burn agriculture, cutting ancient forests to plant a single crop: grass for cattle.

12. As John Robbins points out in his book *Diet for a New America*, "The United States imports 200 million pounds of beef every year from El Salvador, Guatemala, Nicaragua, Honduras, Costa Rica, and Panama—while the average citizen in those countries eats less meat each year than the average American house cat." This deforestation of Latin America for burgers is particularly distressing when you consider that this very fragile area contains 58 percent of the entire planet's rain forests (19 percent are in Africa and 23 percent in Oceania and Southeast Asia).

#### Deforesting Removes Roots, Affecting Groundwater and the Water Cycle

13. Another problem related to deforestation is the loss of drinkable groundwater. Drinkable water falls from the skies as rain and soaks into the ground. At deeper levels, the water has often acquired (from the soil) high concentrations of dissolved minerals, particularly salts. Trees reach deeply down into the earth and draw up moisture from just above this salty water and pump it up into the atmosphere, using the minerals to harden the wood of the tree. This removal of water from the soil creates a downward draw, into

the soil, for the fresh water raining down from above. This circulation keeps the soil healthy.

14. When forests are cut, however, the more saline subterranean water begins to creep upward, infiltrating into higher and higher levels of soil. When this salty water hits a level a few yards below the surface, the remaining trees become immune damaged, just like an AIDS patient, vulnerable to parasitic infections. We see the result of this in beetle infestations and fungal infections such as “rust,” which are wiping out trees around the world.

15. People often think that beetle, caterpillar, moth, and fungus infections are external agents that cause forests to die, so they react with mass sprayings of insecticides or fungicides or by shrugging their shoulders and saying that nothing can be done. But in a healthy forest, such infestations are rare, just as in a healthy human opportunistic infections are rare. One reason why even multispecied, varied-aged tracts of forest in Europe and the United States are dying from these conditions is because they’ve already been weakened by humans’ pumping out much of the surface water, pouring down acid rain on them, and destroying surrounding forests. In Europe the percentage of land that is forest has been reduced to 27 percent. In Asia it’s 19 percent. In North America (including the vast forests of Canada), it’s at 25 percent.

16. When the salty water continues higher and reaches a foot or two below the surface, crops begin to die. And when it hits the surface, the soil becomes incapable of sustaining vegetation and desertification sets in. To deal with this growing soil salinity crisis, farmers from California to Europe to Australia have begun installing deep-water pumps to remove the salt-contaminated water that the trees would have once drawn down deep below the surface. While this works as a short-term solution, over the long term it only makes the problem worse because that undesirable water is not being cycled back up into the atmosphere, as it would be by a tree, but instead is dumped into waterways, which it poisons on its way to the sea. The result is further downwind desertification as well as the poisoning of rivers and lakes.

17. The loss of trees means not only the loss of current topsoil because of salination and desertification but also the loss of future soils. The roots of most plants anchor only into the topsoil, using it for mechanical support and as a medium from which to derive nutrients and water. Trees, however, have deep roots that break up lower levels of rock, slowly bringing them to the surface, and shallow roots that break up surface rock. They also draw minerals up into the tree itself to help make the plant matter. When the leaves are shed, they form an essential component of soil.

18. The result of this action by the roots of trees is the formation of new topsoil. It takes, on average, about 400 years for a forest to create a foot of topsoil that is capable of sustaining crops. Without a forest there is almost no topsoil being created at all. (Some sand is formed through air and water erosion of rock, but that is not soil.) This also shows how slash-and-burn agriculture, where a few feet of topsoil are exposed by burning a forest and then used up by agriculture over just a few years, is so shortsighted.

19. Given that without soil we can have no crops, it would seem that we’d be concerned about both the loss of our soil-creating trees and the loss of our current soil itself. Instead,

more than 300 tons of topsoil are lost worldwide *every minute* as governments and the agricultural corporations that produce most of America's crops look the other way.

20. Because of rising average temperatures from global warming, the life cycle of the bark beetle in Alaska has been cut from two years to one for reproduction. This has led to a near doubling of the population of bark beetles, which have devastated several million acres of Alaskan forests.

Forests are imperiled worldwide.

21. Hardly anything illustrates the rich, complex, interdependent nature of our environment as well as trees do, but they continue to be cut and burned. The result aggravates our situation in these last hours of ancient sunlight: we have less oxygen-releasing leaf surface, less circulation in the water cycle, and increased desertification, while at the same time the burning puts more carbon into the atmosphere. These facts make it appear that humans (at least the humans who control such matters) have no concept of their role in the ecosystem.

Source: Hartmann, Thom (1998). *The Last Hours of Ancient Sunlight*. Harmony Books, pp. 176-182.