

THIS WEEK

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A clean, green science machine

As the world warms and technology improves, researchers and institutions should look at their carbon footprints and question whether they really need to travel to academic conferences.

Every time the United Nations climate negotiations get under way, media stories appear about the carbon emissions generated as thousands of government officials, environmentalists and scientists fly in from around the world. Similar questions have been raised about major environmental-science conferences, such as the Fall Meeting of the American Geophysical Union (AGU), which last year drew an astounding 24,000 people. But rarely does this discussion move beyond the obvious. It can indeed seem a bit disingenuous that people who are trying to understand and protect the planet will engage in such a high-carbon activity as aviation, but what is to be done?

Researchers at the Tyndall Centre for Climate Change Research in Norwich, UK, have published a thoughtful working paper (see go.nature.com/zdzitd) that lays out a practical methodology to tackle these questions, from the standpoint of both individual academics and institutions. The bottom line is that aviation emissions are rising, and that academics in the industrialized world are responsible for more than their fair share, thanks to the countless conferences, the international nature of science and the need to do fieldwork in far-flung locales. If academics are to fall into step, they must curb their aviation emissions in concert with the rest of the world.

Academics in all disciplines — not just climate experts — should read the paper, not least because it goes beyond posing moral questions and delves into solutions. Simply purchasing carbon offsets will not balance things out, the authors argue, because the market for reliable offsets may be limited and the net effect could be to legitimize unnecessary travel. If scientists want to bolster their credibility on the subject of global warming, the authors say, then they must harness the power of the Internet and reduce the time they spend in the air. Indeed, the authors propose that a greater reliance on online conferencing and social media will not just reduce emissions, it will make science more inclusive. The conferences that do need to take place could be more centrally located for the target audience. And to keep track of it all, the paper provides an accounting system that allows institutions to log “hours in motion” and calculate the resulting emissions.

The arguments the authors put forward are powerful, and there are good reasons to pursue their recommendations. In fact, some quarters have already come to similar conclusions and are taking appropriate action: the AGU’s leaders, for instance, have started to look for ways to hold parallel conferences and online dialogues that will allow more academics, often from developing countries, to engage in its meetings. There is real value in face-to-face interaction, and we must not forget that. But the Tyndall Centre is right to point out that senior researchers probably do not need to fly halfway around the globe simply to present a paper at a conference.

In some ways, the working paper opens the door to questions that are even harder to answer. Do scientists have a responsibility to stop eating meat, given what we know about the greenhouse-gas intensity of beef production and to a lesser extent that of pork and chicken?

Should we expect them to park their cars and take the bus or train instead? The fact is that these are personal choices that academics, like everybody else, must grapple with.

Nor does the buck stop with individuals. Institutions, academic or otherwise, have a large influence on the daily lives that their employees lead. It might seem extreme for universities to force vegetarian fare on their students (although many institutions now have a meat-free day), but bosses could go a long way towards reducing traffic jams and carbon emissions by encouraging their employees to telecommute. And in the long run, does it make sense for an institution or company to purchase cheap real estate in the suburbs and then force its employees to bear the cost of commuting?

There are plenty of solutions to be had at many levels, and all options may need to be exercised to stave off the worst impacts of global warming. But lots of seemingly small actions can have an effect: last week, the International Energy Agency reported that global carbon emissions stalled in 2014, even as the global economy grew by 3%, apparently thanks in part to efforts by China and industrialized nations to boost energy efficiency and adopt renewable sources.

Irrespective of what academics do, it seems likely that steaks, cars and planes will not only persist but will increase in number as the population booms and becomes more affluent. Ultimately, the world must identify better ways to raise beef and move people around. And scientists have a key role in making that happen, even if it means hopping on a flight to the next United Nations climate summit. ■

“Lots of seemingly small actions can have an effect.”

Hollow humour

The public’s distorted attitude towards mental-health conditions hampers their treatment.

What is so funny about obsessive-compulsive disorder (OCD)? Paul Cefalu, a professor of English at Lafayette College in Easton, Pennsylvania, asked that question in a 2009 article that analysed why OCD is so frequently, and unfairly, represented in the media with “humor and levity” (P. Cefalu *PMLA* <http://doi.org/c2mtt4>; 2009). Unlike other mental-health disorders, such as depression and schizophrenia, those who suffer from obsessions and compulsions, Cefalu wrote, “can always be counted on to make us laugh”.

The laughs are thinner on the ground in *This Room*, an autobiographical one-woman play about OCD, written and performed by Laura Jane Dean. In a review on page 289, Emily Holmes calls it

“an affecting, sobering account of a life shaped by, yet transcending, a mental-health condition and treatment”.

The portrayal of mental-health conditions (or, to be less semantically guarded, mental illnesses) in the media and popular culture has a significant influence on the way that many people view both the conditions and those who have them. Next to lawyers and police officers, physicians are among the most frequently fictionalized professionals, and psychiatrists feature heavily. Despite the well-quoted statistic that one in four people will experience a mental illness at some point in their lives, the medical reality is something more easily viewed at a distance, peeking through the silver screen at the misery of somebody else. When that picture is distorted, the result is fear and mistrust, not just of the mental-health professionals but also of their patients.

So why do Hollywood and the rest of popular culture often get psychiatric medicine so wrong? Why do we still talk of the psychiatrist's couch when most people who see a psychiatrist never sit on one?

Too many accounts show only the illness, or at least a crude stereotype of it, not the person. And, crucially, they do not show how the person can often improve with the right treatment. Miracle cures are as rare in mental as in physical medicine, but many (perhaps most) people with psychiatric problems who receive the right kind of help can start to feel better. It is important to acknowledge and portray this.

A study published in February in the journal *Social Science & Medicine* (E. E McGinty *et al.* *Soc. Sci. Med.* <http://doi.org/2v4>; 2015), for example, suggested that stories about people who were successfully treated for depression, schizophrenia and drug addiction reduced negative attitudes towards mental illness in those who heard them. Tales of the same problems left untreated produced more willingness to discriminate against sufferers. This discrimination and prejudice is known to act as a barrier to people's recovery, because they can experience

social rejection when word of their condition gets around.

Perhaps here is a way to tackle the stigma of mental illness. It is not enough for scientists, journalists and campaigners to ‘raise awareness’ by highlighting the reality of such conditions, and by publicly criticizing those who misuse the terms and language of psychiatric medicine. It is not enough to point out that phrases such as ‘schizophrenic foreign policy’ and ‘a little bit OCD’ are offensive because they misrepresent

“The way to break the destructive cycle, to treat the OCD, is to resist the ritual.”

and trivialize genuine and serious suffering. It is not enough to emphasize the biological basis of mental illness. To truly change public attitudes, the message must go out more often than this suffering can be alleviated.

In doing so, a powerful cultural myth must be challenged: that mental illness is a gift and comes with benefits. From the supposed enhanced creativity and meaningful visions of those with schizophrenia to the claimed cognitive wizardry and insight of people with autism, mental-health conditions are too often presented as just another way of seeing the world. This sense of instant karma might soften the blow to audiences, to some patients even, but it feeds the damaging impression that psychiatrists are out to rob special people of their gifts and unique potential. It is hard enough for people with mental-health problems to seek help, without their fearing those who are best placed to provide it.

What is so funny about OCD? The answer, Cefalu concluded, is the incongruity of the condition: the harder a sufferer tries to help themselves with comforting rituals, the worse their torment becomes. The way to break the destructive cycle, to treat the OCD, is to resist the ritual, to stop playing to the crowd. That was what Laura Jane Dean managed to do. That was her treatment. That is her story. And stories do not have to be funny to have a happy ending. ■

Strike a chord

The latest episode of the Nature Audiofile podcast looks at how music inspires science.

“**M**athematics and music! The most glaring possible opposites of human thought! And yet connected, mutually sustained!” Thus enthused German scientist Hermann von Helmholtz in an 1857 essay on harmony in music.

Today, mathematicians, ecologists and physicists search for harmony alongside musicians, if not always explicitly. But the link used to be even stronger.

A typical academic curriculum circa 1600 — and for centuries before — blended music and (what we would call) science to a degree rarely seen in today's undergraduate syllabi. The four subjects of the ‘quadrivium’ were arithmetic, geometry, astronomy and music.

Today's scientific training programmes tend to leave music out. They have changed in other ways too, of course, and for the better. Although some universities offer degrees in mathematics and music, or physics and music, modern scientists more often miss the chance to seek musical connections.

“Many people think music is a charming accompaniment to thought,” says musician and scientist Peter Pesic of St John's College in Santa Fe, New Mexico, in the latest episode of Nature's sound-science podcast, *Audiofile* (go.nature.com/xhlu3). “But developments in music,” he notes, “influence other aspects of human thought.”

The podcast — one of a series — contains plenty of musical stories from the history of science. Take the astronomer Johannes Kepler, who was preoccupied with the motions of the planets. He was desperate to find harmony that he felt sure existed in the way the Universe was set up. In 1619, he produced a giant volume called *Harmonices Mundi*,

or *The Harmony of the World*. In one particularly musical moment, he expresses planetary motions in musical notation — the orbits of Mercury, Venus and their neighbours spun out into crotchets and quavers. You can hear the resulting song on the podcast. Without such explicitly musical thinking, it is possible that Kepler may never have arrived at his third law of planetary motion — the relationship between a planet's distance from the Sun and the time it takes to orbit.

Then there is the tantalizing suggestion that Galileo Galilei's musical father might have influenced the way his son thought about science. In the late 1580s, Vincenzo Galilei carried out an experiment on the sounds made by strings held at different tensions. Vincenzo's home-made experiments could well have instilled in his son the idea of looking at a physical system to produce a hypothesis, rather than retrofitting the one to the other.

Musical analogies continue to help scientists to make sense of tricky concepts. String theorists speak of tiny vibrating strings instead of point-like particles. The comparison with stringed instruments is easy to see; the strings represent elementary particles in the same way that the strings on a guitar make different notes.

Musical inspiration can often remain buried under the surface of scientific work; there might not seem to be an immediate harmony between, say, a genome-wide association study and one of Erik Satie's études. But if music remains apart from the sciences, there is much we might lose. Anecdotally, neuroscientists talk of musical theory aiding the analysis of brain patterns. And a theory of strings is more intelligible to some than a theory of tiny, massless, vibrating subatomic squiggles.

Looking too hard for harmony might be misleading if the real picture turns out to be more discordant. But, as explained in the podcast by Jim Bennett, emeritus director of the Museum of the History of Science in

Oxford, UK, music has already provided a great template for interpreting our surroundings: “The insight, which plausibly came from music, that the world has a mathematical blueprint is fundamental to science.” ■

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