

THIS WEEK

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Normalization is not an option

Psychology can moderate our response to unsavoury actions such as the US ban on immigrants. We should all continue to demand that decisions are based on evidence, not ideology.

After police and reservists were called to deal with protests at the 1968 Democratic National Convention in Chicago, Illinois, psychologists who studied reports of the ensuing violence made a curious observation. The officers with firearms seemed more willing than their colleagues without guns to use truncheons and other implements against protestors. It was as if the mere presence of the guns, which they could not use unless they believed lives were in danger, lowered the threshold at which other forms of violence became acceptable to them.

The psychologists attributed this mental shift to the 'contrast effect': a common regulator on human perception. The officers knew they were not using the lethal force of their guns, so the use of sticks and electric prods didn't seem so severe to them. Not as severe, certainly, as it did to the other police without guns, or to the protestors and psychologists.

We see the contrast effect in the optical trick that makes a grey square seem more black or more white depending on the background, and in the lukewarm water that feels scalding hot when your hands are cold. We also see it in the way some media and observers responded over the weekend to the new restrictions on immigration that have been rushed into force by President Donald Trump.

Scientists are among those severely affected by the executive order that blocked entry to the United States for citizens of seven predominantly Muslim countries (see page 13). As the personal, professional and legal implications of the policy have emerged, the Trump administration has supposedly softened its stance, and, for example, said that US green-card holders will be exempt. Whether by accident or design, the instinctive response to this apparent concession — the mental sigh of relief — draws heavily on the contrast effect. The situation is bad, but not as bad as it could have been. The stick is less severe than the gun.

As the Trump presidency continues and more of the promised policies are introduced, it is important that scientists and others continue to see the stick. The tactic, if indeed it is deliberate, of taking an extreme initial position and then retreating behind a bridgehead, should not mask the likely impact of the commuted action. Normalization is not an option. Equally, it is crucial that there is no decrease in the appetite for dissent and protest over unacceptable and ill-informed decisions that are based on ideology rather than evidence — on vaccine safety and climate change, for example.

Still, scientists should remember that problems and chaos similar to those thrown up by Trump's immigration ban have been seen and challenged before. In 2003, for example, an editorial in *Nature Neuroscience* reported how an Australian colleague on the journal was prevented from returning to his New York home for nine weeks after a day trip to Canada, because he was born in Malaysia — a country that was added to a US state department watch list after the terrorist attacks of 11 September 2001 (*Nature Neurosci.* **6**, 203; 2003). (It's worth remembering also that scientists from Israel cannot enter many Arab nations, and the same restriction can apply to anyone with an Israeli stamp in their passport.)

The crackdown on entry visas for the United States and elsewhere

after the 2001 attacks triggered a strong and effective series of protests about the impact on science. The International Council for Science called on the dozens of national academies and scientific societies among its members to hold their conferences outside the United States. The US National Academy of Sciences and others issued warnings about the dependency of the US research system on migrant minds, and how promised visas — and the careers that depended on them — were being cancelled for young scientists from Pakistan and elsewhere. It took years for the promised fixes to the system to be introduced.

"Trump has made a bad situation much worse."

Trump has made a bad situation much worse. The acute problems and distress his order has caused to researchers and others

could yet be compounded by the chronic effects of related actions. Changes to the Department of State and reports of the United States possibly withdrawing from international organizations and treaties — many of which are scientific — have raised new fears about the role and status of scientific diplomacy in the Trump administration.

As noted, we have been here before. Here is this journal's opinion on "science and political responsibility" from an editorial published in November 1935 (*Nature* **136**, 733–734; 1935): "The outcome, as is familiar to all, through the repercussion of economic and political factors, has been the intensive cultivation of the national spirit, to which concessions were made at the close of the War in the interests of justice and peace, but which has now become a source of irritation and danger greater than the injustices which it was fostered to remove."

The contrast with 2017 is not as sharp as we might like. ■

Stormy weather

Privately run Earth-monitoring satellites are promising, but research must continue.

It's more than two decades since a team of US scientists proved that signals from the Global Positioning System (GPS) satellites could be used to gather atmospheric temperature data. The technique, known as radio occultation, depends on precise measurements of delays in the radio signals as they pass through the atmosphere. The first mission, GPS Meteorology, paved the way for the Constellation Observing System for Meteorology, Ionosphere, and Climate (COSMIC-1) in 2006. Radio-occultation data from COSMIC-1 and a handful of follow-on missions have been integrated into government forecasting systems around the globe, and now a trio of private companies is vying to get into the game.

As a result, recent years have seen tension between researchers at the University Corporation for Atmospheric Research (UCAR) in Boulder, Colorado, who want to continue advancing the science of radio occultation, and technology-savvy entrepreneurs, who say they can push the field forward more quickly and cheaply — while making a profit. All parties say that they are marching towards the same goal — to provide high-quality data that could improve weather forecasts. But behind the scenes, both sides have accused the other of sabotage and turf wars. The debate has been counter-productive.

As we discuss this week (see page 18), the US National Oceanic and Atmospheric Administration (NOAA) issued contracts last September to two of the companies as part of a pilot programme to evaluate the commercial data — Spire Global in Glasgow, UK, and GeoOptics in Pasadena, California. Spire already operates 16 or so miniature ‘cube satellites’ and sends more up each month. GeoOptics hopes to get its first satellites into space later this year. A third company, PlanetiQ, based in Boulder, will follow next year.

In parallel, scientists at UCAR are pushing forward with the first half of COSMIC-2, which consists of six small satellites that are scheduled for launch into tropical orbits in September. With an estimated price of US\$420 million, COSMIC-2 is a partnership between the US and Taiwanese governments designed to test the limits, and utility, of high-quality radio-occultation measurements. But the US Congress has only funded the first half of the project. A second constellation of satellites that would orbit the poles, and ensure global coverage, has languished.

NOAA is under considerable pressure from Congress, and particularly from Republicans, to cut costs and allow the fledgling industry to

take flight. The theory is basically sound. This is a time-tested recipe for technological development, but there are potential pitfalls when it comes to data collection and basic science.

First, it only works if governments fund the basic research in the first place. Radio occultation itself is evidence of this: researchers began thinking about using the technique in the context of weather in the late 1980s; only now, with prices falling for both microelectronics and

“Governments must ensure that data that come from private parties are freely available.”

access to space, are companies moving into the market. PlanetiQ argues its spacecraft will provide measurements of the same quality as COSMIC-2, but only time will tell. In the meantime, governments will have to make do with half of the data, meaning that science — and weather forecasts — may suffer.

Second, governments must ensure that the data that come from private parties are freely available. On this point, the news is good. NOAA has suggested that a World Meteorological Organization resolution requires precisely that. For their part, the companies say that they would sell all of the data to NOAA or market them independently to government forecasting agencies around the world, thus sharing the burden. Importantly, they have stated that they will ensure that their data are available to the scientific community for free.

US researchers must identify their priorities and look for ways to be more efficient; the ongoing Decadal Survey for Earth Science and Applications from Space is an effort to do just that. But policymakers must also do their homework and listen to scientists. Privatization is no substitute for basic science. ■

Health gains

Policymakers must be more realistic about what the World Health Organization can do.

The forthcoming election of a new leader of the World Health Organization (WHO) has focused attention on the future direction of the United Nations’ public-health agency. Supporters like to repurpose Voltaire’s famous line about God and argue that if the WHO didn’t exist, it would be necessary to invent it. But the organization is far from being omnipotent and all-powerful. In fact, it would benefit from trying to be a little less of both.

Along with an annual salary of just under US\$240,000 and a high-profile role as the globe’s doctor-on-call, the new director-general will inherit staff who are being pulled in too many directions at once and whose employer is no longer as central to global health as it once was. The WHO member states are in large part to blame.

In 1990, the WHO received \$579 million in dues from its members, but this core budget has fallen to around \$465 million this year. That’s less than the budget of many public-health agencies or large hospitals in rich countries. In 1990, the WHO and other UN agencies received more than half of the \$8.5 billion available for global-health funding, and so had primacy. That funding has since ballooned to almost \$40 billion. There is a plethora of new players with much greater financial clout. Together, these new funders have revolutionized health in the world’s poorest countries. The launch earlier this month of a \$1-billion initiative to preemptively research, develop and test vaccines against potential epidemic threats is a good example of what can be achieved by coordinating funding and efforts.

The choice of a successor to director-general Margaret Chan from the shortlisted nominees announced last week — Pakistan’s Sania Nishtar, the United Kingdom’s David Nabarro and Ethiopia’s Tedros Adhanom Ghebreyesus — is an important decision. But no one should be under any illusions that a new head will be enough to

trigger substantive change when he or she takes office in July.

That must begin with a realistic assessment of what the WHO is and is not — and what it can and cannot be reasonably expected to do. The WHO has become dangerously dependent on voluntary contributions, which now make up more than 80% of its overall budget. Most of this money comes with strings attached by the funders to their own priorities, making it next to impossible for the WHO to have much of a say in its own agenda. As a result, the WHO’s programmes have proliferated but thinned.

Making matters worse, the agency is lumbered with a cumbersome and expensive organizational structure comprising a headquarters in Geneva, Switzerland, and six semi-autonomous regional offices. This has resulted in a complex, bureaucratic and ineffective management structure. It is a body that is ripe for root-and-branch reform. The upheaval is worth it because the WHO — at its best — is worth it.

The WHO’s coordinating role in developing the Ebola vaccine highlights one of its unique benefits — no other body has the rapid convening power of this intergovernmental agency, which can bring together scientists, industry, regulators and national public-health officials when needed.

To respond to crises, the WHO has also launched an emergency programme with a dedicated budget, workforce and command-and-control structure — although it remains to be seen how much funding it will attract and how effective it will be. But the WHO is not a global firefighter, and cannot be expected to be. Rather, it is a facilitator for more-operational organizations — key players such as the medical humanitarian organization Médecins Sans Frontières (also known as Doctors Without Borders) and national public-health authorities.

Tabletop exercises that simulate ways of tackling epidemics and pandemics show that the world remains woefully unprepared for such events. Ultimately, an effective frontline response depends on building functional public-health systems, preparing contingency plans to secure interconnected global supply chains and planning for large outbreaks in cities, which are at increased risk as a result of rampant urbanization. The WHO has a crucial role in these and many other areas of public health as a facilitator and provider of sound scientific expertise. But it is ultimately down to the countries of the world to do the heavy lifting. ■