Correspondence

Don't grant robots legal personhood

In an open letter, 156 artificial-intelligence experts from 14 European countries (go.nature.com/2t5mgov) have rejected the European Parliament's recommendation that robots should have legal status as electronic persons. This would make robots responsible for repairing any damage they might cause (go.nature.com/2wxlwg6). We are not signatories to the open letter, but endorse it nonetheless.

In our view, the parliament's recommendation is flawed. Its rationale seems to be that robots can be electronic juridical persons in the same way as companies are. But companies are constituted and run by real people. That is why they can be meaningfully attributed with intentions, plans, goals, legal rights and duties, and why they can be taught, praised or punished. Hence, they are considered to be responsible, accountable or liable for their actions.

Attributing electronic personhood to robots risks misplacing moral responsibility, causal accountability and legal liability regarding their mistakes and misuses. Robots could be blamed and punished instead of humans. And irresponsible people would dismiss the need for care in the engineering, marketing and use of robots. Even the Romans knew better: the owner of an enslaved person was fully responsible for any damage caused by that person (known as vicarious liability).

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Treating brainwaves is not an option

The rise in neurostimulation methods as potential treatments for neuropsychiatric diseases is encouraging (see *Nature* **555**, 20–22; 2018). As president of the International Pharmaco Electroencephalogram Society, however, I question your suggestion to investigate how brainwaves might be manipulated to benefit patients.

Brainwaves are just the by-products of ongoing neuroelectrical interactions, so an underlying condition gives rise to anomalous patterns on electroencephalograms. Clinical interventions that target the faulty cellular mechanisms responsible will alter those brainwave patterns. This holds true for potential neurostimulation therapies, such as flashing lights and pink noise that you discuss.

In my view, manipulating the brainwaves themselves risks confusing cause and effect, so is unlikely to work as a treatment.

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Local solar solutions can save water

Solar radiation management is good for more than just global geoengineering (see also A. A. Rahman *et al. Nature* **556**, 22–24; 2018). At the local level, the brightening of urban surfaces has helped to cool cities since the sixth century BC in Athens, and the same physics that causes aerosols to brighten the stratosphere (Mie theory) can also make water more reflective.

Dissolving air in water to generate bright, part-per-million dispersions of reflective microbubbles can curb evaporation by reducing solar warming (R. Seitz *Clim. Change* **105**, 365–381; 2011).

Aside from cooling urban reservoirs, this water-conservation technique allows farmers who cannot afford reservoir covers to reduce crop losses from drought.

I suggest that some of the money spent on arguing about global governance of geoengineering could be better used to develop local water-conservation technologies.

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Count the costs of economic skirmishes

China could decide to retaliate against proposed US tariffs on imported Chinese products (see go.nature.com/2wr6etx) by buying its goods from elsewhere. Such a move could have effects on environmental sustainability that need to be taken into account.

For instance, China might choose to import soya beans from Brazil. Brazilian farmers would then expand their production, putting further sensitive rainforest regions at risk. Yields would be maximized by overuse of fertilizers and pesticides, leading to regional contamination of soil and water.

Or there could be environmental benefits to switching. China might turn to Europe for its imports of civilian aircraft, for example, worth US$14 billion to the US market. Compared with the United States, European countries have higher environmental standards: they strongly support the Paris climate accord, and manufacturers there aim to reduce hazardous wastes and have production regulations that penalize environmental damage.

Germany, Japan and South Korea also have superior environmental norms and could step in as alternative suppliers of cars to China. Germany, for example, is heavily investing in renewable-energy resources.

In our view, proper management of the socio-economic and environmental outcomes is a crucial component of fair and stable trade policies (see also Y. Geng *et al. Ecol. Econ.* **132**, 245–254; 2017).

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Get facts straight on computer women

The photograph you captioned as showing female programmers of the Electronic Numerical Integrator and Computer (ENIAC) in the 1940s in fact dates from 1962, and the women were not ENIAC programmers (see W. R. Poster *Nature* **555**, 577–580; 2018; now corrected). They are Patsy Boyce (later Simmers), Gail Beck (later Taylor), Millicent Beck and Norma Stec, who worked at the US Army Ballistics Research Laboratory in Aberdeen, Maryland. The photo shows the progressive miniaturization of circuitry through four generations of computers: ENIAC (1945), EDVAC (1949), ORDVAC (1952) and BRLESC (1962).

Simmers and Stec were mathematicians. They used the ORDVAC and BRLESC computers to calculate US Army weapons-firing tables (see go.nature.com/2ruixtc). As far as I can tell, the stories of the other two women in the photo have not been told. Little is known about the computer artefacts they are holding.

The photo is also an example of historical casual sexism in the field of computing. When originally published (*Army Research and Development News Magazine* **3**, 4; 1962), it was captioned "BRLESC girls pictured below", playing on the pronunciation of BRLESC as 'burlesque'.

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CORRECTION

The Nature Index article 'Facing down disaster' (*Nature* **555**, S66; 2018) misstated the length of the NIED ocean-floor fibre-optic network. It covers 5,500 kilometres, not 5,700.