Truth and lies online

Falsehood flies

On Twitter, fiction spreads farther and faster than the truth

ACROSS the French countryside, in the summer of 1789, rumours swirled about vengeful aristocrats bent on the destruction of peasants' property. It was not true. The Great Fear, as it is now known, tipped France into revolution with a flurry of fact-free gossip and rumour.

Two centuries later the methods for spreading nonsense are much improved. In the first paper of its kind, published in *Science* on March 8th, Soroush Vosoughi and his colleagues at the Massachusetts Institute of Technology present evidence that, on Twitter at least, false stories travel faster and farther than true ones.

The study, carried out at MIT's Laboratory for Social Machines, showed this by examining every tweet sent between 2006 and 2017. The researchers used statistical models to classify tweets as false or true, by applying data taken from six independent fact-checking organisations. That allowed them to categorise over 4.5m tweets about 126,000 different stories. Those stories were then ranked according to how they spread among Twitter's users.

The results were stark. False information was retweeted by more people than the true stuff, and faster to boot. True stories took, on average, six times longer than falsehoods to reach at least 1,500 people. Only about 0.1% of true stories were shared by more than 1,000 people, but 1% of false stories managed between 1,000 and 100,000 shares.

The reason false information does better than the true stuff is simple, say the researchers. Things spread through social networks because they are appealing, not because they are true. One way to make news appealing is to make it novel. Sure enough, when the researchers checked how novel a tweet was (by comparing it, statistically, with other tweets) they found false tweets were significantly more novel than the true ones. Untrue stories were also more likely to inspire emotions such as fear, disgust and surprise, whereas genuine ones provoked anticipation, sadness, joy and trust, leading to the rather depressing conclusion that people prefer to share stories that generate strong negative reactions. Perhaps not coincidentally, fake political news was the most likely to go viral.

The paper also sheds some of the first peer-reviewed light on the impact of "bots"—automated accounts posing as real people. The idea that Russian bots in particular helped sway America's presidential election has lodged itself firmly in the public consciousness. Yet the paper finds that, on Twitter at least, the presence of bots does not seem to boost the spread of falsehoods relative to truth.

The researchers were able to conduct a study of this breadth thanks to the business relationship between one of their number, Deb Roy, and Twitter, which provided its entire historical dataset at a steep discount. But more are likely to come. Technology companies, and particularly social-media firms, are facing a backlash from regulators and consumers worried about the harm from their products. Twitter, for its part, has said it is ready to offer the same dataset to other outside experts. ■

High-tech weapons

Nuclear posturing

Russia's new weapons are technically plausible, but practically iffy

ON MARCH 1st, addressing Russia's parliament, President Vladimir Putin announced a range of new, high-tech, "invincible" nuclear weapons. Lest anyone was unsure at whom that part of the speech was aimed, it featured a computer-generated animation of nukes falling on Florida, where Donald Trump, America's president, has his Mar-a-Lago resort.

Mr Putin's new weapons included nuclear-powered, nuclear-tipped cruise missiles with nearly infinite range and nuclear-armed underwater drones designed to creep up on enemy ports before destroying them. Though they sound fantastical, most of the new weapons are technically feasible. Underwater drones, for instance, already exist. Bolting a nuclear warhead to one poses no fundamental difficulties. The real question is whether there is any strategic or tactical need for them.

Most of the headlines focused on a cruise missile that sports a nuclear engine as well as a nuclear warhead. The idea is not new. The American Supersonic Low Altitude Missile (SLAM) project explored such a scheme in the 1950s and 1960s. A cruise missile was to be powered by a nuclear reactor, which would heat air to produce thrust. The missile would have been able to fly several times around the world, and to carry many nuclear bombs at once. The engine worked in ground tests, although its radioactive exhaust (and the risk of mishap) meant it was deemed impossible to conduct trials in the air. The SLAM was abandoned as scientists perfected intercontinental ballistic missiles (ICBMs). But according to both Mr Putin and unnamed American officials, the Russian missile has already made test flights.

A new ICBM was the most familiar bit of Mr Putin's speech. Russia has been working on the RS-28 missile for years, as a replacement for its existing systems. He said it would be powerful enough to deliver its warheads via the South Pole, dodging American missile-tracking radars which cover the shorter route over the Arctic.

Russian warheads are to be pepped up, too, to be capable of gliding and evasive manoeuvres even at the hypersonic speeds at which they travel, and possibly lofted by yet another new ICBM. This too is an old idea, dating back to the 1930s. Technological developments have now made it practical. America conducted at least four tests of a non-nuclear version of such a weapon between 2010 and 2014; China has also run tests, though how it would arm its system is unclear.

So the whizzy new weapons are probably workable, at least in principle. A bigger question is whether there is any reason to build them. Mr Putin said the weapons were a response to America's withdrawal in 2002 from the Anti-Ballistic Missile Treaty, which limited the development of defences that could shoot down ballistic missiles. Since then, America has deployed limited versions of these defences in eastern Europe and Asia, as well as in America itself, and at sea. Highly manoeuvrable warheads, missiles that can be fired over the South Pole, supersonic cruise missiles and underwater port-busters are all threats that such defences can at present do nothing against.

America insists its defences are meant only to guard against "nuclear blackmail" by states such as North Korea or Iran, not to upset the equilibrium of mutually assured destruction that, in theory, acts as a final safeguard against nuclear war. Russian military planners might be reluctant to trust such assurances. But Russia's existing arsenal of hundreds of missiles and thousands of warheads could easily overwhelm any defence through sheer weight of numbers. There is no practical need for exotic new weapons. But Mr Putin may have a political, or even a personal, one. ■