



Democracy isn't all it is cracked up to be

Statistical analysis can reveal election fraud, a paper says. But the problems with democracy go deeper, argues [Philip Ball](#).

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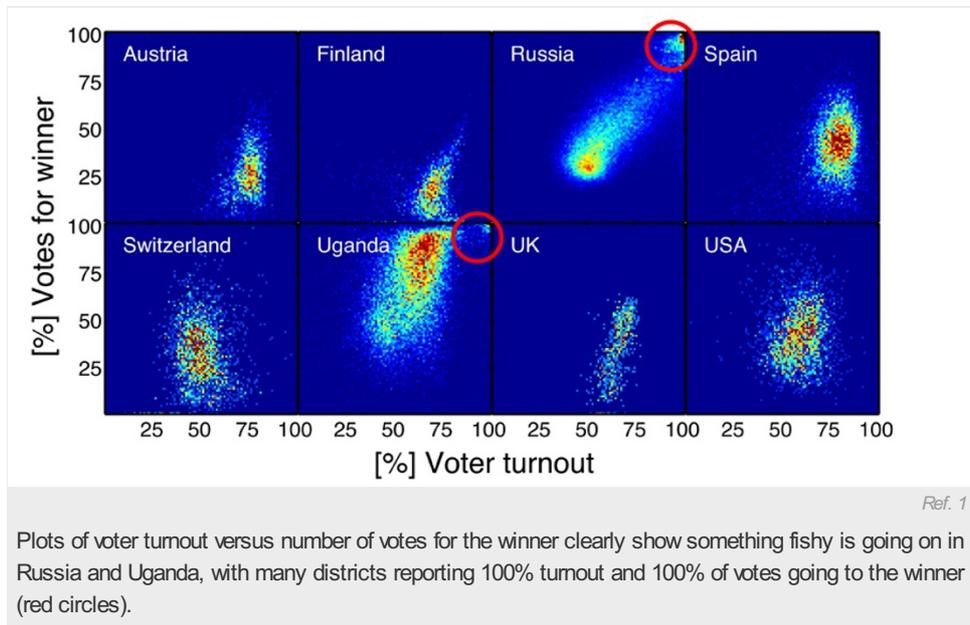
“The people who cast the votes decide nothing,” Joseph Stalin is reputed to have said. “The people who count them decide everything.” A paper uploaded to a preprint server this month suggests that little has changed in Russia.

Peter Klimek, a complex-systems scientist at the Medical University of Vienna, and his colleagues say that the 2011 election for the Duma (the Russian lower house), won by Vladimir Putin’s United Russia party with 49% of the votes, shows a clear statistical signature of ballot-rigging¹.

This is not a new accusation. Some, such as Russian physicist Sergey Shpilkin, have claimed that Russian voting statistics show suspicious peaks at multiples of 5% or 10%, as though ballot officials have simply assigned rounded proportions of votes to meet predetermined figures. And last December, *The Wall Street Journal* conducted its own analysis of the election statistics, which led political scientists at the Universities of Michigan and Chicago to concur that the data showed potential signs of fraud.

Naturally, Putin denies this. But for those who suspect that neither he nor *The Wall Street Journal* is exactly the most neutral of sources on Russian politics, Klimek and his colleagues offer a welcome alternative. They say that the statistical distribution of votes in the Duma election diverges from a normal (bell-curve or Gaussian) distribution — the expected outcome of a set of independent choices — by over one hundred times more than would be expected for an unbiased election.

The same is true for the Ugandan presidential election of February 2011. Both of these statistical distributions are, even at a glance, profoundly different from those of recent elections in, say, Austria, Switzerland or Spain (see Figure, below).



Breaking down the numbers into scatter plots, with the voter turnout plotted against the number of votes for the winner in each voting district, lays the problems bare. Most countries show a single, broad peak, but both Russia and Uganda also have an extra, smaller peak. For both countries, distortion in the main peak suggests ballot rigging — for Russia, this afflicts about 64% of districts.

But the smaller peaks suggest much cruder fraud. They correspond to districts showing both 100% turnout and 100% votes for the winning party. As if.

No perfect system

It is good to see science expose these corruptions of democracy. Yet science also hints that, in general, democracy isn't quite what it is popularly sold as. Take the choice of voting system. One of the most celebrated results of the branch of economics known as social choice theory is that there can be no perfectly fair means of deciding the outcome of a democratic vote. Possible voting schemes are manifold — first-past-the-post (used in the United Kingdom), proportional representation (Scandinavian countries), schemes for ranking candidates rather than simply selecting one, and so on — and their relative merits are hotly debated.

But as Kenneth Arrow, winner of the 1972 economics Nobel prize, showed in the 1950s, none of these systems can satisfy all the criteria of fairness and logic that one might demand² — for example, that a system under which candidate A would be elected from A, B and C should ideally also select A if B is the only alternative. Arrow's 'impossibility theorem' implies that societies must either accept that democratic majority rule has some undesirable consequences, or find fairer alternatives — which none has.

Other considerations can also undermine the democratic principle: for example, bipartisan votes may fall within the margin of statistical error. As demonstrated in the US presidential election of 2000, between George W. Bush and Al Gore, the result is then not democratic but legalistic.

Furthermore, analysis of voting statistics suggests that, regardless of the voting system, political choices are not free and independent (as most definitions of democracy pretend), but partly the collective result of peer influence. That is one — although not the only — explanation of why some voting statistics don't follow a Gaussian distribution, but instead show a relationship called a power law^{3,4}. Klimek and his colleagues find less extreme, but still significant, deviations from Gaussian statistics in their analysis of 'unrigged' elections¹. They assume that some of these deviations result from collective effects such as voter mobilization: targeted, often single-issue campaigns to sway votes.

In fact, a key premise of current models of voting and opinion formation^{5,6} is that most social consensus arises from mutual influence and the spreading of opinion, rather than from isolated decisions. On the one hand, you could say that this is just how democratic societies work. On the other, it makes voting a nonlinear process in which small effects (media bias or party budgets, say) can have disproportionately big consequences. At the very least, it makes voting a more complex and less transparent process than is normally assumed.

This isn't to invalidate Winston Churchill's dictum that democracy is the least bad political system. But let us not fool ourselves about what it entails.

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