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The Numbers Guy

Carl Bialik examines the way numbers are used, and abused.

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Sorry, Wrong Number

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By Carl Bialik

My print column examines high-profile instances, both recent and old, of numerical errors, afflicting data from spacecraft orbit calculations to economic statistics.

The stakes often are high. "Decision-making today is heavily reliant on data, which we now have access to on enormous scales," Anna Nagurney, an applied mathematician at the University of Massachusetts, Amherst, wrote in an email. "However, high-impact decisions require good data, good models and appropriate statistical and analytical methodologies, with the users having an understanding of the validity and applicability of the underlying assumptions. Plus, software in which the models and tools are implemented needs to be fully tested and 'bug-free.' Otherwise, we can have propagating failures with immense consequences."

Human error becomes more likely when steps that can be automated are undertaken manually. Richard Alldritt, head of assessment for the U.K. Statistics Authority, said an investigation into a major error in U.K. construction statistics so far has revealed that the mistake originated when a spreadsheet was updated manually. The Office for National Statistics has aimed to automate its spreadsheets but hasn't yet completed the transition. The spreadsheet mistakenly calculated construction output for the three-month period ending in May instead of June.

The U.S. Bureau of Labor Statistics also has been trying to transition from manually updated spreadsheets, said spokesman Gary Steinberg. "It's mostly been rooted out," he said.

Some errors have stuck with Steinberg. "In January 2004 – I still remember this! – the producer-price-index staff discovered they couldn't produce data at all. Their computer systems completely crashed and they couldn't get them operating at all. That was a principal indicator that I had to tell everyone we couldn't produce and didn't know when we would be able to. That was a pretty busy day for me. My phone was still really smoking that day."

More recently, BLS issued a correction to data on mass layoffs because of erroneous numbers from Arizona. "We try to do everything we can to make sure mistakes don't happen," BLS economist Patrick Carey said. "Once we catch something, we're pretty upfront about it. We try to issue the correction as soon as possible."

The National Aeronautics and Space Administration didn't have the luxury of undoing a mistake by correcting it when it lost a Mars orbiter because a piece of software failed to convert between metric and English units. "On that particular project, they were trying to find new ways of doing things, with less oversight and less cost, and it bit them," said Erik Conway, historian at NASA's Jet Propulsion Laboratory. There are now better safeguards in place, but the "weird hybrid," as Conway called it, remains: "The government is required to use metric but contractors haven't converted because of cost to them. For small companies, making conversion to metric would be very expensive."

For reasons such as that one, "human error is inevitable," as Philip Rush, U.K. economist at Nomura, put it. "Once that is accepted, attention can turn to minimizing and catching those errors before they ever become public."

"Human checks are essential," said JP Morgan economist Allan Monks. At a former employer of his, fact-checking was a standard procedure. "The task involves going through each report, sentence by sentence, and checking that each statement has some kind corresponding evidence or proof. This is of course very time-consuming and labor-intensive, which can be an issue if resources are under strain."

Scotia Capital economist Alan Clarke urges capitalizing on the opportunity mistakes present. "If all else fails, the best way to avoid making a mistake ... is to make one," Clarke said. "At least then the embarrassment and learning from that mistake should prevent countless future errors."