

should be viewed through a different lens. When results in the science of measurement cannot be reproduced, argue Martin Milton and Antonio Possolo, it's a sign of the scientific method at work – and an opportunity to promote public awareness of the research process (M. J. T. Milton and A. Possolo *Nature Phys.* **26**, 117–119; 2020).

The authors – at the International Bureau of Weights and Measures in Paris, and at the National Institutes of Standards and Technology in Gaithersburg, Maryland, respectively – draw on three case studies, each one an instalment in the quest to measure one of the fundamental constants of nature.

The researchers chose the speed of light (c); Planck's constant (h), a number that links the amount of energy a photon carries to its frequency; and the constant of gravitation (G), a measure of the strength of the gravitational force between two bodies.

For both Planck's constant and the speed of light, different laboratories have arrived at the same number using different methods – a sign of reproducibility. In the case of Planck's constant, there's now enough confidence in its value for it to become the basis of the International System of Units definition of the kilogram that was confirmed last May.

However, despite numerous experiments spanning three centuries, the precise value of G remains uncertain. The root of the uncertainty is not fully understood: it could be due to undiscovered errors in how the value is being measured; or it could indicate the need for new physics. One scenario being explored is that G could even vary over time, in which case scientists might have to revise their view that it has a fixed value.

If that were to happen – although physicists think it unlikely – it would be a good example of non-reproduced data being subjected to the scientific process: experimental results questioning a long-held theory, or pointing to the existence of another theory altogether.

Questions in biomedicine and in the social sciences do not reduce so cleanly to the determination of a fundamental constant of nature. Compared with metrology, experiments to reproduce results in fields such as cancer biology are likely to include many more sources of variability, which are fiendishly hard to control for.

But metrology reminds us that when researchers attempt to reproduce the results of experiments, they do so using a set of agreed – and highly precise – experimental standards, known in the measurement field as metrological traceability. It is this aspect, the authors contend, that helps to build trust and confidence in the research process.

One of the wider lessons from Milton and Possolo's commentary is that researchers from different domains must continue to talk and to share their experiences of reproducibility. At the same time, we should be careful about assuming that there's something inherently wrong when researchers cannot reproduce a result even when adhering to the best agreed standards.

Irreproducibility should not automatically be seen as a sign of failure. It can also be an indication that it's time to rethink our assumptions.



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Out-of-office should mean what it says

Employers must do more to support researchers when they take a break.

Setting an out-of-office e-mail reply should come with a sense of satisfaction. But in today's research world, an out-of-office message can seem little more than creative fiction. Its existence and the sender's absence will not bring work to a halt. They don't prevent an overworked researcher from feeling the need to check their inbox while away; nor do they stop senders attempting to contact people who are on holiday, and expecting a reply.

Some out-of-office messages do a better job. Last October, Stephana Cherak, an epidemiologist at the University of Calgary in Canada, received an impressive example from a colleague. “I do not respond to e-mails on weekends,” it read. “If this is an emergency, please call my mobile. If you do not have my mobile number, then you do not have a weekend emergency.”

Cherak approvingly tweeted the message. Of the more than 4,000 re-tweets and replies, many expressed support for drawing firm boundaries around time off, or offered their own tips. “My life has gotten much better since I decided that I don't need ‘fastest/best/most consistent e-mail responder’ to be part of my professional legacy,” wrote @popmediaprof. And @runforbooze recommended that people politely write “I don't expect an immediate reply” if they have to send a message out of office hours.

We asked Cherak to reflect on this experience. In a column in *Nature's* Careers section, she had advice for all those trying to balance work with the rest of life (S. Cherak *Nature* **578**, 179–180; 2020). One recommendation is to ask for support from colleagues and supervisors.

Such support is vital, and employers must recognize that their staff need it. Indeed, in France, the ‘right to disconnect’ became law in 2017. Companies with more than 50 staff members are now obliged to discourage out-of-hours and holiday e-mail communication. Where changing the law isn't an option, a team of organizational psychologists at the University of Manchester, UK, has suggested setting up a ‘bounce-back’, so that e-mails received during time off are automatically returned to the sender.

There are several ways in which employers can support their staff when they take breaks, such as helping to put work on hold, accepting that projects will take a little longer and ensuring that essential tasks can be covered when colleagues are away.

Switching off from work is increasingly difficult – we at *Nature* struggle with this as much as does any organization. An out-of-office message must mean what it says if we are to have any hope of turning things around.