▶ should be easier to maintain.

The new propfan is also lighter, which itself saves fuel and hence emissions. This is not just because the fan housing has been eliminated. The thrust reverser—which on a conventional jet engine uses a series of deflectors to slow an aircraft once it has touched down on the runway—has also gone. Instead of deflectors, the pitches of both the rotating blades and the static vanes can be adjusted on the new propfan to reverse its thrust.

One problem with propfans, though, is noise. This was particularly high inside the cabin of the modified MD-80. The combination of a single ring of blades, and advances in acoustic design should let the engine meet current and anticipated noise regulations, says CFM.

There has been concern about what would happen if a propfan blade broke off. A conventional jet engine is designed to contain a breakaway blade within the fan housing. With no such housing, there is nothing to stop such a breakaway striking the aircraft's fuselage or wing, with potentially catastrophic results. That could mean parts of the aircraft near the open blades will need to be reinforced.

The best thing, though, is to stop the blades breaking in the first place. For that, new materials will help. One legacy of the MD-80 propfan was the pioneering use of extremely strong blades made from carbon-fibre composites. This technology has progressed, and the fan blades in jet engines and the propellers of modern turboprops are now routinely made from composites. These blades are proving their durability by safely notching up millions of flight hours, says a spokeswoman for CFM.

Mounting the propfans under the wings of an aircraft is more in keeping with the way modern airliners are built. It also makes maintenance and safety checks easier. However, the consortium says it can producer a "pusher" version if an aircraftmaker wants to design a plane with its engines at the rear, like the old MD-80.

New aircraft designs are in the works, but the two main builders of airliners, Boeing and Airbus, have yet to commit themselves to any big, new projects. CFM hopes the propfan will be a contender for a new generation of short- and medium-haul aircraft, although it could be used on large wide-body aircraft, too. If flight tests go well, in a decade or so travellers might find the aircraft they are boarding is once again powered by propellers. ∎
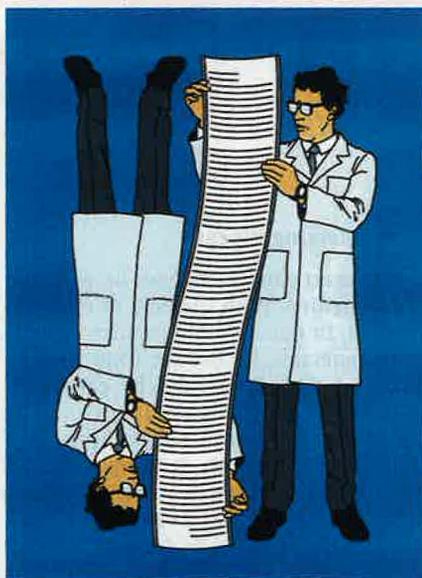
How science works

Methods and madness

Data don't lie—but they can lead scientists to opposite conclusions

ONE OF THE biggest concerns in science is bias—that scientists themselves, consciously or unconsciously, may put their thumbs on the scales and influence the outcomes of experiments. Boffins have come up with all sorts of tactics to try to eliminate it, from having their colleagues repeat their work to the "double blinding" common in clinical trials, when even the experimenters do not know which patients are receiving an experimental drug and which are getting a sugar-pill placebo.

But gathering the data and running an experiment is not the only part of the process that can go awry. The methods chosen to analyse the data can also influence results. The point was dramatically demonstrated by two recent papers published in a journal called *Surgery*. Despite being based on the same dataset, they drew opposite conclusions about whether using a particular piece of kit during appendix-removal surgery reduced or increased the chances of infection.

A new paper, from a large team of researchers headed by Martin Schweinsberg, a psychologist at the European School of Management and Technology, in Berlin, helps shed some light on why. Dr Schweinsberg gathered 49 different researchers by advertising his project on social media. Each was handed a copy of a dataset consisting of 3.9m words of text from nearly 8,000 comments made on Edge.org, an online forum for chatty intellectuals.

Dr Schweinsberg asked his guinea pigs to explore two seemingly straightforward hypotheses. The first was that a woman's tendency to participate would rise as the number of other women in a conversation increased. The second was that high-status participants would talk more than their low-status counterparts. Crucially, the researchers were asked to describe their analysis in detail by posting their methods and workflows to a website called DataExplained. That allowed Dr Schweinsberg to see exactly what they were up to.

In the end, 37 analyses were deemed sufficiently detailed to include. As it turned out, no two analysts employed exactly the same methods, and none got the same results. Some 29% of analysts reported that high-status participants were more likely to contribute. But 21% reported the opposite. (The remainder found no significant difference.) Things were less finely balanced with the first hypothesis, with 64% reporting that women do indeed participate more, if plenty of other women are present. But 21% concluded that the opposite was true.

The problem was not that any of the analyses were "wrong" in any objective sense. The differences arose because researchers chose different definitions of what they were studying, and applied different techniques. When it came to defining how much women spoke, for instance, some analysts plumped for the number of words in each woman's comment. Others chose the number of characters. Still others defined it by the number of conversations that a woman participated in, irrespective of how much she actually said.

Academic status, meanwhile, was defined variously by job title, the number of citations a researcher had accrued, or their "h-index", a number beloved by university managers which attempts to combine citation counts with the importance of the journals those citations appear in. The statistical techniques chosen also had an impact, though less than the choice of definitions. Some researchers chose linear-regression analysis; others went for logistic regression or a Kendall correlation.

Truth, in other words, can be a slippery customer, even for simple-sounding questions. What to do? One conclusion is that experimental design is critically important. Dr Schweinsberg hopes that platforms such as DataExplained can help solve the problem as well as revealing it, by allowing scientists to specify exactly how they chose to perform their analysis, allowing those decisions to be reviewed by others. It is probably not practical, he concedes, to check and re-check every result. But if many different analytical approaches point in the same direction, then scientists can be confident that their conclusion is the right one. ∎