

How science can make the innocent guilty

QED



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As a handy phrase to wheel out in heated debate, "It's simple cause and effect" is right up there with "Where's your evidence?", and "Your trouble is that you're sexually repressed". Yet as a summary of real-life incidents, it is often very wide of the mark.

The recent inquiry into the Space Shuttle Columbia disaster last February is a case in point. At the time many feared that the true cause would never be identified, as the evidence was scattered across hundreds of square miles and several US states. In the end, around 40 per cent of Columbia was retrieved, allowing engineers to show that it had been destroyed by a hole punched in its wing shortly after launch by a breakaway piece of insulating foam.

So was the rogue piece of foam the cause of the disaster? Only up to a point, according to last month's report of the official Columbia Accident Investigation Board. It points the finger at the management culture of Nasa, the US space agency, which led engineers to downplay the significance of a similar foam impact event with

another shuttle just four months earlier, and to turn down requests to examine the effects of the impact on Columbia once it reached orbit.

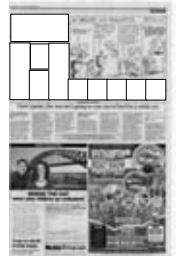
Some would argue that the cause goes higher still, to the insistence of the US Congress that Nasa struggles on with the construction of the International Space Station, while imposing huge budget cuts. But why stop there? Why not pin the blame on the sheer folly of mankind in thinking that space exploration can ever be "routine"? While identifying true causes is rarely easy, I have often suspected that the findings of official reports simply do not follow from the evidence presented. My suspicions appear to be well placed, according to computer scientists who have developed methods of analysing complex documents to reveal the train of logic that leads from evidence to conclusion.

Professor Peter Ladkin of Bielefeld University, Germany, recently told the journal *Nature* that when official reports of accidents are subjected to such analysis, around 50 per cent turn out to

give misleading accounts of the true causes.

Hearing this revived memories of a story I covered in the late 1980s, whose *denouement* struck me at the time as an egregious case of missing the true cause. On January 8, 1989, a British Midland Boeing 737 bound for Belfast crashed near Kegworth, Leicestershire, killing 47 and seriously injuring 74. The official investigation revealed that the pilots had suffered engine problems shortly after take-off, making the whole aircraft shudder. Throttling back the engine, the vibration stopped; the pilots shut it down completely and made their way to East Midlands airport for an emergency landing.

As they made their final approach, the shuddering returned and the engine lost power. The pilots then realised they had made a mistake – and turned off the wrong engine. Unable to restart the other one, they crashed into the embankment of the M1, just short of the runway. According to the Air Accident Investigation Board report, the cause of the accident was clear: the pilots had simply





switched off the wrong engine. The pilots were summarily dismissed, and that was that.

Yet pinning the blame on the two pilots has always struck me as simplistic, to say the least. Yes, they had turned off the wrong engine, but it was only because an engine had failed that they had been compelled to make a decision in the first place. The fact they

made the wrong one wasn't helped by engine vibration dials too small to be read in high-vibration conditions. Add to that the appalling coincidence of the faulty engine ceasing to shudder just as the intact one was throttled down, and simply blaming the pilots becomes a travesty of justice. I put this to Prof Chris Johnson of the University of Glasgow, who

has developed one of the most powerful of these computerised report analysis methods.

As luck would have it, Prof Johnson had already used it on the Kegworth report, and he confirmed that its conclusions didn't really add up – especially over the key issue of the faulty engine. Last week Prof Johnson met officials from Nasa and the US National Transportation

Safety Board to talk over the use of his methods on future accident investigations. When he returns, perhaps he might care to feed his computer with the report of the Hutton Inquiry.

It would be fascinating to see where the science stops and the spin begins.