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Playing with numbers

What's the worst statistic ever?

Sociologist Joel Best claims it's one he saw in 1995 in a paper by a graduate student he was supervising. 'Every year since 1950,' the student wrote, 'the number of American children gunned down has doubled.'

Yes, America is a dangerous place. But has the number of children gunned down really doubled every year since 1950? Could it have? The answer is no, as a quick bit of back of the envelope arithmetic shows. Even if only one child had been shot in America in 1950, doubling that number would give you two in 1951, four in 1952, and so on up to 1024 in 1960. If you keep doubling the number every year, by 1970 you would hit one million and by 1980 one billion. In 1987 you would surpass the best estimates for the total number of humans who have ever existed (110 billion), and by 1995 you would hit 35 trillion. Talk about a violent country.

What is interesting is that this wasn't a graduate student's error: he had quoted it from a professional journal. In other words a professional writer had produced this statistic, editors had signed off on it, proofreaders had approved it, and it now had an existence as journalistic fact, despite being clearly impossible. How does this happen? How do bad statistics - one of the most common forms of poor numeracy - get into our lives, and particularly into media and politics? In some cases, it's sheer accident coupled with poor numeracy.

But in other cases, something more sinister is afoot: numbers are manipulated for political means in the secure knowledge that they will be unquestioned. Banner headlines are a good place to start. Take this example from the Daily Mail: 'Town hall bans staff from using Facebook after they each waste 572 hours in ONE month'. Again, a quick back of the envelope calculation shows this to be virtually impossible: each council worker would have had to spend an average of 19 hours per day (including weekends!) at the office, all of it on Facebook, to make this true. In fact, the total of 572 hours was for the entire council workforce: 4,500 employees (and the online version of the article has been amended to remove the word 'each').(1)

And suddenly, council workers don't appear to be such skivers: that makes the average use of Facebook around seven minutes per month, or 14 seconds a day. But even that was too much, said the Daily Mail, arguing that every one of those seconds was funded by the taxpayer. Here we see another way to lie with statistics: leave out contextualising details, such as the fact that workers may have been using Facebook on their lunch breaks rather than during working hours.

While I'm not keen to give additional coverage to the Daily Mail, it is a good source of bad examples. Earlier last year, the paper reported that state workers were now earning an average of £62 a week more than private sector workers. Both the Conservative party and the Taxpayers' Alliance decried this gross overpayment of public sector workers, but as The Guardian's Polly Toynbee pointed out, this statistic was not comparing like with like.(2)

The figures were arrived at by adding up total pay in the public and private sectors, then dividing those figures by the number of workers in each sector. Because the private sector now accounts for most of the low paid, 'unskilled' jobs such as cleaners, caterers, carers and dinner ladies, its average wage is relatively low. But when comparing similar jobs in the private and public sectors, workers in the former receive on average higher pay than those in the latter.

Contextless reporting of statistics abounds, such as breathless accounts of deaths caused by swine flu, which conveniently neglect to point out that every year, roughly the same number of people die of the flu, whatever its name. Or reports in America after the 2008 election decrying the fact that only 43% of white voters opted for Barack Obama - surely a sad indication of still lingering American racism, right? Perhaps not, if you consider that Obama actually got a higher percentage of the white vote than the two previous (white) Democratic presidential candidates.(3)

Another way of confusing the issue is to overwhelm your audience with large numbers. For example, soon after coming to power in 1997, the Labour government announced that it would spend an extra £300m over five years to create one million new childcare places.(4) £300m sounds like a lot of money, and it is. But is it enough money to create one million childcare places over five years? The only way to answer that is to do the maths. £300m divided by one million places is £300 per place. Divide that by five years, and you have £60 per year, or £5 per month. Is that enough to fund childcare for one child? Suddenly, £300m doesn't sound like that much money at all.

Large numbers can inspire awe, but authoritative use of numbers of any size can also close down debate. Numbers don't even have to be large, just authoritative. You can argue against opinions, but who is going to argue against seemingly objective numbers? It feels like arguing against facts. But precisely because numbers seem so fact-like, it's all too easy to forget to check them. And then they take on a life of their own.

Most adults in the UK know that we are supposed to drink eight glasses of water a day. But where does that number come from? Doctors? Scientists? No one really knows, but those who have looked into it, such as the authors of *Don't Swallow Your Gum: and Other Medical Myths Debunked*, all agree that it is a myth, an urban legend given power by its numerical nature.(5) The truth is, we don't need to drink anywhere close to this amount. Just as we don't need to swallow eight glasses of water a day, we don't need to swallow everything we are told about skills needs, no matter how authoritative the numbers sound.

One of the most frequently cited 'facts' in policy discussions about future skills needs is the prediction that by 2020 the number of jobs in the UK requiring no qualifications will have plummeted from 3.6 million to just 600,000. As *The Guardian*(6) reported, both Alan Johnson and the then Shadow Education Secretary Michael Gove cited this figure, with both of them attributing it to the Leitch report.(7) But Leitch never said anything like this. In fact, the figure is the product of a woeful misreading of another report's prediction that by 2020 the number of people with no qualifications will be 600,000. This says nothing about the number of jobs that will require no qualifications: that number is predicted to be much higher.

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In the next issue of *reflect* he will be following up this article with further advice on how to identify bad statistics.

(1) www.dailymail.co.uk/news/article-1210361/Town-hall-bans-staff-using-Facebook-waste-572-hours-month.html

(2) Toynbee, P. (2009) 'These rottweilers do the work of the Tories for them' *The Guardian*, 10 February.

(3) www.slate.com/id/2204251/

(4) Blastland, M. and Dilnot, A. (2007) *The tiger that isn't: Seeing through a world of numbers*. London: Profile.

(5) Carroll, A. and Vreeman, R. (2009) *Don't Swallow Your Gum and Other Medical Myths Debunked*. Penguin.

(6) Kingston, Peter (2008) 'Lies, damned lies and predictions', *The Guardian*, 29 January.

(7) Department for Universities, Innovations and Skills (2007) World Class Skills: implementing the Leitch Review of skills in England. HMSO.

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