Scepticism and statistics

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Vancouver CoastalHealth
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On average, a North American man has fewer than two legs. This is true. It's a statistical fact!

Unfortunately, many people take statistics at face value, and the more precise the numbers or elegant the presentation, the more likely they will be accepted. Challenging statements that purport to tell a truth with data is an important part of understanding information.

Scientific literacy, a subject we discussed recently, includes being able to effectively cut through the fallacy of some statistics. This means understanding that if even one man in North America is missing one limb, the 'average' must mathematically be less than two per man. Simple answer, but misleading use of a statistic.

An online magazine/blog called 'Stand Science', produced by students at St Andrews University in Scotland provides some interesting examples. Take the fact that "children with bigger feet are better spellers." Or that "countries that add fluoride to drinking water have higher rates of cancer." Shocking? Of course. True. Of course not.

The 'bigger feet' example implies the children are otherwise the same, but there is no proof. Indeed, bigger feet are usually found on older children who have more schooling. And the fluoride 'problem'? Nations that add fluoride to their water are mostly developed nations. In other words, nations in which people can actually grow old enough to develop cancer.

We read headlines, polls and statistics every day, but seldom are they questioned or given second thought. If the statistic is faulty this mostly just misleads people. But in a medical context, the false data can be dangerous.

Take the example of Andrew Wakefield who, in 1998, purported to have found a link between the MMR (measles, mumps and rubella) vaccine and autism. Printed in The Lancet, a prestigious medical journal, this alarmed people to the point where vaccination rates dropped significantly. It soon became clear that the Wakefield study was immensely flawed — for example, having used only 12 subjects — and The Lancet withdrew it. subsequent research has soundly repudiated the Wakefield claims, but to this day, people are choosing to believe in the link, and endangering their children in the process.

Three of the most common errors to watch for when considering statistical claims are avoiding the correlation versus causation fallacy; understanding averages; and knowing that random sampling is not always so random.

Take two clocks, both of which keep perfect time. Whenever clock A points to the hour, clock B rings its bell. Does that mean A causes B to peal? Of course not, but that is the fallacy often presented by those who wish to mislead.

The term 'average' is ambiguous and may not always be the best measure. The 'median' or middle value of a data set could be more important, as could the mode (the one occurring the most).

Whenever clock A points to the hour, clock B rings its bell.

And the famously important 'random sample' may not be so random. A classic example is that of the 1936 US election where a random sample by telephone predicted a landslide for Alf Landon. Ever heard of president Landon? He lost by landslide to Franklin Roosevelt. Seems only the rich had phones.

The statistics are presented with are not always objective, or correct. Some are forged, others are just errors, but it's not always easy to find out what to believe. But if we can make our way through the jungle by sorting out the good from the bad, we have a nice tool to make sense of our world.

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