

FMS1203S: Randomness in scientific thinking

Week 8

Misleading reports in the Media

Journalists make misleading reports on scientific issues involving numbers by various reasons, innocent in statistics or motivated by certain incentives.

In the book *Teaching Statistics, a bag of tricks* by Gelman, A. and Nolan, D. (2002), five different types of misleading presentations of numbers are described, which are briefly discussed in the following slides.

Fabricated or meaningless numbers

This is an unsophisticated abuse of statistics where a number might be made up, or irrelevant to the discussion.

Example 1

An article for the *San Francisco Examiner* was entitled "Patriot missile hits revised from 41 to 4". The article describes how the claim of 41 successes in 42 engagements by the US Defense Department at the end of the Gulf war was found to be untruthful by the General Accounting Office (the investigative watchdog of the US Congress).

Example 2

In an article "Survey: US kids reading well", basic reading ability at ages 9 and 14 were compared between different countries - here the problem is that it is quite difficult to compare basic reading in two different languages.

Misinformation

A claim is made without any effort to look for supporting numerical evidence and the claim may be incorrect.

Example

- ▶ An article in *The Economist* magazine made the claim: "Back in Vietnam days, the anti-war movement spread from the intelligentsia into the rest of the population, eventually paralyzing the country's will to fight."
- ▶ This claim is incorrect, as survey data from that time shows that highly educated people were more likely to support the Vietnam war.

Ignoring the baseline

Example

- ▶ In Australia the number of people dying in car accidents is reported every year for different states during the Easter vacation period.
- ▶ It could be argued that as different states have vastly different populations this is misleading.

Data dredging

Data dredging refers to the practice to bring up something which appears significant but in fact stands out just by chance from a large number of issues.

Example

In an article about cocaine use in school children in the UK discussed previously. One problem with the reporting in the article was that the figures on cocaine use came from a survey with 100 questions, and if we ask enough questions there is a good chance that some significant large differences will appear just by chance.

Misleading comparisons

Example

In an article, shootings of children are compared to shootings of policeman. It's not clear why these numbers should be compared.

Readings for next week

- ▶ For next week's presentations, each group is given two readings - one is a popular article in a newspaper or magazine, and the other is the scientific paper that the popular article refers to.
- ▶ The intention is for you to critically examine the extent to which the journalist did a good job of communicating the science in the scientific paper.
- ▶ You will also gain an appreciation of how difficult a science journalist's job is.
- ▶ You are not intended to understand every detail (or even most of the detail) in the scientific paper. Just describe in general terms what kind of data were analyzed and what kind of statistical methods were used to analyze the data (without going into any detail).

Readings for next week: Group 1

The Ig Nobel prizes are a spoof of the Nobel prizes which celebrate the quirkier side of science.

The article "It's official: swallowing swords hurts your throat" by Alok Jha in *The Guardian*, Friday October 7, 2007, discusses the Ig Nobel winners this year. <http://www.guardian.co.uk/science/2007/oct/05/1>

The Ig Nobel prize for linguistics was awarded for the following paper, which shows that sometimes rats cannot distinguish between Japanese spoken backwards and Dutch spoken backwards:

Toro, J.M., Trobalon, J.B. and Sebastián-Gallés, N. (2005). Effects of backward speech and speaker variability in language discrimination by rats. *Journal of Experimental Psychology: Animal Behavior Processes*, 31, 95–100.

Readings for next week: Group 2

In the 12 March 2011 issue of New Scientist magazine the article "Lack of sleep makes for a more reckless bet" appeared. The results reported were based on the following paper:

Venkatraman, V., Huettel, S.A., Chuah, L.Y.M., Payne, J.W. and Chee, M.W.L. (2011). Sleep deprivation biases the neural mechanisms underlying economic preferences. *The Journal of Neuroscience*, 31, 3712–3718.

Readings for next week: Group 3

The article "Meditation really does reduce stress" appeared in *The New Scientist* on October 13 2007 and describes how volunteers trained in a Chinese meditation technique for just five days produced lower stress levels of the stress hormone cortisol when asked to perform difficult mental arithmetic. The article is based on the following paper:

Tang, Y-Y., Ma, Y., Wang, J., Fan, Y., Feng, S., Lu, Q., Yu, Q., Sui, D., Rothbart, M., Fan, M. and Posner, M. (2007). Short-term meditation training improves attention and self-regulation. *Proceedings of the National Academy of Sciences*, 104, pp. 17152–17156.

Readings for next week: Group 4

The article "Buzzing bees scare trespassing elephants" appeared in The New Scientist on October 13, 2007 and describes how playing recordings of buzzing bees was able to keep elephants away from farmer's land. The story was based on the following article:

King, L.E., Douglas-Hamilton, I. and Volrath, F. (2007). African elephants run from the sound of disturbed bees. *Current Biology*, 17, pp. R832-R833.

Readings for next week: Group 5

The article "Bacterial infection killed almost 19,000 in 2005" by Kevin Sack appeared in the New York Times on October 17, 2007. It reports on a study of the prevalence of drug resistant bacteria. The article is based on the following paper in the Journal of the American Medical Association:

Klevens, R.M., Morrison, M.A., Nadle, J., Petit, S., Gershman, K., Ray, S., Harrison, L. H., Lynfield, R., Dumyati, G., Townes, J.M., Craig, A.S., Zell, E.R., Fosheim, G.E., McDougal, L.K., Carey, R.B. and Fridkin, S.K. (2007). Invasive Methicillin-Resistant *Staphylococcus aureus* Infections in the United States. *Journal of the American Medical Association*, 15, 1763–1771.