

Examples from newspapers

Assignment 4 contained the following question.

Find an article in a newspaper or magazine published in 2011 that gives the results of a survey, observational study or experiment. Cut out the article, which should be no bigger than half of an A4 page, and staple it to the top half of an A4 page. Write down the name of the newspaper or magazine, the page where the article appeared, and the date of publication.

In the second half of the page, comment briefly on the article. For example, does it describe a survey, an observational study or an experiment? If a survey, how was the sample chosen? If an observational study, what conditions were compared? If an experiment, what were the treatments and the experimental units? What was measured?

Do you think this investigation was conducted well?

When we think about data we have to think about its

collection What question were the data-collectors trying to answer? How did they collect the data? What did they measure or ask?

summary and display See the lectures on Exploratory Data Analysis, and also Minitab Practicals 3 and 7.

analysis This includes estimation and hypothesis testing. More advanced techniques are covered in later Statistics modules.

interpretation We have to explain our results in a non-technical way without losing precision.

The assignment question was about the *collection* phase. These notes contain a number of examples submitted in the assignment, to illustrate important points about data collection.

A survey

Source *The Independent*, 7 February 2011.

Questions of interest What proportion of US adults own various electronic gadgets?

Sample 3001 US adults.

How were they chosen? Was it online, by phone, on paper or in interviews?

What exactly was asked? Something like “Do you own an iPad?”.

Or did they tick boxes?

Analysis “Five percent own an e-book reader like Amazon’s Kindle.”

A survey

Source *News of the World*, 6 February 2011, page 4.

Questions of interest Which government would be best for Britain? Do you prefer an “individual party candidate”? Will the LibDems lose?

Sample 2036 adults online, supposedly a random sample.

How did they choose the random sample?

What exactly was asked? Three questions were asked, and they were reported by the newspaper in full:

- “Which of these options would be best for Britain: Con/LibDem coalition, or Labour, or Neither?”,
- “Would you prefer to vote for an individual party candidate or a coalition candidate?”,
- “Do you think the Liberal Democrats will gain or lose votes at the next General Election?”

Analysis Pie charts and bar charts, with the percentages written on.

An observational study

Source *Metro*, 8 February 2011.

Question of interest Do young children's diets affect their IQ?

Observational units 14,000 children born in 1991–1992, tracked as part of the Avon Longitudinal Study of Parents and Children.

What was recorded? Children's diet (classified as 'processed', 'traditional' or 'health conscious') at ages 3, 4, 7 and 8½.

Analysis Processed food at age 3 gives lower IQ at 8½ than health-conscious food at age 3. Diet at ages 4 and 7 had no effect.

Someone suggested that this is just showing that stupid parents have stupid children and give these children processed food, but good statisticians are aware of problems like this, and the article reported that "the dietary links to IQ held after other potentially influential factors were taken into account."

An observational study

Source *The Daily Mail*, 7 February 2010, page 2;

also *Metro*, 7 February 2011, page 11.

They both cite an article in the *Journal of Allergy and Clinical Immunology*.

Question of interest Does affluence increase the risk of peanut allergy?

Data source Records from more than 400 GP practices in England, 2001–2005.

How were the practices chosen?

Analysis The rate is 0.70 per 1,000 among the most affluent; 0.36 per 1,000 among the poorest.

Discussion *Metro* just reported the study and its findings. *The Daily Mail* also sought opinions from other people: one suggested that an excessively clean lifestyle might increase the risk of allergies; another that poor people do not recognise peanut allergy and so do not go to the GP. *The Daily Mail* appears to give just as much weight to these other people's opinions as it does to the results of a long, careful study of data.

An experiment

Source *Metro*, 7 February 2011, page 20.

Question of interest Does laughter increase blood flow?

Treatments $\left\{ \begin{array}{l} \text{nothing} \\ \text{watching a funny film} \end{array} \right.$

Experimental units 20 volunteers, before and after watching “clips of a funny film”.

What was measured? Blood flow.

Conclusion “... blood flow increased by an average of 22 per cent in 19 out of 20 volunteers.”

Why did they exclude one volunteer, rather than giving the average increase for all 20?

An experiment

Source *Times Higher Educational Supplement*, 3–9 February 2011,
citing a paper published in the *Journal of Computer Assisted Learning*.

Question of interest Can social networking sites improve academic performance?

Treatments $\left\{ \begin{array}{l} \text{Twitter} \\ \text{Ning} \end{array} \right.$

Why did they not include ‘none’?

Experimental units Two groups of students on a pre-health course at a single US university.

What was measured? Grades.

Conclusion Those on Twitter averaged one grade (about 10 marks) higher than those on Ning.

Were there other differences between these two groups? Wouldn't it have been better to have 15 groups, five with each networking site and five with none?

A survey??

Source An advert in *Glamour* magazine, January 2011, page 36.

Question of interest Does *Revlon Grow Luscious* make eyelashes look longer?

Sample 53 women tested it.

The student who found this suggested that they had probably all been offered free samples and so felt obliged to be positive.

What exactly was asked? *Who knows?*

Analysis “96% of women saw instantly longer lashes.”

Would it sound as impressive if they said “51 out of 53”?

A survey

Source *Evening Standard*, 7 February 2011, page 27

Question of interest Do young people take risks online?

Sample “... an online questionnaire, sampled more than 2,300 people aged 8–11 from England, Scotland and Wales.”

What exactly was asked? Not stated.

Analysis One in eight talk to strangers online; of these, 60% lie about their age.

So that is 7.5% of them.

Summary “Many young people adopt a different identity online.”

Comment Congratulations to the student who submitted this one and commented that “This article’s purpose is to worry parents, even though it is not providing much information and using the study to give validity to a poorly put-together argument.”

An experiment or an observational study?

Source *The Daily Mail*, 7 February 2011,
citing an article in the journal *Chemical Research in Toxicology*.

Question of interest Are wood-burning stoves bad for health?

What did they compare? (a) Air from a Danish village with many wood-burning stoves;
(b) Air from a nearby rural area with few wood-burning stoves;
(c) Pure wood smoke particles made by the scientists.

What was measured? Crop contamination for (a) and (b) (so this part was an observational study); the effect of (a), (b) and (c) individually on humna cells exposed to them in the laboratory (so this part was an experiment).

Headline “Wood-burning stoves ‘can be as deadly as exhaust fumes’ ”

Comment One student said something like “But there is nothing the matter with exhaust fumes. I walk past them every day.” In fact, a number of studies have shown that exposure to exhaust fumes increases the risk of many diseases, including asthma and heart disease.

An observational study

Source *Nature*, **471**, 3 March 2011, pages 20–24.
(I cheated, and put this one in myself.)

Questions of interest How do medical, educational and socio-economic factors affect disease, employment and social class in the medium term?

Observational units All 16,695 babies born in Britain in the first complete week of March 1946.

What was recorded? Zillions of things; and it is still going on.

Some outcomes Evidence-based policy decisions by government, such as

- abolishing the distinction between grammar schools and secondary modern schools;
- advising middle-aged people to take regular physical exercise.

Comment I helped to analyse some of this data when I was a technician in medical research.

An experiment

Source *The Daily Mail*, 27 January 2011.

Question of interest Can segregation improve the academic results of black students?

Treatments (a) For six minutes each day, separate black students from the rest, and divide them into males and females. Give each group a short daily meeting with a mentor.

(b) No comparator treatment is mentioned, so they are probably going to compare this segregation with what happened in the past.

Hmmmm, ... So if the grades improve, will the cause be the segregation or the mentoring?

Experimental units The groups of male black students and female black students in each class of a certain US high school.

What will be measured? Grades, test scores, attendance.

Examples which I do not regard as data collection

- Theatre reviews
- Scores from all soccer matches played on a particular Saturday
- Numerical announcements by individual companies, such as
 - increase in taxi fares
 - firm's annual profit.