

13.1 Reading the Headlines

WORKSHEET

The question

The average number of pedestrians killed annually in road accidents in Poldavia during the period 1974–1989 was 1080 and the average number killed annually in commercial flight accidents during the same period was 180. Discuss the following newspaper headlines which appeared in 1991. (The percentage figures in square brackets give a rough indication of the weight of marks attached to each discussion.)

10% Six Times Safer To Fly Than To Walk. 1974–1989 Figures Prove It.

10% Our Skies Are Safer. Only 125 People Killed In Air Accidents In 1990.

30% Road Carnage Increasing. 7 People Killed On Tuesday.

50% Alarming Rise In Pedestrian Casualties. 1350 Pedestrians Killed In Road Accidents During 1990.

Hints

Try the question on your own first. If you get stuck, read the hints *one at a time*, and go back to the question after each one. Hints marked *Pause and try* are the key steps.

- ?** **Ask yourself** If deaths occur independently and at random at a steady rate, how much should the yearly total vary? If the average is 1080 a year, what is a typical deviation from year to year?

STAGE 1 “Six times safer to fly than to walk”

- ?** **Ask yourself** 1080 pedestrian deaths and 180 air deaths per year. Six times what, exactly?

STAGE 2 “Our skies are safer: only 125 killed in 1990”

- ?** **Ask yourself** Are air deaths like independent rare events? How variable would you expect the yearly total to be?

STAGE 3 “Road carnage increasing: 7 killed on Tuesday”

- ?** **Ask yourself** On average, how many pedestrians are killed per day? If daily deaths are Poisson, how often would you see 7 or more in a day?

STAGE 4 “Alarming rise: 1350 pedestrians killed in 1990”

- ?** **Ask yourself** Compare 1350 with the Poisson standard deviation. Is this just chance? If not, what else could explain it, and does it justify “alarming rise”?

Try this next

- 1 Poisson tails.** Check that $P(X \geq 7) \approx 0.031$ for X Poisson with mean 2.96. How many days a year would you expect 9 or more pedestrian deaths?
- 2 Clustered deaths.** Suppose air crashes occur as a Poisson process at 1.2 per year, and each kills 150 people. Find the mean and standard deviation of yearly air deaths. Is 125 deaths in a year unusual?
- 3 A significant rise?** If the 1974–1989 figures had been steady at 1080 ± 33 , find (using a normal approximation) the probability of 1350 or more in a single year.
- 4 Write a better headline.** For each of the four headlines, write a headline that the data

actually support.

Further reading

- ▶ **David Spiegelhalter**, *The Art of Statistics* (Pelican). How to learn from data, with many examples from the news.
- ▶ **Tim Harford**, *How to Make the World Add Up* (Bridge Street). Ten rules for thinking about numbers in the media.
- ▶ **Darrell Huff**, *How to Lie with Statistics* (Penguin). A short classic from 1954, still relevant.

The full guided solution, and what the question leads to at university, is in Section 13.1:
https://keithmcnulty.github.io/step_book_mcnulty/ch13/headlines.html