6D4 統計的應用及誤用

6D4 Using and Interpreting Statistics

選圖要配合想表達的資料；讀圖則要核對刻度、單位和比例，避免被圖形的外觀帶偏判斷。

Choose a chart that suits the message, and inspect scales, units and proportions before accepting a visual impression.

學習重點

What to learn

- 比較各類數量，可用棒形圖；簡單計數資料也可用有清楚圖例的象形圖。
  Use bars to compare category amounts; pictograms can also show simple counts with a clear key.
- 觀察按時間排列的數量變化，可用折線圖；比較整體內各類比例，可用圓形圖。
  Use lines for changes over time and a pie chart for shares of one whole.
- 圖上的高度、長度或面積可能造成誤導，應回到標示的數值作計算。
  Visual height, length or area may mislead; check the labelled numerical values.
- 判斷一個統計說法，要檢查資料範圍、比較對象及所用單位是否一致。
  Check the data coverage, comparison groups and units behind a statistical claim.

考試前必記

Remember before a test

- 縱軸由非零數值開始，可能放大視覺差距；先讀起點和刻度，再計實際差或倍數。
  A non-zero baseline can exaggerate visual differences; calculate from the values instead.
- 相同距離的刻度應代表相同差值；若省略一段刻度，必須清楚標示。
  Equal scale spacing should represent equal increments; any omitted interval must be marked clearly.
- 象形圖中，同樣代表一個單位的圖案應保持同樣大小；長和闊各放大至 2 倍，面積便成為 4 倍。
  Keep equal-unit icons the same size. Doubling both width and height makes the area four times as large.
- 合理的結論要說明比較的是數量、差值、比例還是趨勢，不能單憑「看起來多很多」。
  State whether a conclusion concerns amounts, differences, shares or trends; appearance alone is insufficient.

常見錯誤

Common mistakes

- 把棒的可見高度比，直接當作實際數量比，沒有理會縱軸起點。
  Using visible bar-height ratios as data ratios without checking the baseline.
- 兩張圖的刻度或統計期間不同，卻直接比較線條斜度或棒長。
  Comparing slopes or bar lengths from charts with different scales or periods.
- 只選部分時點或組別，便聲稱已代表整段時間或所有人。
  Generalising to all times or people from a restricted selection.
- 沒有說出誤導來自哪裏，只籠統寫「這個圖不正確」。
  Calling a chart incorrect without identifying the misleading feature.

快速自查

Quick check

□ 能為資料選合適的統計圖 I can choose an appropriate chart.	□ 能檢查起點刻度和單位 I can inspect baselines, scales and units.
□ 能用數值核實視覺印象 I can verify an impression numerically.	□ 能說明誤導原因和改進方法 I can explain and correct misleading features.

自編例題

Original worked example

兩個社團的報名人數是 48 和 54。棒形圖的縱軸從 42 開始，兩棒可見高度是 6 和 12。可否說第二個社團人數是第一個的 2 倍？

Two clubs have 48 and 54 applicants. A bar chart’s vertical axis starts at 42, giving visible bar heights of 6 and 12. Can we say the second club has twice as many applicants?

思考與解答：不可以。實際倍數是 54 ÷ 48 = 1.125，相差只有 6 人。可把棒形圖的數量軸由 0 開始，清楚標數。

Reasoning and answer: No. The actual ratio is 54 ÷ 48 = 1.125, and the difference is only 6 applicants. Start the chart’s quantity axis at 0 and label the values clearly.

再試與答案：比較一周每天的用水量變化，宜用甚麼圖？答案：折線圖，時間依序排列，並標明用水單位。

Further practice and answer: Which chart suits changes in daily water use over a week? Answer: a line graph, with days in order and water-use units labelled.