

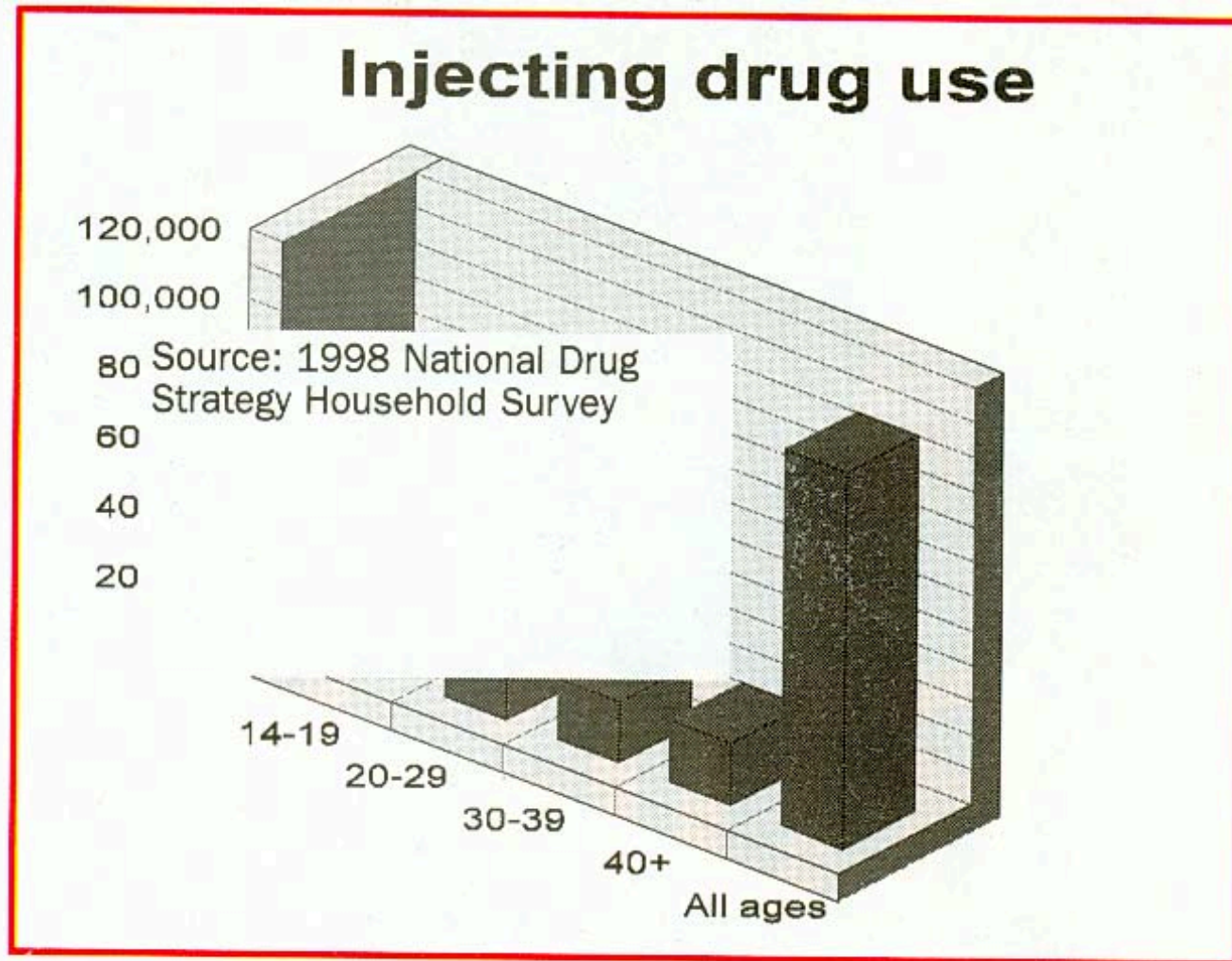
Some principles of good graphics

Melbourne Statistical Consulting Platform

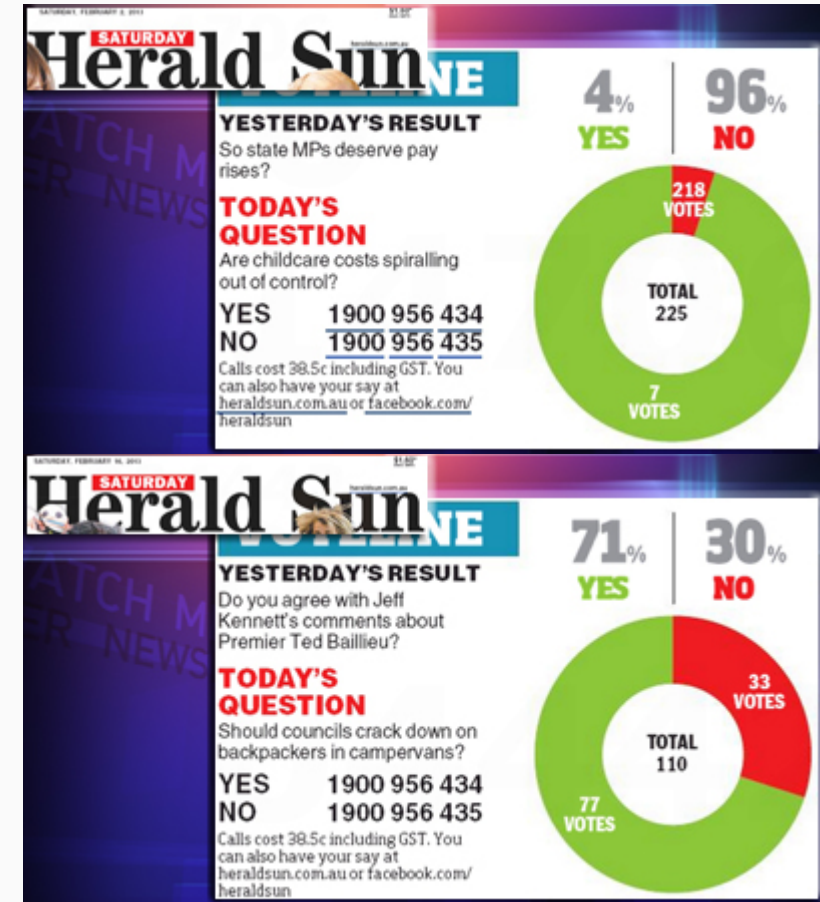
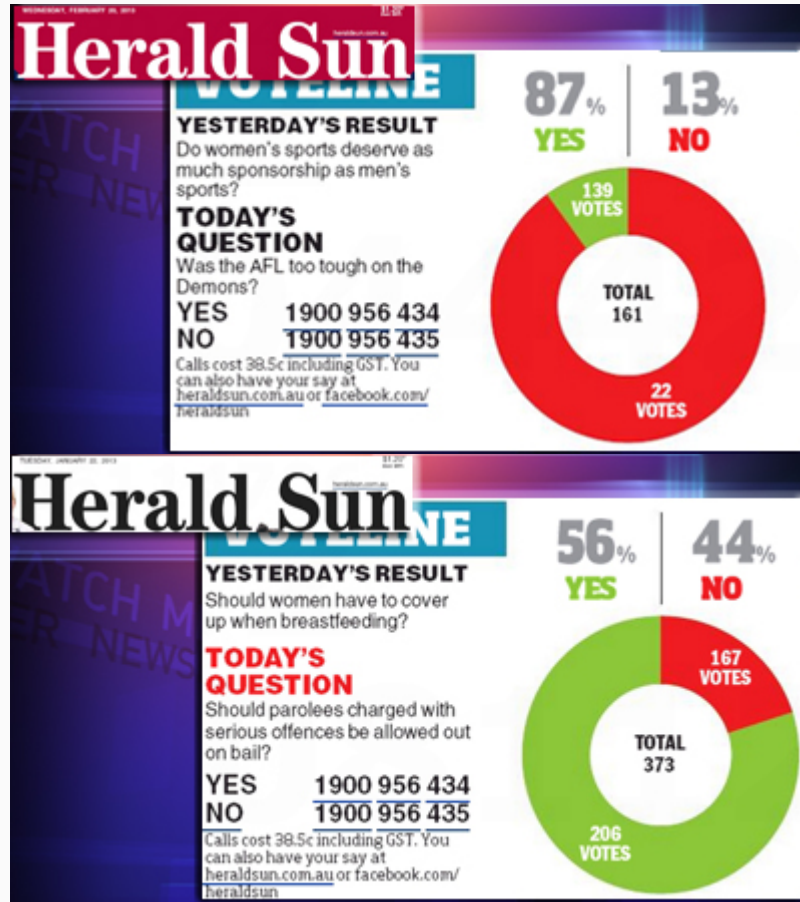
University of Melbourne

April 2024

Bad examples



Further bad examples



Source: Media Watch, 20 February 2013

Bad graphs

- It is alarmingly easy to produce graphs that do not communicate effectively.
- Some causes:
 - Designer assumes an understanding of the data
 - Decoration and aesthetics at the expense of clarity
 - Default software features

Some principles of good graphics

- Show the data clearly
- Use good alignment on a common scale for quantities to be compared
- Prioritise simplicity
- Use standard forms where possible

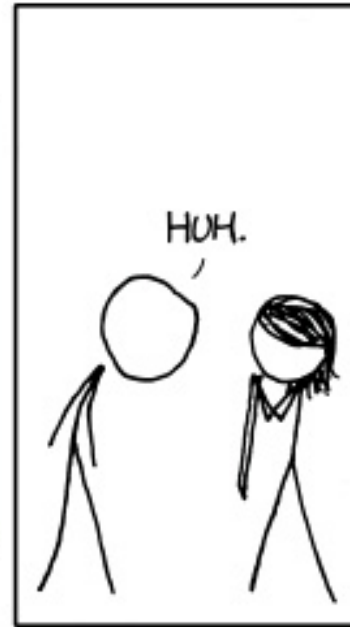
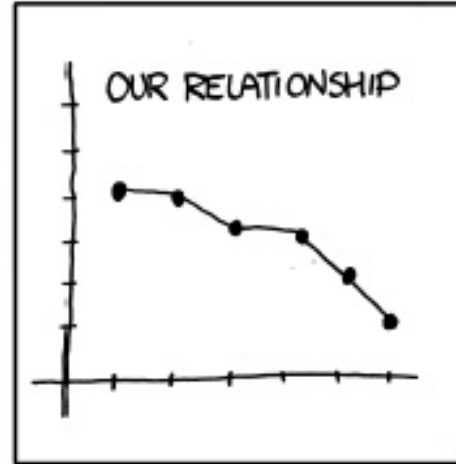
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Show the data clearly

- Identify the source of the data.
- The purpose of the graphic should influence its construction.
- The graph should show the data.
- Distractions and distortions should be avoided.
- Labelling in the title, on axes and for data points should be well chosen and informative.

Show the data clearly



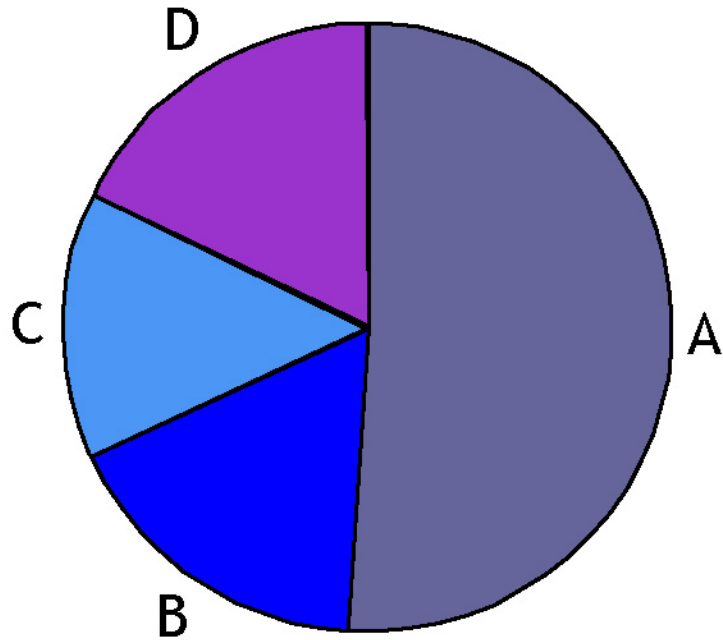
Source: <https://xkcd.com/833/>

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Alignment on a common scale

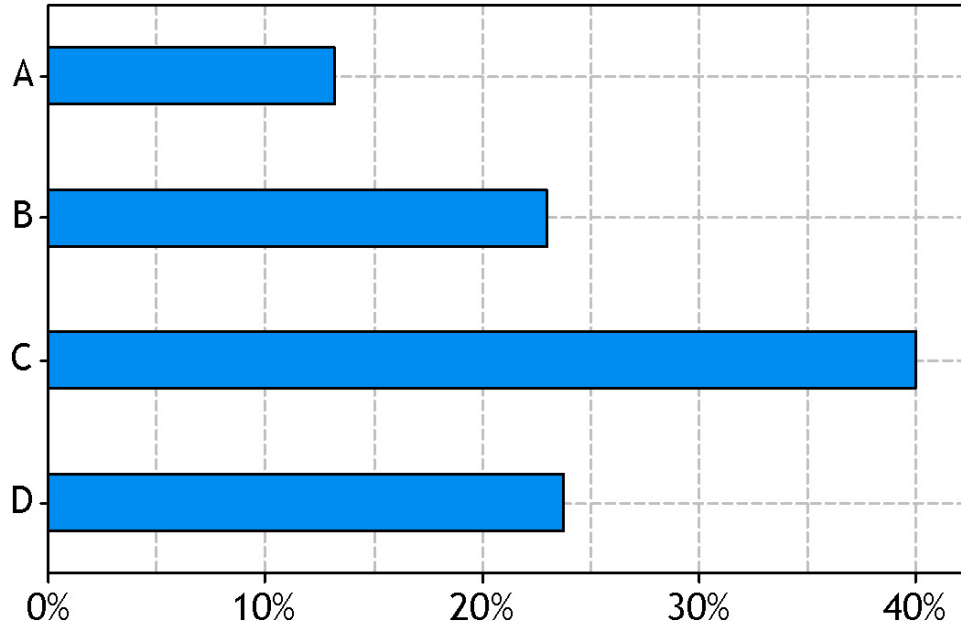
Percentages in four categories



Which is bigger, B or D? Submit your answer via
[PollEv.com/jsil](https://pollev.com/jsil)



Alignment on a common scale



Which is bigger, B or D? Submit your answer via [PollEv.com/jsil](https://pollev.com/jsil)



Alignment on a common scale

- In the pie chart, D (17.8%) is greater than B (17.0%).
- In the bar chart, D (23.8%) is greater than B (23.0%).
- The difference is the same in both cases: 0.8%.
- It is much easier to tell the difference in the bar chart: why?
- The eye is best at differentiating the size of things lined up along a common linear scale.

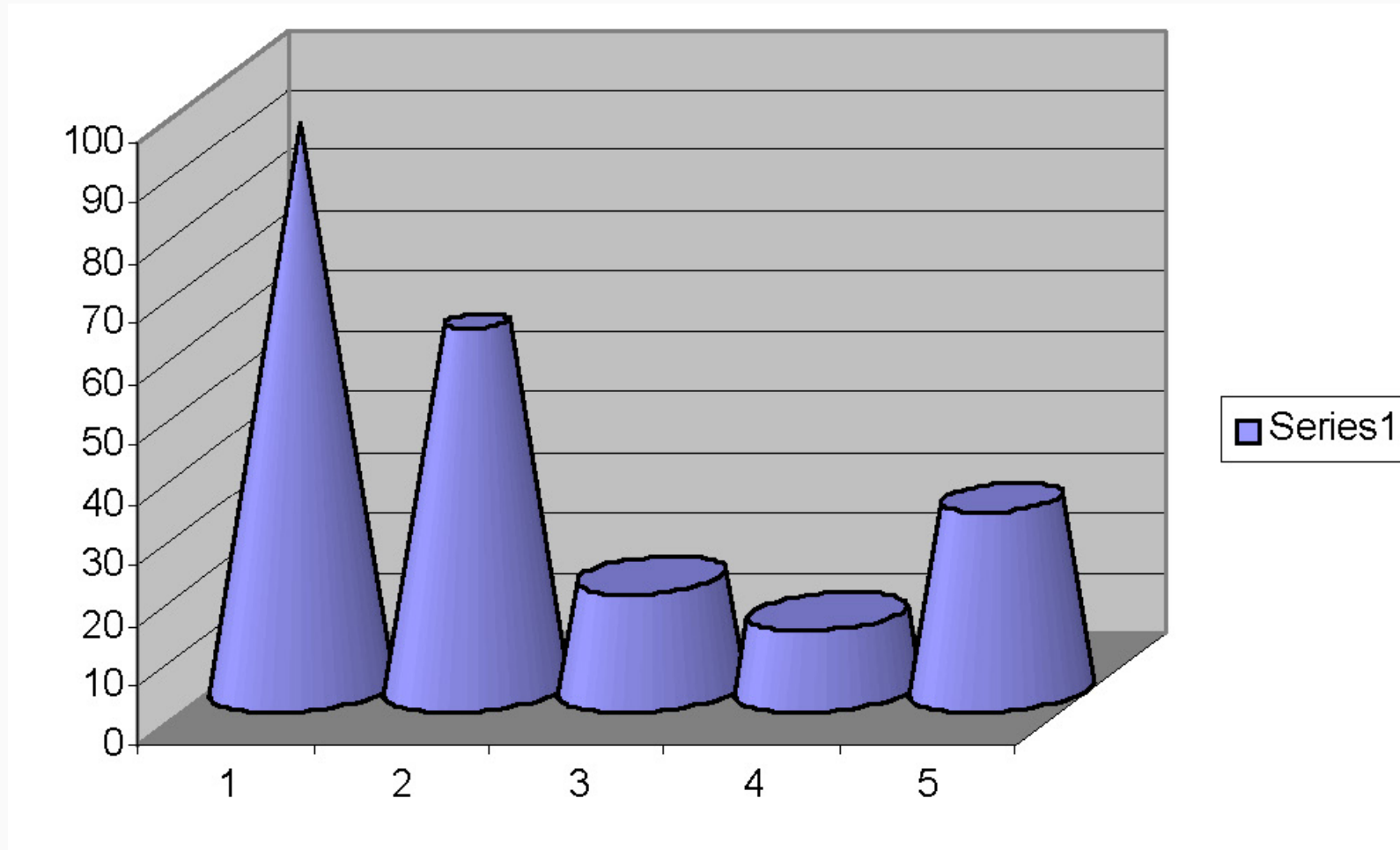
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Design simplicity

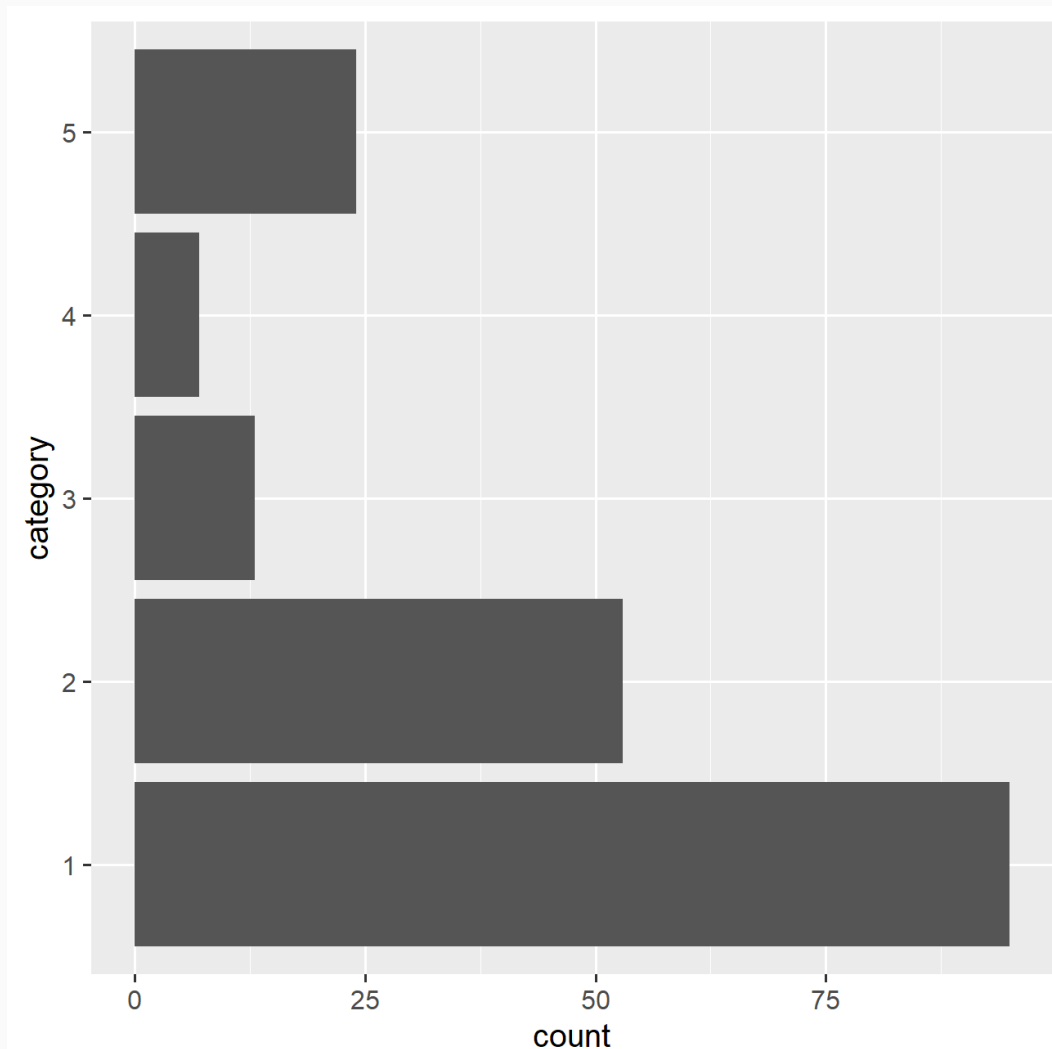
- Graphic designers are often tempted to embellish figures with decorative adornments, such as:
 - 3-D effects: shadowing, perspective;
 - Use of shapes;
 - Additions in or around the figure that block effective communication.
- These should be avoided.
- It is almost always better to use the simpler option.

An unnecessarily and unhelpfully embellished figure



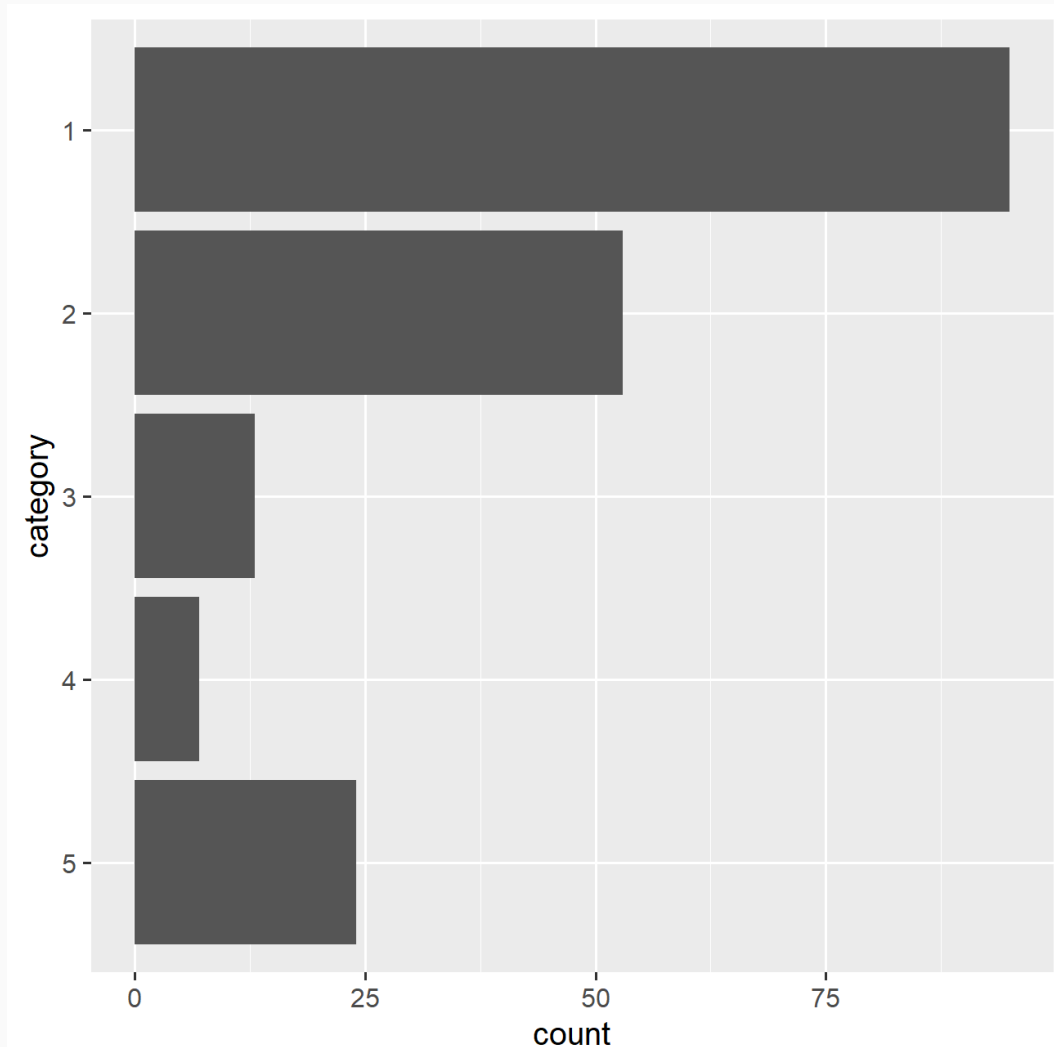
The same data in ggplot

```
dat <- tribble(  
  ~category, ~count,  
  "1",      95,  
  "2",      53,  
  "3",      13,  
  "4",       7,  
  "5",      24  
)  
ggplot(dat, aes(y = category, x = count)) +  
  geom_col()
```



The same data in ggplot with reversed factor order

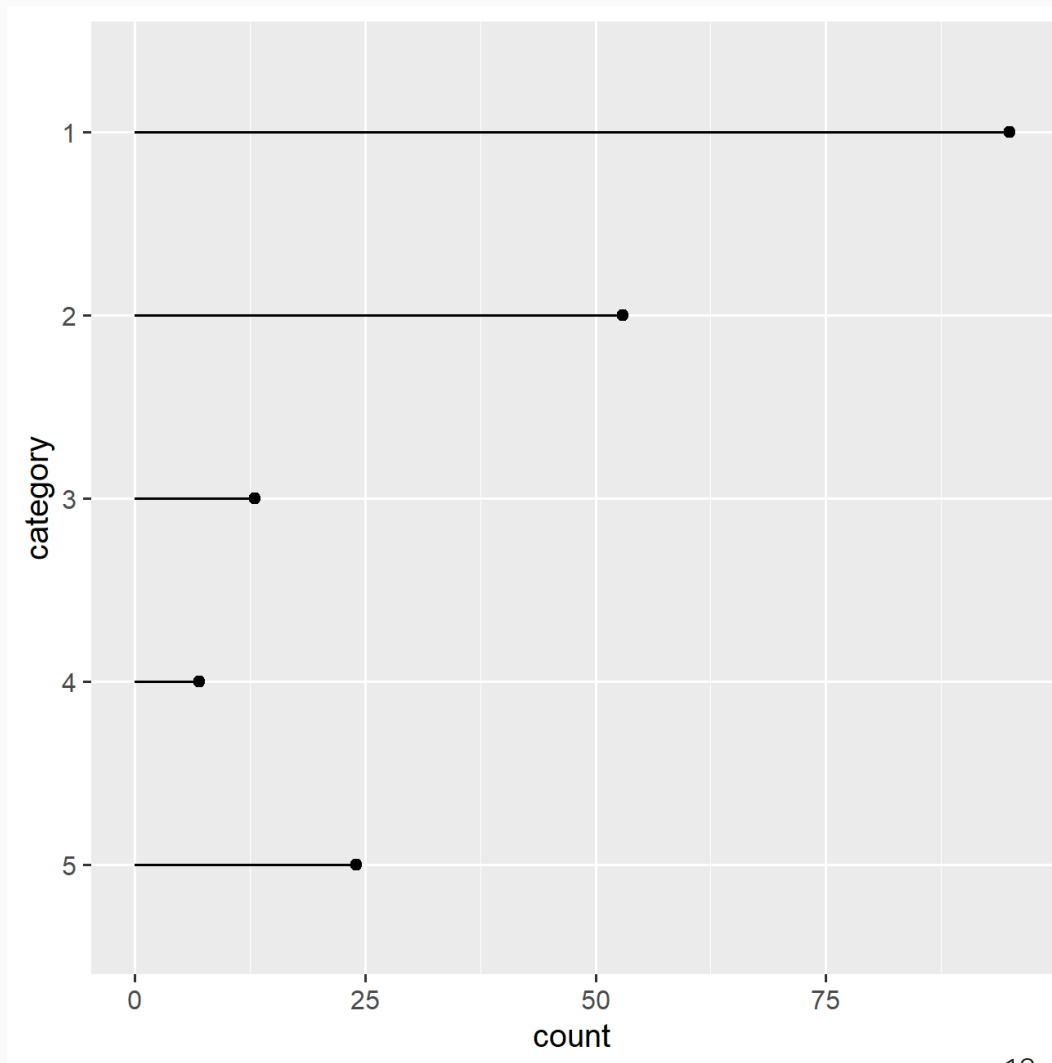
```
dat <- tribble(
  ~category, ~count,
  "1",      95,
  "2",      53,
  "3",      13,
  "4",       7,
  "5",      24
)
ggplot(dat, aes(y = category, x = count)) +
  geom_col() +
  scale_y_discrete(limits = rev)
```



The same data in ggplot with dots and lines

```
dat <- tribble(
  ~category, ~count,
  "1",      95,
  "2",      53,
  "3",      13,
  "4",       7,
  "5",      24
)
ggplot(dat, aes(y = category, x = count)) +
  geom_point() +
  geom_segment(aes(yend = category, xend = 0)) +
  scale_y_discrete(limits = rev)
```

also known as a "lollipop" plot



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Preference for standard forms

- time series plot
- bar chart
- scatter plot
- histogram
- boxplot