Topics in Data Visualization

Perception Of Continuous Variables

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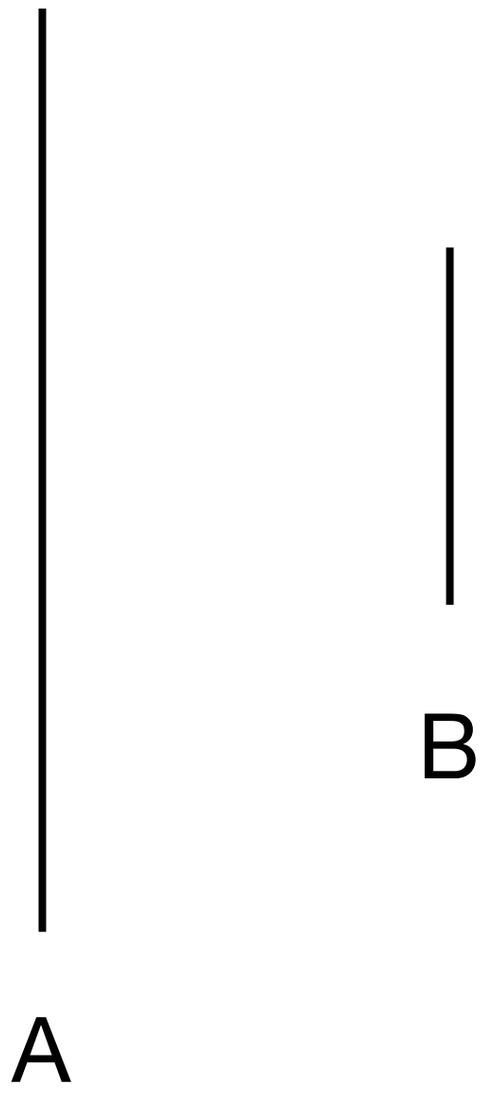
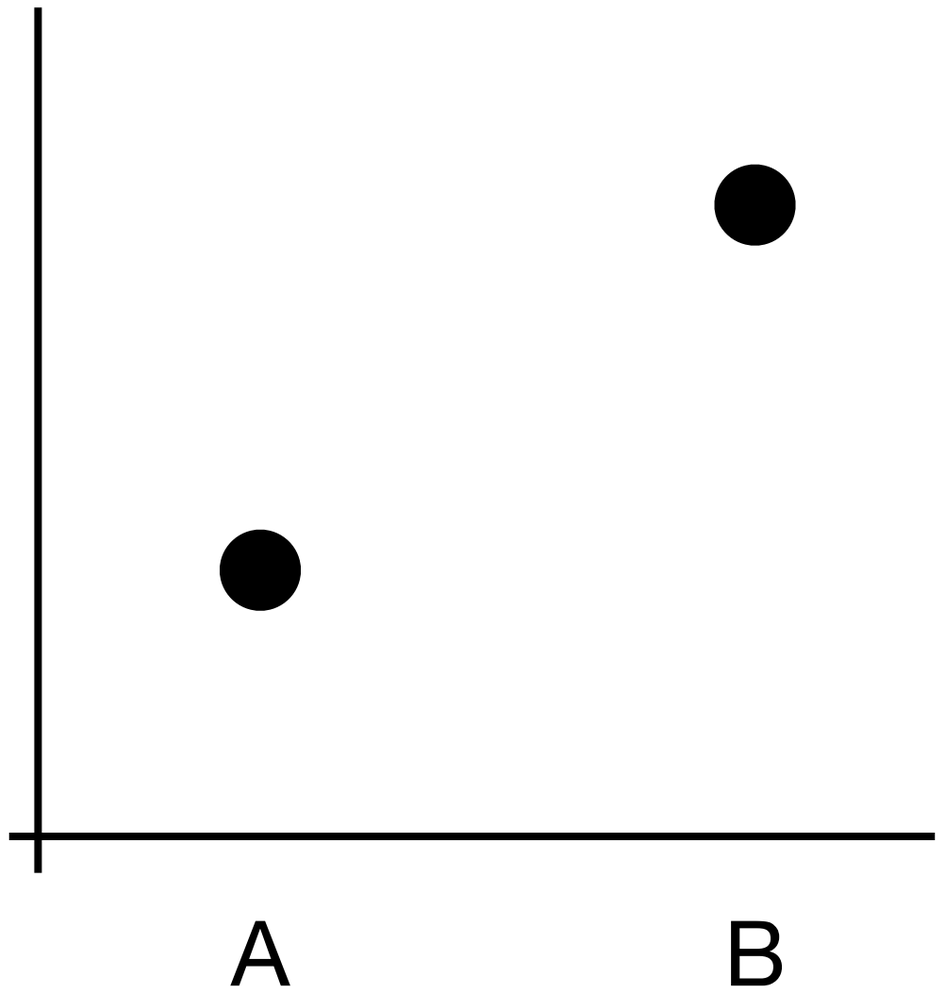
Charlotte Wickham

vis.cwick.co.nz

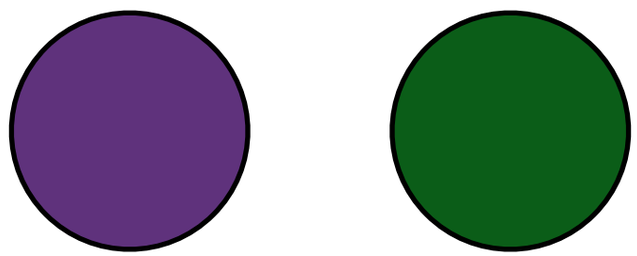
Which is larger?



Which is larger?



Which is larger?



A B

Important tasks for continuous variables:

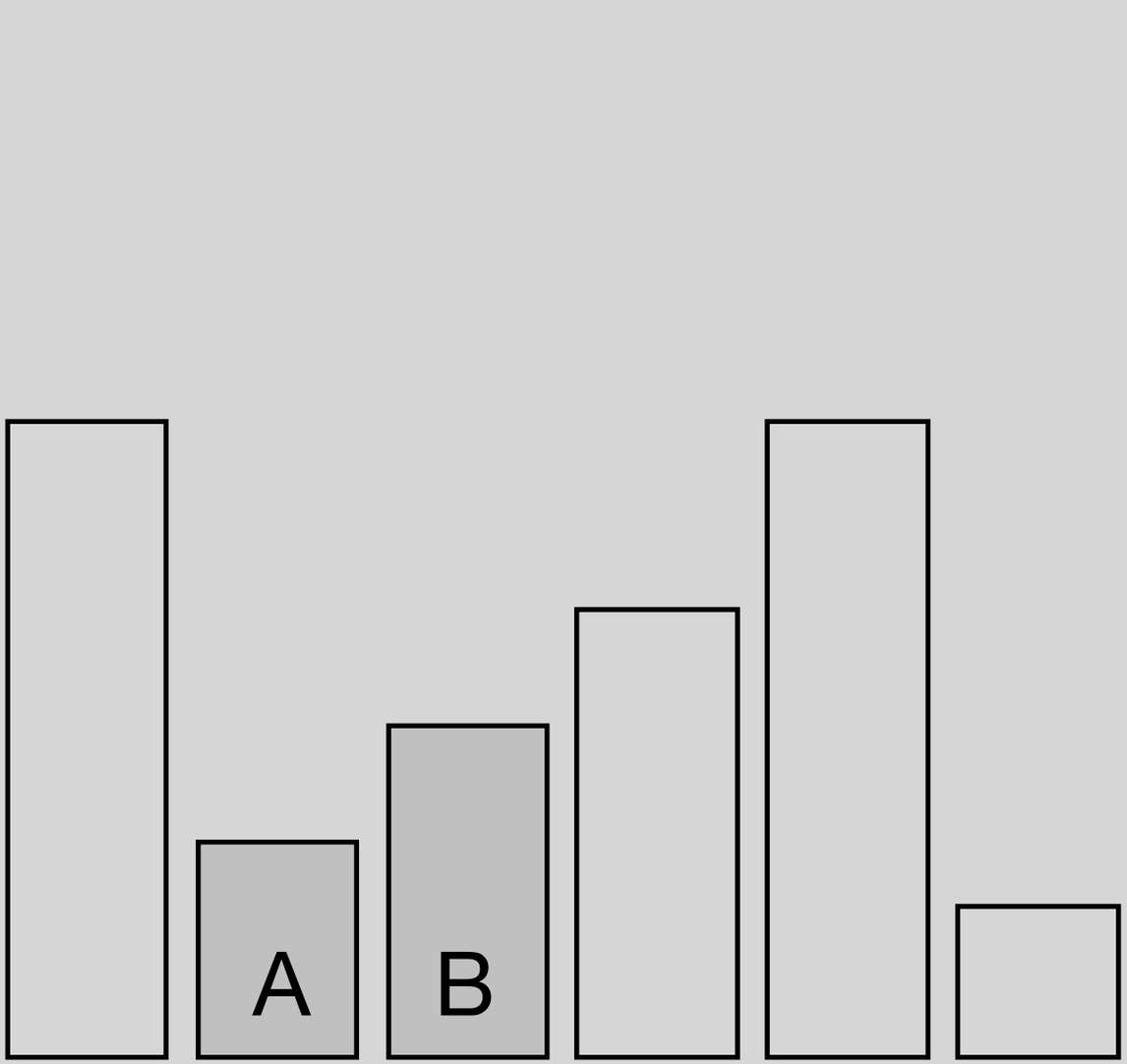
Which is bigger? How much bigger is A compared to B?

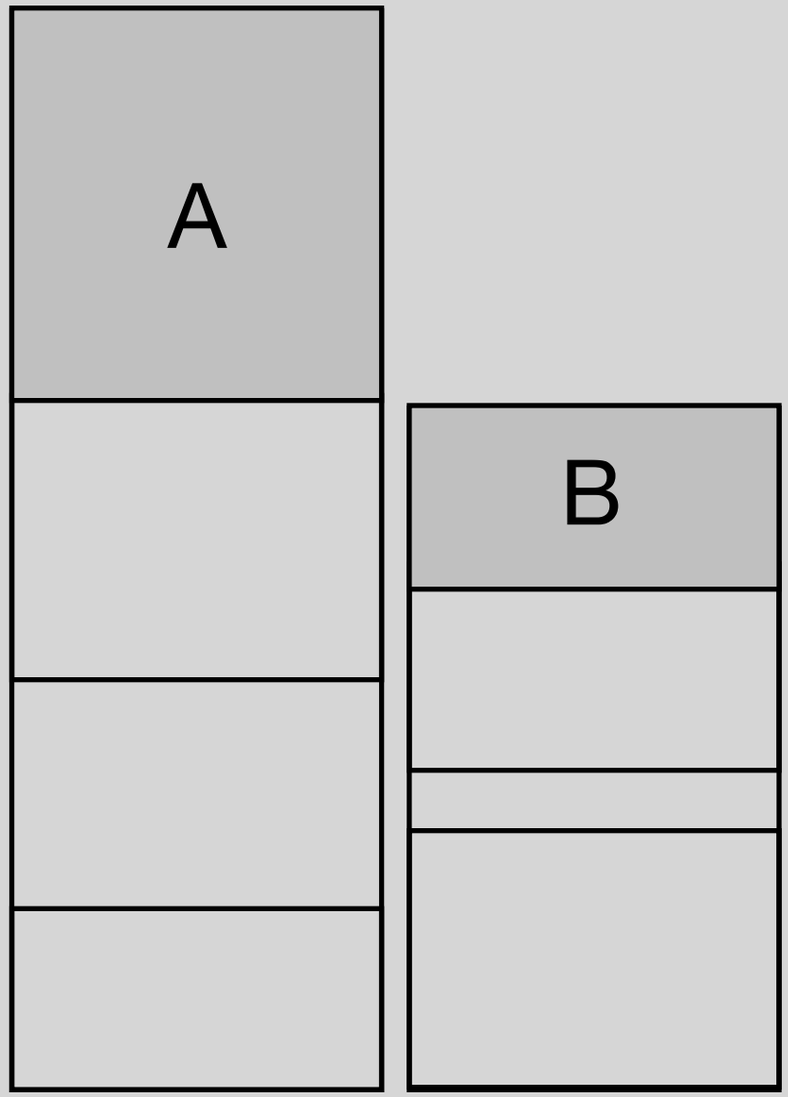
What's the relationship between variable X and variable Y?

Some aesthetics are unordered (like hue, shape), don't use them to encode continuous variables.

Which bar is bigger, A or B?

What % of the larger bar is the smaller bar?





“make a quick visual judgment and try not to make precise measurements either mentally or with a physical object”

W. S. Cleveland and R. McGill. **Graphical perception: Theory, experimentation, and application to the development of graphical methods.** Journal of the American Statistical Association, 79(387):531–554, 09 1984.

Which tasks were we performing for the previous comparisons?

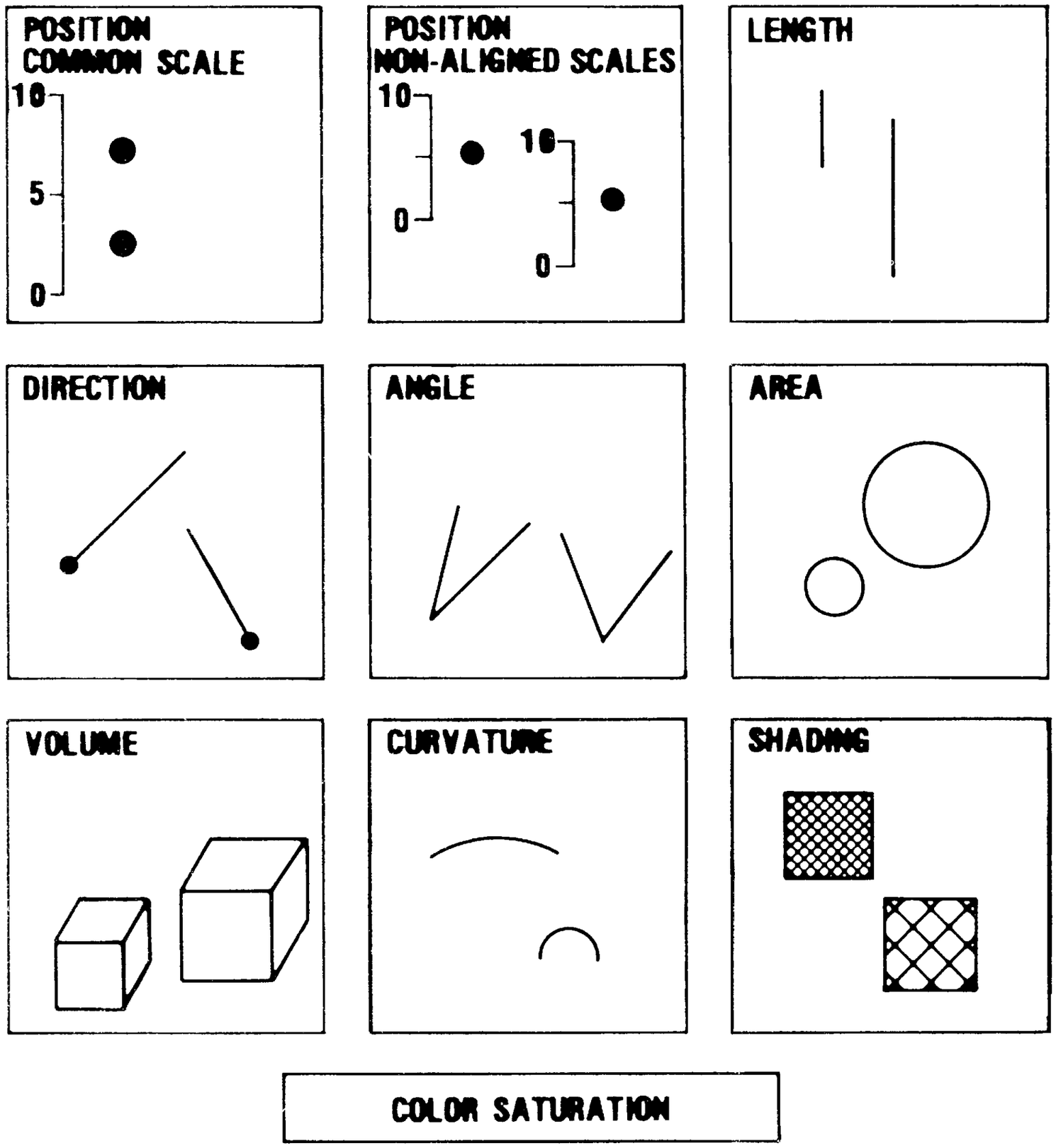
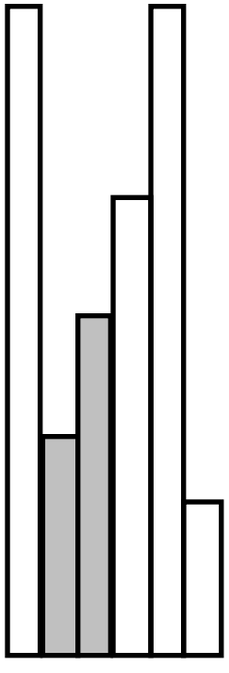
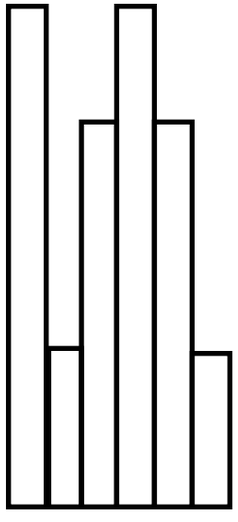
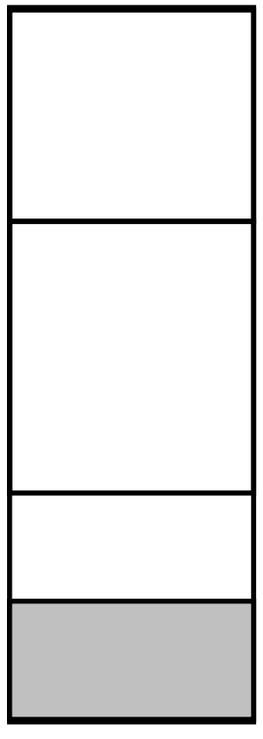
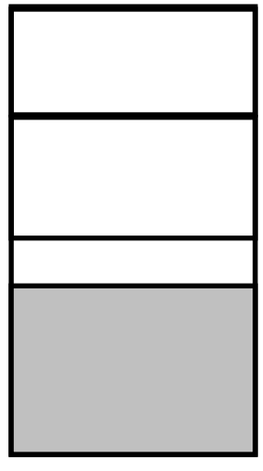


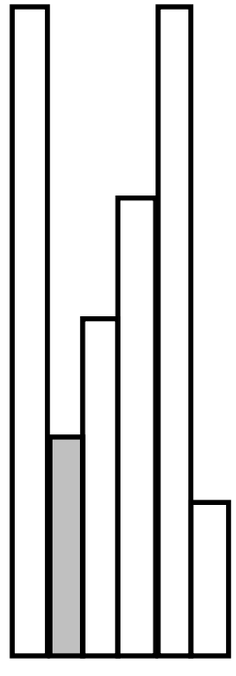
Figure 1. Elementary perceptual tasks.

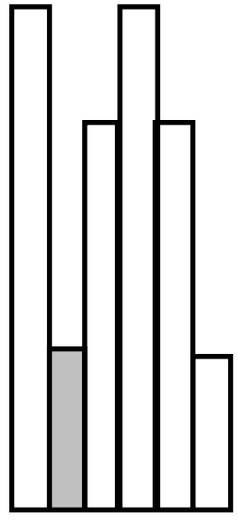


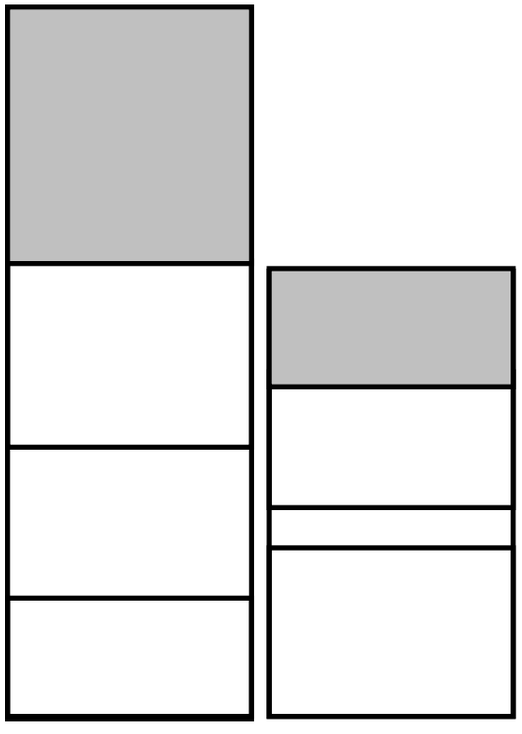


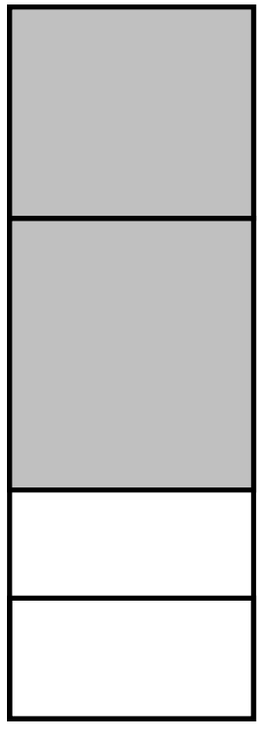


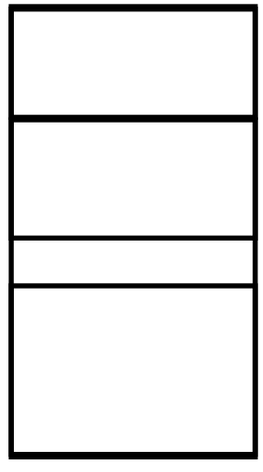






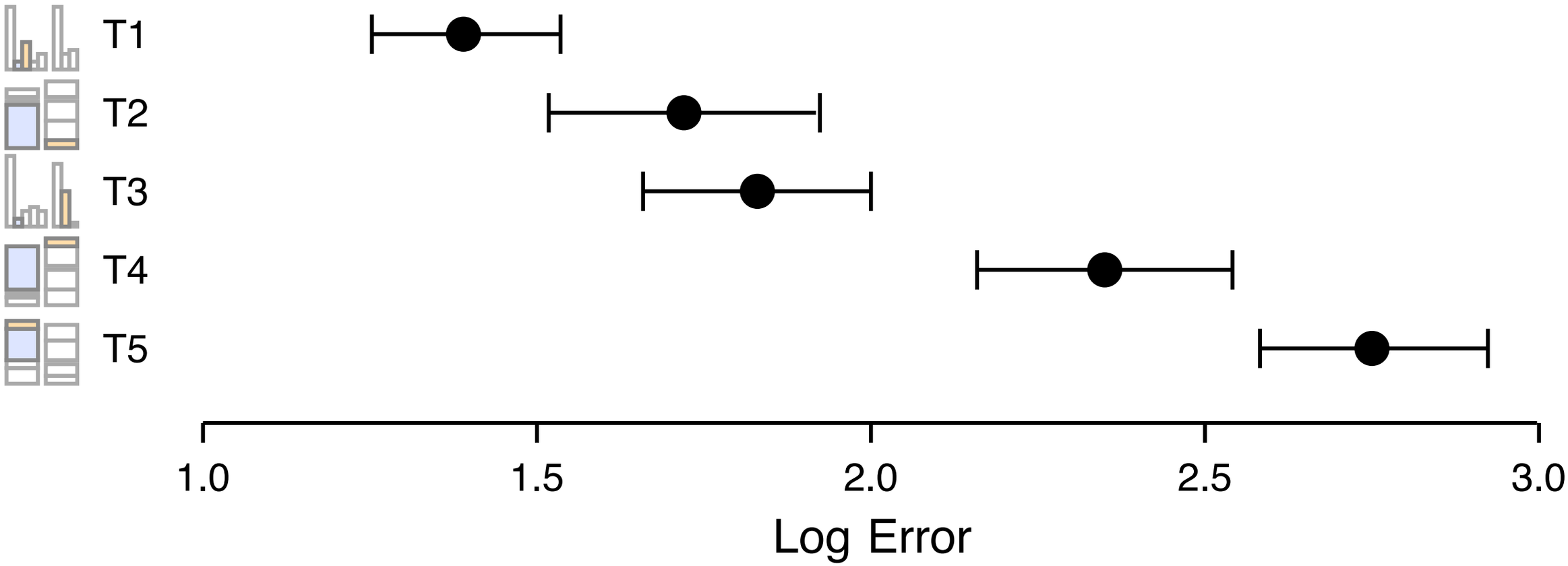






Cleveland & McGill's experiments

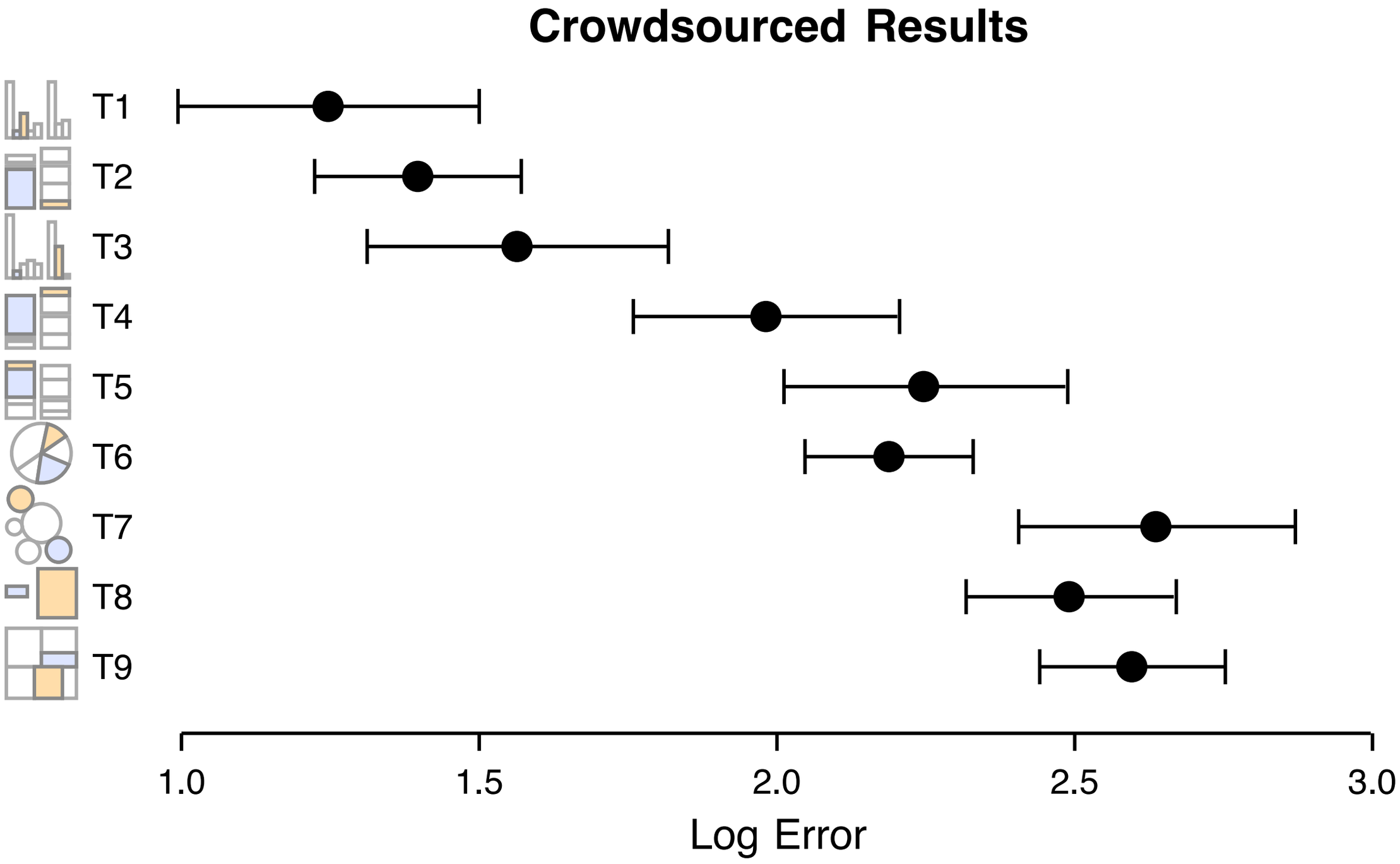
Compare two grey bars



T1, T2, T3 position on a common scale, but increasing distance between comparison.

T4, T5 length

J. Heer and M. Bostock. **Crowdsourcing graphical perception: using mechanical turk to assess visualization design.** pages 203–212. ACM, 2010.



The ranking of perceptual tasks

Easiest

Position along a common scale

Position along non-aligned scales

Length, direction, angle

Area

Volume

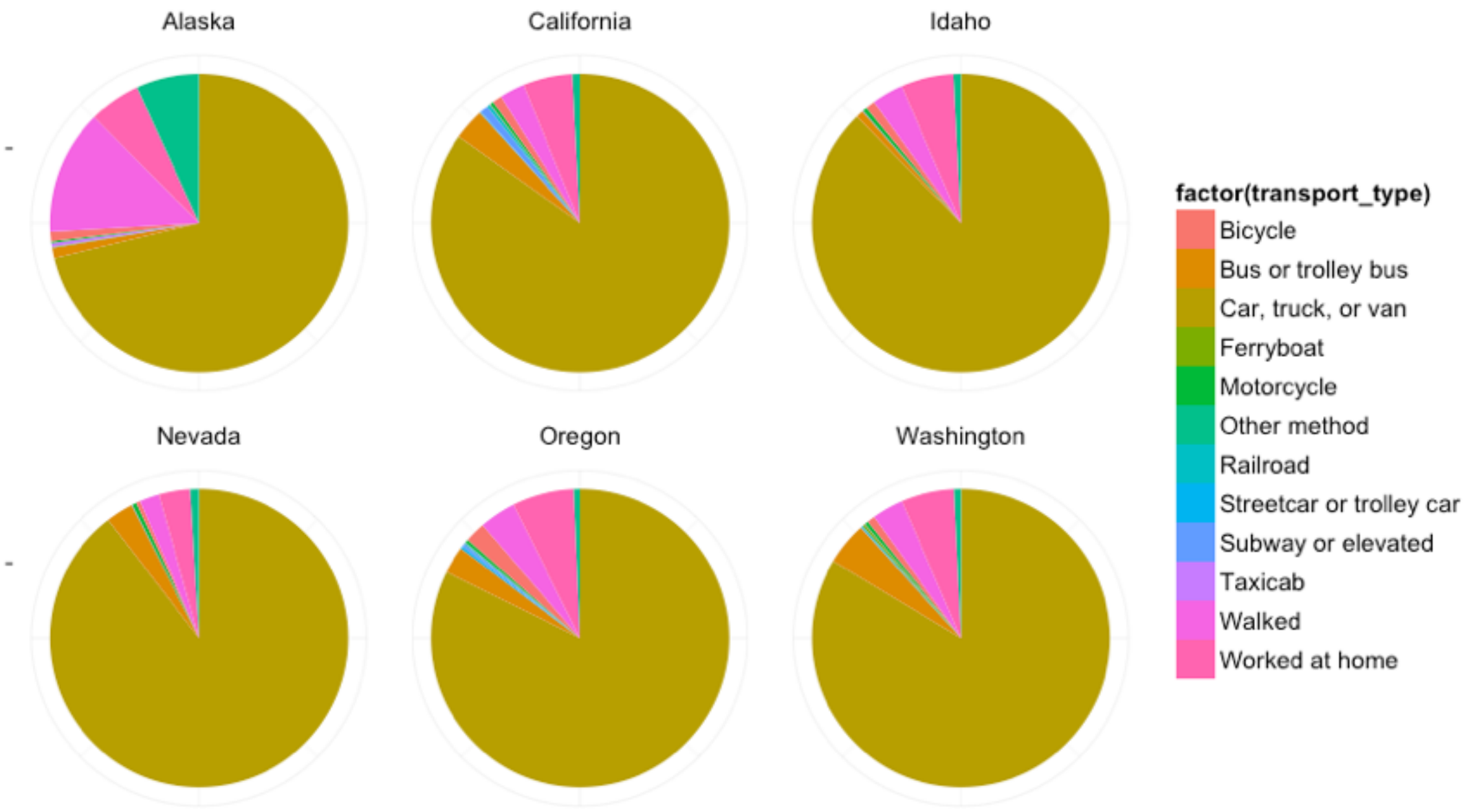
Color (chroma, luminance)

Hardest

Graphs should employ perceptual tasks as high on the ranking as possible.

Keep important comparisons close.

People in Oregon commute by bicycle more than in other (nearby) states



Source: American Community Survey 2012 5 year PUMS

Which perceptual task is involved? How could we improve this plot?