Absolute precision ranking for seeing a single ratio
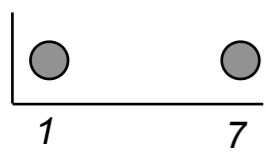
Visual encodings and their differences in precision for estimating ratios (here, 1:7)

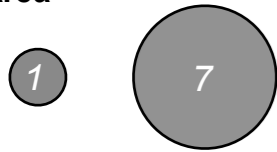**Position**
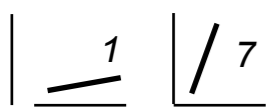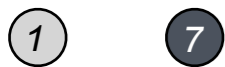

Highest precision

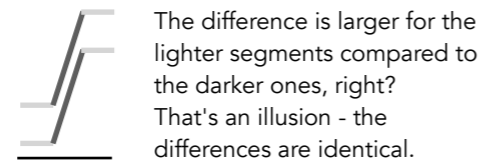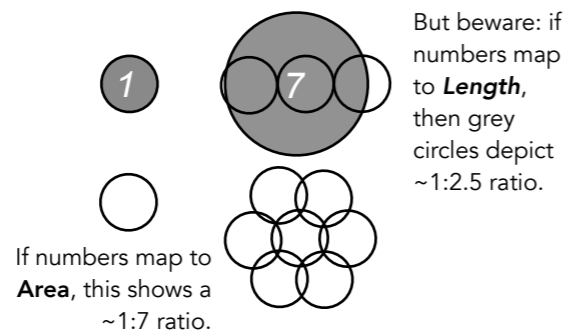**Length**

Area

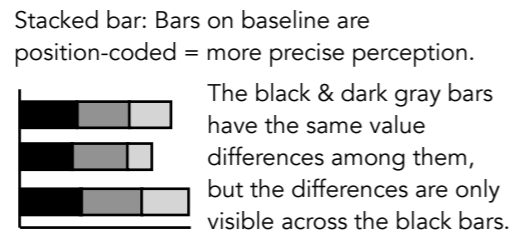*Medium precision*

Angle

Intensity
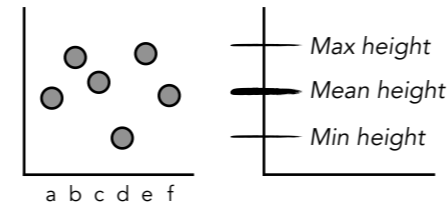

Lowest precision

Common illusions that distort data

Caveats for the visual encoding in each row

Use caution with a non-zero axes. Viewers tend to overestimate differences,

...even when the non-zero base is marked.

Stacked bar: Bars on baseline are position-coded = more precise perception.

The black & dark gray bars have the same value differences among them, but the differences are only visible across the black bars.

But beware: if numbers map to **Length**, then grey circles depict ~1:2.5 ratio.

If numbers map to **Area**, this shows a ~1:7 ratio.

The difference is larger for the lighter segments compared to the darker ones, right? That's an illusion - the differences are identical.

Intensity values can look different depending their backgrounds.
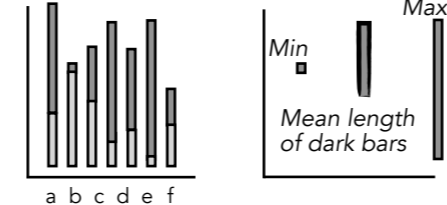
Don't plot intensities on intensities.

Vision is powerful for global statistics

For each visualization, statistics are available quickly

Dot Plot

Max height
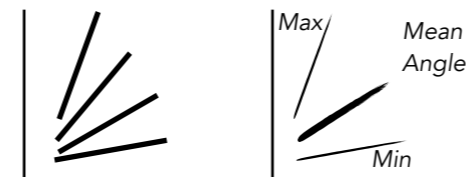*Mean height*
Min height

Stacked Bar

Min *Max*

Mean length of dark bars

Bubble Map

Mean Area

Min *Max*

Slope Graph
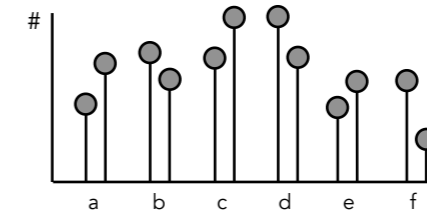

Max *Mean Angle*
Min

Heatmap
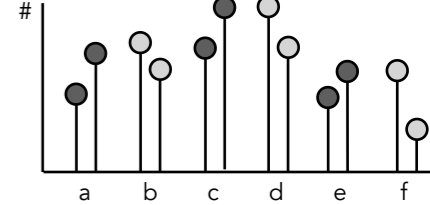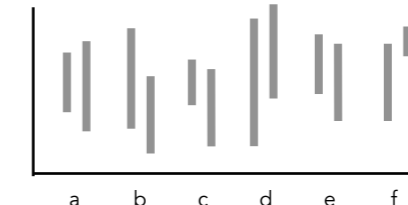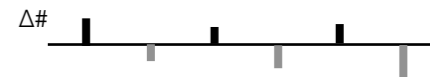

Mean Intensity

Min *Max*
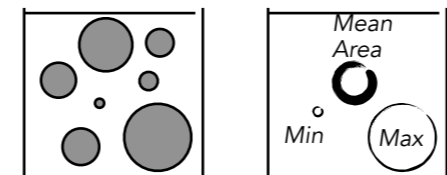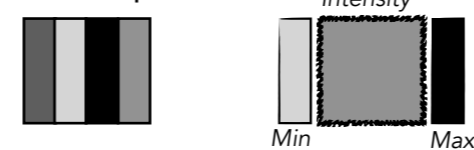
Vision is sluggish for comparisons

Isolating pairs with 'larger second values' is tough

So *guide viewers* to the right comparisons

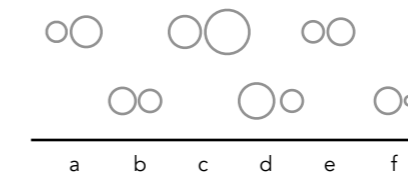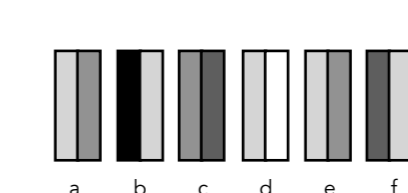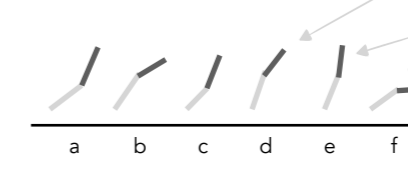**Tool**: Shortcut comparisons by adding direct depictions of the deltas, as below

Δ#

#

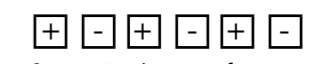"**a, c, & e** have increased"

Tool: Highlight and annotate the *right* comparisons for your viewers, as above

Tool: You and your viewers will (generally) compare values that:
(1) are close together
    or connected
and
(2) have similar colors,
in that priority order

For color heatmaps, depict deltas as blue (+) & red (-)

| + | - | + | - | + | - |

[green/red is unsafe for colorblindness]