Two objectives of effective graphs:

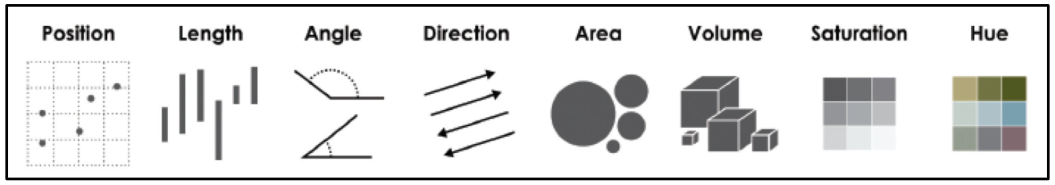
1. Grab & direct attention (iconic memory)
2. Reduce processing demands (working memory)

Graph components:

1. Geoms:
   - points, lines, boxes, bars, etc.
2. Pre-attentive attributes:
   - position, color, shape, curvature, etc.
3. Non-data ink:
   - scales, grid lines, legend, labels, etc.
4. No chart junk!

Pattern recognition hierarchy:

- Position on a common scale
- Position on non-aligned scales
- Length
- Angle
- Area
- Color saturation
- Color hue



Cleveland's three visual operations of pattern perception:

1. Estimation:
   - Discrimination X != Y
   - Ranking X > Y
   - Ratioing X / Y
2. Assembly:
   - The grouping of graphical elements
   - Prägnanz: We strongly prefer to interpret stimuli as regular, simple, and orderly
3. Detection:
   - Recognizing that a geometric object encodes a physical value
   - Above all else, show the data

10 lessons from research on visual perception:

1. Do remove chart chunk
2. Don't make 3D plots*
3. Don't lie
4. Don't use pie charts for proportions*
5. Don't stack bars*
6. Do rotate and sort categorical axes*
7. Do eliminate legends & directly label geoms*
8. Don't use pattern fills
9. Don't use red & green together
10. Do consider tables for small data sets

*most of the time