Display Design 101
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(charts, cognitive aids, slides, documents, etc.)

1. **INCREASE THE SIGNAL/NOISE RATIO**
   a. Minimize extraneous cognitive load (the stuff not related to the information or message you are trying to convey)
      - Illustrative graphics are okay
      - Most word art and animations just add noise
   b. Minimize information access cost
      - ↓ the number of mental operations necessary to interpret data
      - ↓ effort necessary to decode data (displaced legends, tables, etc.)
      - ↓ visual scanning/searching
   c. Maintain consistency across displays – shape, color coding, font, element arrangement, font casing (title case, sentence case, headings, etc.)
   d. ↑ data/ink ratio
      - Minimize the amount of "ink" used to communicate the message (i.e., maximize efficiency of coding)
      - Don't overdo the number of information dimensions packed into one graphic/symbol (i.e., orthogonal coding)
         o e.g., size = importance + color = frequency + width = likelihood, etc.
      - Eliminate "chart junk"
         o e.g., patterns, drastic animations, word art, background colors/images, 3-dimensional designs
      - Avoid cluttering of the slide with text and objects
   o Don't put a ton of text on a slide. If you want people to have notes, used handouts.

2. **MAXIMIZE THE SECURITY OF INFORMATION**
   a. Information should be detectable:
      i. Approximately 1/10 people have color limited vision
      ii. Text should be 1" tall for every 20' of viewing distance
   b. Information should be discriminable:
      i. Use color judiciously
         1. In normal viewing conditions (i.e., distance, illumination, size) acuity for color is **20/40**
         2. Humans can discriminate 7 colors in one display (before they are indiscriminable)
         3. Use color systematically, not randomly
         4. Pay attention to the contrast of text & background color
            - Minimum contrast ratio is 4.5:1 (www.webaim.org/resources/contrastchecker)
               o This is a contrast of 1.4:1
               o This is a contrast of 10:1
               o This is a contrast of 24:1
      ii. JUDICIOUS USE OF CAPITALIZATION: EFFECT IS LOST AFTER A FEW WORDS & ↑ EFFORT OF READING
            - Same goes for other text effects such as **bold**, <u>underline</u>, and *italics*
      iii. Judicious use of punctuation - especially exclamation points!!!!!!

c. Legibility = design of typeface and ability to distinguish characters
- Use san-serif fonts for on-screen reading
- Use serif fonts for text on paper

d. Readability = arrangement of words and word blocks on a page
- Break up large blocks of text
- Use white-space
- Left-aligned is best; justified text is okay for columns of text

e. Limit bullet points on a slide to 7 or less
- Do not display them all at once
- You can get away with more if you dim those already discussed

f. You MUST consider the medium of content delivery, expected viewing conditions (room/display luminance, paper document, online document, slide show, viewing distance, etc.)

3. LEVERAGE PERCEPTUAL PRINCIPLES

a. Gestalt principles (grouping)
    i. Common size
    ii. Common shape
    iii. Connectedness
    iv. Proximity
    v. Common color
    vi. Enclosure
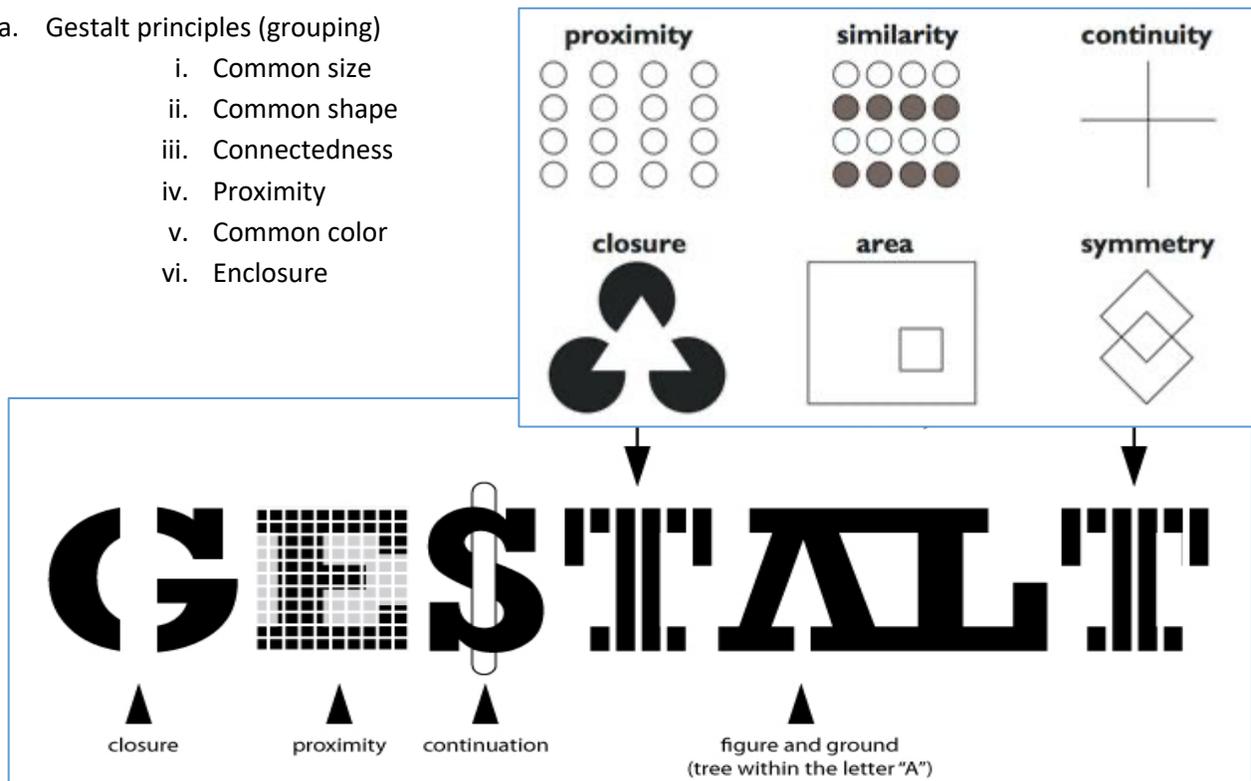
b. Guide attention/visual flow:
    i. salience
    ii. reduce effort
    iii. Increase the value of the information
    iv. Provide cues to highlight important differences, but do so judiciously (documents, emails, etc. can be difficult to follow and result in more errors if multiple methods are used to attract visual attention)