Perception, Meaning, and Gestalt Principles

Background

Several researchers have studied how human perception works, how we form understandings of what we perceive, and how we can exploit this in:

- Visualization
- Web page design
- Graphics displays
- Etc.

Gestalt Principles

- At least 100 years old
- Perceptual Psychologists
- Several Grouping Principles...

Gestalt Grouping Principles

- Proximity
- Similarity (e.g., size, color)
- Common Fate
- Pragnanzstufen
- Objective Set

- Good continuation
- Closure
- Simplicity
- Experience or Habit
- Foreground/Background
Gestalt Details

- **Proximity**
  - Objects close together form groups
  - Example: Rows versus columns versus array of dots

![Proximity Image](image)

Gestalt Details

- **Similarity**
  - Objects that are similar in non-locational aspects (e.g., color, shape) form groups

![Similarity Image](image)

Gestalt Details (cont’d)

- **Common Fate**
  - Objects moving together form groups
  - Objects already grouped in some other way that move are little noticed
  - Objects that are otherwise dissimilar that move together are very noticeable.
  - “Moving” might include just changing size/shape.

![Common Fate Image](image)

Gestalt Details (cont’d)

- **Common Fate**
  - Also can be used in static displays

![Common Fate Image](image)
Gestalt Details (cont’d)

+ Pragnanzstufen
  + ‘Perceptual groups are characterized by regions of “figural stability”’ [MacEachren]
  + There appears to be threshold distances on proximity, for example, that limit its effect

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Gestalt Details (cont’d)

+ Objective Set
  + There seems to be a viewer-imposed “freezing” of groups.
  + For example, if some other factor causes the viewer to group objects, then the viewer tends to keep them grouped even when subsequent changes tend to break the group up.

Gestalt Details (cont’d)

+ Good Continuation
  + Objects that lie along smooth curves tend to be grouped.

Gestalt Details (cont’d)

+ Closure
  + Viewers will close boundaries that appear open.
  + For example, the display of a familiar object that is incomplete will be completed by the viewer.
Gestalt Details (cont’d)

Law of Closure:
Objects grouped together are seen as a whole.
We tend to ignore gaps and complete contours lines. In the image above, there are no triangles or circles, but our minds fill in the missing information to create familiar shapes and images.

Experience or Habit
Familiar shapes or arrangements for groups.

Gestalt Details (cont’d)

ª Simplicity
ª Given a choice, viewers will group objects in the simplest way possible.
ª Experience or Habit
ª Familiar shapes or arrangements for groups.

Parsing a Scene using Gestalt Grouping Principles
References

Lots of good references.

One particularly good one: