

Psychology 351 - Psychology of Perception, Week 9

PERCEPTUAL ORGANIZATION AND FORM PERCEPTION

Structuralism: Additivity of components

Gestalt psychology: Tenets and models

Helmholtz: Unconscious Inference revisited

Fundamental Phenomena of Perceptual Organization

- Perceptual coupling

- Figure-ground segregation

- Multistability

- Grouping

Simplicity (Gestalt) vs. Likelihood (Helmholtz) principles

- Learned vs. innate

- Voluntary vs. automatic

Rules of Organization

Simplicity vs. Likelihood revisited

Patterns and information processing

- Measuring information load, simplicity

- Information Theory

- Attneave's cat

- Pattern goodness: Good patterns have few alternatives

- Selective attention to parts and wholes

 - Separability

 - Integrality

 - Configuration

- Superiority effects

- Global precedence

- Word perception

Summary of "Laws" of Perceptual Organization

Laws of Figure-Ground Segregation

1. Convex region becomes figure
2. Smaller region becomes figure
3. Moving region becomes figure
4. Symmetric ("good") region becomes figure
5. Nearer region becomes figure (multiple depth cues apply)
6. Additional notes:
 - a. Ground continues behind figure
 - b. The contour itself belongs only to the figure (can't see faces and vase simultaneously)

Laws of Grouping

1. Proximity
2. Similarity
3. Common fate
4. Good continuation
5. Closure/ convexity
6. Common region
7. Connectedness
8. Parse regions at deep concavities

Grand Organizing Principles

1. Prägnanz (Gestalt principle)
2. Likelihood (Helmholtzean principle)

Lecture notes for perceptual organization

Feature detectors

Emphasis in course so far has been feature detectors

Structuralists: argued that our perception of the world = sum of sensations.

(features) detected. This is additivity:

Stimulus A => Sensation A'

Stimulus B => Sensation B'

Stimulus A+B => Sensation A'+B'

So, study pure sensations and you will understand perception.

Two problems arise:

 First, we know about non-additivity from context effects.

 Second, how do we recognize patterns of features?

Feature detectors get pretty sophisticated, but they remain feature detectors

So how do we recognize whole objects?

Two alternatives:

 Keep building hyper-hyper-complex detectors. But this takes you into the template problem – you will need an infinite number to solve the pattern recognition problem

 Organize the features through perceptual organization processes, such as grouping: which features go together, which features influence one another

Context effect examples

 Locke's (1690) famous three bowls problem

 Other adaptation effects (don't feel clothing, don't hear clock until it stops)

 Diamond vs. tilted square demo

 B vs. 13 demo

 Rolling wheel demo (lead in for Johansson's point walkers)

 Apparent motion (phi, beta)

Thus, attack on Structuralism came from the Gestalt Psychologists (Wertheimer, Kofka, Kohler) in the 1920's

 Famous, albeit wrong, slogan: whole > sum of parts

Objects, events, and patterns are primary, sensations are secondary. We don't look at world and see points of colored light or clusters of features (note: according to Treisman, this IS what we see when we don't attend).

Millions of examples, demonstrations

Quintessential example: a melody. All the notes can change, but the melody remains the same.

Individual note sounds different in different chords, may not be detectable.

Examples from vision: newspaper photograph made up of dots. Dots don't matter, it's their spacing, configuration (Pomerantz, Navon)

Gestalt conclusion: Sensations don't add. What matters is the Gestalt, the pattern.

Gestalt claim: perceptual organization is automatic and works to form the simplest possible configuration of the sensory elements.

Analogy: the soapbubble.

But can't we analyze percepts into their component parts?

Yes, but this requires a secondary act of what we could call scrutiny or focused attention. This is a conscious act

Minsky Papert spiral demonstration

Gelb effect. Even conscious knowledge doesn't help.

Unfortunately for the Gestaltist, they confused Marr's three levels and invented a strong quasi-physiological theory based on electromagnetic properties of the brain. Field theory was coming into its own in physics. Recall iron filings on a sheet of paper with a magnet underneath.

Disproven by Lashley's experiments shortcircuiting current flows.

Second problem faced by Gestalt psychologists: weak methodology, driven by phenomenology.