Some More from Ch. 6

- Syntax of Diagram  
  - 210-215
- Grammar of Maps  
  - 215-217
- Perception of Causality – Michotte  
  - 100 msec or less, perceived as causal  
  - 222-223

Coding Objects

- 3-D objects  
  - Or 2-D representations of them
- Image-based theory  
  - Much like template theory for patterns
- Structure-based theory  
  - Much like distinctive feature theory for patterns
Image-based Recognition

- Rapid if conditions are right
- Design implications: icons
  - Critical for today’s GUIs

Xerox Alto: Research Prototype

Xerox Star: Product
Icons on Mobile Devices

Icons and Mobile Devices
Icons and Culture

- Icons can mean different things in different cultures
  - Large literature on cross-cultural interface design
- Illustration:
**Basic Structures: Geons**

![Geons and Objects Diagram]

**Table 9.1: Geon Relations**

<table>
<thead>
<tr>
<th>Geon Relation</th>
<th>U.R. (%)</th>
<th>PRS (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underneath</td>
<td>10.08</td>
<td>3.06</td>
</tr>
<tr>
<td>Inside</td>
<td>10.08</td>
<td>3.06</td>
</tr>
<tr>
<td>Inside (hollow)</td>
<td>10.08</td>
<td>3.06</td>
</tr>
<tr>
<td>Underneath (hollow)</td>
<td>10.08</td>
<td>3.06</td>
</tr>
<tr>
<td>Inside (solid)</td>
<td>10.08</td>
<td>3.06</td>
</tr>
<tr>
<td>Inside (solid) (hollow)</td>
<td>10.08</td>
<td>3.06</td>
</tr>
<tr>
<td>On top of</td>
<td>10.08</td>
<td>3.06</td>
</tr>
<tr>
<td>On top of (hollow)</td>
<td>10.08</td>
<td>3.06</td>
</tr>
</tbody>
</table>

**Figure 9.3.4**: The importance of geon relations. Different objects can be formed from the same geons by putting them together in different relations. (After Biederman, 1987.)

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**Structure-Based Theory:**

Irving Biederman

![Irving Biederman Photo]

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6
Experimental Test

Results

Recognition by Components
RBC Model

- Geons play a role
- But not exclusive – see Ware
  - Silhouettes
  - Concavities
  - Occluding relations

Design Implications

- See Ware Fig. 7.13, pp. 241-243
  - Can use geons as primitive elements in visualizations
  - Some evidence supporting their use

Facial Expressions: Ekman
New Guinea
Computer Generated Faces

Facial Expressions Can Be a Powerful Element in Visualizations

Chernoff Faces

- Some success in using to code multi-dimensional data
- But major weakness: humans perceive faces as configurations, not as collections of individual elements
Personal Image Memory Bank

- Ware, p. 232, speculates about what it would be like if could keep everything one experiences
- Gordon Bell has been doing this
  - Major pioneer in computing
  - Now at Microsoft Research
  - MyLifeBits
    - Automatic camera
    - Arm-strap with biometrics
    - Telephone calls

Textures, Surfaces

- Good discussions in Ware
- Ch. 5, pp. 164-176
- Ch. 7, pp. 243-257
  - Esp. Guidelines on p 252-4

Summary of Design Guidelines

- Ware, p. 257
- Characteristics of 3D images, and their 2D representations
- Ability to handle very small number of complex visual objects in mind at one time