

## 9. Vision: Segmentation, Texture, Search, Form

### I. Boundary formation

Image processing: edge enhancement vs. edge detection  
Marr - the primal sketch  
Marr/Hildreth - zero crossings  
Daugman - subharmonic images  
Morrone and Burr - phase coincidence  
Subjective contours

### II. Boundary and object localization

Acuity and hyperacuity  
Tasks: line vernier, edge vernier, dot vernier, line/dot bisection, width discrimination, etc.  
Stimulus variables  
length  
separation  
eccentricity  
flankers  
contrast, contrast sign  
spatial frequency content  
spatial/temporal jitter  
Models of acuity  
Channels, line elements  
Burbeck - two regimes for localization  
Watt and Morgan - cues to localization tasks, Mirage

### III. Texture boundary formation

Beck - neo-Gestaltist approaches  
Julesz  
Take 1: nth-order statistics  
Yellott/Iverson - triple correlation  
Take 2: textons  
Filter models - texture energy analogous to motion energy

### IV. Visual search

Sternberg paradigm  
Treisman - visual search  
Basic phenomenon - Serial vs parallel search  
Search as a paradigm for defining basic visual features  
Conjunction Search, Feature arrays, Attentional Glue, Illusory conjunctions  
Search asymmetries/Texture segregation asymmetries  
Palmer/Verghese/Pavel - Search psychometric functions, SDT approach

Visual search vs texture boundary formation  
Multiple tasks, multiple judgments  
search  
texture detection  
texture discrimination  
texture boundary detection  
texture boundary shape discrimination

## **V. Pattern recognition, object recognition**

Figure/ground  
Gestalt laws  
Good continuation & proximity  
Facilitation of detection - Polat & Sagi  
Contour extraction  
Field, Hayes & Hess  
Kovacs, Geisler et al., etc.  
Palmer - Neo-Gestaltist view  
Relation with selective attention  
Ambiguous figures  
Top-down vs Bottom-up  
Shape models  
Generalized cylinders  
Superquadrics  
Biederman - Recognition by Components  
View-based recognition, Aspect graphs