

# **Partial Configurations:**

**Less than an object, more than a feature**

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# **Perceptual Organization & Object Recognition Are Intimately Related**

**My Scientific Point of View**

**Re-perceiving is part of re-cognizing an object**

**Figure-ground segregation  
(Shape/Object Perception)**

# **Operational Definition of Recognition**

## **Explicit Measures**

**Successfully name an object?**

(but: optic aphasia)

**Consciously judge object familiarity?**

(old/new judgments)

## **Implicit Measures**

**Effects of past experience with a particular object?**

(re-perceiving)

## **Figure-ground segregation**

Figure is shaped by its bounding edge  
Ground is not.

# % "Figure" on side of edge portraying familiar shape



Masked Exposure Time (ms)

28

57

UP: 60%

68%

INV: 50%

52%



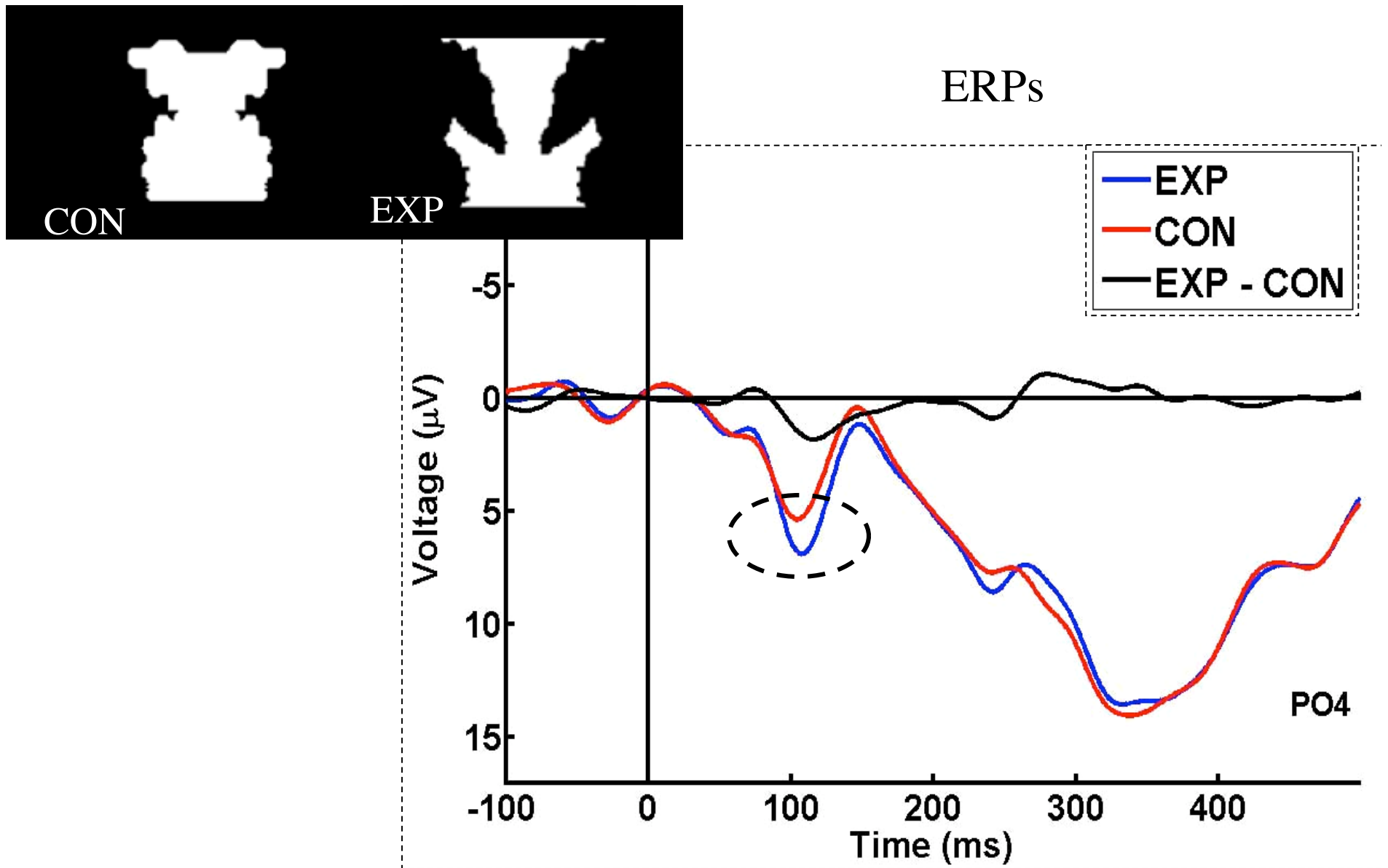
# Just familiar object recognition?

**No**

Familiar shape competing with shape properties on opposite side

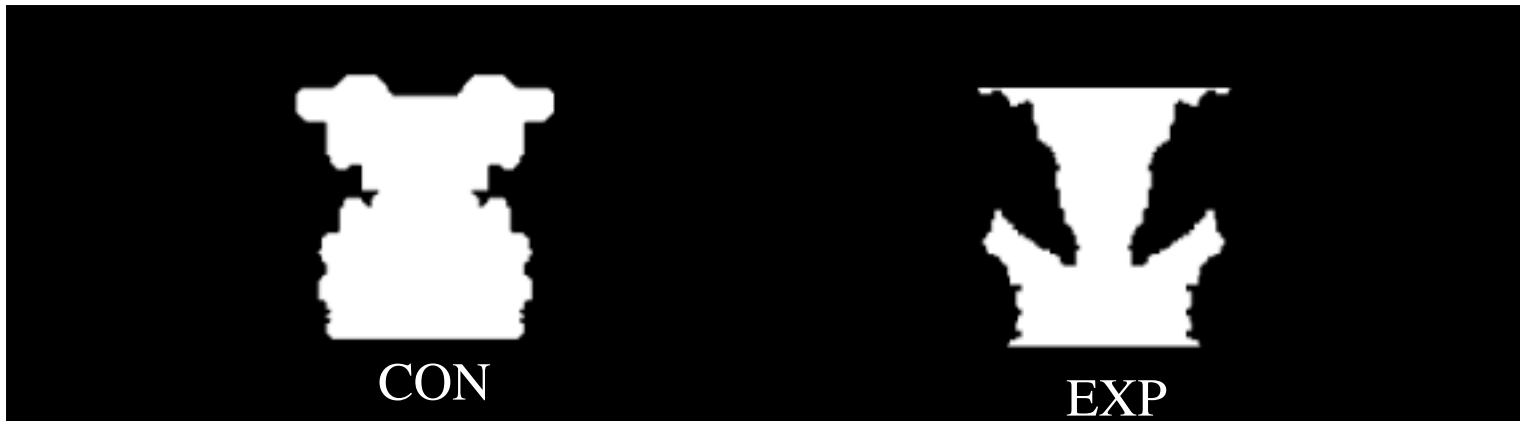
Sometimes wins; sometimes loses

Even when it loses the familiar shape was accessed



Trujillo, Peterson & Allen (2006): Figure-ground  
(Sat., May 6, 11:30AM South Ballroom #201)

# Behavioral Consequences



Object decision  
Familiar or Novel?



Slower after Exp than Con

# Behavioral Consequences



Object decision  
Familiar or Novel?



After  
Experimental



Slower to seahorse  
than to coffee pot

Slowing reflects inhibition of shape memories that lost competition

Peterson & Skow, 2006

# Implications For Object Recognition Theories

- more to explain (competition)
- hierarchically distributed object representations
- not holistic; **partial configurations** (spatial relationships matter)



Partial configurations

Overlapping

Exert a local influence

Similar ideas regarding intermediate level fragments arose in modeling field, e.g.,

Edelman

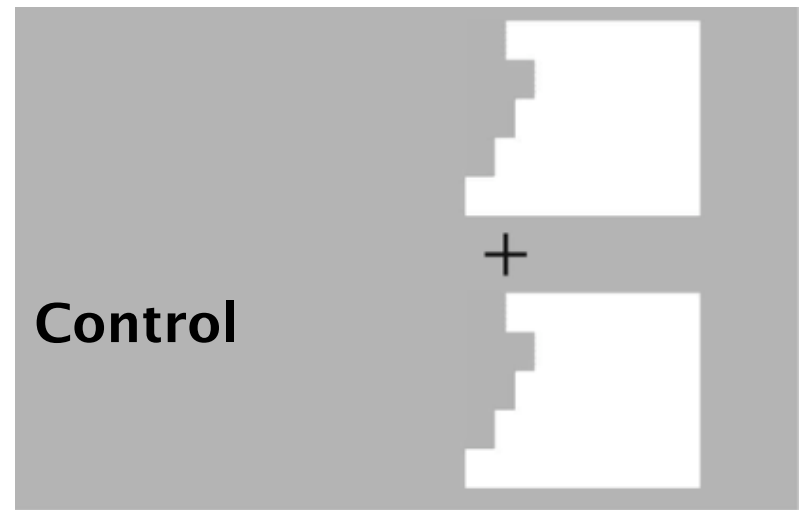
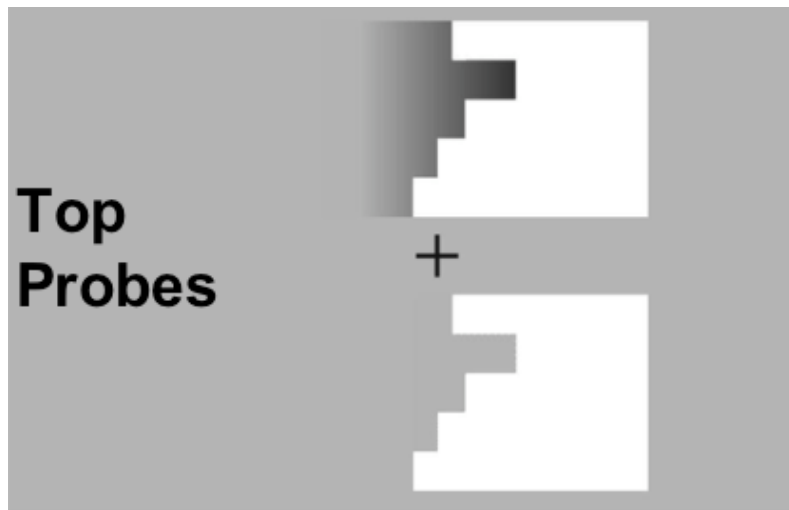
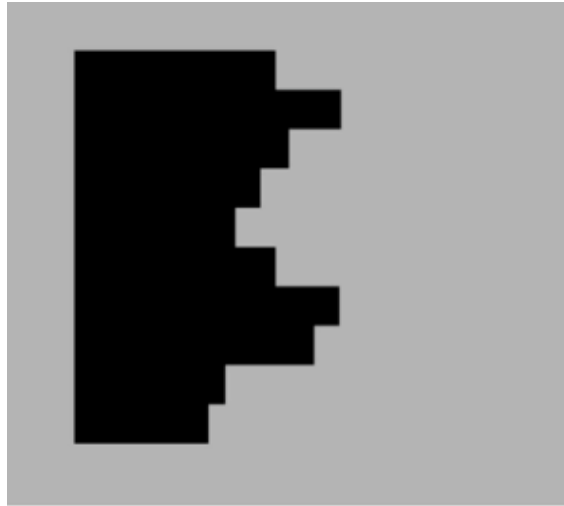
Ullman

Nelson & Sellinger

- intermediate levels are retinotopically mapped
- perhaps spatial relationships between parts/features are coarsely coded retinotopically
- an ensemble of overlapping intermediate level representations can distinguish between different objects with similar features

# **Direct Behavioral Evidence for Partial Configurations?**

After experience with an initially novel object  
A partial configuration suffices to instantiate memory



**Longer RTs**

# What I've Learned

**From Irv Biederman:**

**Object recognition theories must address how  
spatial relationships are represented**

**From Tarr, Bülthoff, Edelman,  
Logothetis & Pauls**

**Abandon classic desiderata  
e.g., view and location invariance**

**Viewpoint specificity/MVT was an essential  
precursor for ideas regarding intermediate  
level representations**

**From modelers & neuroscientists:**

**Tanaka, Connor, Edelman, & colleagues**

**Critical features for recognition**

**not necessarily nameable parts**

**continuous rather than discrete**

## Mistakes

- **“object recognition” before figure–ground segregation**  
To get attention I went too far; I meant access to object memories of the sort I’ve been discussing here
- **“top–down” effects**  
past experience need not be top–down; may reflect changes in posterior brain regions.  
(e.g., Mozer, Zemel, Behrmann & Williams, 1992)  
(our ERPs localized to posterior ventral regions)
- **“parts” in their spatial relationships**  
features/parts can be learned for sets/tasks  
(e.g., Schyns, Goldstone, & Thibaut, 1998)  
parts can be fragments

## Peering into The Future

Behavioral evidence for fragments/partial configurations

Recognition entails re-perception invites an integrative approach

New theory will come from an integration of evidence from

- neuroscience
- modeling
- behavior

**Exciting times building on contributions of past 20 years**