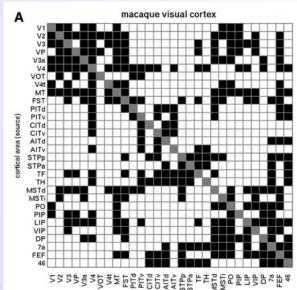


## Bidirectional Symmetry



## Biology => Function

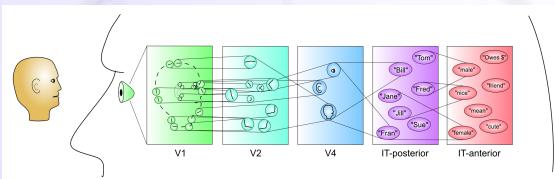
- Feedforward excitation = categorization of inputs
- Feedback excitation = attractor dynamics
- Lateral inhibition = competition, activity regulation

## We Think in Categories



(much easier than disconnected pixels..)

## Hierarchy of Categories



## The Chair Category



## Getting the right ones is key..

- Two men are dead in a cabin in the woods. What happened??

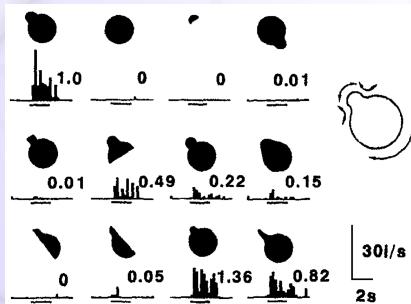
## Categories are Interesting!

- What makes a mental categorization accurate?  
Is there something “real” about a “chair”?
- Stereotypes are mental categories..
- Can you encode multiple categories at the same time??

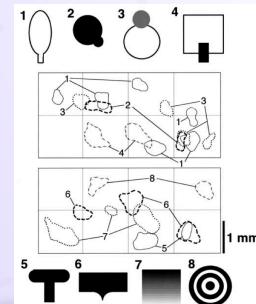
## Distributed Representations

- Let a 1,000 categories bloom.. You've got the room in your head (billions of neurons)
- Each neuron can respond to multiple things (graded similarity)
- And each thing activates many neurons (who knows what is going to be relevant this time?)

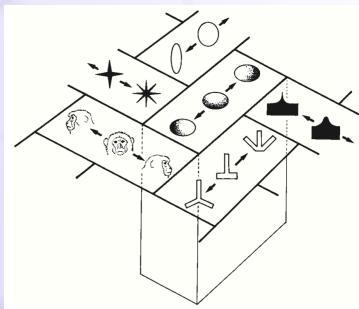
## Graded Responses



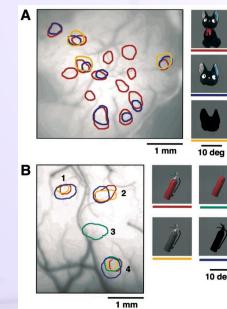
## Distributed Patterns



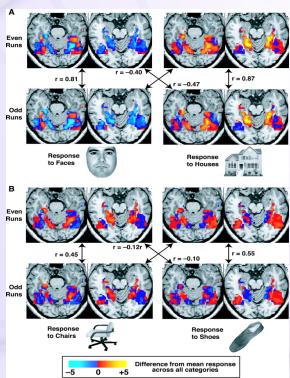
## Topographic Organization



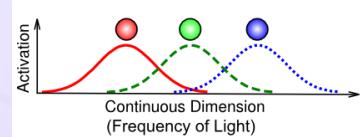
## Distributed Parts



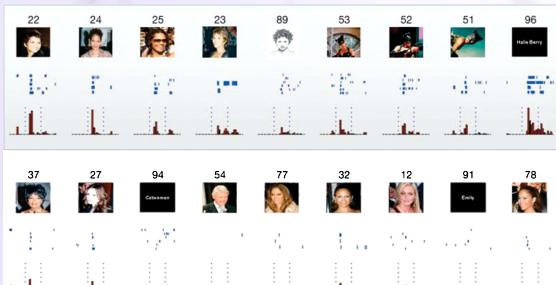
## Not Just Monkeys



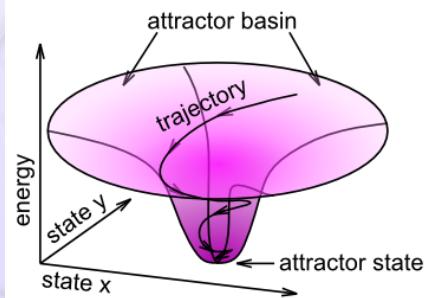
## Coarse Coding Efficiency



## Localist Representations?



## Bidirectional Excitatory Dynamics



## Top-down Ambiguity Resolution



## What Are These?



