Classification,

abstract concepts,

and do they really matter?

What is a 'concept'?

- Mental representation for class of items
- **Classification** is the process of grouping real-world items into these classes
- **Generalization** is extrapolating properties of an item based on its class

Examples

- **Classification:**
  - Pigeons can learn to peck at photos with trees in them, and will peck even at novel photos with novel tree shapes
    - Based on exemplars, features, or prototypes?
- **Generalization:**
  - Bees prefer colors similar to learned ones over unlearned colors
    - Peak shift sometimes occurs

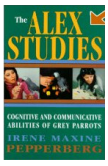
Problem-solving and 'concepts'

- Abstract "concepts" necessary for abstract "thought" (?)
- "Thinking" necessary for complex problem-solving
- What does this really mean? Is a computer solving problems? Does it have 'abstract concepts'? What is 'complex'?

Alex the African Grey Parrot

- Taught for >20 years by Irene Pepperberg
- Later 'Griffin' was also trained

http://www.alexfoundation.org/research.htm



What Alex can do

- Say (in English) the names of lots of objects presented to him ("What is it?")
- Name the color, number, material, and other properties of individual objects or sets of objects
- Answer more complex questions, such as "What is different?" etc.

The Alex studies

What does this show?

- Parrots can mimic sounds
- Parrots can be taught to answer questions
- Parrots can be taught that making the right sound in the right situation gives them food

→ **So far it's pretty straightforward**

The Alex studies

What does this show?

- Alex understands the concept of number including zero
- Alex can identify overlapping categories of objects (i.e. wooden objects, red objects)

→ **These abilities were previously only shown in primates, and sometimes not even there**

Classification & concepts

Biologists' typical critique

- Abilities only shown after extensive training and/or in artificial situation
- Small sample size (only one Alex!)
- How are the abilities shown relevant in nature?
- Why is 'abstract thought' relevant when we already know that very complex computations are done by simple animals (path integration)?

Classification & concepts

What do we make of this?

- Are 'abstract concepts' relevant, and for what?
- Are we convinced animals have them? (Which?)

- Is counting necessary for computing? For problem-solving?
- How does problem-solving work, anyway?