Individuals, categories, words

Week 3
Representation of individuals
Representation of individuals

- Symbolic representations
Representation of individuals

- Symbolic representations
  - Predicates or feature-value structures
Representation of individuals

• Symbolic representations
  - Predicates or feature-value structures
  - Embedding and recursion
Representation of individuals

- **Symbolic representations**
  - Predicates or feature-value structures
  - Embedding and recursion
- **Connectionist representations**
Representation of individuals

• Symbolic representations
  - Predicates or feature-value structures
  - Embedding and recursion

• Connectionist representations
  - Vectors
Representation of individuals

- **Symbolic representations**
  - Predicates or feature-value structures
  - Embedding and recursion

- **Connectionist representations**
  - Vectors
  - Dimensions built into architecture, no embedding
Symbolic representations

feat1: val1
feat2: val2
feat3: ??

feat4:

feat5: val5
feat6: val6
Connectionist representations
Category representations
Category representations

- Categories, classes, types, concepts, generalizations
Category representations

- Categories, classes, types, concepts, generalizations
- Explicit symbolic category representations
Category representations

- Categories, classes, types, concepts, generalizations
- Explicit symbolic category representations
- Localized connectionist category representations
Category representations

- Categories, classes, types, concepts, generalizations
- Explicit symbolic category representations
- Localized connectionist category representations
- Instance-based approaches: no explicit categories
Symbolic category representations

feat1: val1
feat4: feat6: val6
Exemplar-based symbolic “categories”
Localized connectionist category representations
What does it mean to “have” a category?
What does it mean to “have” a category?

- Associate a particular response with a whole range of situations
What does it mean to “have” a category?

- Associate a particular response with a whole range of situations
- Categorical perception
Categorical perception
Categorical perception

- Instances of the same category are perceived as more similar than they “really” are
Categorical perception

- Instances of the same category are perceived as more similar than they “really” are
- Instances of different categories are perceived as more different than they “really” are
Categorical perception

- Instances of the same category are perceived as more similar than they “really” are.
- Instances of different categories are perceived as more different than they “really” are.
- `categorize(thing1) => pear`
  `categorize(thing2) => peach`
  `categorize(thing3) => peach`
  `dist(thing1, thing2) == dist(thing2, thing3) => True`
  `sim(thing1, thing2) < sim(thing2, thing3) => True`
Categorical perception
(thanks to Rob Goldstone)
Categorical perception

- feat1: val1
- feat2: val2
- feat3: ??
- feat4: feat5: val5
  feat6: val6
Categorical perception
Categorical perception

```
feat1: val1
feat2: val2
feat3: ??
feat4: feat5: val5
      feat6: val6

feat1: val1
feat4: feat6: val6
```
Categorical perception

feat1: val1
feat2: val2
feat3: ??
feat4: feat5: val5
     feat6: val6

feat1: val1
feat4: feat6: val6
How categories slice up the world
How categories slice up the world

• Categories implicitly (or explicitly) group together situations in the world
How categories slice up the world

- Categories implicitly (or explicitly) group together situations in the world
- Situations are points in a multidimensional conceptual space; categories are regions in this space
How categories slice up the world

• Categories implicitly (or explicitly) group together situations in the world
• Situations are points in a multidimensional conceptual space; categories are regions in this space
• Where the boundaries are depends on
How categories slice up the world

- Categories implicitly (or explicitly) group together situations in the world
- Situations are points in a multidimensional conceptual space; categories are regions in this space
- Where the boundaries are depends on
  - the “locations” of the particular situations that have been perceived
How categories slice up the world

- Categories implicitly (or explicitly) group together situations in the world
- Situations are points in a multidimensional conceptual space; categories are regions in this space
- Where the boundaries are depends on
  - the “locations” of the particular situations that have been perceived
  - the consequences of the distinctions
How categories slice up the world
How categories slice up the world
How categories slice up the world
Words
Words

• One view: words are categories with form and meaning subcategories.
Words

• One view: words are categories with form and meaning subcategories.
• Accessing a word in comprehension means taking a form pattern as input and matching this against the form components of words (lexical entries).
Words

• One view: words are categories with form and meaning subcategories.

• Accessing a word in comprehension means taking a form pattern as input and matching this against the form components of words (lexical entries).

• Accessing a word in production means taking a conceptual (semantic) pattern as input and matching this against the meaning components of words.
**Words**

Production

Comprehension
Symbolic words
Connectionist words

Production

Situation

Linguistic Form

Comprehension
How words slice up the world
How words slice up the world
How words slice up the world
How words slice up the world