

Individuals, categories, words

Week 3

Q450/B490
Spring 2012

Representation of individuals

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- Symbolic representations

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 - Predicates or feature-value structures

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 - Vectors

Representation of individuals

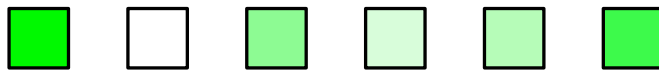
- Symbolic representations
 - Predicates or feature-value structures
 - Embedding and recursion
- Connectionist representations
 - Vectors
 - Dimensions built into architecture, no embedding

Symbolic representations

feat1: val1
feat2: val2
feat3: ??

feat4: feat5: val5
feat6: val6

Connectionist representations



Category representations

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- Explicit symbolic category representations

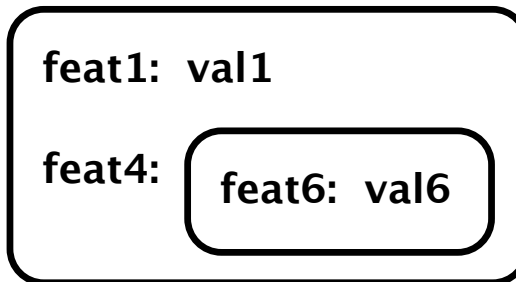
Category representations

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

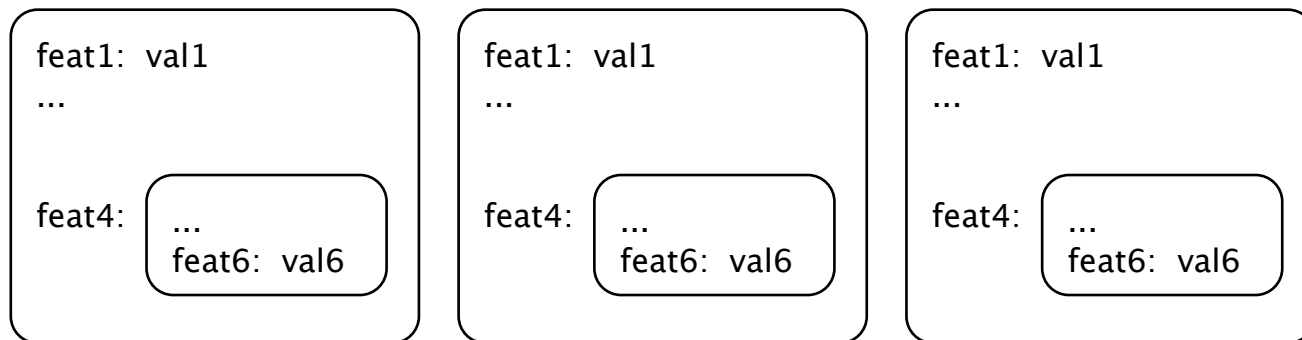
Category representations

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

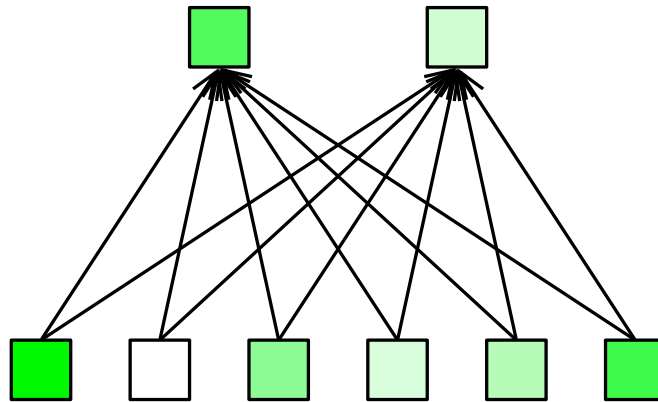
Symbolic category representations



Exemplar-based symbolic “categories”



Localized connectionist category representations



What does it mean
to “have” a category?

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- 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

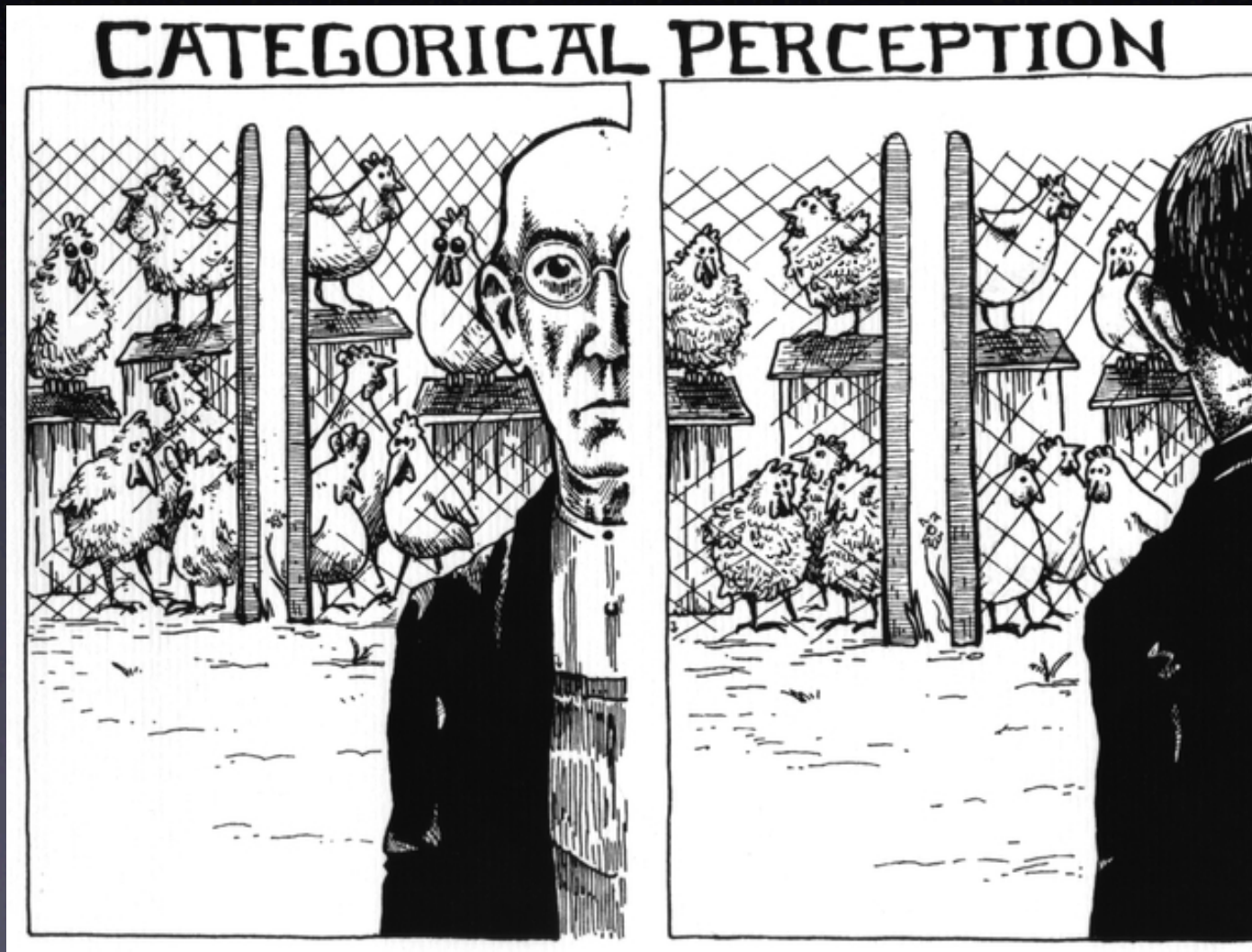
Categorical perception

- 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)

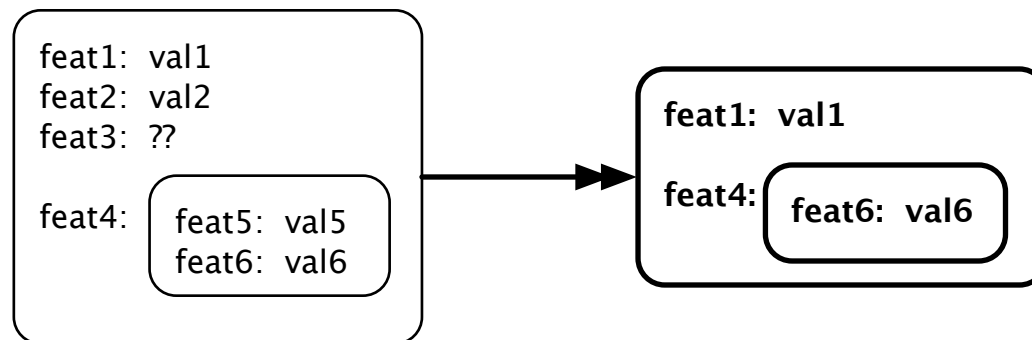


Categorical perception

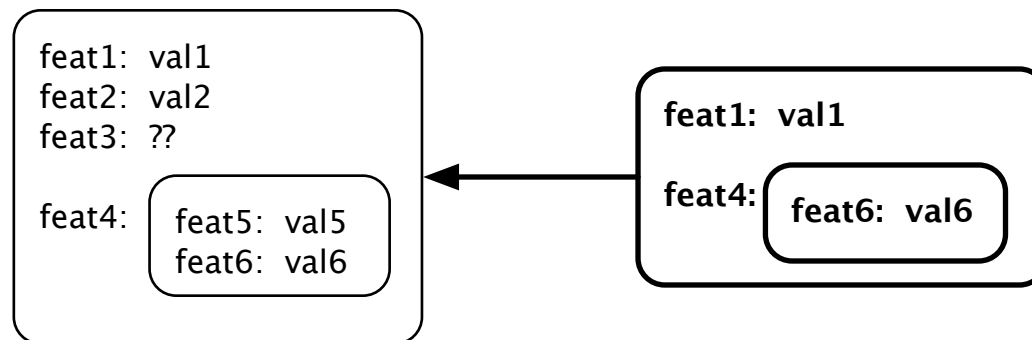
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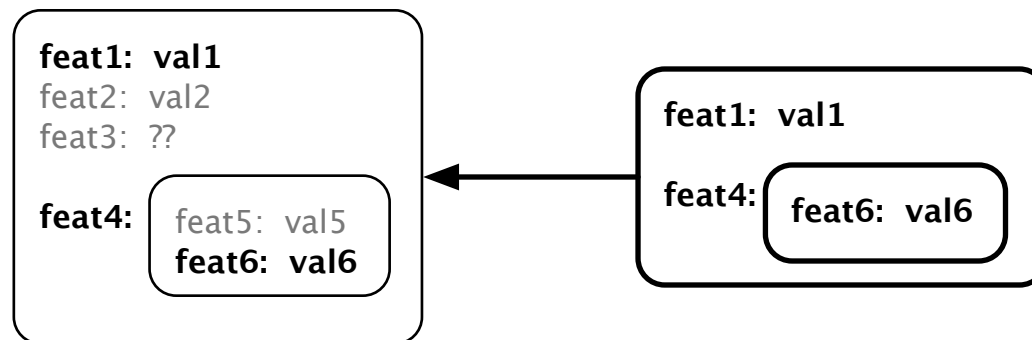
Categorical perception



Categorical perception



Categorical perception



How categories slice up the world

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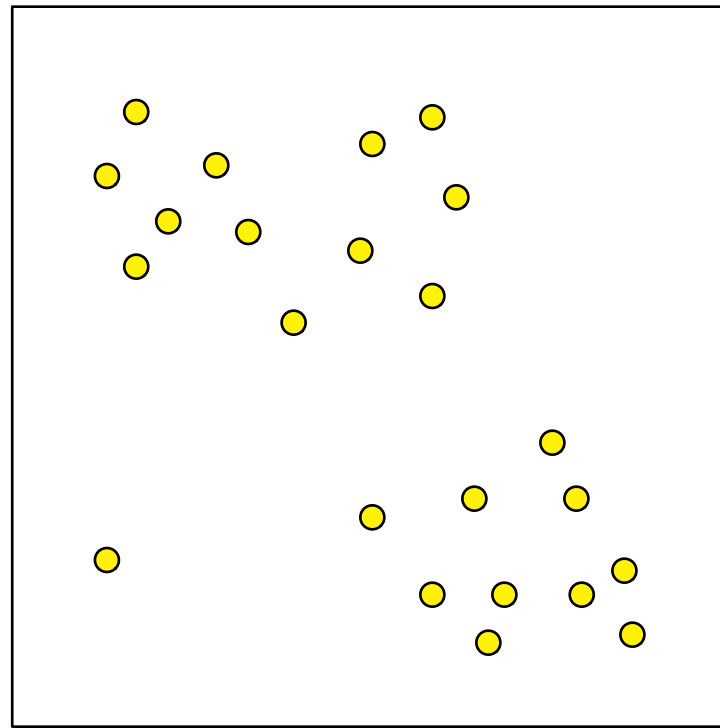
How categories slice up the world

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 - the “locations” of the particular situations that have been perceived

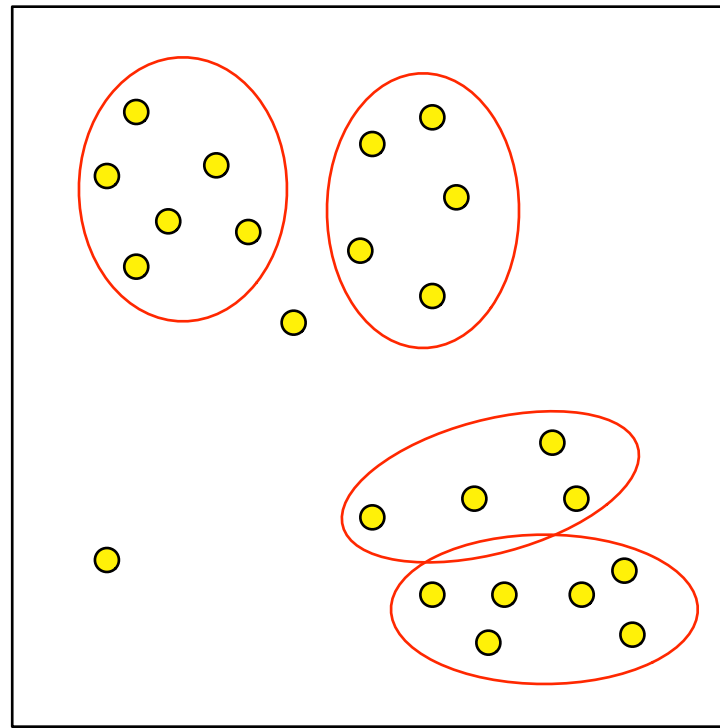
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 - the “locations” of the particular situations that have been perceived
 - the consequences of the distinctions

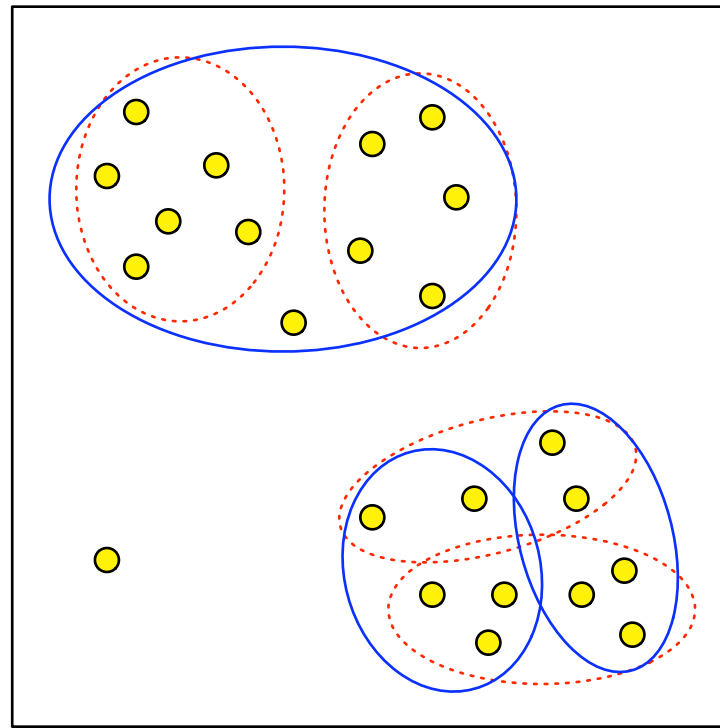
How categories slice up the world



How categories slice up the world



How categories slice up the world



Words

Words

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

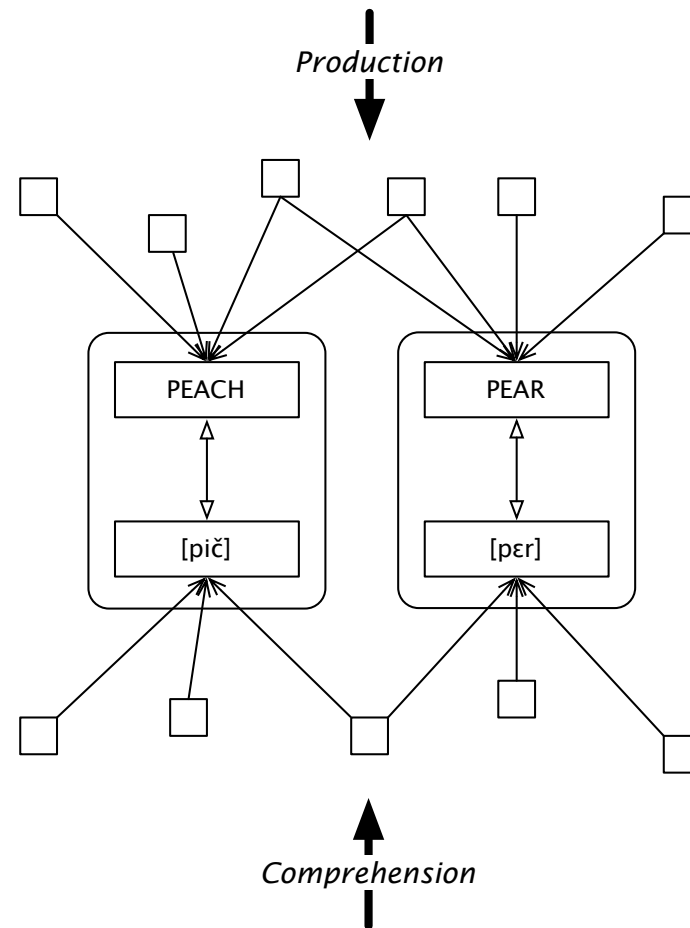
Words

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

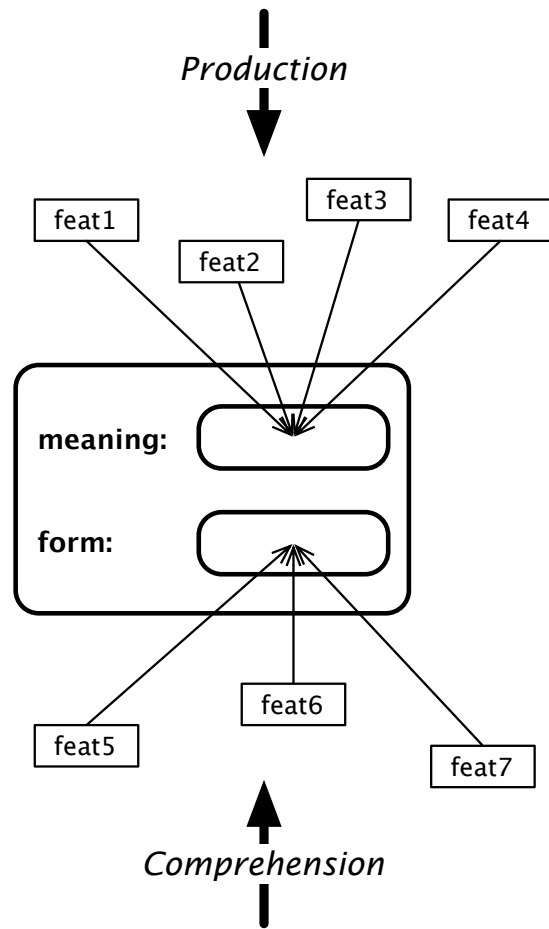
Words

- 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.

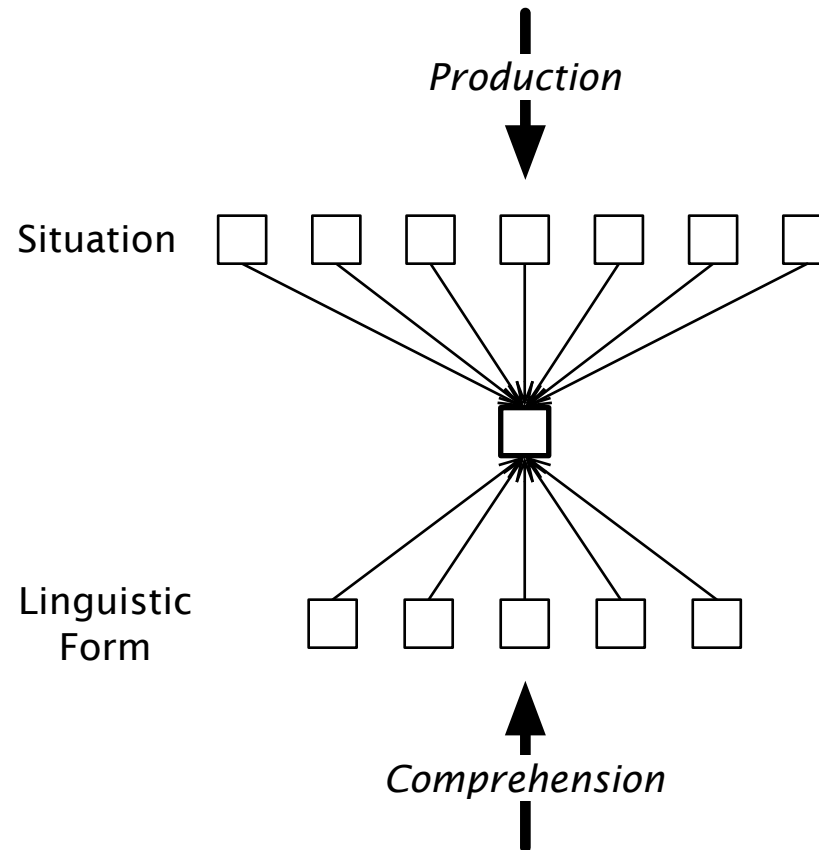
Words



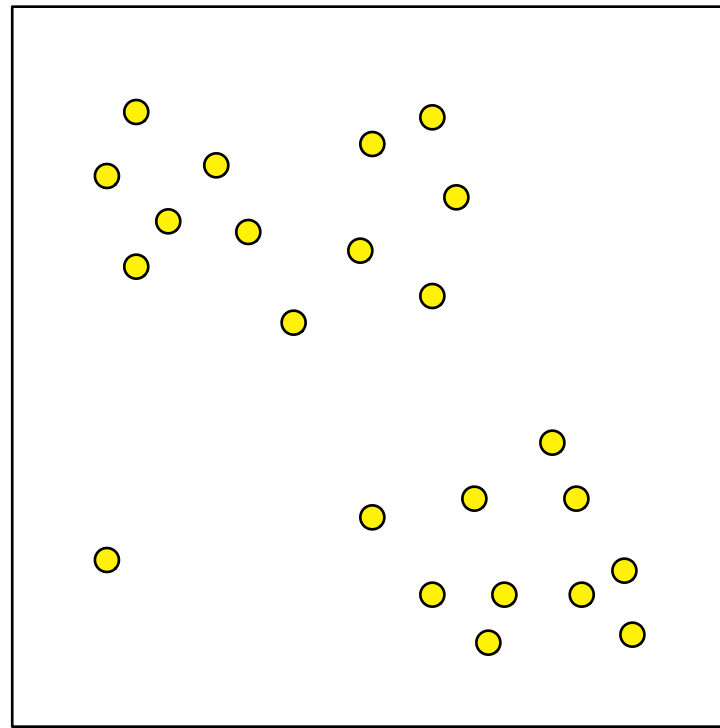
Symbolic words



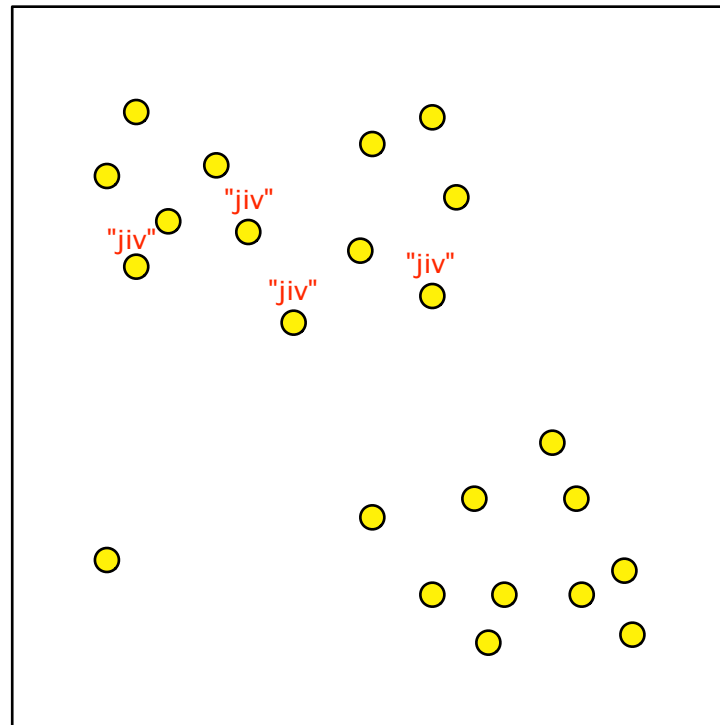
Connectionist words



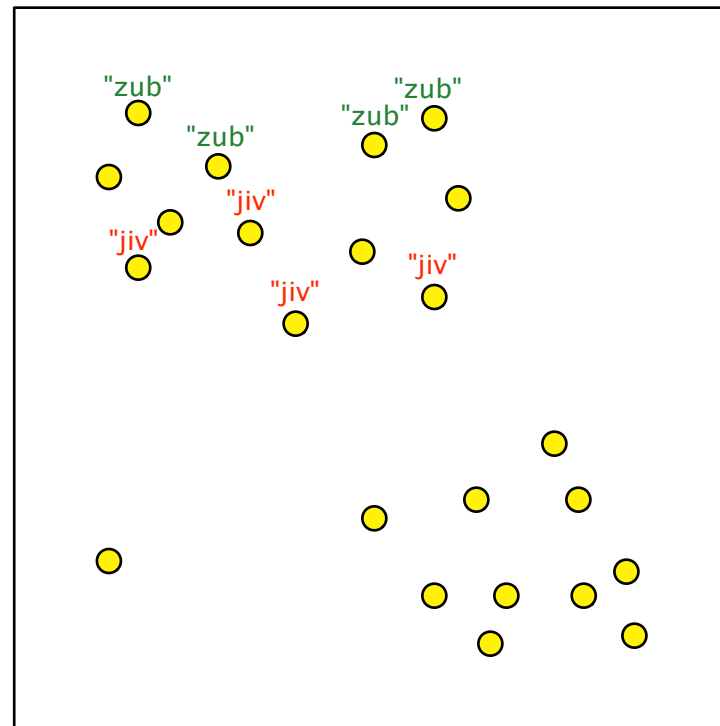
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