

Similarity

- Similarity plays a central role in both prototype theories and exemplar theories
- But what is it, exactly?
- Similarity is very “subjective;” it can mean different things in different situations.

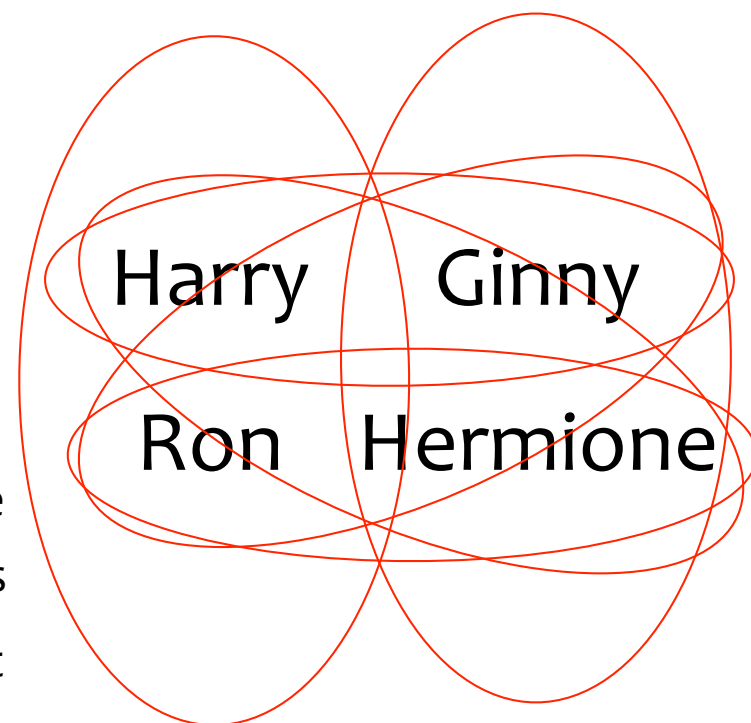
A bear vs a teddy bear?

An apple vs a baseball?

Time vs. a river?

- etc.

Male vs. Female
Married couples
Weasleys vs not



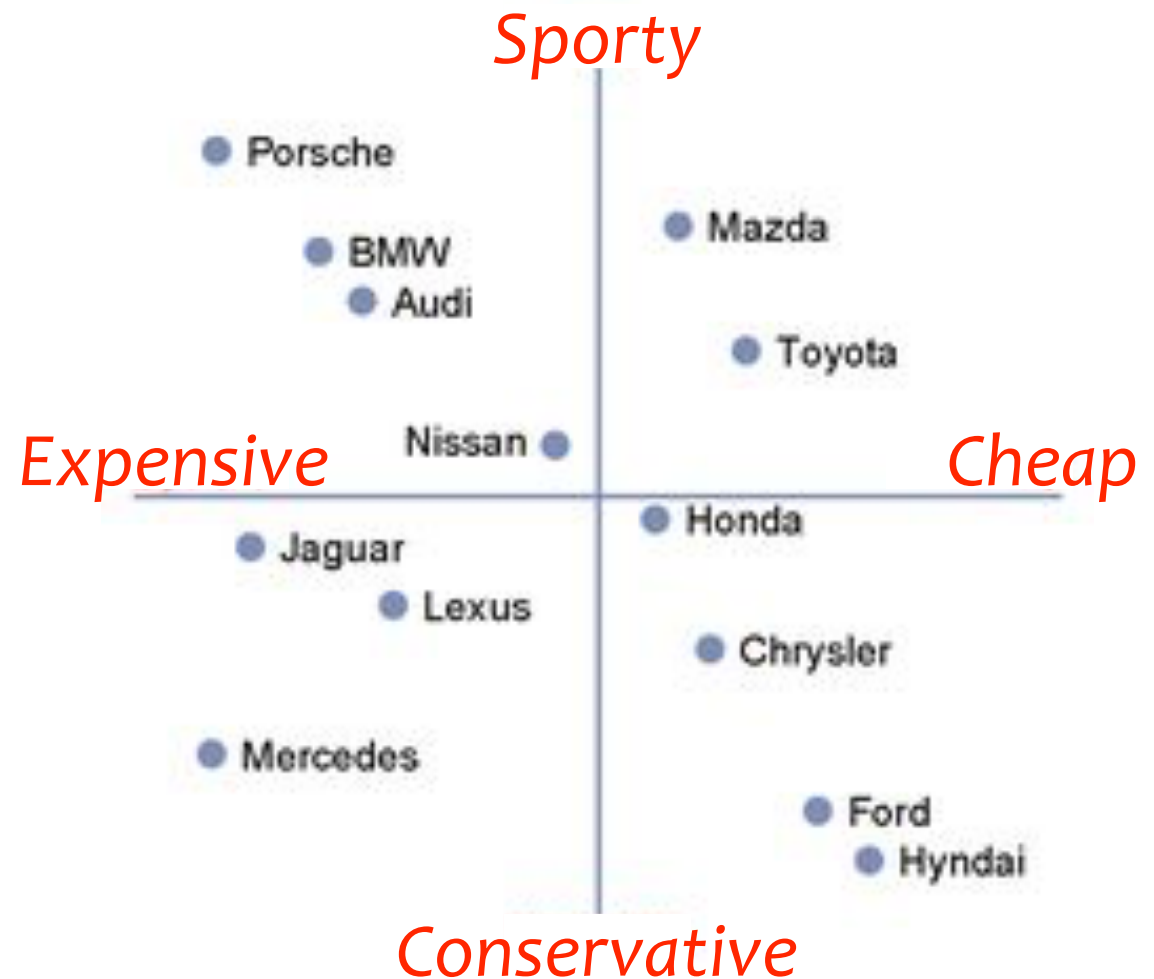
The Geometric Model of similarity

- One view of similarity is that it is analogous to **proximity** in some **mental space**
 - i.e. **dissimilarity** $\leftrightarrow$ **distance**
- That is, mental representation of the perceptual features takes the form of a **mental space** analogous to a physical space
- **Multidimensional Scaling (MDS)** is a statistical technique for visualizing this space
- Given a set of items and judgments of dissimilarity among the items, MDS finds positions in an imaginary space such that inter-item distances match judged dissimilarity as closely as possible
- Starting in about 1957, psychologists have plotted MDS spaces for thousands of types of items

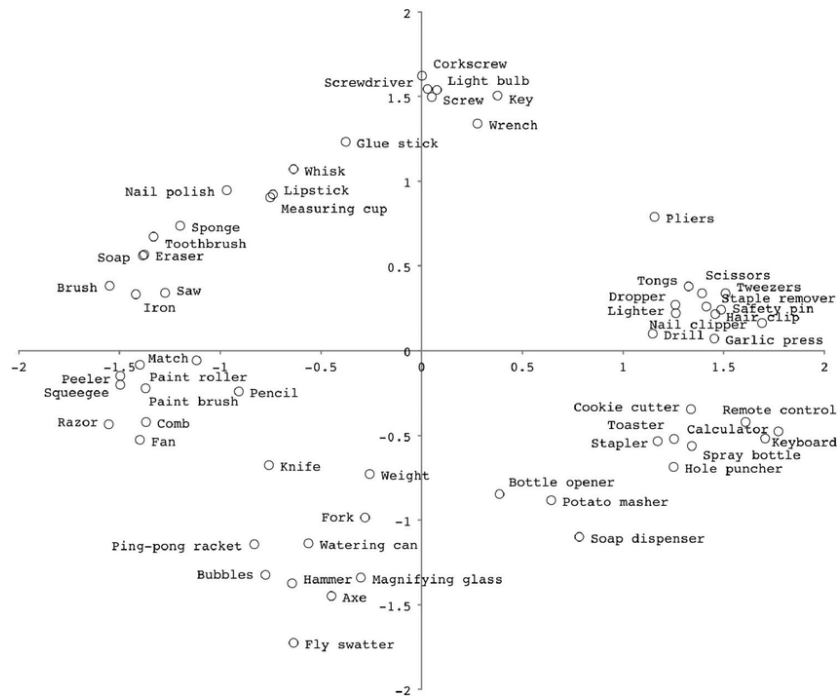
Multidimensional scaling (MDS)

MDS solution:

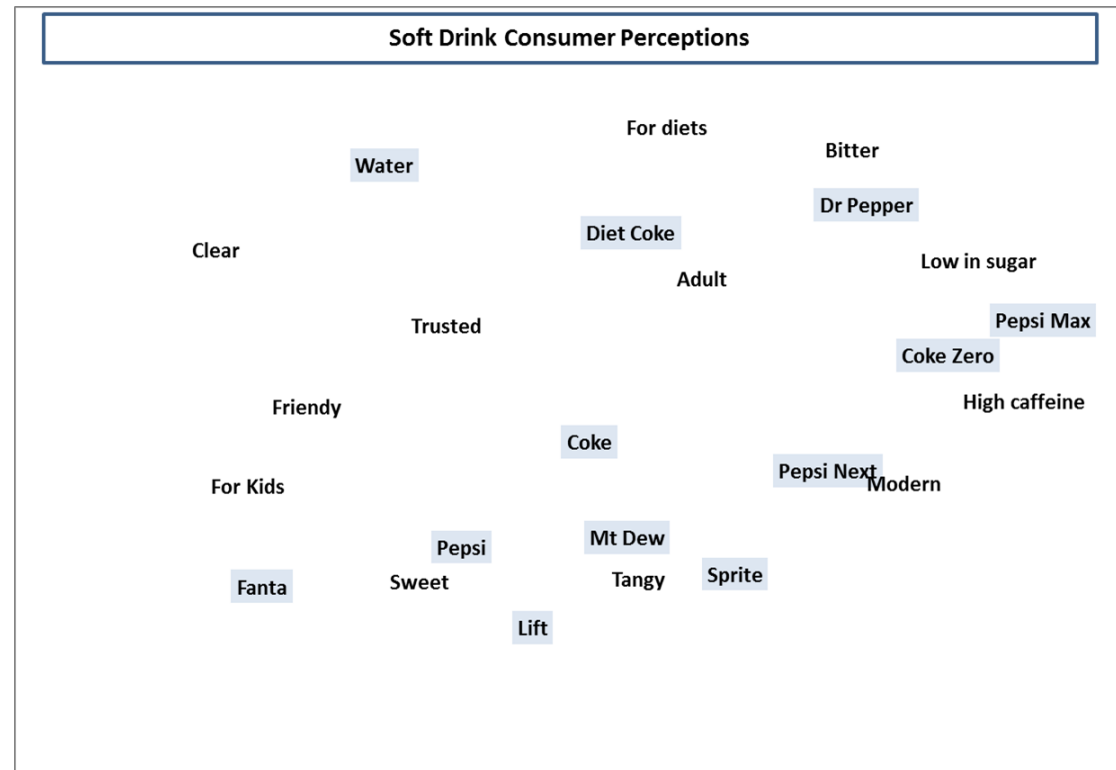
- Subjects are asked to rate the similarity of pairs of objects
- **Multidimensional Scaling** (MDS) is used to reconstruct the corresponding distances in the mental space



more MDS examples

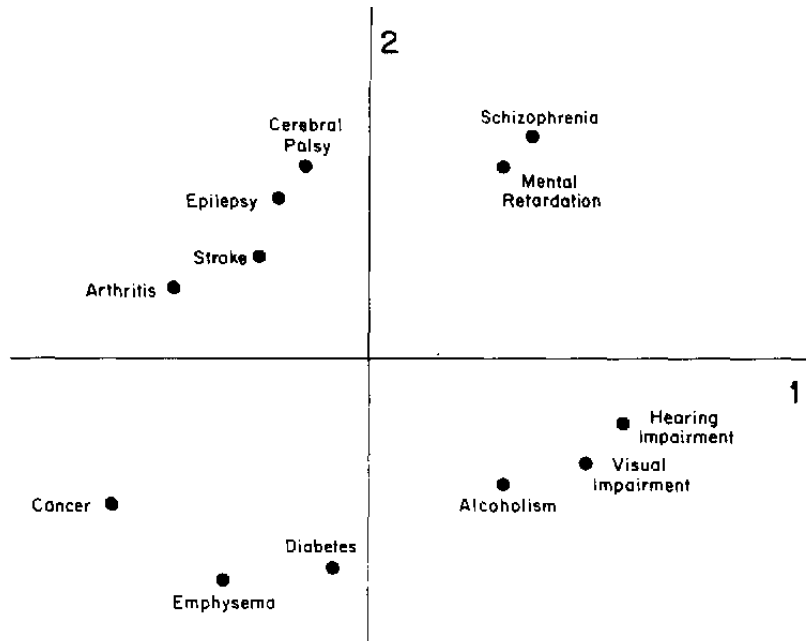


Actions

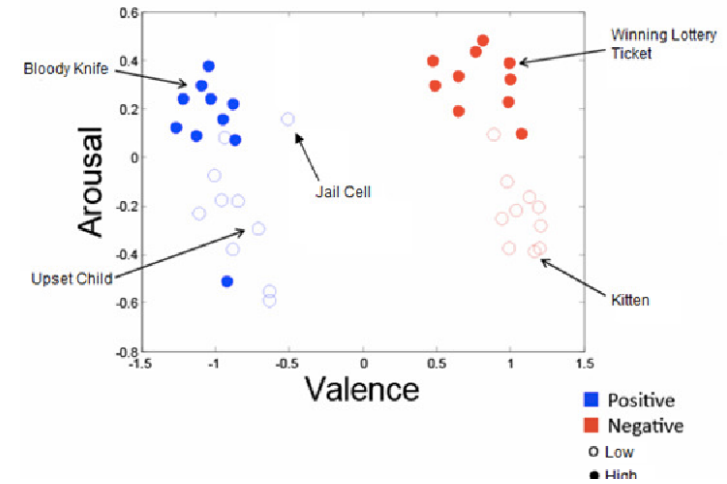


Soft drinks

more MDS examples



Stereotypes of disorders

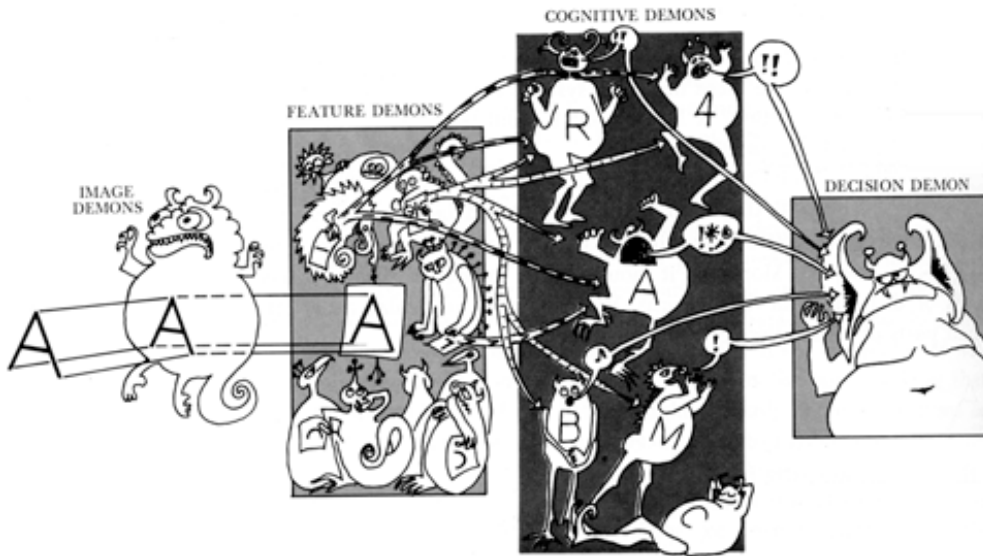


Mental images

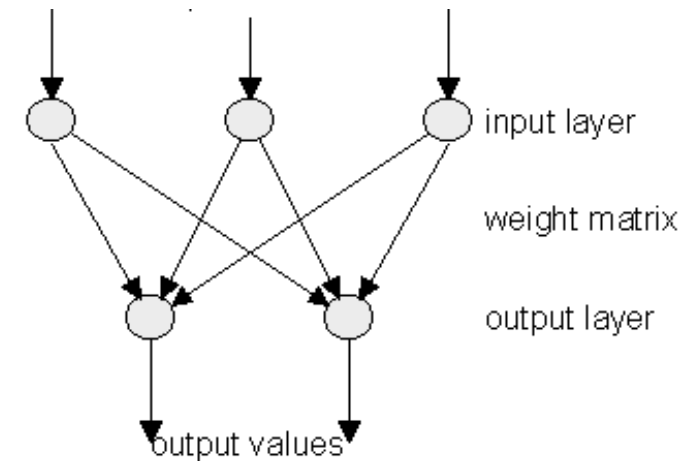
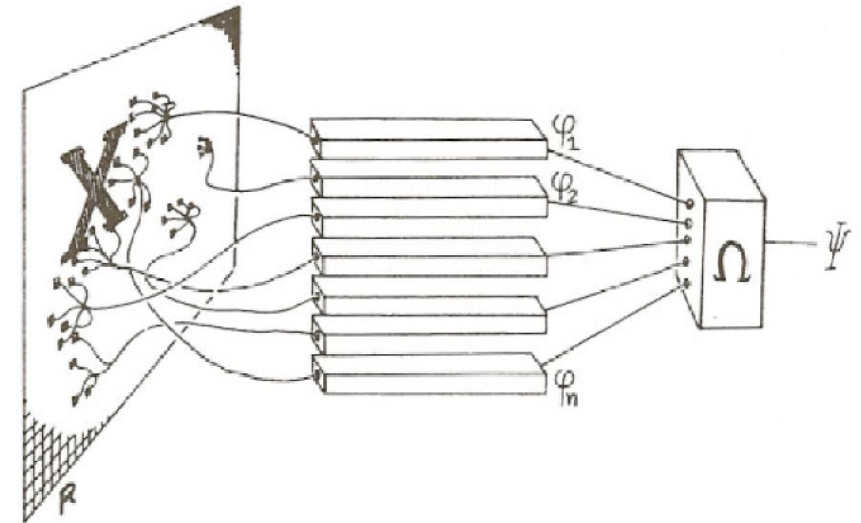
Connectionism

- **Connectionism** (aka artificial neural networks) is an alternate approach to knowledge representation
- Rooted in empiricism/associationism
- with more direct ties to neuroscience

Early neural-network models

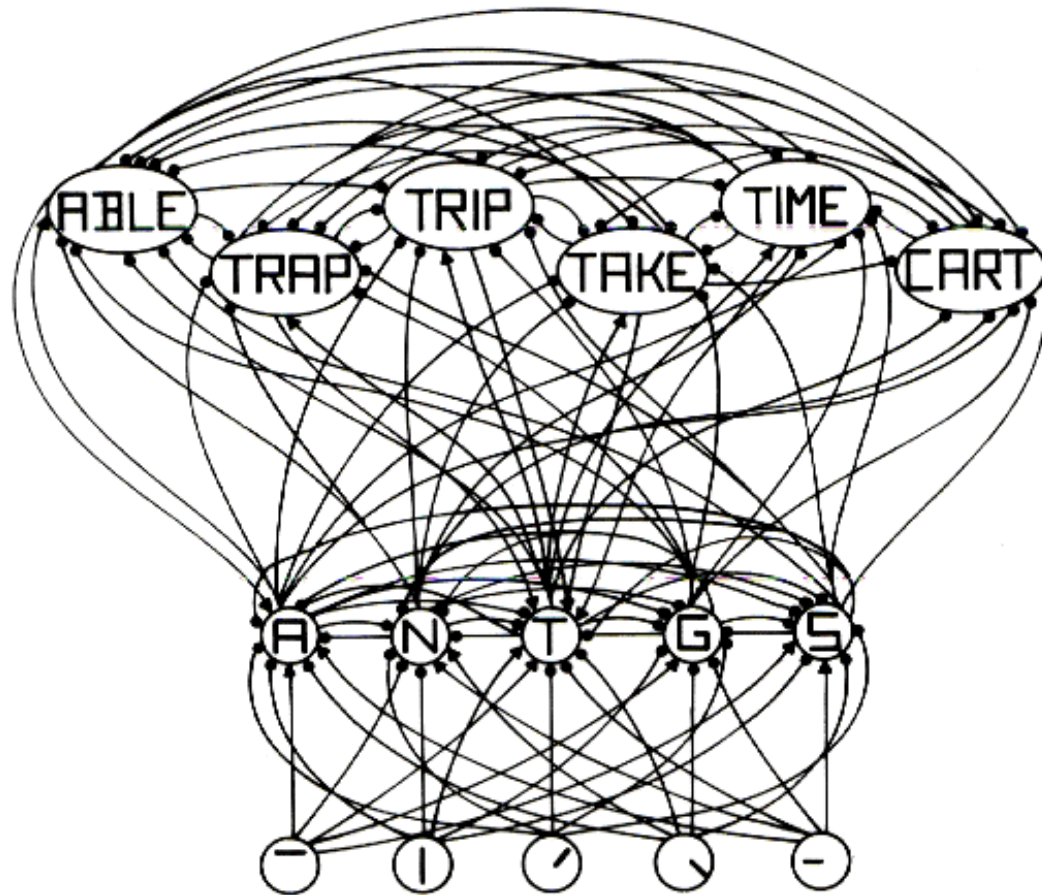


Pandemonium (1959)



Perceptron (1969)

McClelland & Rumelhart's "Interactive Activation" model of reading (1981)



Output

Input