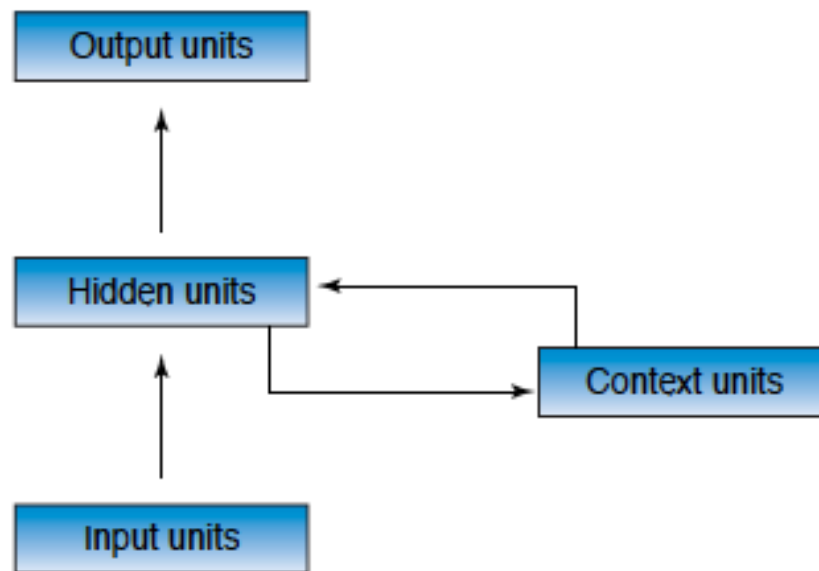# To do today (1/10/11)

- Revisit the SRN model (R2, discussed last time)
- Amodal vs. perceptual symbol systems (R3)
- LSA and HAL, and testing them (R4)
- HW1 questions

The SRN model
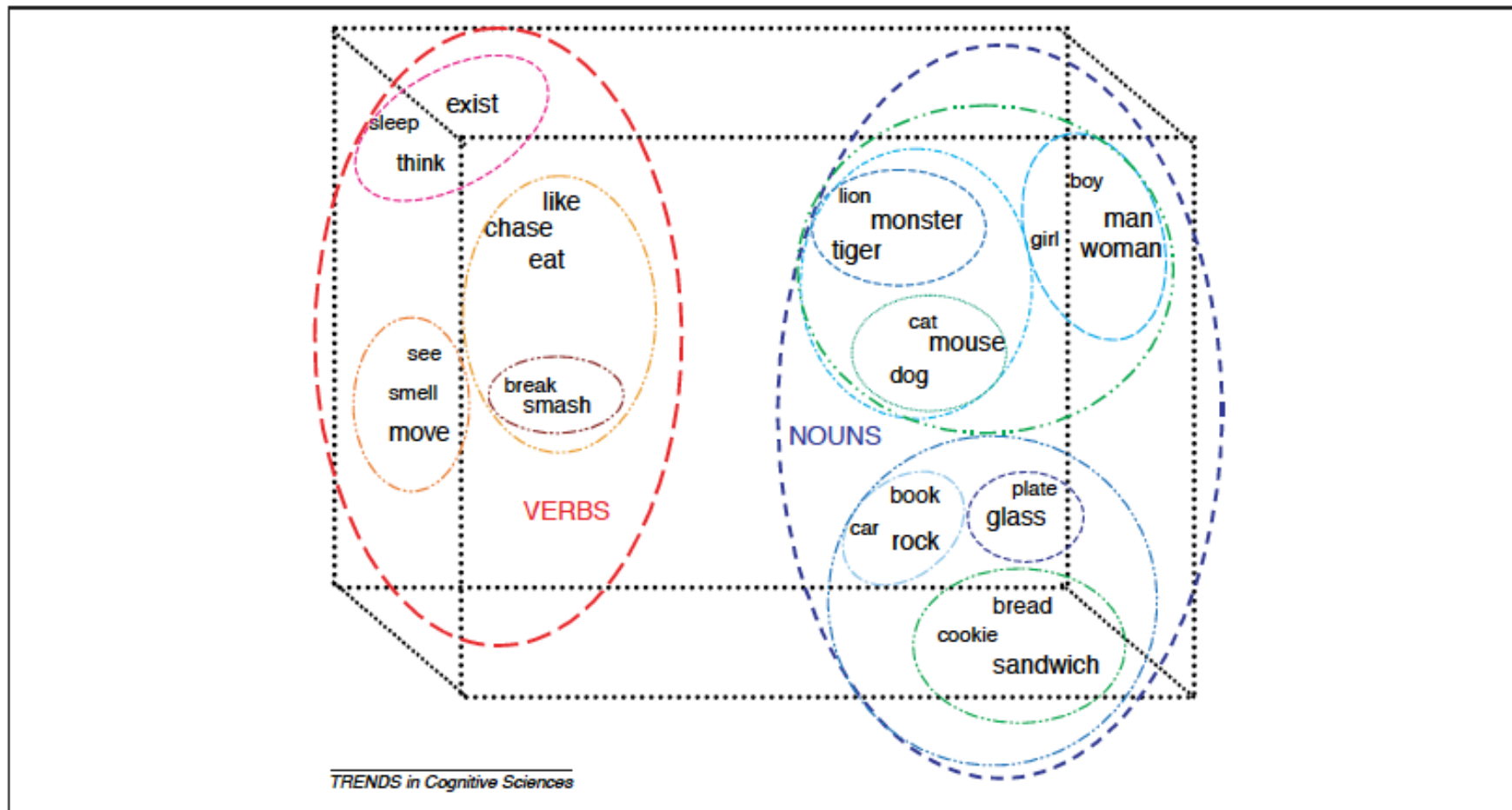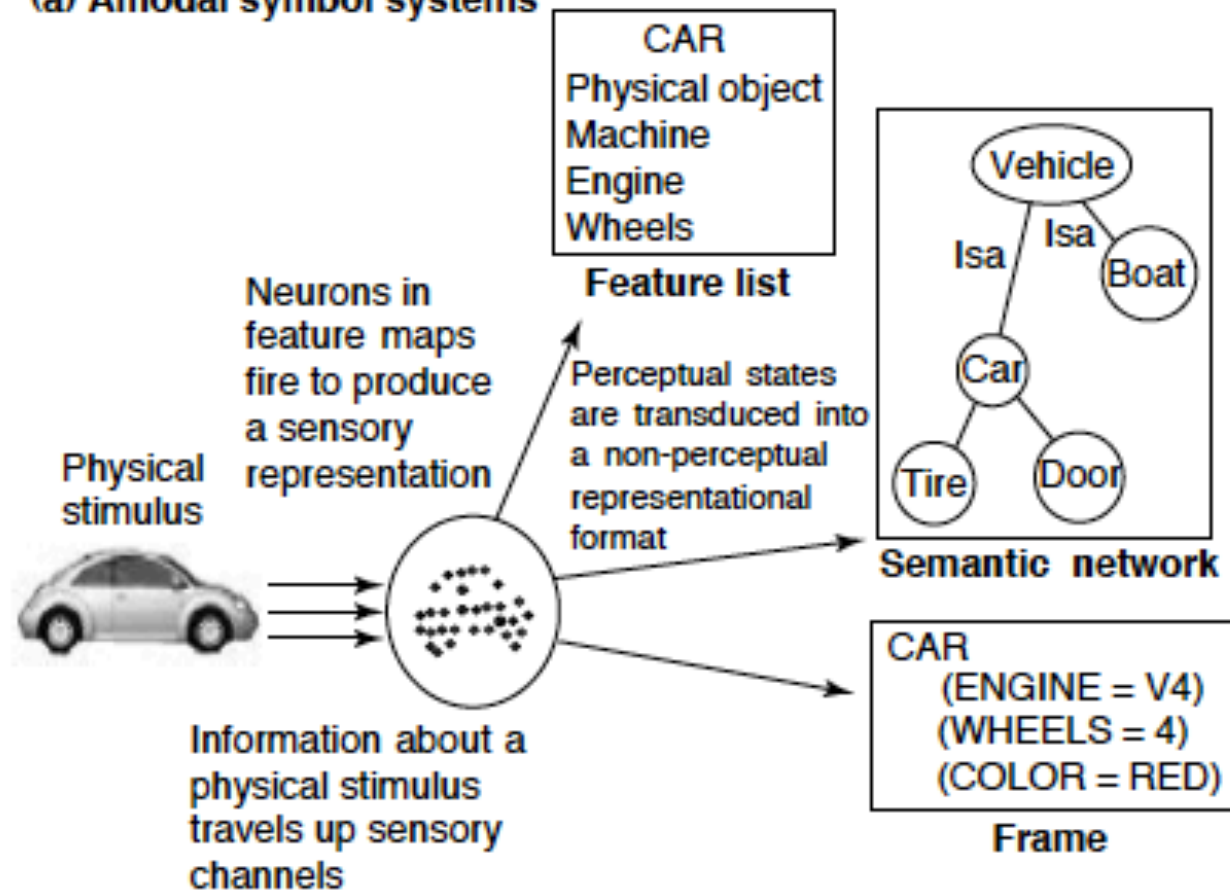
Meaning emerges in the network?

Figure 3. Schematic visualization, in 3D, of the high-dimensional state space described by the SRN's hidden-unit layer. The state space is partitioned into different regions that correspond to grammatical and semantic catgories. Nesting relationship in space (e.g. man within Animate within Noun categories) reflect hierarchical relationships between categories.
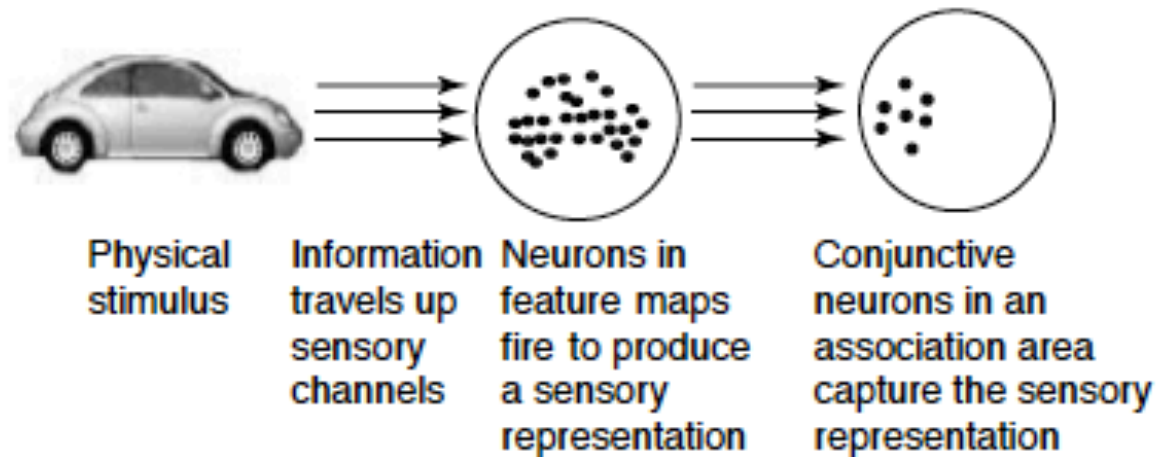
Words as cues to meaning

- "words [are] stimuli, whose *meaning* lies in the causal effects they have on mental states" (p. 306)
- "words don't *have* meaning, they are *cues* to meaning" (p. 306)

(a) Amodal symbol systems

CAR
Physical object
Machine
Engine
Wheels

Feature list

Neurons in
feature maps
fire to produce
a sensory
representation

Perceptual states
are transduced into
a non-perceptual
representational
format

Vehicle

Isa   Isa
Isa   Boat

Car

Tire   Door

Semantic network

Physical
stimulus

Information about a
physical stimulus
travels up sensory
channels

CAR
(ENGINE = V4)
(WHEELS = 4)
(COLOR = RED)

Frame

(b) Perceptual symbol systems

Capture

| Physical stimulus | Information travels up sensory channels | Neurons in feature maps fire to produce a sensory representation | Conjunctive neurons in an association area capture the sensory representation |

Re-enactment / simulation

Neurons in feature maps fire to reenact the earlier sensory representation

Conjunctive neurons in the association area fire to partially reactivate the earlier sensory representation
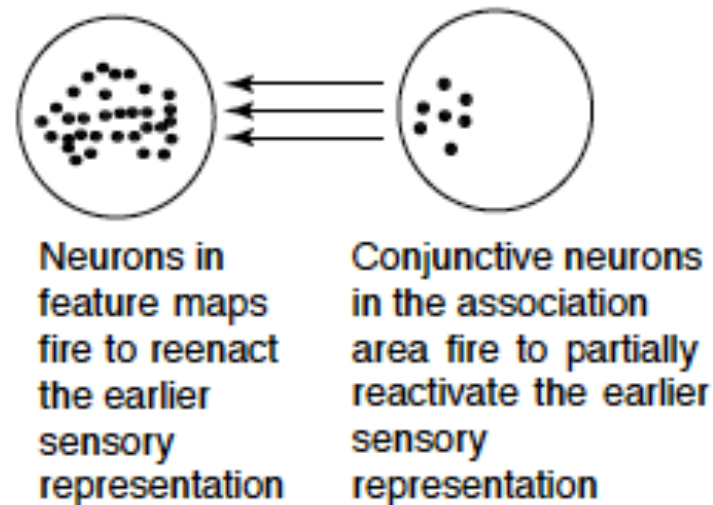
LSA and HAL

- Basic idea:
  - The meaning of a word is a multidimensional vector, describing the contexts the word occurs in and does not occur in (e.g. other words it occurs near or doesn't)
  - The more similar two words' distribution vectors are, the more similar their meanings
  - http://lsa.colorado.edu/

The "indexical hypothesis"

- Words "index" perceptual symbols
- When you put them together in language, these perceptual symbols have to be "meshed"
- You do that through mental simulation

Comparing the accounts

- The accounts make different predictions, that can be tested.

	LSA cosines	
	Sentence to setting	Central to distinguishing
Setting: Marissa forgot to bring her pillow on her camping trip.		
Afforded: As a substitute for her *pillow*, she filled up an old sweater with **leaves.**	.58	.08
Nonafforded: As a substitute for her *pillow*, she filled up an old sweater with **water.**	.55	.06
Related: As a substitute for her *pillow*, she filled up an old sweater with **clothes.**	.63	.24

Sensibility and Envisioning Ratings for Experiment 1

Critical sentence	Sensibility	Envisioning
Sensibility ratings first		
Afforded	4.32	4.94
Nonafforded	1.31	1.58
Related	6.10	6.40
Envisioning ratings first		
Afforded	4.84	4.88
Nonafforded	1.19	1.47
Related	6.52	6.17

- So it seems HAL and LSA don't predict meaningfulness judgments, at least when something creative is going on
- The alternative, that people mesh together indexed perceptual symbols, could account for the behavior, though.

HW1 questions