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## Fundamentals

- Neurons: detectors, net inputs of excitation, inhibition, and leak, thresholded output
- Networks: transformations, pattern completion, amplification, attractor dynamics, constraint satisfaction
- Learning: model and task
- Perception/Attention: transformations, object/spatial paths
- Memory: weights vs. acts, cortex, hippo: prefrontal cortex
- Language: transformations, interacting orthographic, semantic, and phonological pathways
- Higher level cognition: activation-based processing

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## Strengths of Modeling

1. Can drive theory/generate predictions to test in humans.
2. Get around ethical issues of working with humans - can test lesioned models, manipulate environment, observe low level interactions.
3. Can simplify explorations (can test effects of different variables).
4. Can help to understand pathologies.
5. Can help to understand complexity.

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## Limitations to Modeling

1. What's missing? (soul/emotion/motivation/free will)
2. Indeterminacy problem – multiple solutions.

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## Issues

- Models are too simple.
- Models are too complex.
- Models can do anything.
- Models are reductionistic.

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### Contributions to Cognitive Neuroscience

- Models help us to understand phenomena. oriented bars of light and V1, specialized memory systems, divisions of labor in reading.
- Models deal with complexity. object recognition, semantics.
- Models are explicit. disengage/inhibition vs. activation, mechanisms of memory.
- Models allow control.
- Models provide a unified framework.