Neural Modeling Seminar
Program and Bibliography
Eytan Ruppin, Semester Biet, 1997

Part I: Normal Brain Processing

- Introduction to Computational Neuroscience:
  Churchland and Sejnowski (1988); Perspectives on Cognitive Neuroscience. Science 242, 741-745.
  Sejnowski, Koch, and Churchland (1990); Computational Neuroscience. In Hanson and Olson (eds.) (H&O) *Connectionist Modeling and Brain Function.*
  – Talk given by Eitan Katzav.

- Classical Conditioning:
  Tesauro (1990); Neural modeling of classical conditioning: A theoretical viewpoint. In (H&O).
  Sutton and Barto (1990); Time-derivative models of Pavlovian reinforcement. In Gabriel and Moore (eds.) *Learning and Computational Neuroscience: Foundations of Adaptive Networks.*
  – Talks given by Yair Avgar and Eyal Cohen.

- Associative memory models of Hippocampus:
  Willshaw and Buckingham (1990); An assessment of Marr's theory of the hippocampus as a temporary memory store. Phil. Trans. of the Royal Society of London B, 329, 205-215.
  – Elik Aharonvski talked about the paper above.

- Hippocampus as a Cognitive map:
  Burgess, Recce and O'Keefe (1994); A model of hippocampal function. Neural Networks 7(6), 1065-1081.
  Papers of Touretzky on rat navigation. (For a selection of papers look at David Touretzky / Redish homepage http://www.cs.cmu.edu:8001/afs/cs/user/dredish/Web/bibliography.url.
  – Alex Feldman will talk about both papers above.

- Hippocampal-cortical Interaction and consolidation:
  O'Reilly and McClelland (1994); Hippocampal conjunctive encoding, storage and recall: avoiding a tradeoff. Hippocampus 4(6): 661-682.
  Alvarez and Squire (1994); Memory consolidation and the medial temporal lob: A simple network model. Proc. Natl. Acad. Sci. USA, 91, 7041-7045.
  McClelland, McNaughton and O'Reilly (1995); Why are there complementary learning systems in the Hippocampus and Neocortex? Psych. Review 1995.
  – Guy Amit

- Piriform/Olfactory Cortex: Unsupervised perceptual categorization:
  Granger et. al. (1990); Unsupervised perceptual learning: a paleocortical model. In (H&O).
  Hendin, Hopfield and Horn (1994); A Neural Model of the Olfactory Bulb (approximate title..) Proc. Natl. Acad. Sci. USA.
  – Irit Opher will talk about both papers above.

- Cerebellum and Motor Control:
  Glickstien and Yeo (1990); The cerebellum and motor learning. Journal of Cognitive Neuroscience, 2, 69-80.
  Tyrell and Willshaw (1992); Cerebellar cortex: its stimulation and the relevance of Marr's theory. Phil. Trans. of the Royal Society of London B, 336, 239-257.
  – Gil Friedrich will talk about both papers above.

- Spatial representation in Parietal Cortex:
  Zipser and Andersen (1988); A back-propagation programmed network that simulates response properties of a subset of posterior parietal neurons. Nature 331, 679-684.
  Pouget and Sejnowski (1995); Representing spatial transformation in the parietal cortex with basis functions. Paper can be obtained from the Web page of Alex Pouget at the Salk Institute.

- Functional/Structural Organization of the Visual System:
  Van Essen and DeYeo (1995); Concurrent processing in the primate visual cortex. In Gazzaniga (Ed.), *The Cognitive Neurosciences*, 383-400.
  Kaas (1989); Why does the brain have so many visual areas? Journal of Cognitive Neuroscience, 1, 121-135.

- Memory and the attractor Metaphor:
  Amit, Griniasty, Tsodyks (1994); Converting temporal to spatial correlation (approximate title), Neural Computation.
  Amit (1995); Behavioral and Brain Neurosciences.
  Hasselmo et al. (1995); Dynamics of learning and recall at excitatory recurrent synapses and cholinergic modulation in rat hippocampal region CA3. Journal of Neuroscience, 15(7), 5249-5262.
  – talk to be given by Galia Avidan and Izhar Bar-Gad.

Part II: Parperaot (or miscellaneous..)

- Some brute force general assaults on 'understanding general information processing principles in the brain':
  Crick and Mitchison (1983); The function of dream sleep. Nature, 304, 111-114.
  Hopfield, Feinstein and Palmer (1983); Unlearning' has a stabilizing effect in collective memories, 304, 158-159.
  Crick (1984); The searchlight hypothesis, Nature.
  – Dudo Noy will talk about all papers in the item above, and more on sleep.

- High-level cognitive modeling: the next phase?
  Ritter and Kohonen (1989);
  – Someone has spoken with me in class and I promised to reserve it for him. The one who did that - please send me an e-mail in this regard.
  Self-Organizing Semantic Maps. Biol. Cybern., 61, 241-254.
  Herrmann, Ruppin and Usher (1993); A neural model of the dynamic activation of memory. Biol. Cybern., 68, 455-463.
  The Polish guys.
  – Yaron Silberman will talk about both papers above.

- Cortical map self-organization and Information theory: Principles.
  Linsker (1990); Self-organization in a perceptual system: How network models and information theory may shed light on neural organization. In (H&O), and also see Linsker's paper in IEEE Computer, 1988.
  – Talk to be given by Ranit Aharonov

- To Bee or not to Bee:
  Montague, Dayan, Sejnowski (1995). Modeling the foraging of bees with reenforcement learning (approximate title). Nature, 1995 (and some other related papers obtainable from these authors' websites).
  – Talk to be given by Yael Niv.

Part III: Modeling Brain Disorders

- Epilepsy:
  The work of Roger Traub and coworkers (many papers - pick any recent one).
  Mehta et al. (1996); A Neural network model for kindling of focal epilepsy. In (Reggia, Ruppin and Berndt (eds.) (RRB)), *Neural Modeling of Brain and Cognitive Disorders.*
  – Regev Levi will talk about both papers above.

- Stroke:
  Reggia, Goodall, Revett, Ruppin (1997); Computational modeling of the cortical response to focal damage. *Neuroplasticity and Reorganization of Function After Brain*

Injury. H. Levin & J. Grafman (eds.), Oxford University Press

Revett, Ruppin, Goodall, Reggia (1997); Spreading Depression in Focal Ischemia: A Computational Study. Preprint.

– Elad Ofer.

- Phantom Limbs:

  Spitzer et al. (1994); A Neural Model of Phantom Limbs (approximate title), Biol. Cybern. 1994.

  – Gadi Miller.

- Language disorders (aphasia, dyslexia):

  Hinton and Shallice (1991); Psychological Review. Plaut and Shallice; a series of papers in David Plaut's homepage in Carnegie Mellon.

  – Yuval Ben-Dov.

- Alzheimer's disease:

  Papers by our group, and by Hasselmo's group. Two different approaches to the same disease..

  – Nir Levy.