Introduction to Neuroscience & Behavior
NEUR 201, Spring 2005

Lecture room: Olmsted 212
Lab rooms: Olmsted 314 (20 Jan to 4 Mar); Blodgett 213 (22 Mar to 3 May)

Professors: Carol Cristensen (email: christen) & John Long (email: jolong)
Offices: Blodgett 231 & Olmsted 317

Intern: Louisa Steinberg (email: losteinberg)

date	day	lecture topic	lab topic
		Section I: Movement — Generation, Control, Evolution	
Jan 20	R	What is the neural basis of behavior? (Carew, 2000, Ch. 1; Ishiwaka & Mori, 1999)	
21	F		Subjectivity & Objectivity in Measurement: Monosynaptic reflex
25	T	Is movement behavior? (Jayne & Lauder, 1995a)	
27	R	Does muscle activation explain muscle function? (Altringham & Ellerby, 1999; Jayne & Lauder, 1995b)	
28	F		Vertebrate Escape Response I: Movement Patterns (Domenici & Blake, 1997)
Feb 1	T	Neuromodulating muscle force. (Ehrsson et al. 2003; Korff & Wainwright, 2004)	*Measurement paper due at 9:00 a.m.*
3	R	What is the muscular basis of behavior? (Wakeling, 2001; Johnston et al. 1995)	
4	F		Vertebrate Escape Response II: Neural Patterns (Zottile & Faber, 2000)
8	T	Circuits for escape and prey capture. (Norekian, 1999; Svoboda & Fetcho, 1996)	
10	R	Neuromodulation of significant behaviors affecting evolution. (Fetcho & Higashijima, 2004; Ritter et al. 2001)	

11	F		Vertebrate Escape Response III: Neural Basis of Movement
15	T	Neuromodulating the escape response. (Eaton et al. 2001; Hale, 2002)	*Grant proposal due 9:00 a..m. in class.*
17	R	Coordinated, periodic movements. (Grillner et al. 1995; Grillner, 1996; Schaal, et al. 2004)	
18	F		Vertebrate Escape Response IV: Independent Investigations I
22	T	Visual guidance of movements. (Battaglia-Mayer et al. 2001; Wong & Wishsaw, 2004)	
24	R	What is the environmental basis of behavior? (Ellerby et al. 2001; Padua-Schioppa et al. 2004)	
25	F		Vertebrate Escape Response V: Independent Investigations II
Mar 1	T	Are neuromotor systems conserved during evolution? (Smith, 1994; Hale et al. 2002)	*Scientific Manuscript I due; 5:00 p.m.*
3	R	Evolution of behavioral diversity. (Domenici, 2001; McHenry & Patek, 2004).	
4	F		Vertebrate Escape Response VI: Symposium (oral presentations)
		SPRING BREAK	
		Section II: Kin & Social Behavior	
Mar 22	T	Kin selection (Silk, 2002)	
24	R	Kin selection (Chapais et al. 2001; Fehr & Gachter, 2002)	
25	F		Measuring Human Brain Function I: Learning the Neuroscan System (N.B.: Blodgett 213) *Integrative Paper due 1:30 p.m.*
29	T	Facial recognition in primates (Eifuku et al. 2004; Leibenluft et al. 2004; Lyon, 2003)	
31	R	Olfactory recognition in mammals (Penn, 2002; Schaefer et al. 2002)	
April 1	F		Human Brain Function II: Data collection (Blonder et al. 2004)

5	T	Dominance hierarchies (Decker, 2000; Virgin & Sapolsky, 1997)	
7	R	Deception (Ganis et al. 2003; Tibbetts et al. 2004)	
8	F		Human Brain Function III: Data collection (reading TBA, N170)
12	T	Emotion (LaBar et al. 2003; Williams et al. 2004)	
14	R	Motivation & reward (Elliot et al. 2003; Ernst et al. 2004)	
15	F		Human Brain Function IV: Data extraction *Draft of intro & methods due, 1:30 p.m.*
19	T	Risk taking & psychopathology (Anderson et al. 1999; Mitchell et al. 2002)	
21	R	Violence & aggression (Brower et al. 2001; Davidson et al. 2000)	
22	F		Human Brain Function V: Statistical analysis and analysis of variance
26	T	Cooperation & affiliation I (Hyman, 2002; Sapolsky, 1996)	
28	R	Cooperation & affiliation II (de Waal, 2000; Fehr & Gachter, 2002)	
29	F		Human Brain Function VI: Discussion of the results
May 3	T	Social control & evaluation	*Scientific manuscript II due, 5:00 p.m.*

Assignments

Laboratory	Due Date	% of grade
1. Grant proposal	Tuesday, 15 Feb, 9:00 a.m.	5
2. Scientific manuscript I	Tuesday, 1 March, 5:00 p.m.	10
3. Oral presentations	Friday, 4 March, 1:30 p.m.	10
4. Intro & methods draft (II)	Friday, 15 April, 1:30 p.m.	10
4. Scientific manuscript II	Tuesday, 3 May, 5:00 p.m.	15
Analytical paper	Due date	% of grade
1. Measurement & definitions	Tuesday, 1 February, 9:00 a.m.	5
Integrative papers	Due date	% of grade
1. Movement	Friday, 25 March, 1:30 p.m.	20
2. Kin & Social Behavior	paper in lieu of final, 7 May, 5:00 p.m.	20
Participation & attendance	Every day and lab (labs are mandatory!)	5
	TOTAL	100

Written Assignments: for every written assignment, we ask that you turn in (1) an electronic copy to the Blackboard Drop Box and (2) two hard copies to CC and JL.

Grading and Late Policy: Assignments will be graded either with letter grades or with percentages. Translations are as follows, using the B range as an example: B- = 80 – 83.3, B = 83.4 – 86.6, B+ = 86.7 – 89.9. Late assignments are penalized 2% for each day late. All assignments must be completed and handed in prior to 8 May in order to pass the course.

Attendance: Missing a laboratory without prior approval by your Class Advisor will result in a 5% penalty on your final grade. Note well: you will have a FULL laboratory the Friday before Spring Break — DO NOT PLAN TRAVEL BEFORE 5:30 P.M., FRIDAY, 4 MARCH.

Readings

Altringham, J.D. & D.J. Ellerby (1999). Fish swimming: patterns in muscle function. *Journal of Experimental Biology,* 202, 3397-3403.

Anderson, S.W., et al. (1999). Impairment of social and moral behavior related to early damage in human prefrontal cortex. *Nature Neuroscience*, 2(11), 1032-1037.

Battaglia-Mayer,, A., Ferraina, S., Genevesio, A., Marconi, B., Squatrito, S., Molinari, M., Lacquaniti, F., & R. Caminiti (2001). Eye-hand coordination during reaching. II, An analysis of the relationships between visuomanual signals in parietal cortex and parieto-frontal association projections. *Cerebral Cortex*, 11, 528-544.

Blonder, L. X. et al. (2004). Regional brain responses to faces of humans and dogs. *Cognitive Brain Research*, 20, 384-394.

Brower, M. C. & Price, B. H. (2001). Neuropsychiatry of frontal lobe dysfunction in violent and criminal behaviour: a critical review. *Journal of Neurology and Neurosurgical Psychiatry*, 71, 720-726.

Carew, T.J. (2000). *Behavioral Neurobiology: the Cellular Organization of Natural Behavior*. Sinaur: Sunderland Massachusetts.

Chapais B. et al. (2001). Kin selection and the distribution of altruism in relation to degree of kinship in Japanese macaques (Macaca fuscata). *Behavioral Ecology and Sociobiology*. 49, 493-502.

Davidson, R.J., et al. (2000). Dysfunction in the neural circuitry of emotion regulation – A possible prelude to violence. *Science*, 289, 591-594.

Decker, S. A. (2000). Salivary cortisol and social status among Dominican men. *Hormones and Behavior*, 38, 29-38.

de Waal, F.B.M. (2000). Primates — a natural heritage of conflict resolution. *Science* 289, 586-590.

Domenici, P. (2001). The scaling of locomotor performance in predator-prey encounters: from fish to killer whales. *Comparative Biochemistry and Physiology Part A* 131, 169-182.

Domenici, P. & R.W. Blake (1997). The kinematics and performance of fish fast-start swimming. *Journal of Experimental Biology* 200, 1165-1178.

Eaton, R.C., Lee, R.K.K. & M.B. Foreman (2001). The Mauthner cell and other identified neurons of the brainstem escape network of fish. *Progress in Neurobiology* 63, 467-485.

Ehrsson, H. H., Fagergren, A., Johansson, R. S., & Forssberg, H. (2003). Evidence for the involvement of the posterior parietal cortex in coordination of fingertip forces for grasp stability in manipulation. *Journal of Neurophysiology*. 90,2978-2986.

Eifuku, S., et al. (2004). Neuronal correlates of face identification in the monkey anterior temporal cortical areas. *Journal of Neurophysiology*, 91, 358-371.

Ellerby, D.J., Spierts, I.L.Y. & J.D. Altringham (2001). Fast muscle function in the European eel (*Anguilla anguilla* L.) during aquatic and terrestrial locomotion. *Journal of Experimental Biology* 204, 2231-2238.

Elliot, R. (2003). Differential response patterns in the striatum and orbitofrontal cortex to financial reward in humans: A parametric functional magnetic resonance imaging study. *Journal of Neuroscience*, 23(1), 303-307.

Ernst, M. et al. (2004). Choice selection and reward anticipation: an fMRI study. *Neuropsychologia* 42, 1585-1597.

Fehr E. & Gachter, S. (2002). Altruistic punishment in humans. *Nature*, 415, 137-140.

Fetcho, J.R. and S-I. Higashijima (2004). Optical and genetic approaches toward understanding neuronal circuits in zebrafish. *Integrative and Comparative Biology* 44, 57-70.

Ganis, G. et al. (2003). Neural correlates of different types of deception: An fMRI investigation. *Cerebral Cortex*, 13, 830-836.

Grillner, S., Deliagina, T., Ekeberg, O., El Manira, A., Hill, R.H., Lansner, A., Orlovsky, G.N. and P. Wallen (1995). Neural networks that co-ordinate locomotion and body orientation in lamprey. *Trends in Neuroscience* 18(6), 270-279.

Grillner, S. (1996). Neural networks for vertebrate locomotion. *Scientific American* 274(1).

Hale, M.E. (2002). S- and C-start escape responses of the muskellunge (*Esox masquinongy*) require alternative neuromotor mechanisms. *Journal of Experimental Biology* 205, 2005–2016.

Hale, M.E., Long, J.H., Jr., McHenry, M.J., and M.W. Westneat (2002). Evolution of behavior and neural control of the fast start escape response. *Evolution* 56(5), 2002, 993–1007.

Hyman, J. (2002). Conditional strategies in territorial defense: do Carolina wrens play tit-for-tat? *Behavioral Ecology* 13(5), 664-669.

Ishiwaka R. & T. Mori. (1999). Early development of climbing skills in harvest mice, *Animal Behaviour* 58, 203-309.

Jayne, B.C. & G.V. Lauder (1995*a*). Speed effects on midline kinematics during steady undulatory swimming of largemouth bass, *Micropterus salmoides*. *Journal of Experimental Biology* 198, 585–602.

Jayne, B.C. and G.V. Lauder (1995*b*). Are muscle fibers within fish myotomes activated synchronously? Patterns of recruitment within deep myomeric musculature during swimming in largemouth bass. *Journal of Experimental Biology* 198, 805–815.

Johnston, I.A., Van Leeuwen, J.L., Davies, M.L. & T. Beddow (1995). How fish power predation fast-starts. *Journal of Experimental Biology* 198, 1851–1861.

Korff, W.L. & P.C. Wainwright (2004). Motor pattern control for increasing crushing force in the stripted burrfish (*Chilomycterus schoepfi*). *Zoology* 107, 335–346.

LaBar, K. S. et al. (2003). Dynamic perception of facial affect and identity in the human brain. *Cerebral Cortex*, 13, 1023-1033.

Leibenluft, E., et al. (2004). Mothers' neural activation in response to pictures of their children and other children. *Biological Psychiatry*, 56, 225-232.

Lyon, B.E. (2003). Egg recogniction and counting reduce costs of avian conspecific brood parastiasm. *Nature* 422, 495-499.

McHenry, M.J. & S.N. Patek (2004). The evolution of larval morphology and swimming performance in ascidians. *Evolution*, 58(6), 1209-1224.

Mitchell, D. G. V., et al. (2002). Risky decisions and response reversal: is there evidence of orbitofrontal cortex dysfunction in psychopathic individuals? *Neuropsychologia*, 40, 2013-2022.

Norekian, T. P. (1999). GABAergic excitatory synapses and electrical coupling sustain prolonged discharges in the pre capture neural network of Clione limacina. *Journal of Neuroscience*, 19(5), 1863-1875.

Padua-Schioppa, C., Ray, C-S, Bizzi, E. (2004). Neuronal activity in the supplementary motor area of monkeys adapting for a new dynamic environment. *Journal of Neurophysiology*, 91, 449-473.

Penn, D. J. (2002). The scent of genetic compatibility: Sexual selection and the major histocompatibility complex. *Ethology*, 108, 1-21.

Ritter, D.A., Bhatt, D.H. & J.R. Fetcho (2001). *In vivo* imaging of zebrafish reveals differences in the spinal networks for escape and swimming movements. *Journal of Neuroscience* 21(22), 8956-8965.

Sapolsky, R. M. (1996). Why should an aged male baboon ever transfer troops? American *Journal of Primatology*, 39, 149-157.

Schaefer et al. (2002). Olfactory fingerprints for major histocompatibility complex-determined body odors II: Relationship between odor maps, genetics, odor composition, and behavior. *The Journal of Neuroscience*, 22(21), 9513-9521.

Schaal, S., Sternad, D., Osu, R., & M. Kawato (2004). Rhythmic arm movement is not discrete. *Nature Neuroscience*, 7(11), 1270-1279.

Silk, J. B. (2002). Kin selection in primate groups. *International Journal of Primatology*, 23(4), 849-875.

Smith, K.K. (1994). Are neuromotor systems conserved during evolution? *Brain, Behavior and*

Evolution 43, 293–305.

Svoboda, K.R. and J.R. Fetcho (1996). Interactions between the neural networks for escape and swimming in goldfish. *Journal of Neuroscience* 16(3), 843-852.

Tibbetts, E. A. & J. Dale, (2004). A socially enforced signal of quality in a paper wasp. *Nature*, 432, 218-222.

Virgin, C. E. & R. M. Sapolsky, (1997). Styles of male social behavior and their endocrine correlates among low-ranking baboons. *American Journal of Primatology*, 42, 25-39.

Wakeling, J.M. (2001). Biomechanics of fast-start swimming in fish. *Comparative Biochemistry and Physiology, A,* 131, 31-40.

Williams, Z. M., Bush, G., Rauch, S. L., Cosgrove, G. R., & Eskandar, E. N. (2004). Human anterior cingulated neurons and the integration of monetary reward with motor responses. *Nature Neuroscience*, 7(12)1370-1375.

Wong, Y.J. & I.Q. Whishaw (2004). Precision grasps of children and young and old adults: individual differences in digit contact strategy, purchase pattern, and digit posture. *Behavioural Brain Research* 154, 113-123.

Zottoli & Faber (2000). The Mauthner Cell: What has it Taught Us. *The Neuroscientist* 6 (1), 25-37.