

On the following pages you will find the entire first exam from last year's course. This should give you a good feeling for question types, amount of choice in each question and other exam-related issues.

However you should be aware of the following possible shortcomings.

1- Coverage of material may differ from year to year.

2- There are other possible question types not represented here. Among these are

Define *briefly** the neurobiological significance of

a) Occipital lobe – *location of primary visual cortex*

Compare or contrast *briefly** with respect to a common criterion

b) neural tube and neural crest – *tube gives rise to the central nervous system (CNS); the crest to the PNS.*

(note well: *briefly** means no mini-essays)

3- Texts and other readings may differ from year to year

4- Issues in neurobiology (Gazzaniga etc. was not included on the exam last year). It was evaluated separately. Your exam *will* include some Issues questions.

That's about it.

The exam follows on the succeeding pages.

15 Feb. 2007

Examination #1

Welcome to Exam 1 !

1. Write your name at the beginning page of each of the four questions *now*.
2. In all 4 questions, you have a choice of which items to answer.
Read the instructions accompanying each question carefully.
3. You have the full 1 hr. 15 min. for the exam. The exam ends at 12:30 p.m..
- if you have time & one half, proceed to lab 316 or 334 with your paper & continue.
4. Each question counts 25%. Divide your time accordingly.
5. We try very hard to return all papers within one week.
6. According to honor code rules, you must copy & sign the honor code statement below as a condition to have your paper graded (alternatively, you should inform us as to why you could not sign).

Best of luck! [And do well or I'll be depressed when grading them.]

Honor Code Section

"..instructors should require students to write the Honor Code Statement on exams by hand prior to signing it".

"I have not witnessed any wrongdoing, nor have I personally violated any conditions of the

Skidmore College Honor Code while taking this examination."

Student signature

Question #1 (25 points) (answer 10 of 12 questions)

Instructions: Pick the single best answer. Indicate your choice by filling in the space provided to the left of each question number.

Chapter 1

_____ 1. Two of the general categories of brain activity include:

- A. adaptation and internal regulation
- B. sensation and electroencephalogram (EEG)
- C. biological rhythms and internal regulation
- D. all of the above

_____ 2. While considering the relationship of the mind to the brain, the authors of your textbook think:

- A. It is not possible to study the mind.
- B. Study of the mind must include study of the brain.
- C. Only psychologists and philosophers study the mind.
- D. Study of the mind cannot include study of the brain.

_____ 3. The following statement is true:

- A. The peripheral nervous system contains the sympathetic and parasympathetic divisions.
- B. The peripheral nervous system is divided into the autonomic and somatic divisions.
- C. The sympathetic division is part of the autonomic nervous system.
- D. All of the above are true.

Chapter 2

_____ 4. The cellular unit of the nervous system is:

- A. the soma
- B. a nerve
- C. an axon
- D. a neuron

- _____ 5. Which is true of the classification of neurotransmitters?
- A. acetylcholine is an amino acid
 - B. dopamine and norepinephrine are amino acids
 - C. serotonin is a catecholamine
 - D. acetylcholine is a catecholamine
- _____ 6. In the peripheral nervous system, which cells form the myelin sheath?
- A. oligodendrocytes
 - B. Schwann cells
 - C. astrocytes
 - D. multipolar neurons

Chapter 3

- _____ 7. Which of the following statements about neural tube development is true?
- A. The neural groove forms the neural crest.
 - B. The neural groove develops into the ectoderm.
 - C. The neural tube contains the neural crest.
 - D. The neural tube forms from the neural groove.
- _____ 8. Neuronal development is divided into 8 major processes. Which of the sequences below is correct?
- A. induction – migration – proliferation - apoptosis
 - B. induction – migration – aggregation – apoptosis
 - C. migration – proliferation – aggregation – apoptosis
 - D. induction – aggregation – migration – apoptosis
- _____ 9. After birth in humans, the number of neurons:
- A. decreases
 - B. increases but the number of synapses decreases
 - C. increases
 - D. equals the number of synapses

Chapter 4

- _____ 10. Feature detection of visual information is located:
- A. in the retina
 - B. in the primary visual cortex
 - C. in the temporal lobe
 - D. in the lateral geniculate body

_____ 11. The part of the cortex where auditory information travels first is:

- A. to receptors in the cochlea
- B. to the primary auditory cortex
- C. to the medial geniculate body
- D. to the inferior colliculi

_____ 12. On its way to the brain, olfactory information:

- A. passes through a cranial nerve
- B. does not go to the thalamus
- C. goes directly to the olfactory bulb
- D. all of the above
- E. none of the above

Did you answer only 10?

_____10. Early in development adjacent columns in the visual cortex are innervated by neurons connected to both eyes.

Lecture 6

_____11. In the general sensory map of the body, those parts of the body most important for reproduction have relatively large representations.

_____12. If the two central fingers of one hand of a monkey are sewn together, months later the cortical maps of them change such that the sharp border once present between the fingers is now blurred.

_____Lecture 7

13. The ability of congenitally (cortically) blind individuals to ward off objects thrown at them is dependent on an intact inferior colliculus.

_____14. On-center lateral geniculate body (LGB) cell will fire action potentials more frequently if light is shown on the periphery of its visual field.

Did you answer only 10?

Matching

N A M E

Question #3 (25 points) (answer only 10)

Instructions - Match the item in column A with the best choice from column B. Indicate your answer by filling the appropriate number from column B.

Column A	Column B
Lecture 1	
_____ prosopagnosia	1. associated with the midbrain
_____ central sulcus	2. shows brain activity
Lecture 2	
_____ Tetrodotoxin	3. substance P blocks
_____ Pakistani coal walkers	4. fertilization outside womb
Lecture 3	
_____ Acetylcholinesterase	5. strobe-like visual perception
_____ Thalamic stimulator	6. one of eight cells is removed
Lecture 4	
_____ Diencephalon	7. inability to recognize faces
_____ Cerebral aqueduct	8. unpaired forebrain derivative
Lecture 5	
_____ PET scan	9. separates sensory & motor cortex
_____ Barrels	10. whisker sensory cortex
Lecture 6	
_____ Spinal cord pain gating	11. Na channels
_____ Referred pain	12. located in the temporal lobe
Lecture 7	
_____ motion blindness	13. synaptic chemical inactivator
_____ Barn owl auditory map	14. angina (heart pain)
Gazzaniga 1	
_____ Preimplantation genetic diagnosis	15. Michael J. Fox
_____ IVF	16. genetic lack of a type of Na channel

Did you answer only 10?

Essay Question

N A M E

Question #4 Pick one topic or one case (note well: one essay total; no more!)

A. **Topics** – Development- Answer ONE choice from below.

The development of the brain and nervous system proceeds in a step by step sequential manner. The sequence is *genetically programmed* but is capable of being altered via *interaction with environmental events*.

Pick ONE of the choices below and discuss *fully* how this interplay of genetics and environment is illustrated by that experiment or situation.

- 1) Clipping mouse whiskers and the effects on the corresponding cortical barrels.
- 2) The effects of closing one eye with a patch on the development of the visual cortex in a newborn animal.
- 3) The effects of closing both eyes with patches on the development of the visual cortex in a newborn primate.

OR

B. **Cases** (pick ONE case)

For one of the cases below, discuss 1) what is the nature of the abnormality (e.g. symptoms, how does this person differ from the norm) 2) the neurobiological basis of the abnormality (what brain systems, chemical, structures, etc. are askew and how) and 3) possible treatments or natural alleviation (and the neurobiological mechanisms by which they may or may not work).

(a word of warning- be certain to focus on the neurobiology, not just the 'human' aspects)

- 1) Gerald – blind from birth but learns to "see"
- 2) Paulette – prosopagnosia
- 3) Parkinson's disease - Terry Thomas & M. Moufle
- 4) Agnes DeMille - brain damage due to cerebral vascular accident

OR

C. **Topic** – Brain Mapping of the World (pick ONE sensory map type)

Those of you who have taken a philosophy course may know of Bishop George Berkeley (pronounced Barkley), an Irish Anglican Bishop who lived from 1685-1753. As a philosopher he was

- an empiricist (i.e. everything that we know is based on sense knowledge) and
- an idealist (i.e. the universe is made up only of minds and ideas in those minds not of matter)
- there is nothing real outside of the mind or in more blatant terms
- matter ('the real world') does not exist; it is all a construction of our senses.

Berkeley lived before the time of neuroscience but might have found some measure of support in the recent development of our understanding of how the brain maps the world.

In a sense, *maps are selections* by the brain from among the welter of stimulus information input, *of the information "it is interested in"* and a *rejection* by the brain *of all other information*.

Pick *one type* of brain mapping (general sensation, visual mapping, auditory mapping) and show how indeed the brain is "constructing" the sensory world.

(One case OR topic)

If you are stopping here, your essay is probably too short!

Essay (Reminder: only one essay)