

### Directions and Questions for First Exam

Bring **two** bluebooks available in the university bookstore with **nothing** written in or on them (not even your name). These may be redistributed at the time of the exam.

The exam will consist of the two parts, for which the instructions are as follows:

**Part A. Answer each of the following six questions in two to three sentences each (do not go on at length—you will *not* receive extra credit for going beyond a basic answer). Each question is worth up to 5 points (30 points total).**

The actual questions will be drawn from those listed below:

1. What is a major reason cognitive science largely ignored neuroscience in the 1970s and 1980s?
2. What point about the brain was Fodor making using the example of the multiple ways to realize money?
3. What is the deductive-nomological model of scientific explanation?
4. On the deductive-nomological model, what would the reduction of cognitive science to neuroscience require?
5. What was one of the main points on which Kuhn dissented from the “received view” in philosophy of science?
6. What are the components of a mechanistic explanation?
7. What is meant by “decomposing a mechanism”?
8. What are two major differences between deductive-nomological and mechanistic explanation?
9. What is meant by “reduction” on the account of mechanistic explanation?
10. How did Gall propose to link mental capacities to the brain?
11. What is meant by holism with respect to the functioning of the brain?
12. How did Broca determine the site where damage affected articulate speech in Leborgne (Tan)?
13. What is a major difference in the ways Broca and Wernicke addressed language deficits?
14. What are the main claims of the neuron doctrine?
15. What was the principal point of disagreement between Golgi and Cajal?
16. What was the main strategy Huxley employed in developing his and Hodgkin’s model of the action potential?
17. What criteria did Brodmann use to demarcate areas of the brain?
18. What are two of the challenges in interpreting lesion studies?
19. What is meant by saying that primary visual cortex contains a retinotopic map?
20. What sorts of stimuli did Hubel and Wiesel discover elicited responses from simple cells in V1?
21. How does the perception of color in V1 and V4 differ?
22. How is the vision of animals and humans with lesions in inferotemporal cortex affected?
23. How did Mishkin, Ungerleider and Macko characterize the two visual pathways?
24. What is the task of computational theory as the highest level in Marr’s three levels of analysis?
25. What is meant by “top-down processes” in perception?

**Parts B. Address the following two questions each in an essay (35 points each).**

On the actual exam, I will pick two of the following questions. Write as clear and detailed essays as you can in the time allotted.

1. Compare the approach to decomposing mental activities and localizing them in the brain pursued by Gall or Broca (pick one) on the one hand and in the research of Hubel and Wiesel on vision on the other. What sorts of mental traits does each seek to localize? How are these mental traits identified? What affects on behavior would be predicted by each if the associated brain area is damaged? Under what conditions would you expect to see increased activity in the associated brain area?

2. Evaluate Flourens' claim "The entire doctrine of Gall is contained in two fundamental propositions, of which the first is, that understanding resides exclusively in the brain, and the second, that each particular faculty of the understanding is provided in the brain with an organ proper to itself. Now, of these two propositions, there is certainly nothing new in the first one, and perhaps nothing true in the second one." Is he fair to Gall? Is he right in his assessment of Gall? (Be sure to discuss the type of empirical evidence he employed to support his contentions.)

3. Construct a debate between Golgi and Cajal. Discuss the nature of the evidence each had and how each interpreted it. Consider why each thought their interpretation of the evidence was superior. Why was neither moved by what the other said. After presenting the debate, reflect on how disagreements like this are ultimately resolved.

4. Controversies between holists and localizationists have arisen several times in the history of neuroscience. What are the major differences between holists and localizationists. Focus on two episodes we have discussed and identify what sorts of evidence the advocates for each side in the debate offered for their position. How did the controversy get resolved in each case? Are controversies between holists and localizationists likely to be an ongoing feature of neuroscience, or can one of the positions be permanently refuted?

5. Describe how the projects of decomposition and recomposition figure in the development of mechanistic explanations, drawing examples for the history of neuroscience research on vision. Identify and discuss at least two examples of research contributing to the decomposition of visual processing, making clear what information each provided about the mechanisms of vision. Discuss at least one example of attempts to recompose the visual system, being clear about how the recomposition was done and what understanding it provided about how vision works.

6. In studies linking MT to motion perception, three different research techniques were employed. Identify them and describe how each of these techniques works and what each, on its own, shows about the operations performed by MT. Taken individually, what are the limitations of each? How do they complement each other? How might skeptics still raise doubts about what MT itself does? Can such skeptical objections ever be fully to rest?

7. Mishkin, Ungerleider, and Macko on the one hand and Milner and Goodale advance different interpretations of the differentiation of visual processing into two streams. What is the basic difference between their accounts? How could competent investigators differ in such ways? What roles do such differences play in the development of scientific inquiry? How might they be resolved in the future?