CH. 9. FUNCTIONING OF THE EXPERIENCED LEARNER - STUDY QUESTIONS

1. In your own words, explain the meaning of the following statement in the readings: "The environment of the moment remains necessary of the interpretation of complex behavior ... [but] … it becomes increasingly insufficient as the selection history grows more extensive."

2. Can a relation that was originally selected for one reason (i.e., as a result of one contingency) later serve a different function? Explain. Does this situation arise with natural selection as well as with behavioral selection? [Hint: Do you recall the selection history of feathers from Chapter 1?]

Environmental Guidance in the Experienced Learner

3. The first and second paragraphs of this section review the selection process—the first paragraph discusses selection on the behavioral level, the second on the neural level. (See **Figure 9.1** and carefully follow the account in the caption.) Do you understand each point that is made?

Activation Patterns

4. What is an *activation pattern*? Why is it said that "an activation pattern is not a static entity"? Does behavior always occur when the environment evokes an activation pattern? Explain.

Sensory Component

5. Does the environment evoke an entire (complete) activation pattern all at once? Explain your answer.

Measurement of activation patterns

6. What are two techniques that can be used to measure activation patterns? The techniques use either m_____ electrodes or p_____ - e_____ t_____, or _____ - s_____. Indicate an advantage and a disadvantage of each method.

7. What is the difference between the findings with PET-scans when unfamiliar and familiar auditory stimuli are presented to a listener? (See **Figure 9.2**.) How might you account for (interpret) this difference?

Motor Component

8. Under what circumstances does an activation pattern include a motor component? Use the term *discriminated stimulus* in your answer.

9. Sketch the differences in the outcomes of PET-scans when the following stimuli are presented to a subject -- a meaningless sound, a speech sound such as /sh/ or /b/, a speech sound such as "sheep" or "boy". How might you account for these differences?

Inhibitory Processes in Activation Patterns

10. What conditions select (modify the strength of) inhibitory connections? In general, what role do inhibitory connections play in the functioning of the nervous system? What is the effect of this process on behavior?

BEHAVIORAL EFFECTS OF ACTIVATION PATTERNS

11. What is the main point made by the example in which the word "bread" was omitted or obscured by other sounds? Use the terms *context* and *primed* in your answer.

Priming Procedure

12. Describe a priming procedure using the terms *priming stimulus*, *target stimulus*. and *target response*. Illustrate the procedure with words other than those used in the readings.

Priming and Activation Patterns

13. In terms of activation patterns, what must occur if the priming stimulus has an effect on the response to the target stimulus? Explain your answer.

Possible regions of overlap in activation patterns

14. The activation patterns of the priming and target stimulus may overlap in many regions of the brain. Construct examples that illustrate each of the points made by the examples in the readings; e.g., stimuli that are apt to cause overlap only in sensory regions, only in motor association regions, etc.

Extent of Priming

15. Describe the type of priming procedure known as a *naming task*. Use the technical terms *textual response* and *latency* in your answer.

16. Suppose that the priming stimulus was “pot,” would responses to the target stimuli of both PAN and MARIJUANA be primed, and why? Suppose that the priming stimulus was a sentence such as “John looked in the kitchen cupboard for a pot.” What effect would this priming stimulus have on the responses primed by pot? How would you account for any difference from the first result?

17. Indicate how eye movements may be used to assess priming. Are these eye movements observing responses? Explain.

18. Use the priming of responses to “stripes” by the priming stimulus of “lion” to illustrate some of the difficulties in inferring underlying biobehavioral processes from behavioral data alone. Is this a weakness of the biobehavioral approach? Is this alleged weakness overcome by postulating inferred cognitive processes? Explain.

Restrictions on the extent of priming

19. Discuss the role of inhibitory processes in restricting the extent of the activation pattern. In particular, how could you interpret the fact that an ambiguous priming stimulus with one dominant meaning first primes the response to all related target stimuli but after a few ms primes only the response to the most dominant target stimulus?

Inhibitory processes in priming

20. What do PET-scans indicate about the effect of meaningful as opposed to meaningless stimuli on the extent of the activation pattern evoked by a stimulus. (See **Figure 9.4**.) Speaking technically, what is a meaningful stimulus from a biobehavioral perspective?

21. How can inhibitory processes reduce the latency of a response to a target stimulus? Do you understand the analogy with a person pushing his way through a crowd?

Temporal Effects on Priming

22. In general, why should the interval between the presentation of the priming and target stimuli affect the latency of the response to the target stimulus?

23. Summarize specific behavioral evidence that is consistent with the answer that you gave to the preceding question. Include in your answer a reference to cross-modal priming.

24. Why should words that are related only by their meaning require a longer interstimulus interval between the priming and target stimuli to demonstrate priming?

Contributions of Priming to Complex Behavior

25. Is priming a phenomenon that occurs only in the laboratory or does it also occur in everyday living? Explain your answer, illustrating it with a possible everyday example.

26. What is the difference between s_____ and p_____ processing? Indicate a likely example of each in the formation of activation patterns in the brain and of the responses mediated by those activation patterns.

Schemata

27. Relate schemata, a concept from cognitive psychology, to the concept of context from biobehavioral science.

Enduring effects of priming

28. Comment of the possible lasting effects of priming through the effects of internal reinforcement (via feedback from the motor association cortex to the VTA). Which stimulus functions as a potential reinforcing stimulus, the priming or the target stimulus, and why?

Multiple Determinants of Priming

29. Is priming a fundamental biobehavioral process? Explain your answer. Comment on the following statement: In a priming procedure, the response to a target stimulus occurs more rapidly because it is primed.

Recurrence and reafference

30. What is the difference between a f_____-_____ network and a network with r_____ connections? Which of these networks is characteristic of the nervous system? Explain your answer.

31. Explain the following statement: "Functionally, the effect of activity conveyed by recurrent connections is similar to the effect of changes in behavior that produce changes in the environment sensed by the organism."

32. Comment on some differences between *afference* and *reafference*.

33. Why should priming mediated by recurrent connections require longer interstimulus intervals between the priming and target stimuli?

34. Summarize the procedure and results of a priming experiment that can be interpreted as an effect of recurrent connections.

35. Under what conditions should extended practice on a task cause a shift from priming mediated by recurrent connections to priming mediated by feed-forward connections? Explain your answer making reference to the previous experiment

Priming and Awareness

36. What conclusion follows from the experiments described in this section concerning whether awareness of the priming stimulus is necessary for priming? What findings support this conclusion, using the terms *thresholds of detectability* and of *semantic detection*? Comment on the relation of these findings to what was previously referred to as the *verbal bias*.

37. What is the threshold of detectability, and how was it determined experimentally?

38. What is the threshold of semantic detection, and how was it determined experimentally?

39. What were the different effects of priming when the priming stimulus was presented just below these thresholds?

IMAGING

40. Technically, what is meant by the term *imagining*?

41. In terms of your preceding definition, explain the meaning of the statement, "...under some conditions a subject "sees" in the absence of the stimuli that guide seeing"?

41. Describe a procedure used to evaluate the priming effects of possible and impossible line drawings of objects? (See **Figure 9.6**.) What were the findings and what are the implications of this experiment?

42. Can priming occur when the priming and target stimuli are from different sensory modalities? Describe a procedure that evaluates this question, and indicate the findings and implications of this study.

53. Describe what occurs when you try to imagine the number of windows on the front of the place where one of your best friends lives? Relate what you imagined to the discussion in the readings.

Behavioral Observations

54. Describe some behavioral observations that are consistent with the interpretation that, when subjects are instructed to imagine a stimulus or a behavior, the resulting activation patterns include sensory and motor components that are similar to those initiated by the imagined events themselves.

55. Describe the procedure and findings of studies in which subjects were asked to indicate whether two line drawings could be renderings of the same object from different vantage points. (See **Figure 9.7**.)

56. Can we conclude from the preceding findings that the subjects mentally rotated the figures in their heads in order to respond in these experiments? Explain your answer. [Hint: Can we safely infer sub-behavioral processes from behavioral observations alone? How is the verbal bias relevant to these results?]

Physiological and Neuropsychological Observations

57. In neuropsychological studies, are the observations at the behavioral level or the physiological level? Explain your answer.

58. Are wholly different neural mechanisms involved when seeing an object and when visualizing (visually imagining) an object? Cite experimental evidence to support your answer. (See **Figure 9.8**.)

59. In the study in which a person with damage to the right visual association cortex was asked to imagine a plaza that was familiar to him, why did the investigators ask him to imagine the plaza both when looking North and when looking South? What were the findings and what were their interpretations of this study?

Interpretation of Imagining

60. In general terms, state the relation between sensing and imagining.

61. What is meant by *affordance*, and what is its relevance to components of activation patterns?

AWARENESS

62. Refresh your memory, technically what does it mean to be aware of a stimulus?

Neuroanatomical Basis of Verbal Behavior

63. Sketch the lobes of the cerebral hemispheres and indicate something of the functions that are mediated by the neurons in each lobe. (See **Figure 9.9**.) Review the function of the *corpus callosum*. (See **Figure 7.2**.)

64. What are the two types of brain damage whose effects on verbal behavior are examined in the next section?

Effects of Damage to the Corpus Callosum

65. What effect should interrupting the corpus callosum have on the integration of activity between the right and left cerebral hemispheres? Explain your answer. Specifically, what should be the effect on verbal behavior, and why?

66. What should be the effect of interrupting the corpus callosum on the ability of light falling on the retina to activate neurons in the left and right primary visual cortices of the occipital lobes? Explain your answer neuroanatomically.

67. Describe the logic and procedures of the "key-case" experiment. What were the findings with respect to the guidance of verbal behavior by visual stimuli? How did the findings differ with regard to the guidance of behavior of the hands, and why?

68. What are the implications of these experiments for the common view that, before acting, we must first have an "idea" or the "will" to act?

Effects of Damage to Intrahemispheric Pathways

69. Sketch the major pathways outlined in **Figure 9.10**. Indicate the functions that are apt to be affected by interruption of these pathways at the places indicated by the letters a, b, and c.

70. Interruption of the pathways between sensory association cortex and the h_____ produce a deficit known as h_____ a_____.

Hippocampal amnesia

71. From what you learned in the chapter on perceiving, what should be the effect on environment-behavior relations of interruption of pathways between the hippocampus and sensory association cortex? Differentiate between the likely effects on previous environment-environment selections and those on future selections. Explain why this difference is expected.

72. Summarize evidence that is consistent with the expectations described in the previous question. What types of relations cannot be acquired; what types can still be acquired -- and why? Use the terms *retrograde* and *anterograde amnesia* in your answer.

73. Are only *polysensory integrations* that involve verbal behavior affected when pathways between the hippocampus and sensory association cortex are interrupted? Cite evidence to support your answer and indicate why this evidence is consistent with expectations.

74. Comment on our ability to use experimental analysis to investigate verbal behavior in humans. What are some implications of these limitations?

75. What did Marvin Minsky mean when he said: "Reflective thought is the lesser part of what our minds do".