

9.10/9.100 REVIEW QUESTIONS

Developmental Cognitive Neuroscience

1. Briefly outline what the A~B (read “A-not-B”), Object Retrieval and Delayed Response tasks are.
2. According to Diamond, correct performance on these tasks by infants depends on the maturation of the frontal lobes.
 - Why does she infer that the frontal lobes must be involved?
 - Why does she infer that the improvement is due to maturation and not something else?
3. Why is it that infants don't make the A~B error when...
 - they are allowed to look at or orient their bodies toward the well with the hidden toy?
 - no delay is imposed?
 - the well with the hidden toy is indicated by some object (a landmark)?
4. In the Object Retrieval task, why do human and monkey infants perform better when the reward is covered by an opaque box, as opposed to a transparent box?
5. What abilities, which are mediated by the frontal lobes and acquired gradually by the infants as they mature, are required for success on these tasks?
6. What physiological changes in the maturing prefrontal cortex might underlie improved performance on these tasks?
7. Do lesions of the hippocampus and parietal cortex lead to errors on the A~B task (with delays < 10 sec)? What, if anything, does this reveal about infants' performance on this task?
8. Suppose you are told that hippocampal lesions impair performance on the A~B task at long delays (> 10 sec). Would you expect the same *pattern* of errors as that seen when frontally-lesioned subjects and infants perform the A~B task with short (<= 10 sec) delays? Why or why not?
9. Why do children treated early and continuously for phenylketonuria (PKU) have a selective reduction of dopamine in the central nervous system? Which parts of the central nervous system are most affected?

10. Do reduced levels of dopamine in the prefrontal cortex cause impairments similar to those seen with prefrontal damage? Describe a few studies which have addressed this issue.