

Homework 2

Out: Wed. March 2, 2011

Due: Wed. March 23, 2011

Pick 6 of the following 10 questions and answer each one of them in details.

1. What is the difference between learning and development? If you think that they are different then give an example that makes the distinction obvious. If you think that they are the same then explain why.
2. What is a circular reaction? Give several examples. Why do you think Piaget put so much emphasis on circular reactions during the early stages of child development?
3. Summarize the main points of Piaget's theory (sensorimotor stage only). Provide at least a paragraph for each of the six stages.
4. Describe the essence of the enactive approach. List its main strengths. List some of its weaknesses. Describe a robot architecture that uses this approach.
5. What is an affordance? Why are affordances important in robotics? Compare and contrast the approaches in at least three different robotics papers that describe computational models of affordances.
6. What is an exploratory behavior? Where does it come from? Many primitive animals (and even humans) exhibit a wide range of innate behaviors and reflexes. Some of these can be quite elaborate (e.g., fixed action patterns, courting rituals, etc.). How do you think these behaviors are encoded? Try to be as specific as possible.
7. What is intelligence? What do intelligence tests really measure? What are some of the common problems that show up on intelligence tests? Why does the ability to solve these specific types of problems correlate with intelligence? Or does it?
Suggest several intelligence tests for robots.
8. Why is self-detection important for normal development? Compare and contrast the existing methods for self-detection in robots. What are their strengths? What are their weaknesses?
9. What is a body schema? What are its properties? Why is it important? Compare and contrast the existing computational models of body schemas in robotics. What are their strengths? What are their weaknesses?
10. Compare and contrast the existing approaches to *autonomous* tool use in robotics. What are their strengths? What are their weaknesses? How do they stack up against the autonomous tool using abilities of animals.