

**COMP 150: Developmental Robotics**  
**Homework 2**  
**Due Thursday, October 12th**

**Pick 4 of the following questions. Your answers should be at least 2-3 paragraphs long.**

1. In class, we discussed self-recognition as a pixel labeling problem -- the robot needs to detect which pixels in its camera image are part of its body. What other ways are there to formalize this problem? What else would the robot need to detect about itself other than individual pixels? What type of an experiment or data would need to be collected to solve the problem?

2. Our body is the most persistent and predictable part of the environment (we can't run away from it) and yet our brain is capable of modifying our body schema in seconds. Why is our body schema so pliable? Give an example of a task and explain how having a malleable body schema helps us to solve the task.

3. What is an affordance anyway? Try to give your own definition. Why is it that robots need to learn affordances rather than pre-programming affordance related knowledge in advance?

4. Suppose that two robots have a non-overlapping set of exploratory behaviors coupled with different sensors which they use to explore a specific object. Will these robots "understand" the object in the same way? Would it be ever possible for these two robots to have a "shared" understanding or knowledge of the same object?

5. Gibson claims that children first learn the affordances of objects and only then do they learn their properties/features/qualities. Later on in development, however, children can guess the affordances of objects by observing their visual features (without necessarily having to interact with them). Finally, at even later stages, children can infer the affordances of object using language used to describe those objects. How could a robot learn a mapping from visual features to affordance or from language to affordances of an object?

6. As the deadline for the project proposal, think of a research question that interests you related to robotics and the class in general. What kind of a test would you need to perform to answer it? What type of a method would need to be developed to enable the robot to solve the problem you're thinking of? What else would you need to know to accomplish the task?



