Computational Cognitive Science, Tutorial 03

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This week's tutorial is mostly conceptual questions that examine how we can use Bayesian models to answer how people perform different kinds of generalization. Also, since your first Problem Set should be out this week, if you have any questions about it feel free to bring them up in this week's tutorial.

1 More on Bayesian Inference

- What are the components required to specify a Bayesian model? Give an example of each of these components, from examples of Bayesian models we have seen in class.

2 Inductive Generalization

- What is a generalization gradient? From empirical work, what do we know about the shape of generalization gradients in humans (and non-humans)?
- What happens to generalization gradients as we begin to see more and more data? Which component of Bayesian models leads to this effect?

3 Number rules

- Consider the number rule game from last week's lecture. We saw that from 5 positive examples of the rule (9, 36, 25, 49 and 1), it seemed obvious to conclude that the correct rule was perfect squares. But is it really obvious? Consider the set of natural numbers from 1 to 100. How many possible subsets of numbers or number rules such as $\{10, 20, \ldots, 100\}$ (multiples of 10), or wacky ones like $\{35, 64, 57\}$ exist?
- Suppose you see a single positive example, how many possible number rules out of the possible subsets remain that are consistent with your one observation? What about after five positive examples?

4 Inductive and deductive reasoning

- What are some examples of the kinds of phenomena found in inductive reasoning tasks? Can you give examples of each of these phenomena using a different set of premise and conclusion sets than the ones covered in the lecture?
- What is frame monotonicity? How does frame monotonicity lead to the idea that inductive and deductive reasoning have the same underlying mechanism?