

Informatics One: Cognitive Science

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1 Introduction

Welcome to Informatics One: Cognitive Science. This course serves as a foundational introduction to cognitive science with a computational focus. The course is structured to cover both cognitive science principles and computational modeling techniques.

2 Course Overview

2.1 What is Cognitive Science?

Cognitive science is defined as the science of mental representation and processes. It encompasses various disciplines including psychology, neuroscience, artificial intelligence, linguistics, philosophy, and anthropology. The course will primarily focus on cognitive functions such as vision, language, memory, and decision-making.

2.2 Course Structure

The course is divided into two main parts:

- The first part focuses on high-level cognitive functions, particularly language and decision-making.
- The second part, taught by Matthias Hennig, delves into neuroscience, exploring how the brain processes information and its implications for cognitive science.

3 Course Organization

3.1 Assessments

The assessment structure includes:

- One practical assignment (20%)
- Quizzes (4% each, totaling 20%)
- Final exam (60%)

Quizzes will occur every other week, and there will be a practice assignment available for feedback.

3.2 Lectures and Tutorials

Lectures will be held three times a week, with recordings available for those unable to attend in person. Tutorials will provide smaller group sessions for discussion and clarification of lecture material.

3.3 Labs

Practical lab sessions will be held to support programming skills in Python, essential for the assignments. These labs will start in the second week of the course.

4 Cognitive Functions and Computational Modeling

4.1 Cognitive Functions

The course will explore various cognitive functions:

- **Vision:** Understanding how visual information is processed.
- **Language:** Examining language acquisition and processing.
- **Memory:** Investigating how memories are formed and retrieved.
- **Decision-Making:** Analyzing how decisions are made under uncertainty.

4.2 Computational Modeling

Computational modeling is emphasized as a vital tool in cognitive science. It allows for:

- Evaluating theories and generating new hypotheses.
- Simulating cognitive processes to better understand behavior.

5 Examples and Applications

5.1 Neuroscience and Cognitive Modeling

The course will include discussions on how brain structures relate to cognitive functions. For instance, studies show that the hippocampus can physically grow with learning, as seen in taxi drivers who navigate complex environments.

5.2 Cultural Perspectives on Cognition

The course will also explore cognitive abilities in different cultures, such as the Pirahã tribe, which lacks number words but can still perform quantity matching tasks.

6 Conclusion and Next Steps

The first lecture concluded with a preview of the next session, which will address decision-making through a practical example involving pizza sizes and area estimation. Students are encouraged to engage with the course materials and participate actively in discussions.