Building Brains –
Intelligence, Computability, and the Mind

In 1920 Hilbert famously challenged the consistency of the construct of mathematics – in the hope for a positive answer. The question was: Can all of mathematics be formulated as a set of algorithms, or will there always be new problems that cannot be solved by any given algorithm but only by human creativity? What Hilbert – speaking of algorithms – had in mind was some machinery operating on strings as finite entities. This idea surfaced again a little later in the work of Church and Turing, preparing the ground for modern computing machinery and, in particular, Artificial Intelligence as a discipline with all its achievements in mathematics and with all its problems on the programmatic and conceptual side.

The two-week advanced seminar "Building Brains" (in English) will focus on select topics in Artificial Intelligence, formally/mathematically introduce the concept of Turing computability, and discuss aspects of agency and autonomy as well as formal issues in ethics. Prior knowledge of mathematics and/or logic is helpful but no pre-requisite. Students are asked to present a philosophical text and to write a short essay to receive credits. Topics include:

- Computability and its limits
- Turing machines
- Church's thesis
- Recursive functions
- Mind and brain
- Implementability of ethical theories
- Action, autonomy, and causal planning

Schedule

The seminar will have 9 sessions and take place 31 March to 4 April and 7 April to 10 April. It will be followed by a one-day graduate workshop on 11 April, 2014.

Graduate Workshop on "Implementing Intentionality" (11 April, 2014)

Dr. Roland Poellinger (Munich Center for Mathematical Philosophy – Munich, Germany) and the Pécs Doctoral School of Philosophy are organizing a graduate workshop on 11 April, 2014, at the University of Pécs.

We invite student essays on the topic: "Implementing Intentionality"
In 1950 Alan Turing formulated his famous *Imitation Game* to compare natural and artificial intelligence in a behavioral test (cf. *Computing Machinery and Intelligence*). The *Turing Test* reduces intelligence per se to linguistic competence, which has been criticized by many authors. One of the main points of criticism is the fact that *Turing's Imitation Game* does not measure intentional thinking, supposedly one of the characteristic faculties of the human mind. If the Turing Test is to be understood as a measure of intelligence, then the question remains if intentionality is maybe not one of the building blocks of intelligence. Others have argued that intentionality simply does not surface in intelligent behavior. Can there be any way to define intentionality in an explicit way? In an attempt to formally pin down what intentional agency amounts to we might arrive at thinking about ways of implementing this concept. We invite papers reflecting on this topic and connected problems.

How to submit a paper
Extended abstracts (up to 1000 words, written in English) *along with a short CV* (all in pdf format) are to be sent via mail to imp-int@outlook.com by 6 April, 2014.

Contact Details

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Graduate Seminar "Building Brains"
Syllabus and Reading

Session 1: Preliminaries and Introduction

Preliminaries and Introduction
[01] Dreyfus: Artificial Intelligence

Session 2: Artificial Agents

[02] Scriven, Michael: The Compleat Robot – A Prolegomena to Androidology
[03] Turing, Alan: Computing Machinery and Intelligence

Session 3: Turing Machines

Lecture: Church's Thesis and Turing Computability
Tutorial: Implementing Turing Machines

Session 4: Limits of Computability

[04] Boolos, Burgess, Jeffrey: Uncomputability – The Halting Problem (in "Computability", chpt. 4)
Lecture: Introduction to Recursive Functions

Session 5: Computer and Man

[05] Simon and Newell: Information Processing in Computer and Man
[06] Putnam, Hilary: Minds and Machines

Session 6: Neurons and Networks

Video lecture and discussion:
Hannes Leitgeb – Logic and the Brain (available through the MCMP website, see "Media")

Session 7: Simulated Cognition

[07] McCarthy: Ascribing Mental Qualities to Machines
[08] Searle: Minds, Brains, and Programs

Session 8: Implementing Ethics

[09] James Moor: Is Ethics Computable? Metaphilosophy, 2007.
[10] Colin Allen and Wendell Wallach: Moral Machines: Contradiction in Terms, or Abdication of Human Responsibility?

Session 9: Action and Autonomy

[11] Pearl, Judea: Epilogue to "Causality"
[12] Mathias Gutmann, Benjamin Rathgeber & Tareq Syed: Action and Autonomy: A Hidden Dilemma in Artificial Autonomous Systems