

Human Reasoning and the Weak Completion Semantics



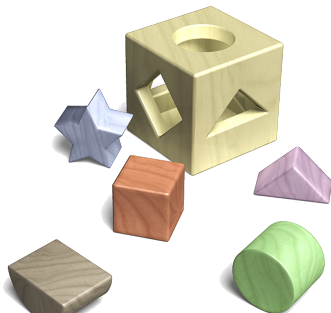
Human Reasoning and the Weak Completion Semantics

Steffen Hölldobler

Technische Universität Dresden, Germany

North Caucasus Federal University, Russian Federation

- ▶ **Human Reasoning**
- ▶ **Some History**
- ▶ **Subareas**
- ▶ **Table of Contents**
- ▶ **Working Material**



"Logic is everywhere ..."

Human Reasoning

- ▶ **Instructions on the boarding card distributed at Amsterdam Schiphol Airport**
 - ▷ *If it's thirty minutes before your flight departure, make your way to the gate*
As soon as the gate number is confirmed, make your way to the gate
- ▶ **Notice in the London Underground**
 - ▷ *If there is an emergency, then you press the alarm signal bottom*
The driver will stop, if any part of the train is in a station
- ▶ **Observations**
 - ▷ Intended meaning differs from literal meaning
 - ▷ Rigid adherence to classical logic is no help in modeling the examples
 - ▷ There seems to be a reasoning process towards more plausible meanings
 - ▶▶ *The driver will stop the train in a station, if the driver is alerted to an emergency and any part of the train is in the station*
Kowalski: Computational Logic and Human Life 2011

Human Reasoning – More Examples

- ▶ **What follows from the following sentences?**
 - ▷ *If I solve all exercises, then I will pass the exam*
I solve all exercises
 - ▷ *If I do not water my plants, then they will die*
I water my plants
 - ▷ *In some cases when I go out, I am not in company*
Every time I am very happy, I am in company
- ▶ **What are adequate models of human reasoning?**
- ▶ **Can logics adequately model human reasoning?**
- ▶ **Are models formal, computational, and cognitive?**

Some History from a Personal View

- ▶ **Logic programming and logic based knowledge representation and reasoning**
 - ▷ **Least models**
- ▶ **Neural-symbolic integration**
 - ▷ **Connectionist model generation**
- ▶ **Models versus mental models**
- ▶ **Errors in** Stenning, van Lambalgen: Human Reasoning and Cognitive Science 2008
 - ▷ Łukasiewicz: O logice trójwartościowej 1920
 - ▷ H., Kencana Ramli:
Logic Programs under Three-Valued Łukasiewicz's Semantics 2009
 - ▷ **Weak Completion Semantics (WCS)**
- ▶ Khemlani, Johnson-Laird: Theories of Syllogisms: A Meta Analysis 2012
 - ▷ **WCS outperformed 12 cognitive theories**

Subareas

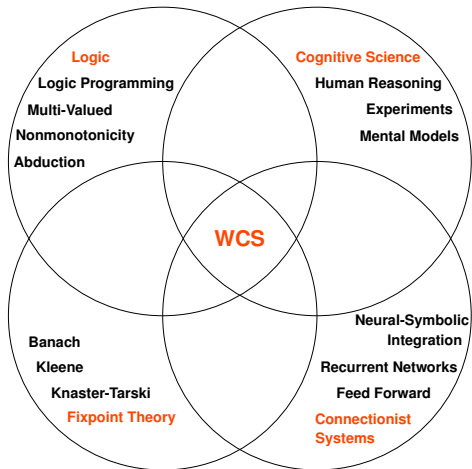


Table of Contents

- ▶ **Introduction**
- ▶ **Foundations**
- ▶ **Theory**
- ▶ **Applications and Extensions**
- ▶ **A Connectionist Realization**
- ▶ **Outlook**

Working Material

- ▶ **A manuscript will be available**
- ▶ **All references are given in the manuscript**

MAI4CAREU

Master programmes in Artificial
Intelligence 4 Careers in Europe

 **Co-financed by the European Union**
Connecting Europe Facility

This Master is run under the context of Action
No 2020-EU-IA-0087, co-financed by the EU CEF Telecom
under GA nr. INEA/CEF/ICT/A2020/2267423

