

Logic Workshop in Chiayi, 2022

Workshop venue:

Room 412, College of Humanities, National Chung Cheng University

Program:

Saturday, December 24		
14:30~15:30	蔡承志 Cheng-chih Tsai	“Hi-worlds and Hi-individuals”
15:30~16:30	傅皓政 Hao-Cheng Fu	“The Ramsey Test and DP Problem”
16:30~17:30	Shawn Standefer 史德凡	“Extensionality, intensionality, and hyperintensionality in relevant logics”
18:00~	Dinner	
Sunday, December 25		
9:00~10:00	蔡行健 Hsing-Chien Tsai	“A General Method for Proving the 1-completeness of a First-order R.E. Theory”
10:00~11:00	李瑞麟 Jui-Lin Lee	“CME via other Inconsistency”
11:00~12:00	Tony Tan 陳偉松	“Towards a more efficient approach for NEXP-complete problems”
12:00~13:30	Lunch	
13:30~14:30	Masahiro HAMANO 濱野正浩	“Continuous Duality and Modality for Linear Logic”
14:30~15:30	廖文華 Wen-Hwa Liao	“Ethical Challenges of Artificial Intelligence Applications”
15:30~16:30	王仁俊 Ren-June Wang	“Logic of proofs in Gentzen-style”
16:30~17:30	廖純中 Churn-Jung Liao	“Logics of Dominance for Reasoning about Multi-criteria Decisions”
18:00~	Dinner	

Abstracts:

- 蔡承志 Cheng-chih Tsai / 馬偕醫學院全人教育中心 The Center of Holistic Education, MacKay Medical College

“Hi-worlds and Hi-individuals”

By resorting to the intrinsic hierarchical structure of the hi-world semantics, the varying of domains from worlds to worlds can be accommodated within a unified framework. With the introduction of a universal domain D of hi-individuals and an existence predicate E that serves as a realization operator, a semantics for quantified modal logic can be set up. It allows individual variables to range over embodiments of hi-individuals in different levels of a hi-world, and is indifferent to the ontological debate about the existence of ordinary objects. Possible applications of the semantics will be sketched in the talk.

- 傅皓政 Hao-Cheng Fu / 文化大學哲學系 Department of Philosophy, PCCU

“The Ramsey Test and DP Problem”

In the article ‘On the Logic of Theory Change: Partial Meet Contraction and Revision Function’ published by Alchourrón, Gärdenfors and Makinson in 1985, a basic model of belief change was constructed, so-called the AGM theory. However, there are two important issues remain to be resolved, one is the incompatibility between the Ramsey Test and the Preservation Principle, and the other is the problem of iterated belief change. In fact, these two issues are related because the Ramsey Test is an attempt to explain the rationality of belief revision function, but it will encounter the triviality when combined with the AGM theory. Gärdenfors blames the culprit is the Ramsey Test and contends that we should give up to explain the role of conditional in the theory of belief change in virtue of Ramsey Test. But there are some scholars such as Bradley and Chandler provide different direction to this problem, they contend the Ramsey Test should be retained, and raise the challenges to the Preservation Principle, especially in the subject of the DP Problem. The purpose of this paper is to examine the conflict between these two solutions and to prove both the triviality problem and the DP Problem cannot be solved by weakening the Ramsey Test or the Preservation Principle.

- Shawn Standefer 史德凡 / 台灣大學哲學系 Department of Philosophy, NTU

“Extensionality, intensionality, and hyperintensionality in relevant logics”

In this talk, I will present the distinction between extensional, intensional, and hyperintensional contexts in propositional logic. I will examine this distinction in the context of relevant logics. I will argue that relevant logics are, by their own lights, hyperintensional. As such, this makes them excellent logics for investigating phenomena that need hyperintensional analysis.

- 蔡行健 Hsing-Chien Tsai / 中正大學哲學系 Department of Philosophy, CCU

“A General Method for Proving the 1-completeness of a First-order R.E. Theory”

A useful general method for proving the 1-completeness of a first-order R.E. theory is by interpreting in a suitable way a theory known to be 1-complete, say T_1 , into the theory that we are investigating, say T_2 . We will see that a suitable interpretation from T_1 to T_2 will induce a recursive function f via which $G(T_1)$ is 1-reducible to $G(T_2)$, where $G(T)$ is the set of Gödel numbers of sentences in T . In that case $G(T_2)$ must be 1-complete if it is R.E. In order to employ such a general method, we also need at least one theory known to be 1-complete. For that purpose, we will show that the first-order pure logical theory of universal language (that is, the first-order language whose signature contains enumerable infinitely many predicates for each arity ≥ 1 but no function symbols or constant symbols) is 1-complete. Then applying the aforementioned general method, quite a few first-order theories can be shown to be 1-complete. Notably, the first order theory of partial orderings is 1-complete and such a basic theory can serve as a good starting point for proving more results.

- 李瑞麟 Jui-Lin Lee / 虎尾科技大學通識教育中心 Center for General Education, NFU

“CME via other Inconsistency”

In this talk we will study propositional logics satisfying classical model existence via other inconsistency, i.e., other than simple inconsistency. We will start from Hilbert systems using iterated implication. At the end we will talk about the cases related to BCIW.

- Tony Tan 陳偉松 / 台灣大學資工系 Department of Computer Science & Information Engineering, NTU

“Towards a more efficient approach for NEXP-complete problems”

The last few decades have seen major work on the classifications of fragments of first-order logic with decidable satisfiability problems such as Bernays-Schönfinkel-Ramsey (BSR) class, the Löwenheim (monadic) class, the two-variable logic, the guarded-fragment formulas and its various extensions, just to name a few. Most of their precise complexity is known and a significant number of them are NEXP-complete. However, most (if not all) of the known algorithms are not practical and can be quite difficult to implement.

In this talk I will discuss concrete algorithms for two-variable logics. I will also discuss a technique to obtain polynomial time reductions from various NEXP-complete problems to DQBF (Dependency Quantified Boolean Formulas) — an NEXP-complete extension of QBF that recently has attracted the attention of many researchers.

- Masahiro HAMANO 濱野正浩 / 成功大學敏求智慧運算學院 Miin Wu School of Computing, NCKU

“Continuous Duality and Modality for Linear Logic”

In the recent development of probabilistic programming languages, the original categorical semantics of linear logic has been generalised into the probabilistic coherent spaces by Danos-Ehrhard.

This talk presents (i) a measure theoretic duality employing Lebesgue integral, and (ii) a free exponential modality employing a certain class of transition kernels between continuous measurable spaces. The continuous construction (i) and (ii) when restricted to the countable measurable spaces are shown to coincide with those in the probabilistic coherent space.

Our general construction with measure-theoretic probability gives a comprehensive explanation how combinatorial probabilistic method arises peculiarly in the discreteness of probabilistic coherence.

The discretisation of (ii) also yields a comparison with weighted Rel which is known to be a simplest probabilistic denotational model.

- 廖文華 Wen-Hwa Liao / 臺北商業大學資訊與決策科學研究所 Institute of Information and Decision Sciences, NTUB

“Ethical Challenges of Artificial Intelligence Applications”

Human society is about to enter the era of human-machine coexistence. In order to ensure that the artificial intelligence system runs under control and can coexist harmoniously with humans, a series of countermeasures need to be taken in the process of design, research and development, production and use to properly deal with security, privacy, ethical issues, and other risks of artificial intelligence. Artificial intelligence is supported by parallel computing and big data technology, and the intelligent computing model represented by deep learning has shown strong capabilities. However, the current machine learning model still belongs to a black-box working mode. It is still difficult for people to explain the reasons for the abnormal situations that occur in the operation of AI systems, and it is also difficult for developers to accurately predict and grasp the behavioral results of the operation of intelligent systems. In the future, people need to develop smart computing models that are more transparent and interpretable. Developing explainable, understandable, and predictable intelligent systems to reduce the unpredictability and uncertainty of system behavior has become one of the focuses of future research on artificial intelligence.

- 王仁俊 Ren-June Wang / 中正大學哲學系 Department of Philosophy, CCU

“Logic of proofs in Gentzen-style”

In contrast with proof terms in Artemov’s Logic of Proofs (LP) whose structures correspond to the structures of Hilbert-style proofs, in this paper we introduce GLP-S4 as a logical system with proof terms encoding Gentzen-style proofs. We prove that syntactical features of LP such as the internalization property and the Realization Theorem, which connects LP with S4, are retained by GLP-S4, and show that GLP-S4 as a cut-free system has structural properties such as the quasi-subformula property and the subterm property. In addition, we also prove the decidability and some other properties of GLP-S4. Furthermore, we show that cut-free S4 proofs can be realized by proofs in a modified system of GLP-S4. This version of the Realization Theorem is then adapted for other GLP counterparts of modal logics and their subsystems.

- 廖純中 Churn-Jung Liao / 中研院資訊所 Institute of Information Science, Academia Sinica

“Logics of Dominance for Reasoning about Multi-criteria Decisions”

In this paper, we present modal logics of preference and dominance for reasoning about multi-criteria decisions. We first explore a basic logical framework based on multi-criteria preferences and its special case when the relations are total preorders. Then, we extend the basic formalism to a logic of modal dominances. The syntax, semantics, and complete axiomatization of each logic is presented. Finally, we also consider several extensions and variants of the proposed logics that can represent rules induced by dominance-based rough set analysis and beyond.