UNESCO WORLD LOGIC DAY 2022 (Nigeria)

LOGIC – A WORLD OF INTERDISCIPLINARY SCIENCE 2

Friday, 14 January 2022

In the twenty-first century - indeed, now more than ever – the discipline of logic is a particularly timely one, utterly vital to our societies and economies. Computer Science and information and communications technology, for example, are rooted in logical and algorithmic reasoning.

- *Audrey Azoulay, Director-General of UNESCO*

Human beings are called logical animals because they are endowed with the ability to reason. Logic is a science that deals with the rules and processes used in reasoning and as such plays a fundamental and foundational role throughout science. As part of the UNESCO World Logic Day 2022 (see here for the previous edition of our World Logic Day), logicians across the globe are invited to join in a virtual event on 14 January 2022 to celebrate the World Logic Day in Nigeria.

January 14 was chosen as the World Logic Day in honor of two prominent logicians of the twentieth century: Kurt Gödel, who died on 14 January 1978, established the incompleteness theorem, which transformed the study of logic in the twentieth century; and Alfred Tarski, who was born on 14 January 1901, developed theories which interacted with those of Gödel. The date was officially proclaimed by UNESCO at the 40th session of its General Conference in November 2019, in association with the International Council for Philosophy and Human Sciences (CIPSH).

The zoom meeting will be featuring talks around the role and applications of logic (classical and non-classical) in different areas of research, and it is open to anyone interested in logic in the fields of Mathematics, Philosophy, Computer Science and other related areas.

Click here to register and receive the zoom link for this event.

For inquiries, please send a mail to
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Speakers (in alphabetical order)

Marcos Cramer
Technical University of Dresden
Explaining the Liar Paradox Within a Paracomplete Truth Theory

Michel Gaspar
University of Hamburg
Closed graphs and their Borel chromatic numbers in multiple models of set theory

Deborah Kant
University of Hamburg
An empirically informed perspective on the set-theoretic pluralism debat:

Yurii Khomskii
University of Hamburg &
Amsterdam University College
Paraconsisent and paracomplete Zermelo-Fraenkel set theory

T. O. William-West
Ahmadu Bello University Zaria
Five-valued logic in uncertain settings

Organizers

Funmilola Balogun
Federal University Dutsin-Ma

Deniz Sarikaya
University of Hamburg

Preliminary Schedule (WAT, GMT+1)

10.00 - 10.05	Electronic arrival
10.05 – 10.10	Welcome address: Funmilola Balogun
10.10 – 10.45	Paraconsisent and paracomplete Zermelo-Fraenkel set theory: Yurii Khomskii
10.45 – 11.20	An empirically informed perspective on the set-theoretic pluralism debate: Deborah Kant
11.20 – 11.55	Five-valued logic in uncertain settings: T. O. William-West
11.55 – 12.30	Explaining the Liar Paradox Within a Paracomplete Truth Theory: Marcos Cramer
12.30 – 1.05	Closed graphs and their Borel chromatic numbers in multiple models of set theory: Michel Gaspar
1.05 – 1.10	Closing remarks & zoom photograph: Deniz Sarikaya

The room will stay open for further interactions after the meeting.

Abstracts

Paraconsisent and paracomplete Zermelo-Fraenkel set theory by Yurii Khomskii

We present a treatment of set theory in a four-valued paradefinite logic, i.e., a logic that is both paracomplete (propositions can be neither true nor false) and paraconsistent (propositions can be both true and false). Our approach differs from most previous attempts at setting up a paraconsistent set theory, in that we do not chase increasingly general comprehension principles. Rather, we prioritise an intuitive treatment of non-classical sets so as to make our set theory accessible to the classical mathematician used to working in ZFC.

We propose an axiomatic system BZFC which generalizes classical ZFC and allows us to use set theory in a natural way in a paradefinite setting. Our system is obtained by carefully analysing the intuition behind ZFC and translating the axioms appropriately. This approach seems to overcome many of the obstacles encountered in previous attempts at such a formalization. This is joint work with Hrafn Oddsson (Bochum University).

An empirically informed perspective on the set-theoretic pluralism debate by Deborah Kant

One of the key questions in the set-theoretic pluralism debate is whether extrinsic justification of axioms by desirability judgements is valid or not. In this talk, this debate is framed in practical terms analysing the disagreement between set theorists who believe that new axioms will be adopted (absolutist*) or not (pluralist*). Currently, set theorists do not generally use desirability judgements about axioms as a justification of their truth. This observation allows for three possible conclusions: depending on whether the status of the ZFC axioms is described as `accepted as true' or `accepted as epistemically valuable', and on whether the knowledge and understanding of set theorists regarding set-theoretic independence and new axioms is considered advanced or not, either the pluralist* is right, the absolutist* might be right, or both are partially right.

Five-valued logic in uncertain settings by Tamunokuro Opubo William-West

Uncertainty in data reveals the inadequacy of applying (Aristotle's) two-valued logic of yes - no, and sometimes (Kleen's) three-valued logic of yes - no – unknown truth values in many domains. The presence of different forms of partial knowledge or information in data is the main issue limiting these constructs. That is, lack of truth values for representing partially known instance which occurs in many real-life problems degrades the efficiency of two-valued and (sometimes) three-valued logic. The yes - no truth values represent complete information, whereas partially known truth values comes in two senses: partially no and partially yes, which is clearly distinguishable from the unknown truth value used to represent unclear evidence. In this presentation, a notion of five valued logic in uncertainty representation is discussed. By taking fuzzy sets as a concrete model, its role in decision-making and data classification is illustrated. Two fundamental issues of how to determine the criteria for assigning its truth values to different instances and how to work with partially known data are also discussed. The advantage of minimizing decision (or classification) error with five-valued logic is also shown from synthetic data.

Explaining the Liar Paradox Within a Paracomplete Truth Theory by Marcos Cramer

One way to deal with the Liar paradox is the paracomplete approach to theories of truth that gives up proofs by contradiction and the Law of the Excluded Middle. This allows one to reject both the Liar sentence and its negation. The simplest paracomplete theory of truth is KFS due to Saul Kripke. At face value, this theory suffers from the problem that it cannot say anything about the Liar paradox, so a defender of this theory cannot explain their rejection of the Liar sentence within the language of KFS. This was one of the motivations for Hartry Field to extend KFS with a conditional that is not definable within KFS. With the help of this conditional, Field defines a determinateness operator that can be used to explain one's rejection of the Liar sentence within the object language of his theory. Field's determinateness operator can be transfinitely iterated to create stronger notions of determinateness required to explain the rejection of paradoxical sentences involving the determinateness operator. In this paper, we show that Field's complex extension of KFS is not required in order to express rejection of paradoxical sentences like the Liar sentence. Instead one can work with a transfinite hierarchy of determinateness operators that are definable in KFS. This allows for Field's philosophically appealing treatment of the Liar sentence, the truth-teller and strengthenings of the Liar sentence to be reproducible within the theory KFS, which is semantically much simpler than Field's extension of KFS with a conditional.

Closed graphs and their Borel chromatic numbers in multiple models of set theory by Michel Gaspar

Are there infinite cardinals strictly between the one of the natural numbers, and the cardinality of the real line? The method of forcing is unarguably the main technique set-theorists use to access universes in which objects with intermediate values may exist. For decades this has been done for a variety of cardinals emerging from topology, functional analysis, algebra etc. Here, we provide insight on cardinals arising from the recent discipline of Descriptive Graph Combinatorics, started by Kechris, Solecki and Todorcevic.


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