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Faculty of Philosophy

Department of Logic

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Introduction

Trends in Logic is the conference series of the journal Studia Logica (see www.studialogica.org and link.springer.com).

The 20th Trends in Logic international conference, **Logic and Reasoning: Formal and Informal**, was to be held at the Taras Shevchenko National University of Kyiv, Kyiv, Ukraine, initially on May 13-15, 2020, and then was delayed to May 12-14, 2021. It is organized by the Department of Logic at the Faculty of Philosophy of the Taras Shevchenko National University of Kyiv, in co-operation with Studia Logica.

The following *Call for Papers* explains the key topics of the conference.

* * *

Reasoning is at the very heart of logic, constituting its subject matter. In the last few decades, there has been considerable progress both in the purely logical analysis of reasoning and in applied logical investigations of various concrete subject domains, such as philosophical and scientific discourse, logic programming and everyday communication. Reasoning has been studied from proof-theoretical as well as semantic standpoints. Along with further elaboration of standard techniques (axiomatic systems, sequent calculi and natural deduction) a range of other approaches (such as display calculi, tableaux methods, hypersequent systems, etc.) and semantic modeling of logical systems are being developed. Moreover, there is a powerful tradition of analyzing and evaluating reasoning patterns by means of informal logic and argumentation theory. Recent advances in these fields, in particular constructing theoretical models of argumentation and dialectical systems, have proved promising. The aim of the conference is to bring together scholars working in various areas of proof-theoretic, semantic, argumentative and informal logic analysis. The topics of interest may include, but are not limited to:

- modern approaches to proof theory;
- structural proof theory and structural reasoning;

- proof-theoretic methods in non-classical logics;
- proof-theoretic semantics;
- Kripke models and algebraic methods in semantics;
- semantic analysis of non-classical logics;
- semantic modeling of knowledge representation and reasoning;
- provability logic;
- description logic, defeasible reasoning and non-monotonic logic;
- inductive reasoning and probabilistic logic;
- automated reasoning;
- formal models of argumentation;
- abstract argumentation systems;
- argumentation schemes and patterns;
- practical reasoning and argumentation, argumentation in interpersonal communication;
- argumentation in special contexts: finance, medicine, law, policy making, academy, (social) media, etc.;
- dialogue logic, empirical logic, informal logic;
- informal fallacies and cognitive biases in relation to reasoning.

* * *

This call for papers attracted quite a few submissions from all over the world. 62 papers by 89 participants from 20 countries were accepted for presentation at the conference.

However, the pandemic situation caused by the global spread of coronavirus forced the conference to be postponed. This Book of Abstracts contains the titles of all the accepted papers, as well as the short abstracts of some of them received by the Organizing Committee. At the moment of issuing this book (June 2021) the Organizing Committee hopes that the conference will take place in May 2022.

List of Accepted Papers

Krzysztof Apt and Dominik Wojtczak
Open problems in a logic of gossips

Ryuta Arisaka and Takayuki Ito
A new perspective of May-Must argumentation: three pillars

Pavel Arazim
It is just a language game

Elena Astapova-Vyazmina
Game aspect of reasoning

Mohamad Awwad
On the insufficiency of strong computationalism and hypercomputationalism

Viktoriia Babiuk
Good argument versus valid argument

Tamila Baulina
Application of argumentation schemes for the analysis of the communicative process

Libor Behounek
A many-valued semantics for multi-agent probabilistic-doxastic reasoning

Piotr Błaszczyk and Anna Petiurenko
Were mathematical proof comes from, where is it going to?

Kateryna Bura
What are key features of multimodal argumentation?

Ahmet Cevik
Multiverse theory of sets and hierarchical pluralism

Alex Citkin
Deductive systems with unified multiple-conclusion rules

Ludovica Conti
Zig zag solutions for Russell's paradox

Seit Coşkun and Svitlana Nesterova Coşkun
The logic of humour: informal fallacies and formal rules in the structure of joke

Michel Dufour
A new trend in the study of fallacies?

Ihor Dutsyak
Is validity of belief in existence equivalent to validity of belief in non-existence? A formal analysis

Diego Fontanive
Implementing metamemetic thinking as an approach to implicit bias reduction

Nissim Francez and Michael Kaminski
Truth-value constants in multi-valued logics

David Fuenmayor and Christoph Benzmüller
Logical analysis of argumentation networks using proof assistants

Tomasz Jarmużek and Piotr Kulicki
Relating semantics for ability and agency operators

Tomasz Jarmużek, Mateusz Klonowski and Jacek Malinowski
Boolean connexive logic: motivation, semantics and axiomatization

Hanna Hnatovska
The specificity of ideographic writing in explaining the problems of Chinese logic exploring

Sara Ipakchi
A philosophical analysis of irrefutability

Oleksandr Khlopuk
Introducing moral foundations to formal normative argumentation

Iryna Khomenko
The place of informal logic in modern studies of argumentation

Nadiia Kozachenko
Immediate inferences: contextual, linguistic and logical aspects

Anatolii Konverskyi
Critical thinking as a reflection of discourse and academic discipline

Vitaly Krikun
Argumentation in the post-truth time

Svitlana Kutsepal
Argumentation in the Internet communication

Iryna Liashenko
The evaluation of the critical, logical and analytical thinking skills of current Ukrainian universities alumni

Xiaolong Liu and Weiwei Chen
On the proportional acceptability of arguments of argumentation frameworks

Inna Matiushyna
Practical logic: expectations versus reality

Alexei Muravitsky
On matrix consequence

Ruslan Myronenko
The genetic fallacy in philosophical controversies

Federico Pailos
A multi-Standard approach to Logic

Olena Pavlova
Application of the reasoning ways in culture economy: The Netflix Case

Marianna Plakhtiy
Ivan Sleshinsky: from mathematics to mathematical Logic

Iaroslav Petik
Formal arithmetic importance for definability of algebraic structures: platonic perspective

Vit Puncochar
Non-classical dynamic logic of questions

Davide Emilio Quadrellaro
Algebraic semantics for propositional dependence logic

Eric Raidl, Andrea Iacona and Vincenzo Crupi
The logic of the evidential conditional

Nataliia Reva
The laws of logic and probability: Can the forced use of logic save us from the conjunction fallacy?

Elio La Rosa
Informal provability and its logics

Cristián Santibáñez
Epistemic vigilance as a distributed argumentative strategy

Igor Sedlar
Relevant dynamic logics

Olena Shcherbyna and Nataliia Shcherbyna
Dual meaning of silence as an argument

Nikolay Shilov
Survey of program schemata approach to algorithmic problems of propositional program logics

Yaroslav Shramko
An informational approach to entailment based on the Ackermann principle

Dmitrij Skvortsov
On a possibility of finite characterizations for Kripke complete non-recursively axiomatizable superintuitionistic predicate logics

Yaroslav Sobolievskyi
Laurens Perseus Hickok and his logic of reason

Corina Strößner
The rationality of predicate change

Andrii Synytsia
Linguo-philosophical reasons of certainty: L. Wittgenstein's approach

Joanna Szalacha-JarmuEjek and Krzysztof Pietrowicz
Formalization of sociological reasoning: experiences, challenges and opportunities

Allard Tamminga, Hein Duijf and Frederik Van De Putte
Expressivity results for deontic logics of collective agency

Claudia Tanús
The irrelevance of permutation

Agata Tomczyk, Marta Gawek and Szymon Chlebowski
Natural deduction system for intuitionistic logic with identity

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The perception of critical thinking skills in the current ukrainian educational practices

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Love de simulacro: logical analysis

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Deference, experts beyond the limits of individual experience

Bartosz Więckowski
Counterfactual possibilities and might-counterfactuals

Eunsuk Yang and Jon Michael Dunn
Implicational tonoids and their representations

Olena Yaskorska-Shah
What can we achieve from a data-driven dialogue system?

Olena Yurkevych and Zhanna Pavlenko
Psychometric testing logic: construction of GELCT and solution method

Alan Zhangozha
Modern logic applications in artificial intelligence

Invited Papers

The Moore sentence and the Fitch paradox in Dynamic Epistemic Logic

Hans Van-Ditmarsch

Dynamic epistemic logics are modal logics of knowledge (and belief) change, with modal epistemic operators to describe knowledge and dynamic modal operators to describe change of knowledge. In such a logic we can analyze the Moore sentence, "p is true but you don't know that p is true", and also the Fitch paradox. "Everything is knowable" is inconsistent with "there is an unknown truth". The Moore sentence becomes false as a consequence of being announced. In this sense it is an "unsuccessful" knowledge update. "Success" is one of the requirements in AGM belief revision. The Fitch paradox can be analyzed in dynamic epistemic logic when we interpret "knowable" as "known after an announcement". The Moore and Fitch themes are much related and hold for S5 knowledge and for KD45 (consistent) belief. Given the interpretation of "successful" as "known after its announcement" "knowable" as "known after an announcement", successful implies knowable.

Logic-based strategic reasoning in social context

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Reasoning in social context has many important aspects, one of which is the reasoning about strategic abilities of individuals (agents) and groups (coalitions) of individuals to guarantee the achievement of their desired objectives while acting within the entire society. Various logical systems have been proposed for formalizing and capturing such reasoning, starting with Coalition Logic (CL) and some extensions of it, introduced the early 2000s. Coalition Logic provides a natural, but rather restricted perspective: the agents in the proponent coalition are viewed as acting in full cooperation with each other but in complete opposition to all agents outside of the coalition, which are treated as adversaries.

The strategic interaction in real societies is much more complex, usually involving various patterns combining cooperation and competition. To capture these, more expressive and refined logical frameworks are needed. In this talk I will first present briefly Coalition Logic and then will introduce and discuss some more expressive and versatile logical systems, including:

i. the Socially Friendly Coalition Logic (SFCL), enabling formal reasoning about strategic abilities of individuals and groups to ensure achievement of their private goals while allowing for cooperation with the entire society;

ii. the complementary, Group Protecting Coalition Logic (GPCL), capturing reasoning about strategic abilities of the entire society to cooperate in order to ensure achievement of the societal goals, while simultaneously protecting the abilities of individuals and groups within the society to achieve their individual and group goals. Finally, time permitting, I will discuss briefly conditional strategic reasoning. In conclusion, I will take a more general perspective on a unifying logic-based framework for strategic reasoning in social context.

Short Abstracts Received by the Organizing Committee

Open problems in a logic of gossips

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Gossip protocols concern a set up in which each agent holds initially a secret and the aim it to arrive, by means of point-to-point or group communications (called calls), at a situation in which all agents know each other secrets. During the calls the agents exchange some, possibly all, secrets they know.

In turn, distributed protocols are programs in which each agent follows its own program that allows him to communicate with other agents. Distributed epistemic gossip protocols use epistemic formulas in the component programs for the agents. Such protocols were introduced in 2014 in a paper by Attamah, Van Ditmarsch, Grossi, and Van der Hoek. In this paper a dynamic epistemic logic was provided in which gossip protocols could be expressed as formulas.

In 2016 Apt, Grossi, and Van der Hoek introduced a simpler modal logic that is sufficient to define these protocols and to reason about their correctness. This logic is interesting in its own rights and was subsequently studied by us in a number of papers. In particular, we established decidability of its semantics and truth for a limited fragment. Also, we studied its extension to common knowledge.

However, several natural open problems remain, in particular concerning extension of the above results to larger fragments of the logic.

On the insufficiency of strong computationalism and hypercomputationalism

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Computationalism means that cognition can be explained by computation. A position of a strong computationalism suggests that cognition is equivalent to computation meaning that the whole mental activities can be modeled and understood using computational models. Many arguments against a strong computationalism, such as consciousness, intentionality, and mathematical objection, have been given in the literature. In this paper, I argue that a strong view of computationalism is doomed to failure through providing new arguments concerning aspects about 1) the difference by essence between cognition and computation which can be called an ontological objection and 2) the difference by knowledge, that can be classified under an epistemological objection, which investigates the levels of comprehension that underlies these two concepts. However, I propose in this paper some elements in favor of partial computationalism. Finally, I argue that hypercomputational models, supposed to go beyond Turing machine limits, so too cannot explain human mind. This task relies in part on the preceding arguments independently of the use of classical doubts about any physical realization of hypercomputation (M. Davis). An extension of this argument toward some philosophical reflections is made afterward. In more details, I show how a position about a partial computationalism is still defendable regardless any belief about the suggested points. Particularly, I defend the idea that some cognitive mechanisms could be explained by computations. These mechanisms include, among others, logical calculi (reasoning, deductions, etc.), formal calculations, deterministic (finite) processes, knowledge representation and processing, argumentation (coupled with some linguistic phenomena), and learning. Moreover, I clearly point out in this research my skeptical view on strong hypercomputationalism that suggests models of hypercomputation to correspond to cognition, and supposed to go beyond Turing machines' limits. Many philosophical extended questions are asked in line with our [mis]understanding of cognition nature particularly its non-computable aspects.

What are key features of multimodal argumentation?

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The theory of argumentation has radically changed since its inception. It is not only about the emergence of interest in non-verbal means of influence that, on the origin of the discipline, was hardly taken into account, but also about the change in the idea of what an argument is.

Nowadays, we consider such ways of communication like persuading, convincing and disputing, that are non-rational, as integral elements of argumentation. For this reason, the area covered by "the argument" needs to be revised and rethought. Argumentation theorists usually value linear reasoning over all other means of persuasive communication. However, when it comes to non-verbal communication, rationality cannot be the only correct criterion. There are several "modes" of arguing that deserve attention while analyzing argumentation process. Multimodal argumentation should be developed to in order to apply standards (pragma-dialectics, informal logic, rhetoric) to acts of argumentation that use non-verbal means of argumentation/ The latter can be defined as structural elements used by the debater when he or she is directly in dispute. Multimodal theory noticeably extends what is semantically meaningful while considering an argument. Various modes must become the subject of research as structure bricks of argumentation process.

Multiverse theory of sets and hierarchical pluralism

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The multiverse conception of sets, prominently supported by Joel David Hamkins (2012), Michèle Friend (2014), Peter Koellner (2009), and Mark Balaguer (2017), adheres that there are many (possibly equally plausible) models of set theory. It argues against the realist view that there should be a standard model. Pluralism also avoids the independency phenomenon by arguing that independent problems can be solved both positively and negatively within the multiverse conception. To reconcile realism and pluralism, Balaguer (2017) argues that what he calls the intention-based Platonism is compatible with the multiverse view. But he claims that a certain version of anti-platonism is also compatible with pluralism. Hence he concludes that pluralism must be true. We note that intention-based Platonism leaves open problems unsettled. By Gödel (1940) and Cohen (1963), it is known that the Continuum Hypothesis (CH) is independent of the axioms of set theory. There are models of set theory for which CH is true. But there also exist models for which CH is false. Unlike realism, pluralism does not insist that there must be a solution for CH. We propose a better reconciliation of realism and set-theoretic pluralism by what we call hierarchical pluralism. The idea is to assign every model of set theory a "degree" based on its "intendedness" ensuring that for any given two distinct models of set theory, up to isomorphism, say M and N, either the degree of intention of M is greater than that of N or vice versa. The model with the highest degree of intentionality is described as the highest standard model yet to have. On hierarchical pluralism, a proposition is true iff it is true in the highest standard model. By this way, we maintain working in the multiverse domain while satisfying the realist requirement that some models have a higher sense of intendedness than the others.

The specificity of ideographic writing in explaining the problems of Chinese logic exploring

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If the definition of the creative work of prominent Chinese thinkers of Ancient and Middle Ages is considered to be the one that contains the development of eristic and semantics, is found justified by most researches, then the validity of revealing the history of logic within it is much doubt. Ideographic writing is based on a "sign–meaning" relationship rather than a "sigh–phoneme", which is a fertile round for polysemy due to the limited amount of hieroglyphs, compared to the ability to combine signs in phonetic languages. A counterargument to the importance of the polysemy in the Chinese language may be the fact that Sanskrit also demonstrates the ambiguity of most terms, but in Chinese, we see its specific manifestation. First, the same hieroglyph can denote nouns, adjectives, verbs, personal names, etc. Secondly, the symbol of which the same hieroglyph is mostly united by the "association principle", as well as those hieroglyphs that can mark the same subject. This explains the reasons for the absence of a theory of ancestral subordination in the history of philosophy of ancient and medieval China, where the genus would exhaustively cover the scope of species concepts. An important aspect is a fact that the structure of the sentence, recorded in ideographic writing, does not disclose the obvious relationship between the subject and the predicate or the distinction between subject and the predicate. Hieroglyphs are usually unable to capture the variation of words in the declension and are unable to show formal signs of different parts of the language.

The place of informal logic in modern studies of argumentation

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In this paper I present my reflections on informal logic. Although it was formed in the late 1970s, consensus on many issues in this field has not been achieved so far. Nowadays it is difficult to identify informal logic as one well-defined approach to argumentation. The aim of this paper is to take a look at the place of informal logic in the state-of-the-art studies of argumentation by clarifying its tasks and figuring out the realm to which informal logic belongs.

I emphasize that it is possible to consider informal logic from various perspectives: logical, epistemic, and cognitive. The first relates to the normative standards, criteria, and procedures of real argument interpretation. The second focuses on the problem of real argument assessment. The third concentrates on the descriptive study of argument. Informal logic involves appeals not only to the theoretical research. Empirical studies are important in this field as well.

In the end, I conclude that informal logic can be viewed as a normative and descriptive discipline, sitting on the borderline between the interests of logic, epistemology, and cognitive science with the task to study real arguments through the development of certain standards, criteria, and providers for their interpretation and evaluation.

Immediate inferences: contextual, linguistic and logical aspects

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Immediate inferences imply the conclusion from a single premise. The classic examples of direct inference are obversion and conversion, which make it possible to obtain conclusions from one particular premise without involving additional data. But in real reasoning an interesting effect appears: the less data contains in the premise, the more additional information the reasoner involvs to inference. Thus, in the methodological sense, direct inferences are very useful in teaching critical thinking, because they allow us to work in three lines of reasoning: contextual, linguistic and logical.

(1) Contextual aspect offers to consideration wide contextual background. It is very difficult to conclude from one single premise without involving additional context. In most cases, this leads to a false constriction or extension of the original premise, and leads to incorrect conclusions.

(2) Linguistic aspect points out the use of a lexical-linguistic component for the sake of acceptable, good-looking or melodious formulation in odinary language. Natural language words and phrases have additional semantic connections. These relations are not always logical, but nevertheless they are stable. Thus linguistic aspect is an important aspect of reasoning, because reasoner often focuses on familiar language cliches and adjusts the conclusions under them.

(3) Logical aspect is the simplest of these aspects, as long as it is only a careful adherence to the rules of reasoning. But the logical dimension of reasoning never exists independently in real reasoning and is constantly accompanied by the other two. Contextual and linguistic aspects complement logical rules.

Critical thinking as a reflection of discourse and academic discipline

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It is known that the American philosopher John Dewey who is the founder of such approaches in modern American philosophy as "philosophy of success" and "philosophy of education" proposed the term "critical thinking".

The term "critical thinking" has mainly spread among scholars from the USA, Canada, and some European countries since the mid-nineteenth century. It was usually represented as the culture of thinking, the logical culture, the thinking according to the laws of logic, and the art of correct thinking.

The emergence of critical thinking treatment was a kind of reaction to the impossibility of applying the methods of mathematical logic in real arguments.

This fact led to the point that a lot of researchers have identified the term of critical thinking as informal logic, new rhetoric, or theory of argumentation.

In my opinion, critical thinking should be divided into two parts. The first could be defined as a logical component the main goal of whose is

(1) to develop rules and requirements for the functioning of notions and judgments in various types of reasoning,

(2) to define criteria for distinguishing valid reasoning from wrong ones,

(3) the explore the typology of logical fallacies and identify ways to eliminate them.

The second part covers the basic procedures of critical thinking related to the theory of argumentation and rhetoric. This component can be called the argumentative part.

Also, I would like to stress that critical thinking is not hermeneutics, public relation, and exegetics. It is not even logic. It is a type of applied logic.

On the proportional acceptability of arguments of argumentation frameworks 1

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In this paper, we introduce proportionality to the acceptability of arguments of abstract argumentation. Our study provides a novel approach to differentiate levels at which an argument can be accepted or rejected, by partitioning the attackers of such argument into two parts and considering the proportion of each part to the attackers, and also partitioning counter-attackers of each attacker into two parts and considering the proportion of each part to the counter-attackers. The proportions are represented by rational numbers which range from 0 to 1. For example, we can require that an argument is acceptable w.r.t. a set of arguments, if more than half of the attackers of this argument are such that more than half of their counter-attackers are in this set. Furthermore, we define generalized extensions of Dung's extensions. Our semantics can be considered as a generalization of Dung's semantics, or a variant of the graded semantics by Grossi and Modgil, and some differences between our semantics and these two semantics will be studied. For instance, to check whether an argument is acceptable at a certain level, the required numbers of its defenders and attackers are fixed in the graded semantics, whereas the required numbers of its defenders and attackers are floating in our semantics. With such notion of acceptability, we argue that in some scenarios, our semantics is able to illustrate some desirable and intuitive features of acceptability of arguments which fail to be captured by existing semantics in the literature.

On matrix consequence

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These results are a contribution to the model theory of matrix consequence. We give a semantic characterization of uniform and couniform consequence relations. The first concept was introduced by Łoś and Suszko (1958), and the second by Wójcicki (1970) to characterize structural consequence relations having single adequate matrices. In different variants of the single-adequate-matrix theorem of Łoś and Suszko (corrected by Wójcicki), the uniformity of consequence is used in conjunction with other properties (e.g. finitariness), and in the Wójcicki theorem uniformity and couniformity of consequence are used together. These properties have never been treated individually, at least in a semantic manner. We consider these notions from a purely semantic point of view and separately, introducing the notion of a uniform bundle/atlasn and that of a couniform class of logical matrices. Then, we show that any uniform bundle defines a uniform consequence; and if a structural consequence is uniform, then its Lindenbaum atlas is uniform. Thus, any structural consequence is uniform if, and only if, it is determined by a uniform bundle/atlas. On the other hand, any couniform set of matrices defines a couniform structural consequence. Also, the Lindenbaum atlas of a couniform structural consequence is couniform. Thus, any structural consequence is couniform if, and only if, it is determined by a couniform bundle/atlas. We then apply these observations to compare structural consequence relations that are defined in different languages when one language is a primitive extension of another. We obtain that for any structural consequence defined in a language having (at least) a denumerable set of sentential variables, if both this consequence and Wójcicki's structural consequence in any primitive extension of the given language are uniform and couniform, then they can be determined by one and the same atlas which is both uniform and couniform.

The genetic fallacy in philosophical controversies

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There is a difference between the reason for believing something (credentis attitude, explanation) and the reason that something is true (veritatis attitude, rationale). Ideally, it is precisely because of the justification of a hypothesis that we take it on faith and consider it true, and vice versa – if the hypothesis does not go through the verification process, we tend to talk about its falsity, or in a less rigid form – about its unreliability. Nevertheless, both in everyday speech and in philosophical reasoning, people tend to use the argument of faith to substantiate the truth or to doubt the correctness of a certain judgment because of its origin, which does not inspire confidence. Such a phenomenon is an informal fallacy, which was called the "genetic fallacy": the origin or reason for the judgment is perceived as having a direct correlation with its truth. The fallacy can take two common forms:
– argument ad hominem – the root of the genetic fallacy in appealing to authority as a "guarantor" of the truth / falsity of the argument;
– argument ab auctoritate – the root of the genetic fallacy in appealing to the original context of the phenomenon to argue its truth / falsity.

If we turn to the historical and philosophical context, we can see that the genetic fallacy plays an important role in philosophical disputes, and its identification by one of the interlocutors often leads to clarification of the initial position (for example, the argument of Anselm of Canterbury and the monk Gaunilo from Marmotir). One of such applications for detecting the genetic fallacy is, for example, "returning" interlocutors to more neutral positions, which do not level the opponentвЂ™s convictions, but provide an opportunity to continue the discussion in an ethically neutral manner for both parties.

A multi-standard approach to logic

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I will present both a new, multi-standard way to characterize a logic, and a family of three-standard logics based on four three-valued Strong-Kleene logics: LP, K3, (the non-transitive) ST and (the non-reflexive) TS. These logics are characterized by a language and a set of standards of validity, antivalidity and contingency. One of these logics arguably recovered classical logic, in the sense that it not only shares its validities with it – as ST does –, but also its antivalidies – as TS – and its contingencies. Moreover, it can be non-trivially expanded with a transparent truth predicate. Another member of this family is a truly empty logic, in the demanding sense of having no validities, antivalidities and contingencies whatsoever. The multi-standard characterization of logics can be interpreted as radicalizing the way to characterize a logic shown by mixed logics, that are such that the standards of the premises and conclusions of a sound inference can be very different from each other. One unexpected consequence of this approach is that, in some of these logics, some inferences fall in more than one category, being, for example, bot valid and antivalid. Another interesting feature of them is that, in many three-standard logics, there are inferences that are neither valid, nor antivalid, nor contingent, thus prompting the question of whether the three-standard approach is general enough.

The logic of the evidential conditional

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According to the evidential interpretation of "if then", suggested by Crupi and Iacona, a conditional "If A, then C" is true just in case A supports C. This is captured by two conditions. One is the Ramsey Test: in the closest possible worlds where A is true, C must be true. The other is the Reverse Ramsey Test: in the closest worlds where C is false, A must be false. We call Chrysippus Test the conjunction of both. The Chrysippus Test is stronger than the Ramsey Test in the way required by the intuition of support. Imagine a situation where C can easily hold independently of A, and C does not hold in virtue of A. The Reverse Ramsey Test, unlike the Ramsey Test, is not satisfied in such a case: even if the closest worlds where A is true and C is false may well be distant, they are no more distant than the closest worlds where A and C are both false. Thus, even if the falsity of C is kept away from the actual world, it is not because of the truth of A. Although the evidential account differs from the Stalnaker-Lewis account, there is an important relation. Let B stand for the Chrysippean "if then", and $>$ for the Ramsey "if then". We show that any sentence of the form α B β is equivalent to a sentence whose only conditional is $>$, and conversely. This is the cornerstone of our reasoning. We start from the fact that Lewis" logic VC is a sound and complete system for $>$ with respect to his centered sphere semantics. We prove that there is a corresponding system for B which is sound and complete for B, applying a method elaborated by Raidl. Our talk presents the logic for the evidential conditional, and discusses the most important principles.

Natural deduction in sequent style for fine-grained hyperintensional approach to natural language inferences

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It is well known that to capture natural language inferences one must provide fine-grained hyperintensional model of meaning that is also capable to cover modalities, verb tenses, propositional attitudes etc. The suitable system we utilise is an extension and simplification of the type theory proposed by Tichy 1988 (TTT), a higher-order multi-modal logic. Tichy 1982 proposed a natural deduction in sequent style (ND) which was, however, only appropriate for his early type theory. We extend here his ND to cover TTT (which only is capable of fine-grained hyperintensionality). We discuss its various features, e.g. its embracing of partial functions or the interplay of model-theoretic and proof-theoretic aspects.

The laws of logic and probability: Can the forced use of logic save us from the conjunction fallacy?

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Logic and probability theory have always been the primary means in a formal study of human reasoning. From the first sight, we can assume that these two instruments are the opposite: logic deals with the rigorous rules of truths and inferences, while, at the same time, the probability theory manages the uncertainties. Nevertheless, I do not want to speak of their working alliance, but both of them as independent phenomena for cognitive science.

Daniel Kahneman insists that both logic and probability require engaging attention and rationality of a slow system 2, which in its turn tries to get rid of them as quickly as possible. It is hard to escape the logical tasks, but easy to dispose of probability because of its uncertainty nature. Often people that are asked to make a likely forecast of events are more likely to give the most plausible answer.

One of the most common mistakes is Γ conjunction fallacy (Tversky, Kahneman, 1983). It occurs when people decide that the probability of two events occurring together is more credible than the probability of either one of them occurring alone. While in fact, the conjunction of two possible events is always less than one of the conjuncts, which is easily proved by Venn diagrams. For that matter, we may say that conjunction fallacy is a consequence of people's failure to apply a relevant logical rule.

The question is this failure is a result of a lack of knowledge or the laziness of our mind. If the first option is a case, thus, the simple study of logic and its laws should resolve this problem. If the cause is our mental passivity, therefore, we should train our brain from times to times with the simple logical puzzles.

Epistemic vigilance as a distributed argumentative strategy

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The notion of epistemic vigilance (Sperber et al., 2010) refers to the natural individual competence to filter or scan information when the agent perceives that something in the message or in the source of the message could be misleading. In this paper it is proposed that, from the point of social behavior, a better conceptual understanding of how epistemic vigilance works could be conceived as a distributed argumentative strategy that coherently emerges as a collective agency (groups with specific identities, value-based communities, corporations, institutions). From this perspective, the picture of epistemic responsibility is more realistic; a better notion is advanced to understand how intra-group argumentative diversity works in public settings; and a more suitable conceptual tool is proposed to analyze how argumentative exchanges function in social scenarios. In order to explain the conceptual proposal two real examples are analyzed. One example is an international political debate, and the other is an empirical result consisting of argumentative exchanges between elderly people trying to resolve a practical problem together. The political example will illustrate the problem of epistemic responsibility within a controversial setting, and the example of an exchange between some elderly people trying to resolve a problem (social dilemma) together will illustrate how intra-group argumentative diversity is distributed among the participants.

Dual meaning of silence as an argument

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The authors offer to consider silence as an argument in the context of a pragmatic study of reasoning as arguments. The emphasis is placed on the problem of evaluating an argument from silence as a weak argument. The point is that an argument from silence used in historical methodology, when the researcher does not mention a particular event or fact, the information of which he should be aware, formulates reasoning with a probable conclusion. This can be considered as an unconvincing argument. It is difficult to determine when such an argument is reasonable and when it is used incorrectly. The authors proceed from the fact that silence in argumentative practices can be used as a way of arguing our point of view and as a way of forming our understanding of the point of view of another (opponent). The above gives reason to distinguish between argument to silence and argument from silence. This may be the basis of the answer to the question of reasonableness and, therefore, the acceptability of silence as an argument.

In the process of substantiating their position, the authors consider the example of research of Locke's use of silence in discussing the problem of English history. It is noted that J. Locke does not directly analyze silence as an argument in his writings. However, his formulation of the ad ignorantiam argument in "An Essay Concerning Human Understanding", and his understanding of tacit consent in "Two Treatises of Government", are certainly connected with silence as an argument.

Also, as an example of confirming the position of the authors, the situation of the group silence of people who present during the marriage ceremonies in the Christian and Muslim traditions is analyzed. It is emphasized that the acceptability of the argument of silence depends on the role it plays for each side of the ritual in a particular marriage ceremony tradition.

An informational approach to entailment based on the Ackermann principle

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My talk will be based on a joint paper with Heinrich Wansing "The nature of entailment: an informational approach", Synthese (2019), https://doi.org/10.1007/s11229-019-02474-5, recently published on-line first. In this paper we elaborate a conception of entailment based on what we call the Ackermann principle, which explicates valid entailment through a logical connection between (sets of) sentences depending on their informational content. We reconstruct Dunn's informational semantics for entailment on the basis of Restall's approach, with assertion and denial as two independent (primary) speech acts, by introducing the notion of a "position description". We show how the machinery of position descriptions can effectively be used to define the positive and the negative information carried by sentences of a given language and to present a formalized version of the Ackermann principle as an inclusion relationship between the informational contents of the conclusions and the premises of a valid entailment. Being so interpreted, the entailment relation exhibits certain properties, including the property of transitivity (and, more generally, admissibility of the cut rule). Whereas properties such as Anderson and Belnap's variable sharing property or Parry's proscriptive principle are normally presented as imposing a relevance requirement on valid entailment, the suggested formalization of the Ackermann principle supports all of Gentzen's structural rules, including weakening, a rule that is normally given up in sequent-style proof systems for relevance logics. In this way we propose an Ackermann-inspired explication of the nature of entailment as a relation between the informational contents of sentences.

Expressivity results for deontic logics of collective agency

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We use a deontic logic of collective agency to study reducibility questions about collective agency and collective obligations. The logic that is at the basis of our study is a multi-modal logic in the tradition of stit ("sees to it that") logics of agency. Our full formal language has constants for collective and individual deontic admissibility, modalities for collective and individual agency, and modalities for collective and individual obligations. We classify its twenty-seven sublanguages in terms of their expressive power. This classification enables us to investigate reducibility relations between collective deontic admissibility, collective agency, and collective obligations, on the one hand, and individual deontic admissibility, individual agency, and individual obligations, on the other. (Joint work with Hein Duijf and Frederik Van De Putte.)

Natural deduction system for intuitionistic logic with identity

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The backbone of our work is the philosophical discussion regarding the relation between identity and equivalence. Frege argues that two formulas are equivalent iff their logical values are the same, that is $v(\varphi \equiv \psi) = 1 \Leftrightarrow v(\varphi) = v(\psi)$. This is not the case with the propositional identity, however. Two formulas may be equivalent yet not identical in Suszko's sense. Suszko, who challenged Frege's theory of denotation, introduced a number of non-Fregean logics, one of which is Sentential Logic with Identity. Identity of two formulas is true iff both formulas refer to the same situation. In an intuitionistic setting, equivalence of two formulas, φ and ψ, means that each proof of φ can be transformed into a proof of ψ and vice versa. But we can still think of a stronger notion which says that the classes of constructions proving φ and ψ are exactly the same. The aim of our work is to present Natural Deduction system for Intuitionistic Sentential Calculus with Identity. The introduced system does not employ any sort of replacement rule which is present in earlier approaches. The proposed rules cannot be classified as introduction or elimination rules B–ISCI-specific rules are based on axioms characterizing identity connective. Consequently, the obtained system does not entertain standard subformula property.

Love de simulacro: logical analysis

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Most human beings occasionally make mistakes regarding the objects of their intentional states, such as emotions, desires and intentions. Perhaps the most often discussed context where we are prone to err about objects is that of love or affection. Robert Kraut in his article "Love de re" (Midwest Studies in Philosophy, 1986) distinguishes between two kinds of love: person-directed love de re, and properties-directed love de dicto.

I argue that the distinction between intentionality de re and de dicto is not sufficient if we are to explore why human beings make mistakes in identifying the objects of their emotions. As object relation theory suggests, our emotions are directed not only towards other persons or things but also towards our internal objects, i.e. parental figures, which we happen to identify with external entities.

To integrate this projective aspect of intentionality, I propose to distinguish between intentionality towards internal objects (intentionality de simulacro) and towards external objects (intentionality de re ipsa). I use as an analytic tool, the logic of projective intentionality LPI, built on the base of Priest's logic of intentionality (Priest, Towards Non-Being, 2005). LPI is multimodal paraconsistent logic with a special kind of relevant implication, called "triggering implication," and equality. Among intentional operators and predicates of LPI, there are formal analogues of "unconscious" attitudes, such as phantasy and wish. LPI includes an axiomatic theory of projective identification, which opens an opportunity for the analysis of projective phenomena described in the object relations theory, such as introjection, projection, transfer, displacement etc.

Applying the logic of projective intentionality for the explication of both de re/de dicto and de simulacro/de re ipsa distinctions, I formulate conditions describing different kinds of love.

Implicational tonoids and their representations

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This is a continuation of our work "Implicational tonoid logics and their relational semantics," in which we introduced implicational tonoid logics as logics combining two classes of generalized logics, one of which is the class of weakly implicative logics introduced by Cintula (2006) and the other of which is the class of gaggle logics introduced by Dunn (1991). More precisely, we defined implicational tonoid logics in general and then introduced relational semantics, called the "Routley–Meyer–style semantics," for those logics. Here, we investigate representations of implicational tonoids. More precisely, we first review implicational tonoid matrices. We then introduce their representations. We in particular consider embeddability properties for implicational tonoid matrices. Note that we have at least three reasons to do this. One is that, in general, representation is important in the sense that one can actually obtain a completeness theorem from the corresponding representation theorem using well-known techniques. Another is that although Dunn and his colleagues have introduced representations of several kinds of gaggles, we think that readers may have difficulties in understanding some of them. For instance, for the representation of partial gaggles, the proof in Dunn (1993) is provided at the level of the idea sketch and the proof in Bimb & Dunn (2008) occurs in the middle of a complicate book. Here, we will focus the special cases of implicational tonoids so we can provide more detail in a simpler context. The other is that in our former work we introduced implicational tonoids based on underlying (abstract) operations as abstractions of operations such as implication and fusion. Therefore, we need to provide representations for such tonoids.

Psychometric testing logic: construction of GELCT and solution method

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The General Educational Legal Competency Tests (hereinafter referred to as the GELCT) is intended to establish the level of general development of the intellectual abilities of legal professionals as their legal competence. Psychometric technology was used to construct this test. Logic is not only an instrument (technique) for solving individual problems, but also a methodology for their structural construction, "logical algorithm" which can be raised to a higher level of generalization, or speculative attitude to psychometric tests, which generally gives greater efficiency in their construction and solutions. For the first time in Ukraine, a logical approach to GELCT was proposed by O.M. Yurkevich and Zh.O. Pavlenko in the research work "Preparing for the GELCT Assembly in Tasks and Solutions: A Logical Approach" (2018, 2-nd edition in 2019). Based on the principle of reasonableness of law and on the basis of generalization of logical methods, the method of solving test problems according to their types was determined, the practical value of logic as a methodology for measuring the intellectual level of development, defining the general legal competence, was rethought. To solve the test problems, the authors propose logical methods for tables, diagrams, graphs, elementary calculations, etc. Typical analytical thinking tasks require pre-coding of the information contained in the condition, as well as in the answers provided. The next step is to choose one of the methods of solution: table, diagram, method of algebraic equation, etc. Logical-structural analysis of verbal test tasks requires the use of knowledge of logical theory of argumentation.

Modern logic applications in artificial intelligence

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Today Artificial Intelligence is covering more and more parts of human activities and routines. It helps to ease communication between machines, services, and humans even in real-time, solving many critical issues in our everyday life. Due to the application of Artificial Intelligence such technologies as smart cities, smart managements, smart supply chains, smart homes, etc. could be translated into deeds. From this point, it is essential to understand the methods that are used and understand the principles, which are based on the science of logic core. Nowadays, it is especially shown in the concepts of IoT (Internet of things), as far as interchangeable information needs to be clear for all the elements (devices) of the ecosystem. No doubt, modern technologies means the appearance of new challenges, which are caused by issues of responsible and correct usage of Artificial Intelligence implications. It is also important to consider the specificity of wireless sensor networks, various radio technologies, and cellular infrastructure collaboration to optimize their performance might. The logic is one of the strongest tools to omit possible uncertainties in Artificial Intelligence decisions and implications. It seems to be the solution for an efficient and secure way of how gadgets cooperate with each other, building concise chains of proof. State-of-the-art IoT products are mostly based on fuzzy logic as it deals with ambiguities and allows a low level of detail. Particularly, when we talk about approximate data and linguistic approaches. "The structure of the fuzzy inference system (FIS) is based on fuzzy logic, fuzzy set theory, and fuzzy if-then rules. Framing of fuzzy if-then rules forms the key component of FIS. It is a very commonly used technique, and it is commonly applied in different fields such as system identification, automatic control, expert system, decision-making, model classification robotics, time series analysis, and forecasting. A fuzzy logic system consists of three basic components. These are a rule base, a database, and a logic mechanism. Rule base consists of selected fuzzy rules, while a database defines the membership functions of fuzzy rules. The fuzzy logic inference is modeled according to the rules to obtain a reasonable output or result".

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