Felsefe Arkivi
Archives of Philosophy

İSTANBUL UNIVERSITY PRESS

Felsefe Arkivi - Archives of Philosophy, Sayı/Issue: 51, 2019
DOI: 10.26650/arcp2019-5131 Deneme / *Essay*

The Future of Logic

Jean-Yves Beziau[1]

[1]Prof. Dr., University of Brazil, Department of Philosophy, Regular Faculty, Rio de Janeiro, Brazil

ORCID: J.Y.B. 0000-0002-7067-1606

Sorumlu yazar/Corresponding author:
Jean-Yves Beziau,
Prof., University of Brazil, Department of Philosophy, Regular Faculty, Rio de Janeiro, Brazil
E-mail/E-posta: jyb.logician@gmail.com

Başvuru/Submitted: 20.12.2019
Kabul/Accepted: 23.12.2019

Atıf/Citation:
Beziau, Jean-Yves. (2019). " The Future of Logic" *Felsefe Arkivi- Archives of Philosophy, 51*: 367-374.
https://doi.org/10.26650/arcp2019-5131

ABSTRACT
In this paper we discuss the recent developments of logic and explain what can be done to promote a bright future for logic. After comments on the contest *The Future of Logic* that took place during the 5th UNILOG in Istanbul in 2015, we give a general idea of how logic can be practiced and understood, emphasizing in particular the distinction between logic as reasoning and logic as the science of reasoning. And we discuss some projects we have launched: the book series *Logic PhDs*, series of events such as UNILOG, SQUARE and LIQ, the *Logic Prizes Contest* and the *World Logic Day*.
Keywords: Logic, reasoning, future of logic, logic prizes, world logic day

At the 5th UNILOG (World Congress and School of Universal Logic), which took place at the University of Istanbul, June 20-30, 2015, many activities were organized, including the contest *The Future of Logic*. It was presented as follows:

> Modern logic (starting with George Boole in the mid XIX century) changed the world. It led to a new understanding of reasoning, language, mathematics. It gave new directions in philosophy and gave birth to computation.
>
> After 150 years we may wonder what the future of so successful a science is, today much of the time in the shadow of its multifaceted offspring.
>
> This contest wants to promote a reflection on what can be the future of modern logic considering its 150-year history. Here are a few questions:

1) Will or can logic give a better understanding to sciences / fields such as physics, biology, economics, music, information?

2) How will the internal life of logic, its objectives and tools, evolve?

3) How will the interactions between logic and philosophy, logic and mathematics, logic and computation develop?

We received several submissions, none of them really answering these questions. This showed that nowadays logic is dismantled, confused, without head or tail.

Like in many fields, what dominates is over-specialization. And this is not good in particular for young students/researchers who have to enter at a very young age into specialization to get a grant, a job, a life. Very restricted grants are offered to these young people within some research projects, apparently ambitious or challenging, but most of the time meaningless. This is due in particular to the dominant bureaucratic organization of financial support for research favoring fashionable ephemeral trends over deep serious fundamental research lines.

In what follows I will give some hints about how logic can survive and evolve, mentioning some actions I have promoted for this, with the support of many colleagues all over the world, in particular from Turkey.

First of all it is very important to make the distinction between logic as reasoning and logic as the science of reasoning.

Reasoning is an art that can be practised without much theorizing like music, dance or painting. This can be done by exercising, following the examples of good reasoners, dead or alive. They can be mathematicians, philosophers, scientists, great thinkers and writers, like Plato, Descartes or Lewis Carroll, to quote just a few names.

On the other hand at some stage theorization can be crucial and in fact the two mix, the practice and the theory.

One may want to focus on the theoretical aspect, on the science of logic. The science of logic, like other sciences, does not reduce to one theory, one framework, one system. In modern logic we have four important theories: set theory, proof theory, recursion theory and model theory. And we have plenty of logical systems: classical propositional logic, first-order logic, second-order logic, the modal logic S5, the three-valued logic L3, the paraconsistent logic C1, etc. If one wants to be a theoretical logician he needs to have a general knowledge of all that, not just to be a specialist of the turbo polar fuzzy system 758 he himself has created.

The person who knows only truth-tables knows quite nothing about logic. He is in the same position as someone who knows the tables of multiplication and addition, vis à vis the mathematical science. Such a man knows quite nothing about mathematics …

Moreover to have a good understanding of logic it is also important to relate logic with other fields both at the theoretical level and at the practical level.

For example the relation between semiotics and logic is very important. Peirce, one of the main figures of modern logic, was considering logic as a part of semiotics. Modern logic is often called *symbolic logic*. This is in particular due to the work of Boole who was inspired by the British school of *symbolic algebra*, where the idea was to perform operations on signs independently of their specific meaning or interpretation (an idea going back to Leibniz).

And since we are talking about historical figures of logic it is also good to emphasize the interaction between recent technical advancements and historical knowledge of logic. Knowledge of historical works can be very inspiring for developing new ideas and vice versa: knowledge of contemporary logic can help us to have a better understanding of historical work. It is a continuous fruitful interaction. And when we are talking about the history of logic, we are not only talking about ancient logic, also of the logic of the last 100 years.

In this spirit I have launched the book series *Logic PhDs* with a look back at the past and opening doors for the future. The objective of this series is described as follows:

> The idea of this book series Logic PhDs is to publish PhD dissertations on logic (exclusively on logic but all aspects of logic):
>
> (1) important PhDs from the past
>
> (2) the best recent ones.
>
> The idea is not only to publish the dissertation but to have an extended presentation of the author and his work:
>
> (a) To give precise details of the circumstances of the PhD and an analysis of its content.
>
> (b) To describe the background both from the perspectives of the history of logic and personal bio of the author
>
> (c) To explain further developments after the PhD, also in both perspectives (in case of recent PhDs: expectations of future developments).

The first volume published in this series (in 2017) is *Grundlagen der kombinatorischen Logik* by the American logician Haskell Curry, one of the central figures of modern logic, whose work is paradoxically still quite unknown. He did his PhD in Göttingen under David Hilbert. It was written in German and had not yet been translated into English.

Application of logic does not only apply to the history of logic but also to many other fields: not only physics, computer science or linguistics, but also music, the theory of colors, politics, etc. At the school of universal logic in Istanbul we had 12 tutorials on applications of logics, besides 10 tutorials on the history of logic and 8 tutorials on logic theorems. The idea of UNILOG is really to promote logic in all its dimensions.

I have also developed another series of events; it is around the square of opposition. It is at the same time more focused on a specific tool / framework, and more interdisciplinary, considering that this structure can be applied to almost everything.

And since the theory of opposition, although quite ingenious, is a very simple mathematical structure that can be understood by people having little knowledge of logic or mathematics, if any, this permits the exchange of many ideas on the basis of a common intelligible and precise ground.

SQUARE, like UNILOG, is an event circulating around the earth, in even more original or exotic locations. After a first edition in Montreux, we had a second edition in Corsica, a third one in Beirut, a fourth one in the Vatican, a fifth one on Easter Island and a sixth one on Crete.

In contrast to these rotating series I have also launched a third series of events, taking place every year in the same location, i.e. at the Sorbonne in Paris. It is entitled *Logic in Question* and is based on a series of 10 questions:

1) Is Aristotle the first logician?

2) Are Cartesians logical animals?

3) Modern logic: Boole or/and Frege?

4) Should logic be mathematical?

5) Does logic solve any philosophical problem?

6) What is the difference between logic and metalogic, if any?

7) Is reasoning computing?

8) Is logic multiple?

9) Is logic relative?

10) Is logic necessary?

To further develop logic, besides organizing events and editing books and journals, I have developed two further activities of another kind.

The first is the *Logic Prizes Contest*. I started by creating the Newton da Costa Logic Prize for Brazil, as a gift to (and in honor of) my advisor. And the 5th UNILOG in Istanbul was a crucial step, because the winner of this prize went to present his work at this event. The spirit/idea of this prize is at the same insider and outsider: developing interaction between logicians of all kinds in a given country and then making their works known outside the country presenting it at an international congress.

After creating this prize I had the idea to create logic prizes in other countries so that each winner of a prize would present his work in a general contest at the next UNILOG. This was at the 6th UNILOG which took place in Vichy, France in 2018.

Among many prizes which were created, here is the example of the Canadian Logic Prize, having the same structure as all of them:

Schotch-Jennings Logic Prize for Canada

1) Every two years a prize is attributed

2) Each contender should submit a non-published paper (between 10 to 30 pages) in any area of logic, written in English or French

3) The jury is formed of 5 researchers working in Canada, representative of all areas of logic and the geography of the country

4) The prize, besides being honorific, supports the participation (travel + housing + registration fee) of the winner in the World Congress of Universal Logic and the publication of the paper in the journal *Logica Universalis*, Birkhäuser

5) There is no restriction of age, sex, race, nationality. The contender only needs to live in Canada and be affiliated to a University (or other educational institution) in Canada.

Schotch-Jennings Logic Prize 2018

i) Participation in UNILOG 2018 in Vichy, France: air ticket + housing + registration fees will be provided to the winner. Publication of the paper in the journal *Logica Universalis*

ii) Send your paper by January 15, 2018 to john.woods@ubc.ca and francois.lepage@umontreal.ca

iii) Jury 2018

Alasdair Urquhart, University of Toronto - General Logic (Chair)

Wendy MacCaull, St. Francis Xavier University - Logic and Computer Science

Jean-Pierre Marquis, Université de Montréal - Foundations of Logic

Sandra Lapointe, McMaster University - History and Philosophy of Logic

Bryson Brown, University of Lethbridge - Non-Classical Logics

Organizers of the Prize:

John Woods, University of British Columbia, Vancouver

François Lepage, Université de Montréal, Québec

The winner of the 1st Logic Contest Prizes, chosen by a jury of 9 famous logicians from all over the world, was Ivan Varzinczak, a Brazilian logician of Polish origin working in France, participating in the contest as the winner of the Louis Couturat Logic Prize for France.

And just after this first logic prizes contest I decided to work on the creation of the *world logic day*. I had the idea to create this day some years before, after noticing that Alfred Tarski was born on January 14, the same day of the calendar when Gödel died. I had no time to work on that, but after the logic prizes contest this was a good opportunity to start because I had been working for these prizes with many logicians around the world who were organizing local interaction in

many countries. So I encouraged them to celebrate in their locations the *1st World Logic Day* on January 14, 2019. This was not easy because the time was short, but we succeeded in having 60 celebrations all around the world: St Petersburg, Valparaiso, Paris, Mecca, Montréal, Vatican, Kiev, Berlin, Lisbon …

After that I sought to have this day recognized by UNESCO. I submitted the project to the Ambassador of Brazil at UNESCO, a woman called Maria Edileuza Fontenele Reis, whom I met in Paris in April 2019. She very much liked the idea and succeeded in getting the support on the one hand of the Brazilian government, on the other of other countries at UNESCO. On October 17, 2019, the World Logic Day was approved by the executive committee of UNESCO. The proposal was based on a paper I wrote just after the 1st celebration and the official text approved by UNESCO runs as follows:

1. The ability to think is one of the most defining features of humankind. In different cultures, the definition of humanity is associated with concepts such as consciousness, knowledge and reason. According to the classic western tradition, human beings are defined as "rational" or "logical animals". Logic, as the investigation on the principles of reasoning, has been studied by many civilizations throughout history and, since its earliest formulations, logic has played an important role in the development of philosophy and the sciences.

2. Despite its undeniable relevance to the development of knowledge, sciences and technologies, there is little public awareness on the importance of logic. The proclamation of World Logic Day by UNESCO, in association with the International Council for Philosophy and Human Sciences (CIPSH), intends to bring the intellectual history, conceptual significance and practical implications of logic to the attention of interdisciplinary science communities and the broader public.

3. A dynamic and global annual celebration of World Logic Day aims at fostering international cooperation, promoting the development of logic, in both research and teaching, supporting the activities of associations, universities and other institutions involved with logic, and enhancing public understanding of logic and its implications for science, technology and innovation. Furthermore, the celebration of World Logic Day can also contribute to the promotion of a culture of peace, dialogue and mutual understanding, based on the advancement of education and science

4. On 14 January 2019, the first World Logic Day was celebrated as an initiative of universities, research institutes, foundations and associations active in the fields of mathematics, philosophy, computer sciences, engineering, economics and cognitive sciences. The existence of these networks, and their commitment to future annual celebrations of World Logic Day, offer credible assurance that the

> proclamation of the Day by UNESCO, in association with the relevant member organizations of the CIPSH, will lead to a solid action plan towards impact and added value. UNESCO's commitment to World Logic Day will ensure that it has a broader and more geographically diverse orientation and connects organically to established programme priorities in the humanities.

The recognition of the World Logic Day by UNESCO opens new doors for logic and gives the perspective of a bright future for logic.

I am glad to have written this paper for the journal *Felsefe Arkiv*, considering that my colleagues from Istanbul University, in particular Safak Ural and Vedat Kamer, have taken an active part in the activities described here: the organization of UNILOG, creation of a Turkish Logic Prize, celebration of the World Logic Day.

Acknowledgements: Thanks to Pascale Roure for her comments on a previous version of this paper.

Conflict of Interest: The authors declare that they have no conflicts of interest

References

J.-Y.Beziau "1st World Logic Day: 14 January 2019", *Logica Universalis*, vol.13 (2019), pp.1-20.

J.-Y.Beziau "Logic Prizes et Cætera", *Logica Universalis*, vol.12 (2018), pp.271-296.

J.-Y.Beziau, "Logic is not logic", *Abstracta* 6 (2010), pp.73-102.