

Tsinghua University - University of Amsterdam Joint Research Center for Logic

Annual Report 2019



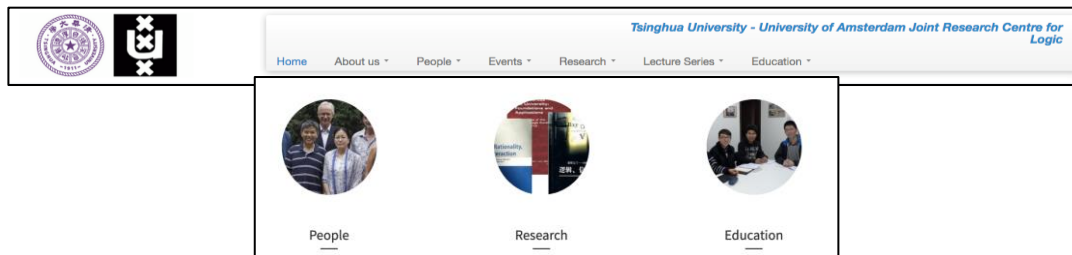
In 2013, Tsinghua University and the University of Amsterdam (UvA) instituted a joint research center for logic (JRC), based on a long-standing history of cooperation.



The mission of the JRC is to create an active interface in research and education between the Institute for Logic, Language and Computation (ILLC) at the UvA and the Logic Group at Tsinghua and collaborators elsewhere in China, in a collegial spirit of public service.

JRC Co-directors: Johan van Benthem, Fenrong Liu. Oversight Committee: Wan Junren (Tsinghua, chair), Sonja Smets (UvA), Martin Stokhof (UvA), Yde Venema (UvA), Lu Wang (Tsinghua), Andrew Yao (Tsinghua). For further participants, see our website

<http://www.tsinghualogic.net/JRC>



STATEMENT FROM THE DIRECTORS

This is our sixth annual report on main research lines, education in pure and applied logic, our graduate program, publications, academic events, and people involved with the center. A second five-year contract has been signed by our two universities, and this report reflects some changes in structure and research themes as our center keeps evolving. Broader challenges for this new period include stimulating contributions from logic to current societal developments around AI, and increasing the educational and cultural outreach of the center. Further details on all items can be found at our website.

RESEARCH PROJECTS

The JRC administers six programs involving UvA and Tsinghua participants plus colleagues elsewhere. The following list contains main participants, key publications, and funding sources in 2019. Names of the responsible project leaders are italicized.

Logic and Agency

Goal: Investigating reasoning agents in complex informational social settings, with an emphasis on information dynamics, emergent attitudes, and strategic behavior in games.

Core group: Alexandru Baltag (ILLC), Johan van Benthem (ILLC), Beishui Liao (Hangzhou), Fenrong Liu (Tsinghua), Jeremy Seligman (Auckland), Sonja Smets (ILLC).

Key publications:

1. A. Baltag, N. Bezhanishvili, A. Özgün & S. Smets: A Topological Approach to Full Belief. *Journal of Philosophical Logic*, 48(2): 205-244, 2019
2. J. van Benthem & F. Liu: Graph Games and Logic Design. *Journal of Tsinghua University*, (Philosophy and Social Sciences), 34(2): 131-139, 2019
3. H. Dong, B. Liao, R. Markovich, L. van der Torre: From Classical to Non-Monotonic Deontic Logic using ASPIC+, *LORI 2019*: 71-85

Highlights: 2nd Workshop, China national project “Logics of Information Flow in Social Networks”, led by Fenrong Liu, with Johan van Benthem, Jeremy Seligman, Beishui Liao and Xinwen Liu as subproject leaders. Over 30 Chinese and international participants.



Funding: Logics of information Flow in Social Networks, (2017-2021), Major Program National Social Science Foundation of China (社科基金重大项目). Grant No.17ZDA026.

Logic and Computation

Goal: Extending computational foundations and tools for logics of information and agency. New connections between logic, probability, and computing paradigms in AI.

Core group: Johan van Benthem (ILLC), Malvin Gattinger (Groningen), Thomas Icard (Stanford), Katrin Schulz (ILLC), Kaile Su (Griffith),

Key publications:

1. J. van Benthem, F. Liu & S. Smets: Logico-Computational Aspects of Rationality, in Knauff, M. & Spohn, W., eds., *The Handbook of Rationality*. Cambridge, MA: MIT Press
2. T. Icard & D. Ibeling: Probabilistic Reasoning across the Causal Hierarchy, in *34th AAAI Conference on Artificial Intelligence (AAAI 2020)*
3. Y. Cai, Xu, D. Ke, K. Su, & J. Sun: Trainable Back-Propagated Functional Transfer Matrices. *Applied Intelligence* 49(2): 376-395, 2019

Highlights: Michael Wooldridge, Artificial Intelligence: Fact and Fiction, The 2019 Jin Yuelin Lectures, Tsinghua University.
Johan van Benthem. Logic and Agency: Promises and Challenges, The 2019 Lindström Lectures, Gothenburg University.



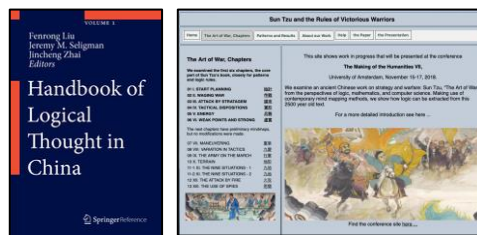
History of Logic in China

Goal: Chinese and international researchers work on creating a history of logic in China from ancient to modern times, centered around the creation of a *Handbook of the History of Logical Thought in China*, while organizing related academic events.

Core group: Peter van Emde Boas (ILLC), Chad Hansen (Hong Kong), Christoph Harbsmeier (Oslo), Fenrong Liu (Tsinghua), *Jeremy Seligman* (Auckland), Jincheng Zhai (Nankai).

Key publications:

Chapters of the two-volume 1500 page Handbook covering Chinese, Buddhist and Western thought are being translated into Chinese or English, toward publication in 2020.



Highlight: Website developed by Ghica & Peter van Emde Boas, assisted by Zhao Bonan and Kaibo Xie, extracting logical structure of Sun Tzu's "Art of War", using computational mind-map techniques: <https://suntzu.squaringthecircles.com>

Logic and Philosophy

Goal: Exploring newly emerging interfaces between logic and various areas in philosophy, such as philosophy of language, philosophy of mind, epistemology, metaphysics, and practical philosophy.

Core group: Asher Jiang (Tsinghua), Fengkui Ju (BNU), Xinwen Liu (CASS), John Perry (Stanford), Chenwei Shi (Tsinghua), *Martin Stokhof* (ILLC), Hao Tang (Tsinghua), Lu Wang (Tsinghua), Wei Wang (Tsinghua).

Key publications:

1. V. Goranko & F. Ju: Towards a Logic for Conditional Local Strategic Reasoning. *LORI2019*: 112-125
2. L. Wang: Are Philosophical Concepts Translatable: Taking the Word BEING as an Example, *Journal of Hubei University* (Philosophy and Social Science) Vol.46, No.4, 2019
3. C. Shi: Knowledge in Topological Argumentation Models: *LORI2019*: 286-296

Highlight: Chenwei Shi obtained a Shuimu Postdoc position (水木学者博士后) at Tsinghua, and a national research grant on "Belief and Knowledge in Social Networks".

Logic and Language

Goal: Syntax, semantics and pragmatics of natural language investigated by logical methods, with a special interest in comparative perspectives on the Chinese language.

Core group: Maria Aloni (ILLC), Dun Deng (Tsinghua), Mingming Liu (Tsinghua), Stanley Peters (Stanford), Martin Stokhof (ILLC), Frank Veltman (ILLC), *Dag Westerståhl* (Stockholm).

Key publications:

1. D. Deng: The Syntax of Xihuan ‘to Like’ in Mandarin and Some Related Theoretical Issues, *Contemporary Linguistics* 21(4): 515-530, 2019
2. M. Liu: Unifying Universal and Existential wh’s in Mandarin. *Proceedings of Semantics and Linguistic Theory (SALT) 29*, 2019
3. D. Westerståhl: Generalized Quantifiers (Fall 2019, substantive content change), *Stanford Encyclopedia of Philosophy*, Ed Zalta (ed.), CSLI, Stanford, 2019

Highlights: The first Workshop on “Logic, Language and Meaning” organized by Dun Deng, Mingming Liu and Dag Westerståhl, took place at Tsinghua 20-21 Apr, 2019. Due to its big success, it will continue as an annual event of our center. This year, Dun Deng also received the Second Prize in the 11th Teaching Competition in Beijing.



Logic and Proof Systems

Goal: Investigating logics with provability semantics and proof theory for non-classical logics.

Core group: Sergei Artemov (CUNY), Nick Bezhanishvili (ILLC), Melvin Fitting (CUNY), Minghui Ma (Guangzhou), Junhua Yu (Tsinghua).

Key publications:

1. J. Yu: Lyndon Interpolation Theorem of Instantial Neighborhood Logic – Constructively via a Sequent Calculus, *Annals of Pure and Applied Logic* 171(1): 102721, 2020
2. M. Fitting: De Re, De Dicto, and Binding Modalities, in Liu, Ono and Yu eds, *Knowledge, Proof and Dynamics*, Logic in Asia series: Springer
3. Z. Lin, M. Ma: Gentzen Sequent Calculi for Some Intuitionistic Modal Logics. *Logic Journal of the IGPL* 27(4): 596-623, 2019

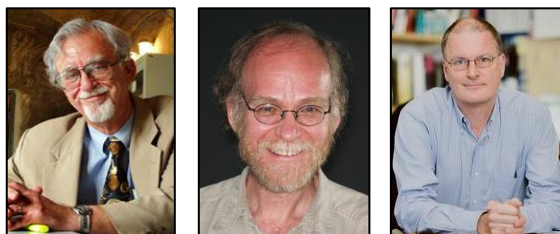
APPOINTMENTS

The two founding universities have created two special positions supporting the JRC.

- *Amsterdam – China Logic Chair*, 2014 – 2024, held by Fenrong Liu.
- *Jin Yuelin Chair Distinguished Professorship*, 2017–2020, to be extended.
First holders Johan van Benthem, Martin Stokhof, Dag Westerståhl, Jeremy Seligman. This team started work in 2017, teaching new courses and seminars, supervising students, and carrying out research at Tsinghua.



The JRC hosts a distinguished lecture series honoring Jin Yuelin, founder of Tsinghua's philosophy department and a prominent pioneer in introducing modern logic to China. The three Jin Yuelin lecturers so far have been John Perry, Stanford (2015), Joseph Halpern, Cornell (2017), Michael Wooldridge, Oxford (2019).



VISITORS

The center hosts international visitors on a regular basis who engage in joint research, participate in center events, and conduct intensive courses and seminars for graduate students. The following list contains visitors at both sites in 2019.

Tsinghua Dag Westerståhl, Stockholm (Feb–Apr 2019); Lanier Anderson, Stanford (March 2019); Jeremy Seligman, Auckland (Apr–Jun); Hanti Lin, UC Davis (Apr 2019); Patrick Blackburn, Roskilde; Jer-Shiarn Lee, Taiwan (May 2019); R. Ramanujam, Chennai (Jun 2019), Frank Veltman, Amsterdam (Sep 2019); Declan Thompson, Stanford (Oct–Nov, 2019); Michael Wooldridge, Oxford, Kevin Kelly, Carnegie Mellon, Kaibo Xie, Amsterdam (Oct 2019); Yang Liu, Cambridge (Nov 2019); Johan van Benthem, Stanford & Amsterdam (Sep, Dec 2019); Martin Stokhof, Amsterdam (May, Nov–Dec 2019).

ILLC UvA Dazhu Li, CSC/Tsinghua (2018 Sep–2020 Sep); Xie Kaibo, CSC/Tsinghua; Fenrong Liu, Tsinghua (June 2019), Dag Westerståhl, Stockholm (Jan 2019).

The center also has regular collaborations with research groups at Stanford, CUNY New York, the University of Bayreuth and various major universities in China, and hosts occasional events exploring such connections in a workshop series “Tsinghua Meets ...”.

EDUCATION

Graduate program The JRC has a small selective graduate program with Ph.D. students co-supervised at both sites, plus a few further affiliated students. A new joint degree program is expected to implement from 2020, selected students will receive their Ph.D degree jointly issued by Tsinghua University and University of Amsterdam.

Former students: Malvin Gattinger (Ph.D., 2018), Chenwei Shi (Ph.D., 2018).

Current students:

- Xiaoxuan Fu (qualitative vs. quantitative decision making)
- Kaibo Xie (causality and logic)
- Yu Chen (proof theory)
- Haibin Gui (logics for evidence-based doubt)
- Dazhu Li (graph games and social networks)
- Huanfang Dong (logic and formal learning theory)
- Yiyang Wang (collective agency)
- Jialiang Yan (formal semantics)

Tsinghua Logic Salon Hosted by a group of Ph.D students and postdocs at Tsinghua, a Logic Salon was started this year, with the aim of promoting lively academic, social and cultural interactions between researchers and students together with invited visitors.

- Nov 28 Quantum Logic. Guest: Shengyang Zhong (PKU)
- Nov 14 Natural Language and Formal Language: a Complex Relationship.
Guest: Martin Stokhof (UvA)
- Oct 23 Logic of Social Influence. Guest: Dazhu Li (UvA and Tsinghua)
- Oct 23 Formal Semantics for Counterfactuals. Guest: Kaibo Xie (UvA and Tsinghua)
- Oct 10 Imperatives in Natural Language. Guest Frank Veltman (UvA)



Seminars The JRC organized several advanced seminars and colloquia at Tsinghua.

- Feb – June, *Logic in Artificial Intelligence*,
Fenrong Liu, Dag Westerståhl and Jeremy Seligman
- Apr, *Formal Learning Theory*, Hanti Lin (UC Davis)
- May, *Temporal Logics*, Patrick Blackburn (Roskilde)
- Sep 2019 – Jan 2020, *Philosophical Logics*, Logics for Social Agency,
Fenrong Liu and Chenwei Shi

Undergraduate initiative A newly designed series of interdisciplinary courses in logic started at Tsinghua, with the following 4 courses at different levels. New textbooks are being written, tested, and will be published both in English and in Chinese.

- *Logic, Language and Philosophy*, co-taught by Fenrong Liu and Martin Stokhof
- *Mathematical Foundations of Logic*, meta-theory of FOL, taught by Dag Westerståhl
- *Modal Logics and their Applications*, introduction to modal, temporal, and epistemic logics with an emphasis on philosophical analysis, taught by Jeremy Seligman
- *Logic, Computation and Games*, advanced introduction to dynamic epistemic logic, games and probability, including research topics, taught by Johan van Benthem



SCIENTIFIC EVENTS

Workshops

The 6th Tsinghua Logic Colloquium — Hiking Mount Logic, Sep 28, 2019

Workshop on the Handbook of Logical Thought in China, May 17, 2019

Workshop on Logics for the Formation and Dynamics of Social Norms, May 4-5, 2019
 Interdisciplinary Workshop on Logic, Language, and Meaning, Apr 20-21, 2019

Guest lectures

- Dec 24 Development of AI Logic, Beishui Liao (Zhejiang Uni.)
 Nov 1 Two Tales of Epistemic Models, Yang Liu (Cambridge)
 Oct 25 Inductive Knowledge, Kevin Kelly (Carnegie Mellon)
 Oct 16 Local Fact Change Logic, Memory Logic and Expressive Power,
 Declan Thompson (Stanford)
 Sep 27 The Core Logic of Dependence, Johan van Benthem (Stanford & Amsterdam)
 Sep 26 Monotonicity: A Red Thread Through Logic, Johan van Benthem
 June 14 Collective Belief as Tendency towards Consensus, Chenwei Shi (Tsinghua)
 Mar 29 Logics of Knowing How, Yanjing Wang (Peking Uni.)
 March 23 Is Logic Normative?, Dag Westerstahl (Stockholm)
 Mar 22 Group Knowledge in Dynamic Epistemic Logic, Yi Wang (Zhejiang Uni.)

PUBLICATIONS

The following publications by members and associates demonstrate the JRC's activities.

Articles

1. A. Baltag, S. R. Rad, and S. Smets: Learning Probabilities: Towards a Logic of Statistical Learning, *Proceedings Seventeenth Conference on Theoretical Aspects of Rationality and Knowledge*, EPTCS 297, 2019
2. A. Baltag, N. Bezhanishvili, A. Özgün, and S. Smets: A Topological Approach to Full Belief. *Journal of Philosophical Logic*, 48(2): 205-244, 2019
3. A. Baltag, F. Liu, C. Shi, and S. Smets: Collective Belief as Tendency Toward Consensus, under submission
4. A. Baltag, D. Li and M. Y. Pedersen: On the Right Path: A Modal Logic for Supervised Learning. *LORI-19*: 1-14
5. J. van Benthem and F. Liu: Logic Design and Graph Game Design, *Journal of Tsinghua University (Philosophy and Social Sciences)*, 34(2): 131-139, 2019
6. J. van Benthem and D. Klein: Logics for Analyzing Games, *Stanford Electronic Encyclopedia of Philosophy*, 2019
7. J. van Benthem and F. Liu: Deontic Logic and Changing Preferences, in Dov Gabbay, John Horty, Xavier Parent eds. *Handbook of Deontic Logic and Normative Systems*, Vol.2, 2019
8. J. van Benthem, F. Liu and S. Smets: Logico-Computational Aspects of Rationality, in *The Handbook of Rationality*, The MIT Press, 2019
9. C. Shi: Knowledge in Topological Argumentation Models. *LORI 2019*: 286-296
10. J. van Benthem and D. Westerstahl: Generalized Quantifiers Meet Modal Neighborhood Semantics, Amsterdam & Stockholm, to appear in volume for Istvan Németi.
11. Y. Cai, Xu, D. Ke, K. Su, J. Sun: Trainable Back-Propagated Functional Transfer Matrices. *Appl. Intell.* 49(2): 376-395, 2019
12. D. Deng: The Syntax of Xihuan 'to Like' in Mandarin and Some Related Theoretical Issues, *Contemporary Linguistics*, Vol.21, No.4, 2019, pp.515-530

-
13. D. Deng: The Explanation for the Syntactic Abnormality of the Nominalizer Suo (所) in Classical Chinese from the Perspective of Grammaticalization, *Journal of Tsinghua University*, No. 6, 2019
 14. H. Dong, B. Liao, R. Markovich, L. van der Torre: From Classical to Non-Monotonic Deontic Logic using ASPIC+, *LORI 2019*: 71-85
 15. V. Goranko & F. Ju: Towards a Logic for Conditional Local Strategic Reasoning. *LORI2019*: 112-125
 16. G. Jiang, P. Laurent, D. Zhang, H. Zhang, Y. Zhang: Game Equivalence and Bisimulation for Game Description Language. In *Proceedings of the 16th Pacific Rim International Conference on Artificial Intelligence (PRICAI-2019, CCF C)*, 2019
 17. G. Jiang, P. Laurent, D. Zhang, H. Zhang, Y. Zhang: Characterizing the Expressivity of Game Description Languages. In *Proceedings of the 16th Pacific Rim International Conference on Artificial Intelligence (PRICAI-2019, CCF C)*, 2019
 18. D. Klein, R.K. Rendsvig: Converging on Common Knowledge, *Proceedings of the Twenty-Eight International Joint Conference on Artificial Intelligence*, 2019
 19. D. Klein, A. Marra: From Oughts to Goals: A Logic for Enkrasia. *Studia Logica*, 2019.
 20. H. van Lee and S. Smets: The Logic of Observation and Belief Revision in Scientific Communities. *Journal for General Philosophy of Science*, 2019
 21. B. Liao, M. Slavkovik, L. van der Torre: Building Jiminy Cricket: An Architecture for Moral Agreements Among Stakeholders, in *Proceedings of the 2019 AAAI/ACM Conference on AI, Ethics, and Society, AIES 2019*, Honolulu, pp. 147-153, 2019
 22. D. Li. Losing Connection: The Modal Logic of Definable Link Deletion. *Journal of Logic and Computation*, 2019
 23. Mingming Liu: Unifying Universal and Existential wh's in Mandarin. *Proceedings of Semantics and Linguistic Theory (SALT) 29*
 24. Mingming Liu: Explaining the Exceptive-Additive Ambiguity in Mandarin. *Proceedings of the 22nd Amsterdam Colloquium*
 25. Xinwen Liu: 70 years' Research on Logic in China, in Wang Lisheng eds, *70 Years' Research on Philosophy in China*, Chinese Social Science Press, 2019, pp. 254-295
 26. Xinwen Liu: The Origin of Shen Youding's Pure Logical Calculus, *Journal of Chongqing Institute of Technology*, No.9, pp.7-12, 2019
 27. Xinwen Liu, et al, trans: *A Beginner's Guide to Mathematical Logic*, by Raymond M. Smullyan, China Light Industry Press, 2019
 28. F. Liu, H. Ono and J. Yu, eds., *Knowledge, Proof and Games*, Post-Proceedings of the 4th Asian Workshop on Philosophical Logic, Springer, to appear in 2020
 29. B. Kim, J. Brendle, G. Lee, F. Liu, R. Ramanujam, S. Srivastava, A. Tsuboi, L. Yu, eds., *Proceedings of the 14th and 15th Asian Logic Conferences*, World Scientific, 2019
 30. F. Liu and X. Fu: A Third Way of Studying Preference: Between Qualitative and Quantitative Approaches, 2019, under review.
 31. F. Liu: Preference Change: An Overview, in Y. Xia eds. *Collections of Works in Philosophy*, Tsinghua University Press, to appear in 2020
 32. F. Liu and X. Fu: Decision Making under Uncertainty: A New Pairwise Preference Lifting Method, *Festschrift for Sven Ove Hansson*, 2019
 33. M. Y. Pedersen, S. Smets, T. Ågotnes: Analyzing Echo Chambers: A Logic of Strong and Weak Ties. *LORI 2019*:183-198

-
34. S. Peters & D. Westerståhl: The Semantics of Exceptives, under review.
 35. C. Proietti, D. Grossi, S. Smets & F. R. Velázquez-Quesada: Bipolar Argumentation Frameworks, Modal Logic and Semantic Paradoxes. *LORI2019*: 214-229
 36. S. R. Rad, A. H. Sharafi & S. Smets: A Complete Axiomatisation for the Logic of Lattice Effect Algebras. *International Journal of Theoretical Physics*, online first, 2019
 37. K. Schulz, S. Smets, F. R. Velázquez-Quesada, & K. Xie: A Logical and Empirical Study of Right-nested Counterfactuals. *LORI2019*: 259-272
 38. S. Smets & F. R. Velázquez-Quesada: A logical study of group-size based social network creation. *Journal of Logical and Algebraic Methods in Programming*, 106, 117-140, 2019
 39. S. Smets & F. R. Velázquez-Quesada: Philosophical Aspects of Multi-Modal Logic, in the *Stanford Encyclopedia of Philosophy*, Online Encyclopedia, June 2019
 40. A. Solaki, F. Berto, & S. Smets: The Logic of Fast and Slow Thinking. *Erkenntnis*, 2019
 41. D. Westerståhl, Generalized quantifiers (Fall 2019, substantive content change), *Stanford Encyclopedia of Philosophy*, Ed Zalta (ed.), CSLI Publications, Stanford, 2019
 42. J. Yu: Lyndon interpolation theorem of instantial neighborhood logic – constructively via a sequent calculus, *Annals of Pure and Applied Logic* 171(1) 102721, 2020
 43. J. Zhai: Development and Future of Argumentation Theory: From a Logical Point of View, *Journal of Nankai University (Philosophy and Social Sciences)*, No.1, 2019.

DISSEMINATION

Logic in Asia The JRC hosts a new Springer book series “*Logic in Asia: Studia Logica Library*”, a new research platform for monographs by researchers in Asia and worldwide. Editors-in-chief: Fenrong Liu, Hiroakira Ono, and Kamal Lodaya.

Titles published in 2019:

1. Mihir Kumar Chakraborty and Soma Dutta: *Theory of Graded Consequence. A General Framework for Logics of Uncertainty*, 2019
2. Liao Beishui, Thomas Ågotnes and Wang Yi (Eds.) *Dynamics, Uncertainty and Reasoning. The Second Chinese Conference on Logic and Argumentation*, 2019

Forthcoming volumes, finalized:

1. Ju Shier, Alessandra Palmigiano and Ma Minghui (Eds.) *Nonclassical Logics and Their Applications*, Post-proceedings 8th International Workshop on Logic and Cognition.
2. Liu Fenrong, Hiroakira Ono and Yu Junhua(Eds.) *Knowledge, Proof and Games*, The Fourth Asian Workshop on Philosophical Logic.

Short textbooks A new Springer series “*Short Textbooks in Logic*” has started. Editors: Fenrong Liu, Hiroakira Ono and Jeremy Seligman. Aim: present readers worldwide with clear and concise textbooks on mathematical, philosophical and computational logic. First volume: Eric Pacuit, *Neighborhood Semantics for Modal Logic*, Spring 2017. Second volume: Hiroakira Ono, *Proof Theory and Algebra in Logic*, Spring 2019.

Outreach

The JRC started a Tsinghua Logic Wechat Platform this year, in order to publish news and announce center events fast. This new channel has improved public outreach immensely. Among all items, interviews with the Jin Yuelin professors about their teaching experience at Tsinghua got over 20,000 reads, clearly resonating with many Chinese colleagues.

