Seminar on Formal Epistemology (80-521/80-821)

Spring 2018

Monday/Wednesday 12:00–1:20, Doherty 4303

`http://www.andrew.cmu.edu/user/abjorn/Site/Teaching.html`

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Description: This seminar will focus on dynamic and epistemic logics, with special emphasis on the use of topological tools in such settings. No background in topology is necessary, though some familiarity with modal logic will be very helpful. We will begin with a review of foundational and introductory works and then progress to contemporary research articles. Core topics include public announcement logic, action logic, propositional dynamic logic (for nondeterministic program executions), dynamic topological logic, and evidence models. Additional topics will be chosen based on the interests and suggestions of those in the seminar. The format will be presentation-style: each student will be expected to present approximately two papers over the course of the semester.

Evaluation: Everyone will give **two presentations** and submit **one final paper**.

Presentations should take 1–2 class sessions, including plenty of time for questions and discussion. At least one presentation must be based on a paper that forms a part of the core reading list for the seminar ("on-track talks"). If you wish, the other presentation may be on any topic you choose, provided it fits (very broadly) the theme of formal epistemology ("off-track talks"). Such topics should be chosen in consultation with me.

Preparing a talk is a lot of work—please be sure to meet with me beforehand for help in understanding the material and in crafting an effective presentation!

The final paper must be on a topic that is related to the theme of the seminar; it should be discussed in advance with me. It is due on the last day of classes: May 4.

On-track talks

Topic / Readings	**Dates**	**Speaker(s)**
Introduction to epistemic logic and topology		
Dynamic Epistemic Logic (Ch. 2: Epistemic Logic) [13]	Jan 17–Feb 7	Bjorndahl
Reasoning About Space: The Modal Way [1]		
Topology and Epistemic Logic [8]		
Public Announcements		
Dynamic Epistemic Logic (Ch. 4: Public Announcements) [13]	—	—
Topological Subset Space Models for Public Announcements [4]	Feb 12, 21	Bjorndahl
Announcement as Effort on Topological Spaces [12]	—	—
Topo-Logic as Dynamic-Epistemic Logic [3]	Feb 28	Nalls
Knowledge, belief, and evidence		
On Logics of Knowledge and Belief [9]	Mar 5	Schwartz
Dynamic Logics of Evidence-Based Beliefs [11]	Mar 19/21	Fry
Justified Belief and the Topology of Evidence [2]	Mar 21/26	Lam
Logic and Topology for Knowledge, Knowability, and Belief [5]	Mar 28	Bjorndahl
Action Logic		
Dynamic Epistemic Logic (Ch. 6: Action Models) [13]	—	—
Endogenizing Epistemic Actions [7]	Apr 2	Nalls
Dynamic (Topological) (Epistemic) Logic		
Propositional Dynamic Logic [10]	Apr 4	Neumann
Dynamic Topological Logic [6]	Apr 11	Viera-Patron
The Epistemology of Nondeterminism [draft]	Apr 16	Bjorndahl

Off-track talks

Topic	**Date**	**Speaker**
"When Large also is Small"	Feb 14	Teddy Seidenfeld
"Updating for Externalists"	Feb 19	Dmitri Gallow
"Probability Modals and Infinite Domains"	Feb 26	Adam Marushak
"Knowledge and Belief Operators in Type Theory"	Mar 7	Colin Zwanziger
"An Explanatory Semantics for Inductive Knowledge"	Apr 9	Kevin T. Kelly
"Normic Evidence Models"	Apr 18	Josh Fry
TBA	Apr 23	Elizabeth Viera-Patron
"Pseudo-Deontic Modals"	Apr 25	Edward Schwartz
"Counterlegals and Context-Dependence"	Apr 30	Wayne Lam
TBA	May 2	Jacob Neumann

References

[1] M. Aiello, J. van Benthem, and G. Bezhanishvili. Reasoning about space: The modal way. *Journal of Logic and Computation*, 13 (6):889–920, 2003.

[2] A. Baltag, N. Bezhanishvili, A. Özgün, and S. Smets. Justified belief and the topology of evidence. In J. Väänänen, Å. Hirvonen, and R. de Queiroz, editors, *Logic, Language, Information, and Computation. WoLLIC 2016.*, volume 9803 of *Lecture Notes in Computer Science*, pages 83–103, Berlin, Heidelberg, 2016. Springer.

[3] A. Baltag, A. Özgün, and A. V. Sandoval. Topo-logic as a dynamic-epistemic logic. In A. Baltag, J. Seligman, and T. Yamada, editors, *Logic, Rationality, and Interaction. LORI 2017.*, volume 10455 of *Lecture Notes in Computer Science*, pages 330–346, Berlin, Heidelberg, 2017. Springer.

[4] A. Bjorndahl. Topological subset space models for public announcements. In H. van Ditmarsch and G. Sandu, editors, *Jaakko Hintikka on Knowledge and Game Theoretical Semantics*, volume 12 of *Outstanding Contributions to Logic*. Springer International, 2018.

[5] A. Bjorndahl and A. Özgün. Logic and topology for knowledge, knowability, and belief. In J. Lang, editor, *Proc. of the 16th conference on Theoretical Aspects of Rationality and Knowledge (TARK)*, 2017.

[6] P. Kremer and G. Mints. Dynamic topological logic. *Annals of Pure and Applied Logic*, 131:133–158, 2005.

[7] W. Nalls and A. Bjorndahl. Endogenizing epistemic actions. In J. Lang, editor, *Proc. of the 16th conference on Theoretical Aspects of Rationality and Knowledge (TARK)*, 2017.

[8] R. Parikh, L. Moss, and C. Steinsvold. Topology and epistemic logic. In M. Aiello, I. Pratt-Hartmann, and J. van Benthem, editors, *Handbook of Spatial Logics*. Springer, 2007.

[9] R. Stalnaker. On logics of knowledge and belief. *Philosophical Studies*, 128(1):169–199, 2006.

[10] N. Troquard and P. Balbiani. Propositional dynamic logic. The Stanford Encyclopedia of Philosophy, Spring 2015 Edition. `https://plato.stanford.edu/archives/spr2015/entries/logic-dynamic/`.

[11] J. van Benthem and E. Pacuit. Dynamic logics of evidence-based beliefs. *Studia Logica*, 99(1):61–92, 2011.

[12] H. van Ditmarsch, S. Knight, and A. Özgün. Announcement as effort on topological spaces. In *Proc. of the 15th conference on Theoretical Aspects of Rationality and Knowledge (TARK)*, pages 95–102, 2015.

[13] H. van Ditmarsch, W. van der Hoek, and B. Kooi. *Dynamic Epistemic Logic*. Springer, 2008.