Boris Babic

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Academic Appointments

Postdoctoral Scholar and Instructor, California Institute of Technology *2017-2019*

Visiting Fellow, Australian National University *July 2018*

Education

PhD in Philosophy, University of Michigan, Ann Arbor *2013-2017*

Dissertation Title: Foundations of Epistemic Risk
Committee:
James Joyce (Chair), Peter Railton,
Brian Weatherson, Rich Gonzalez (Statistics/ Psychology)

MS in Statistics, University of Michigan, Ann Arbor *2013-2017*

Visitor, Carnegie Mellon University *June 2014*

JD, *cum laude*, Harvard Law School *2007-2010*

BA (Honors), *summa cum laude*, York University *2003-2007*

Areas of Specialization and Competence

AOS: Formal Epistemology, Philosophy of Science (esp. Statistics), Philosophy of Law
AOC: Decision & Game Theory, Logic, Normative Ethics

Publications

A Theory of Epistemic Risk, *Philosophy of Science* forthcoming

Moral Obligations and Epistemic Risk, *Oxford Studies in Normative Ethics* prov. forthcoming
(co-authored with Zoë Johnson-King)

Work in Progress

A Challenge for Approximate Coherentism *available on request*

Norms, Stereotpyes, and Accuracy *available on request*

Testing for Discrimination and the Risk of Error *available on request*

Adaptive Burdens of Proof *available on request*

Dynamic Epistemic Risk *in progress*

Invariance, Entropy, and (Objective) Bayesianism *in progress*

Selected Presentations

"Moral Obligations and Epistemic Risk"
Arizona Workshop in Normative Ethics (January 2019)

"A Challenge for Approximate Coherentism"
University of Colorado, Boulder, 34th Conf. on Chance and Probability (October 2018)

"Testing for Discrimination and the Risk of Error"
Philosophy of Science Association, 26th Biennial Meeting, poster (November 2018)
The Australian National University (July 2018)

"Dynamic Epistemic Risk"
University of California, Irvine (February 2018)
California Institute of Technology (January 2018)

"Generalized Entropy and Epistemic Risk"
University of Michigan, Philosophy of Science Colloquium (February 2018)
London School of Economics, Philosophy of Probability Conference (June 2017)
University of Chicago, Graduate Conference (April 2016)

"Frequency Encoding Credences"
London School of Economics, Decisions, Games and Logic Workshop (June 2015)

Comment on Elisabeth Camp, "Whence and Wherefore Semantics"
University of Michigan, Spring Colloquium (March 2015)

"Degrees of Belief, Moral Judgment, and Legal Responsibility"
Harvard Legal Philosophy Colloquium (November 2014)

"A Puzzle about Presidential Non-Enforcement of Laws"
UCLA, Law and Philosophy Conference (April 2012)
Harvard Law School, Public Law Workshop (April 2010)

Fellowships & Awards

Doctoral Fellowship ($60,000) *2015-2018*
Social Sciences and Humanities Research Council of Canada

Rackham Dissertation Fellowship ($10,200) *2017*
University of Michigan, Ann Arbor

Rackham Research Grant ($3,000) *2017*
University of Michigan, Ann Arbor

Conference Travel Grant ($1,000 x 3) *2017, 2016, 2014*
University of Michigan, Ann Arbor

Weinberg Summer Fellowship ($4,000) *Summer 2015*
University of Michigan, Ann Arbor

Phi Kappa Phi honor society *April 2015*
University of Michigan, Ann Arbor

Mellon Recruitment Fellowship ($4,000) *April 2013*
University of Michigan, Ann Arbor

Rhodes Scholarship Finalist *December 2009*
for Province of Ontario

Public Interest Law Fellowship ($5,000) *2008*
Harvard Law School

Prize for best undergraduate essay in philosophy (x 2) *2006, 2007*
York University

Queen Elizabeth II Merit Scholarship ($14,000) *2003-2007*
Province of Ontario

Teaching (as primary instructor)

Statistics, Ethics, and Law *Spring 2018*
Caltech

Probability, Evidence and Belief *Spring 2018*
Caltech

Knowledge and Reality *Fall 2017*
Caltech

Nature of Science *Fall 2016*
University of Michigan

Knowledge and Reality *Summer 2016*
University of Michigan

Teaching (as TA)

Philosophy, Politics & Economics *Fall 2015*
University of Michigan

Philosophy, Politics & Economics *Winter 2015*
University of Michigan

Intermediate Logic *Fall 2014*
University of Michigan

Experience

Stikeman Elliott, LLP — Toronto
Litigation Associate — *2012–2013*

Quinn, Emanuel, Urquhart & Sullivan, LLP — Los Angeles
Litigation Associate — *2010–2012*

Kirkland & Ellis, LLP — New York
Summer Associate (offer extended) — *Summer 2009*

Petrie-Flom Center for Health Law Policy, Biotechnology & Bioethics — Cambridge, MA
Research Assistant for I. Glenn Cohen, Harvard Law School — *2009–2010*

UNIDROIT — Rome, IT
Research Associate for International Commercial Contracts Group — *Summer 2008*

Professional Service

Reviewer for the following publications:
Philosophy of Science, Synthese, Erkenntnis, American Philosophical Quarterly

10th Workshop in Decisions, Games and Logic — *June 2019*
Organizer (Co-), $10,000 from various funding sources

Philosopher's Annual — *2017, 2016*
Editor (Volumes 35 and 36)

Foundations of Belief and Decision Making Workshop — *2015-2017*
Coordinator (and Co-founder), $11,000 in grant funding

9th Workshop in Decisions, Games and Logic — *July 2015*
Organizer (Co-), $4,000 from various funding sources

Graduate Student Faculty Representative — *2015-2016*
University of Michigan Department of Philosophy

University of Michigan, Department of Philosophy Spring Colloquium — *Spring 2015*
Organizer (Co-), $8,000 grant funding

Graduate Student Representative to Rackham Forum — *2014-2015*
University of Michigan Department of Philosophy

Law & Philosophy Working Group — *2013-2015*
Coordinator (Co-), $12,000 grant funding

Harvard Journal of Law and Technology — *2007-2009*
Editor

Computer Skills

R, Python, SAS, JAGS, Stan

Memberships & Affiliations

State Bar of California

US Federal District Court for the Northern District of California

Provincial Bar of Ontario (i.e., Law Society of Upper Canada)

References

Research

James Joyce

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Brian Weatherson

Marshall M. Weinberg
Professor of Philosophy,
University of Michigan,
Ann Arbor
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Teaching

Elizabeth Anderson

John Dewey
Distinguished University Professor,
University of Michigan,
Ann Arbor
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Graduate Coursework

Statistics

Random Processes (Ohwadi, Caltech)
Probability (Tamuz, Caltech)
Statistical Computing (Bois, Caltech)
Advanced Bayesian Inference (J. Kang)
Survival Analysis (Li)
Machine Learning (Nguyen)
Linear Models (Thelen)
Statistical Inference (M. Kang)
Probability Theory (Braun)
Game Theory II (Lupia)
Game Theory I (Osgood)

Philosophy

Decision Theory (Joyce)
Formal Methods (Moss)
Philosophy of Mathematics (Tappenden)
Advanced Logic (Goldfarb, Harvard, audit)
Epistemology (Williamson)
Epistemology (Lasonen-Aarnio, audit)
Formal Epistemology (Joyce)
Metaphysics (Manley, audit)
David Lewis Seminar (Weatherson)
Quine (Goldfarb, Harvard)
Wittengstein (Goldfarb, Harvard)
Moral Psychology (Railton)
Normative Uncertainty (Weatherson)
Plato (Evans)
Hume (Loeb, audit)

Law (Harvard, selected advanced courses)

Public Law Workshop (Minow/Fallon, by admission)
Constitutional Law, Fourteenth Amendment (Minow)
Constitutional Law, First Amendment (Feldman)
Comparative Constitutional Law (Michelman)
Separation of Powers (Kavanaugh)
Administrative Law (Rakoff)
International Law (Goldsmith)
International Law Theory (Alford)
Federal Litigation (Rosenberg)

Dissertation Abstract

While risk analysis is central in ordinary decision theory, it is almost entirely absent in the decision-theoretic assessment of partial beliefs or credences. As a result, in my doctoral dissertation I propose a general theory of *epistemic risk*. This theory is broadly inspired by C.S. Peirce and his notion of the "economy of research."

In the first two chapters, I motivate and develop a general measure of epistemic risk. I suggest that one probability measure is riskier than another if an agent who adopts the first as her credence function, instead of the second, incurs a potential gain in cognitive utility as well as a corresponding potential cost (where cognitive utility is measured by a statistical loss function). The most conservative probability measure is the one that guarantees a certain outcome in terms of cognitive utility. The measure of epistemic risk is then given as a smooth monotonic function of the difference between the loss to the agent, if they move away from the truth, and the gain, if they move closer to it. This measure is similar in important respects to the Rothschild/Stiglitz notion of risk in terms of stochastic dominance for ordinary economic prospects. In the simple case where we are formulating a credence about a single proposition, the intended interpretation of this risk function is that risk increases monotonically with potential increases in marginal inaccuracy in the direction of false positive (Type I) or false negative (Type II) errors. A symmetric risk function indicates indifference between error types whereas an asymmetric one reflects different kinds of trade-offs an agent might make.

I show that under modest regularity conditions, this notion of risk is dual to a generalized notion of information entropy. In particular, risk is a scaled reflection of generalized information entropy so that their sum is always constant. That is,

$$Risk + Entropy = k$$

Like entropy, epistemic risk forms a partial order on a Bayesian agent's set of potential prior credence functions. As a result, thinking about credences from a risk perspective offers a novel approach to identifying an appropriate prior. If we know (1) the shape of an agent's risk function and (2) their attitude to epistemic risk (together, I call this the agent's 'risk profile') then we can determine the prior they ought to hold, by their own lights. For example, it is often argued that an agent ought to choose a prior by maximizing Shannon information entropy. My approach makes clear that this is true only if the agent is both extremely conservative and indifferent to different types of error. This is a highly specific (and unusual) risk profile.

In the third chapter, I extend this theory of epistemic risk to the updating context, where I defend the claim that dynamic epistemic risk is given by cross-entropic change, because the minimum cross-entropy posterior credence function is the unique credence function that preserves the epistemic risk profile reflected in the agent's prior credences. And in most cases, the minimum cross-entropy posterior is indeed the posterior recommended by Bayesian conditioning. Therefore, the theory of epistemic risk I propose also yields a novel defense of updating by Bayesian conditioning.

In the final chapter, I apply the epistemic risk framework to legal decision-making. In particular, I explain how attitudes toward epistemic risk affect a judge or jury's subjective interpretation of the burden of proof and their assessment of statistical evidence. By recasting the debate over statistical evidence in terms of sensitivity to epistemic risk, the account I propose enables us to understand, and resolve, some well-known paradoxes in the theory of evidence law.