Travis LaCroix

Contact Information	✉ 740 Social Science Tower University of California, Irvine Department of Logic and Philosophy of Science 3151 Social Sciences Plaza Irvine, CA 92697-5100	☎ ✉ 	+1 (438) 520-8152 tlacroix@uci.edu travislacroix.github.io uci.academia.edu/tlacroix

Citizenship	Canada
Areas of Specialisation	Evolutionary Game Theory Philosophy of Language & Linguistics
Areas of Competence	Dynamical Systems Philosophy of Biology & Behavioural Science Formal & Traditional Epistemology Decision & Game Theory

Education

University of California, Irvine, Irvine, California USA
Ph.D, Philosophy, June 2020 (Expected). GPA: 3.95/4.00
Department of Logic and Philosophy of Science

Dissertation: On the Evolution of Evolved Capacities
Committee: Jeffrey Barrett (Chair)
Brian Skyrms
Simon Huttegger
Cailin O'Connor

M.A., Social Science, March 2018
Institute for Mathematical Behavioral Science

Simon Fraser University, Burnaby, British Columbia CAN
M.A., Philosophy, April 2016. GPA: 4.05/4.33

Thesis Topic: "On Signaling Games and Their Models"
Committee: Nicolas Fillion (Chair)
Matt DeVos

University of British Columbia, Vancouver, British Columbia CAN
B.A. (Hons.), Philosophy; English Literature, April 2014. GPA: 81.5/100

First Class standing

Camosun College, Victoria, British Columbia CAN
A.A., English, April 2011. GPA: 8.14/9

Appointments

Montréal Institute for Learning Algorithms, Montréal, Québec CAN
Visiting Researcher, July 2018 – June 2019

Supervisor: Yoshua Bengio

Publications

Refereed Journal Articles

1. LaCroix, Travis. 2018. "On Salience and Signaling in Sender-Receiver Games: Partial Pooling, Learning, and Focal Points." *Synthese* (Forthcoming). doi.org/10.1007/s11229-018-1766-z

Papers Under Review

(Draft available upon request)

"What Russell Can Denote"
"Power by Association" (w/Cailin O'Connor)
"Evolutionary Explanations of Simple Communication"
"The Correction Game"

Selected Working Papers

(Draft available upon request)

"Reference by Proxy and Truth-in-a-Model"
"Self-Assembly and Logical Operations"
"Less is More: Degrees of Compositionality for Complex Signals"
"Polysemy and Role-Asymmetry in the Evolution of Compositional Signals"
"State Partitions and Information Transfer"
"Principle of Indifference" (w/Jeffrey A. Barrett)
"Fake News!" (w/Cailin O'Connor & Anders Geil)

Popular Media

1. "Academics Have a Responsibility to Distribute Accurate Data." (Published as "It's not a woman's world just yet.") *Ottawa Citizen* (November 6, 2017).

Conference Presentations

Refereed Talks

2019

11. "Using Logic to Evolve More Logic: Composing Logical Operators via Self-Assembly"
American Philosophical Association, Pacific Division
Vancouver, Canada, 17–20 April 2019.

2018

10. "Less is More: Degrees of Compositionality for Complex Signals"
Philosophy of Science Association
Seattle, USA, 1–4 November 2018. *Symposium Contribution.*

9. "Reference by Proxy and Truth-in-a-Model"
Western Canadian Philosophical Association
Calgary, Canada, 26–28 October 2018.

8. "On The Role of Power in the Evolution of Inequitable Norms" (w/Cailin O'Connor)
L'Association Canadienne de Philosophie
Montréal, Québec, 4–7 June 2018.

7. "On The Role of Power in the Evolution of Inequitable Norms" (w/Cailin O'Connor)
   Latin American Association for Analytic Philosophy, and
   Colombian Conference on Logic, Epistemology, and Philosophy of Science
   Villa de Leyva, Colombia, 16–18, May 2018.

6. "On The Role of Information in the Evolution of Signaling"
   University of Calgary Graduate Philosophy Conference
   Calgary, Canada, 3–4 May 2018.

2017

5. "On Salience and Signaling in Sender-Receiver Games"
   Western Canadian Philosophical Association
   Regina, Canada, 13–15 October 2017.

4. "Evolving Salience in Sender-Receiver Games"
   Luce Graduate Student Conference
   Irvine, USA, 2 June 2017.

2016

3. "Signaling Games & Their Models"
   Colombian Conference on Logic, Epistemology, & Philosophy of Science
   Bogotá, Colombia, 17–19 February 2016.

2015

2. "Fractionally Quantified Predicate Logic"
   Logic, Math and Physics Graduate Student Conference
   London, Canada, 4–5 June 2015.

2014

1. "The Metaphysics of Philosophical Objects and their Methodological Implications"
   Canadian Undergraduate Philosophy Conference
   Calgary, Canada, 7–9 February 2014.

Departmental Talks

5. "Less is More: Degrees of Compositionality for Complex Signals", Interdisciplinary Workshop Series, Department of Philosophy, McGill University, 23 October 2018.

4. "Power By Association" IMBS Friday Seminar, Institute for Mathematical Behavioral Sciences, University of California, Irvine, 27 April 2018.

3. "On Salience and Signaling in Sender-Receiver Games" Social Dynamics Seminar (Fall 2017), Department of Logic and Philosophy of Science, University of California, Irvine, 2 October 2017.

2. "On Signaling Games and Their Models" Social Dynamics Seminar (Fall 2016), Department of Logic and Philosophy of Science, University of California, Irvine, 22 November 2016.

1. "A Prélude to Fractional Quantification" Simon Fraser University Philosophy Graduate Student Colloquium, Simon Fraser University, Burnaby, 7 November 2014.

Commentor

1. "Responsibility for Saying and Asserting" (Henry Schiller) CPA/ACP 2018 Annual Congress, Université du Québec à Montréal, Montréal, Canada, 4–7 June 2018.
2. "Simplicity and A Priori Probability Principles" (Noa Latham) CPA/ACP 2018 Annual Congress, Université du Québec à Montréal, Montréal, Canada, 4–7 June 2018.

Academic Experience

Teaching Assistant

University of California, Irvine

1. Inductive Logic, Simon Huttegger — Spring 2018
   Department of Logic and Philosophy of Science
   Department of Philosophy
2. Introduction to Linguistics, Arunima Choudhury — Winter 2018
   Department of Linguistics
3. Acquisition of Language, Lisa Pearl — Fall 2017
   Department of Linguistics
   Department of Cognitive Sciences
4. Inductive Logic, Simon Huttegger — Spring 2017
   Department of Logic and Philosophy of Science
   Department of Philosophy
5. Probability and Statistics for Economics I, Kent Johnson — Winter 2017
   Department of Economics

Simon Fraser University

1. Critical Thinking, Jillian McIntosh — Spring 2016
2. Critical Thinking, Jillian McIntosh — Fall 2015
3. Critical Thinking, Jillian McIntosh — Spring 2015
4. Introduction to Ethics, Evan Tiffany — Fall 2014

Guest Lectures

University of California, Irvine

1. "Language and Cognition" *Acquisition of Language* (Linguistics/Psychology), 1 Dec. 2017.

Research Assistant

University of California, Irvine

Social Dynamics and Diversity in Epistemic Communities
Cailin O'Connor (NSF Grant 1535139) — Fall 2018

Social Dynamics and Diversity in Epistemic Communities
Cailin O'Connor (NSF Grant 1535139) — Summer 2018

Social Dynamics and Diversity in Epistemic Communities
Cailin O'Connor (NSF Grant 1535139) — Summer 2017

Simon Fraser University

Constructing Questions for Critical Thinking
Jillian McIntosh — Spring 2015

University of British Columbia

Aristotle's Earlier Logic
John Woods — Summer 2014

Grants and Fellowships

Research Awards

1. *Social Sciences and Humanities Research Council of Canada* Joseph-Armand Bombardier Canada Graduate Scholarships, Simon Fraser University ($17,500 CAD), 2015–2016
2. *Social Sciences and Humanities Research Council of Canada* Joseph-Armand Bombardier Canada Graduate Scholarships, University of British Columbia ($17,500 CAD), declined, 2014–2015

Academic Awards

University of California, Irvine

1. Justine Lambert Graduate Prize in the Foundations of Science, for "On Salience and Signaling: Partial Pooling, Learning, and Focal Points", University of California, Irvine ($1000 USD), 2018.
2. Social Science Merit Fellowship ($257,818 USD), 2016–2022

Simon Fraser University

1. Graduate Fellowship ($6250 CAD), 2015

University of British Columbia

1. John Alexander Scholarship in Humanities ($1500 CAD), 2014
2. Robert and Kazuko Barker Award ($225 CAD), 2014

Professional Service

Symposium Organizer "Evolutionary Explanations of Compositional Communication" Philosophy of Science Association 2018 Biennial Meeting, November, 2018.

Chair The Vancouver Summer Philosophy Conference (19–23 August 2018, Vancouver, CAN); F-SEW: Formal Social Epistemology Workshop (25–26 May 2018, Irvine, USA); The Western Canadian Philosophical Association 54th Annual Meeting (13–15 October 2017, Regina, CAN); The Ninetieth Annual Meeting of the American Philosophical Association, Pacific Division (30 March – 3 April 2016, San Francisco, USA).

Graduate Student Representative Department of Philosophy, Graduate Student Society, Simon Fraser University, 2015–2016.

Editor-In-Chief *hemlock. Undergraduate Philosophy Journal*, 2013–2014.

Specialized Training

University of California, Irvine

Sex Offense Prevention Training — Fall 2017
Teaching Assistant Professional Development Program — Fall 2016

Simon Fraser University

TA/TM Day: Teaching Orientation Program	Spring 2016
TA/TM Day: Teaching Orientation Program	Fall 2015
TA/TM Day: Teaching Orientation Program	Spring 2015
TA/TM Day: Teaching Orientation Program	Fall 2014

University of British Columbia

Student Directed Seminar, Training Workshop	Fall 2012

Languages English (native), French (intermediate), German (beginner)

Technical Skills

Mathematics:
Ordinary / Partial Differential Equations, Linear Algebra, Multivariate / Vector Calculus

Logic:
Set Theory, Modal Logic, Predicate Logic

Programming Languages:
Python, Java, Javascript

Markup:
LaTeX, HTML, CSS

Computation and Graphing:
R, MatLab, Excel

Affiliations
Canadian Philosophical Association
Philosophy of Science Association
American Philosophical Association
Society for Exact Philosophy

Seminars and Graduate Coursework

(† = Directed Study, ∗ = Audit)

Epistemology & Philosophy of Language	Bayesian Epistemology	S. Huttegger	UCI	2018
	Information Theory	C. O'Connor	UCI	2017
	Metasemantics	O. Simchen	UBC	2015
	Language at the Interface	A. Atkins	SFU	2015
	Recent Perspectives on the *A Priori*∗	P. Hanson	SFU	2015
	Errors of Reasoning	J. Woods	UBC	2014
Decision & Game Theory	Social Dynamics	B. Skyrms	UCI	2016-18
	Evolution and Learning in Games	J. Carvalho	UCI	2017
	Evolutionary Game Theory	S. Huttegger	UCI	2016
	Decision Theory and Game Theory	N. Fillion	SFU	2014
Natural & Aritifical Intelligence	Adv. Topics in Computing Systems∗	D. Precup	McGill	2019
	Fundamentals of Machine Learning∗	I. Mitliagkas	UdeM	2018
	Deep Learning†		UCI	2018
	Reinforcement Learning	R. Dechter	UCI	2018
	Intro to Artificial Intelligence	K. Kask	UCI	2017
	Conscious Systems	K. Saberi	UCI	2017
Logic & Philosophy of Logic	Undecidability and Incompleteness	K. Johnson	UCI	2017
	Metalogic	K. Wehmeier	UCI	2017
	Set Theory	S. Walsh	UCI	2016
	Modal Logic	S. Walsh	UCI	2016
	Hypergraphs and Philosophy	R. Jennings	SFU	2014
Mathematics & Philosophy of Mathematics	Mathematical & Computational Bio	G. A. E. Ruiz	UCI	2017
	Philosophy of Set Theory	P. Maddy	UCI	2016
	History of Analysis	T. Archibald	SFU	2016
History of Philosophy	Frege, Russell, Wittgenstein	J. Heis	UCI	2017
	Hume's Treatise	K. Schafer	UCI	2017
	Leibniz and Berkeley∗	D. Heide	SFU	2016
	Descartes	L. Shapiro	SFU	2015
Ethics	Direction of Moral Duties	A. Zylberman	SFU	2016
	Responsibility & Excuse	E. Tiffany	SFU	2015
	Pro-Seminar	E. Tiffany	SFU	2014
Professional Training	Professional Development	D. Pritchard	UCI	2019
	University Teaching	M. McBride	UCI	2018
	University Teaching	M. McBride	UCI	2017

Last updated: January 11, 2019

Selected Course Evaluations [1]

7- Among Best
4- OK
1- Among Worst

Introduction to Inductive Logic, Spring, 2018; $n = 22$

	MEAN	St. Dev.	MEAN (All S.S. Courses)
TA was competent in course material	6.55	0.66	5.91
TA was able to make presentations clearly	6.48	0.73	5.85
TA was responsive to students	6.45	0.72	5.97
TA was able to integrate the lecture and discussion material	6.50	0.72	5.94
TA was present and on time for discussion sections and office hours	6.64	0.57	6.09
The discussion sections were useful to the success of the course	6.36	1.02	5.81
I would expect another course with this TA to be	6.64	0.57	5.84
General teaching effectiveness	**6.50**	**0.84**	**5.63**

Introduction to Linguistics, Winter, 2018; $n = 75$

	MEAN	St. Dev.	MEAN (All S.S. Courses)
TA was competent in course material	5.84	1.14	5.83
TA was able to make presentations clearly	5.87	1.10	5.78
TA was responsive to students	5.93	1.14	5.94
TA was able to integrate the lecture and discussion material	5.95	1.15	5.89
TA was present and on time for discussion sections and office hours	6.07	1.11	6.11
The discussion sections were useful to the success of the course	5.74	1.36	5.74
I would expect another course with this TA to be	5.85	1.24	5.78
General teaching effectiveness	**5.78**	**1.11**	**5.60**

Acquisition of Language, Fall, 2017; $n = 35$

	MEAN	St. Dev.	MEAN (All S.S. Courses)
TA was competent in course material	5.60	1.57	5.72
TA was able to make presentations clearly	5.83	1.52	5.65
TA was responsive to students	5.66	1.57	5.83
TA was able to integrate the lecture and discussion material	5.45	1.63	5.77
TA was present and on time for discussion sections and office hours	5.50	1.61	5.98
I would expect another course with this TA to be	5.60	1.55	5.65
General teaching effectiveness	**5.47**	**1.45**	**5.52**

Introduction to Inductive Logic, Spring, 2017; $n = 26$

	MEAN	St. Dev.	MEAN (All S.S. Courses)
TA was competent in course material	6.19	1.44	5.86
TA was able to make presentations clearly	5.88	1.55	5.79
TA was responsive to students	6.16	1.46	5.93
TA was able to integrate the lecture and discussion material	6.08	1.47	5.89
TA was present and on time for discussion sections and office hours	6.26	1.45	6.06
The discussion sections were useful to the success of the course	5.87	1.75	5.74
I would expect another course with this TA to be	6.00	1.56	5.77
General teaching effectiveness	**5.93**	**1.21**	**5.63**

[1] Full course evaluations available upon request

Dissertation Abstract

Communication is found everywhere in nature; however, language is often claimed to be unique to humans. Thus, two questions immediately arise: What are the relevant differences between language and communication? How did language evolve? My dissertation suggests answers to these questions by providing a novel way of understanding the evolution of complex communicative dispositions. I show how simple communication systems themselves might compose to create more complex systems.

Communication is a unique evolutionary process in the following sense: once a group of individuals has learned some set of simple communication conventions, those learned behaviours may be used to influence future communication, giving rise to a feedback loop. When faced with a novel context, an evolutionary agent can always evolve a brand new disposition from scratch. However, the agent may also learn to take advantage of previously evolved dispositions. I propose several ways that this might happen. When the contexts are dissimilar the individual may appropriate her previous disposition for use in the new context. Or, if the agent has learned several independent dispositions, she might learn to combine them in suitable ways for the new context.

My dissertation demonstrates that these types of evolutionary models provide a plausible explanation of how complex communication systems arise. This advances a growing body of work in the evolution of language that spans several disciplinary boundaries including philosophy, linguistics, and evolutionary biology. My methodology utilises formal models from evolutionary game theory to test the plausibility of my hypotheses. This is the theory of signalling games (Lewis, 1969; Skyrms, 1996; Skyrms 2010). Evolutionary signalling games constitute a now-standard model for explaining and studying the emergence of communication systems in a wide range of social organisms from humans to monkeys to bees to bacteria.

Under this framework, we can reformulate the formidable question of how languages arise to the more tractable question of how complex signalling systems arise. The first part of my dissertation suggests new ways of understanding the evolutionary processes underlying complex signalling in a way that accounts for empirical data. This challenges the existing paradigm, which focuses on the evolution of syntax, and further serves to connect currently independent methodologies from philosophy, linguistics, cognitive systems, and evolutionary biology. The second part of my dissertation presents simulation results from several new models that show how simple signalling games evolve into complex signalling games. The signalling game methodology is still relatively young, and so many open question remain, and many results, extensions, and applications have yet to be explored.