JEAN-GABRIEL YOUNG

Assistant Professor

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RESEARCH INTERESTS: Computational Statistics, Complex Systems, Forecasting, Epidemiology

PROFESSIONAL EXPERIENCE

• University of Vermont, Assistant Professor, Department of Mathematics and Statistics*	2021-
• Université Laval, Professeur Associé Département de Physique	2020-
• University of Vermont, Research Assistant Professor, Department of Computer Science	2020-2021
• University of Michigan, Postdoctoral Fellow, Center for the Study of Complex Systems	2018-2020
• <i>Université Laval</i> , Research Assistant, Group of Prof. Louis. J. Dubé	2012-2018

EDUCATION

Ph.D. in Physics, Université Laval	2014–2018
• <i>Thesis title</i> : Inférence et réseaux complexes [†]	
 Advisors: Louis J. Dubé and Patrick Desrosiers 	
M.Sc. in Physics, Université Laval	2012-2014
 Thesis title: De la détection de la structure communautaire des réseaux complexes ‡ 	
• Advisors: Louis J. Dubé	
B.Sc. in Physics, Theoretical Physics major, Université Laval	2009–2012

SCHOLARSHIPS, GRANTS AND AWARDS

Fellowships and Scholarships

• Doctoral Research Scholarship, Fonds de recherche du Québec – Nature et Technologies (\$60,000)	2014
Grants	

2017

• Postdoctoral Fellowship in Studying Complex Systems, James S. MacDonnell Foundation (\$200,000)

• NSF. "Altruistic stress, economic networks, and endogenous organizational change" (\$399,653, co-PI)	2024	
• NSF. "Contagion on Complex Social Systems Conference" (\$47,838, PI)	2023	
• James Jeffords Grant, University of Vermont. "Vermont Open Source Connector" (\$4,600, PI)	2023	
• OVPR Express Grant, University of Vermont. "Choice Theory in Networks Workshop" (\$3,000, PI)	2021	
 YRNCS Bridge Grant, YRCSS. "Simplicial Configuration Models" (€1,000, PI) 	2016	

Awards

• FOSS Award, 2021 Mining Software Repositories Conference	2021
Zachary Karate Club Club award	2021
Best oral presentation award, NERCCS 2020	2020
• Board of Honour (Highest overall mark award by all committee members), Ph.D thesis, Université Laval	2018
• Concours d'expression scientifique Pierre Amiot, Physics Department, Université Laval	2016

^{*}Secondary appointement with: Vermont Complex Systems Center, Larner College of Medicine, Department of Computer Science

[†]Inference and complex networks

[‡]Of community structure detection on complex networks

PUBLICATIONS

Peer-	reviewed journals	
36.	Reconstructing networks from simple and complex contagions N. W. Landry, W. Thompson, L. Hébert-Dufresne, and JG. Young Phys. Rev. E 110, L042301	2024
35.	Network compression with configuration models and the minimum description length L. Hébert-Dufresne, JG. Young , A. Daniels, and A. Allard Phys. Rev. E 110, 034305	2024
34.	The simpliciality of higher-order networks N. W. Landry, JG. Young , and N. Eikmeier EPJ Data Sci. 13, 17	2024
33.	Hypergraph reconstruction from uncertain data S. Lizotte, JG. Young , and A. Allard Sci. Rep. 13, 21364	2023
32.	Accurately summarizing an outbreak using epidemiological models takes time B. K. M. Case, JG. Young , and L. Hébert-Dufresne R. Soc. Open Sci. 10, 230634	2023
31.	Opposing responses to scarcity emerge from functionally unique sociality drivers A. B. Kao, A. K. Hund, F. P. Santos, JG. Young , D. Bhat, J. Garland, R. A. Oomen, and H. F. McCreery Am. Nat. 202, 3	2023
30.	Exact and rapid linear clustering of networks with dynamic programming A. Patania, A. Allard, and JG. Young Proc. R. Soc. A 479, 2275	2023
29.	Compressing network populations with modal networks reveals structural diversity A. Kirkley, A. Rojas, M. Rosvall, and JG. Young Commun. Phys. 6, 148	2023
28.	Latent network models to account for noisy, multiply-reported social network data C. De Bacco, M. Contisciani, J. Cardoso-Silva, H. Safdari, D. Theuerkauf, T. Sweet, JG. Young , J. Koster, C. Ross, R. McElreath, D. Redhead, and E. A. Power J. R. Stat. Soc. A 186, 355–375	2023
27.	Spatial epidemiology and adaptive targeted sampling to manage the Chagas disease vector Triatoma dimidiata B. K. M. Case, JG. Young , D. Penados, L. Hébert-Dufresne, and L. Stevens PLOS Negl. Trop. Dis. 16, e0010436	2022
26.	Impact and dynamics of hate and counter speech online J. Garland, K. Ghazi-Zahedi, JG. Young , L. Hébert-Dufresne, and M. Galesic EPJ Data Sci. 11, 3	2022
25.	Clustering of heterogeneous populations of networks JG. Young , A. Kirkley, and M. E. J. Newman Phys. Rev. E 105, 014312	2022
24.	Reconstruction of plant–pollinator networks from observational data JG. Young , F. S. Valdovinos, and M. E. J. Newman Nat. Commun. 12, 3911	2021
23.	Hypergraph reconstruction from network data§ JG. Young , G. Petri, and T. P. Peixoto Commun. Phys. 4, 135	2021
22.	A clarified typology of core-periphery structure in networks R. J. Gallagher, JG. Young , and B. Foucault Welles Sci. Adv. 7, eabc9800	2021
21.	Bayesian inference of network structure from unreliable data JG. Young , G. T. Cantwell, and M. E. J. Newman J. Complex. Netw. 8, cnaa046	2021

[§]Appears in the Focus Collection on Higher-order Interaction Networks

20.	Inference, model selection, and the combinatorics for growing trees G. T. Cantwell, G. St-Onge, and JG. Young Phys. Rev. Lett. 126, 038301	2021
19.	Networks beyond pairwise interactions: structure and dynamics (<i>review</i>) F. Battiston, G. Cencetti, I. Iacopini, V. Latora, M. Lucas, A. Patania, JG. Young , and G. Petri Phys. Rep. 874	2020
18.	Improved mutual information measure for classification and community detection M. E. J. Newman, G. T. Cantwell, and JG. Young Phys. Rev. E 101, 042304	2020
17.	Macroscopic patterns of interacting contagions are indistinguishable from social reinforcement L. Hébert-Dufresne, S. V. Scarpino, and JG. Young Nat. Phys. 16, 426	2020
16.	Phase transition in the recoverability of network history JG. Young , G. St-Onge, E. Laurence, C. Murphy, L. Hébert-Dufresne, and P. Desrosiers Phys. Rev. X 9, 041056	2019
15.	Efficient sampling of spreading processes on complex networks using a composition and rejection algorithm G. St-Onge, JG. Young , L. Hébert-Dufresne , and L. J. Dubé Comput. Phys. Commun. 240, 30	2019
14.	Universality of the stochastic block model JG. Young, G. St-Onges, P. Desrosiers, and L.J.Dubé Phys. Rev. E 98, 032309	2018
13.	Exact analytical solution of irreversible binary dynamics on networks E. Laurence, JG. Young , S. Melnik, and L.J.Dubé Phys. Rev. E 97, 032302	2018
12.	Phase transition of the susceptible-infected-susceptible dynamics on time-varying configuration model networks G. St-Onge, JG. Young , E. Laurence, C. Murphy, and L. J. Dubé Phys. Rev. E 97, 022305	2018
11.	Construction of and efficient sampling from the simplicial configuration model JG. Young , G. Petri, F. Vaccarino, and A. Patania Phys. Rev. E 96, 032312	2017
10.	Strategic tradeoffs in competitor dynamics on adaptive networks L. Hébert-Dufresne, A. Allard, PA. Noël, JG. Young , , and E. Libby Sci. Rep. 7, 7576	2017
9.	Finite size analysis of the detectability limit of the stochastic block model JG. Young , P. Desrosiers, L. Hébert-Dufresne, E. Laurence, and L. J. Dubé Phys. Rev. E 95, 062304	2017
8.	Growing networks of overlapping communities with internal structure JG. Young , L. Hébert-Dufresne, A. Allard, and L. J. Dubé Phys. Rev. E 94, 022317	2016
7.	Constrained growth of complex scale-independent systems [¶] L. Hébert-Dufresne, A. Allard, JG. Young , and L. J. Dubé Phys. Rev. E 93, 032304	2016
6.	Complex networks as an emerging property of hierarchical preferential attachment L. Hébert-Dufresne, E. Laurence, A. Allard, JG. Young , and L. J. Dubé Phys. Rev. E 92, 062809	2015
5.	General and exact approach to percolation on random graphs A. Allard, L. Hébert-Dufresne, JG. Young , and L. J. Dubé Phys. Rev. E 92, 062807	2015
4.	A shadowing problem in the detection of overlapping communities JG. Young , A. Allard, L. Hébert-Dufresne, and L. J. Dubé PLOS ONE 10, e0140133	2015

[¶]Editors' suggestion

In revision, Evolution

arXiv:2406.10711

arXiv:2412.03421

Submitted, npj Complexity

S. Lizotte, J.-G. Young, and A. Allard

S. Bernatchez, C. Choquette, and A. A. Cohen

• Symmetry-driven embedding of complex networks in hyperbolic space

• Governance as a complex, networked, democratic, satisfiability problem

L. Hébert-Dufresne, N. W. Landry, J. Lovato, J. St-Onge, J.-G. Young, M.-E. Couture-Ménard,

3.	Coexistence of phases and the observability of random graphs ¶ A. Allard, L. Hébert-Dufresne, JG. Young , and L. J. Dubé Phys. Rev. E 89, 022801	2014
2.	Percolation on random networks with arbitrary <i>k</i> -core structure L. Hébert-Dufresne, A. Allard, JG. Young , and L. J. Dubé Phys. Rev. E 88, 062820	2013
1.	Global efficiency of local immunization on complex networks L. Hébert-Dufresne, A. Allard, JG. Young , and L. J. Dubé Sci. Rep. 3, 2171	2013
Peer	-reviewed conference proceeding	
5.	Cutting through the noise to infer autonomous system topology K. G. Leyba, J. J. Daymude, JG. Young , M. E. J. Newman, J. Rexford, and S. Forrest INFOCOM 2022, Proceedings of the 2022 IEEE International Conference on Computer Communications, pp. 1609–1618.	2022
4.	The OCEAN mailing list data set: Network analysis spanning mailing lists and code repositories M. Warrick, S. F. Rosenblatt, JG. Young , L. Hébert-Dufresne, and J. P. Bagrow MSR 2022, Proceedings of the 19th International Conference on Mining Software Repositories	2022
3.	Which contributions count? Analysis of attribution in open source JG. Young , A. Casari, K. McLaughlin, M. Z. Trujillo, L. Hébert-Dufresne, and J. P. Bagrow MSR 2021, Proceedings of the 18th International Conference on Mining Software Repositories	2021
2.	Countering hate on social media: Large scale classification of hate and counter speech J. Garland, K. Ghazi-Zahedi, JG. Young , L. Hébert-Dufresne, and M. Galesic ACL 2020, Proceedings of the Fourth Workshop on Online Abuse and Harms, pp. 102–112.	2020
1.	Connected graphs with a given degree sequence: Efficient sampling, correlations, community detection and robustness J. Ring IV, JG. Young , and L. Hébert-Dufresne. NetSci-X 2020, Proceedings of NetSci-X 2020: Sixth International Winter School and Conference on Network Science, pp. 33–47.	2020
Othe	er edited works	
2.	Book review: Advances in Network Clustering and Blockmodeling JG. Young J. Soc. Struct. 23, 47	2022
1.	Open source ecosystems need equitable credit across contributions A. Casari, K. McLaughlin, M. Z. Trujillo, JG. Young , J. P. Bagrow, and L. Hébert-Dufresne Nat. Comput. Sci. 1, 2	2021
Prep	rints in submission (4)	
•	The network epidemiology of an Ebola epidemic L. Hébert-Dufresne, JG. Young , J. Bedson, L. Skrip, D. Pedi, M. F. Jalloh, B. Raulier, O. Lapointe-Gagné, A. Jambai, A. Allard, and B. Althouse arXiv:2111.08686	
•	The promise of trans-species coexpression analysis in studying the coevolution and ecology of host-parasite interactions. A. Hund, P. Tiffin, JG. Young , and D. Bolnick arXiv:2206.12711	

TEACHING AND MENTORING

Instructor			
• STAT-6300: Bayesian Statistics	F2021, F2022, F2023, F2024		
STAT-6990: Statistical Network Analysis	S2022, S023		
• CS-3993: Independent Study: Machine Learning with graphs	F2023		
STAT-2510: Applied Probability	F2024		
• CSYS-6993: Independent Study: Information, Physics, and Computation	F2024		
Schools and guest lectures			
• CSYS/CS 302: Modeling Complex Systems, University of Vermont, Burlington VT,	2020, 2021		
 CNWW: Complex Networks Winter Workshop, Québec, Canada 	2020, 2023		
 CRM Summer School: Spectral Theory and Applications, Québec, Canada 	2016		
Supervision			
Postdoctoral fellows:			
 Nicholas W. Landry, University of Vermont 	2022–2024		
• Ph.D. students:			
 William H. Thompson, University of Vermont 	2024–		
 Simon Lizotte, Université Laval (co-direction with Antoine Allard) 	2022-		
 Jonathan St-Onge, University of Vermont 	2022–		
 Nicholas J. Robert, University of Vermont 	2021-		
♦ B. K. M. Case, University of Vermont	2021–2023		
Master's students:			
 Aviral Chawla, University of Vermont 	2022–2024		
⋄ Erik Weis, University of Vermont	2021–2023		
 Simon Lizotte, Université Laval (co-direction with Antoine Allard) 	2020–2022		
Undergraduate students:			

• Undergraduate students:

♦ Erin Silver (Research Intern), University of Vermont	Summer 2024
♦ Nathan Blanchard (Honors Thesis), University of Vermont	AY 24/25
♦ Trevor Blanchard (Honors Thesis), University of Vermont	AY 22/23

INVITED TALKS AND SELECTED CONFERENCE CONTRIBUTIONS

• "Message passing for intervention design in networks." QMDN24, Los Alamos, NM (invited talk)	2024
 "Bayesian framework for inference on heterogenous waste-water networks." NetSci 2024, Québec, Canada (contributed talk) 	2024
 "Complex or simple? Determining a contagion's type from observational data." WDPCN24, São Paulo, Bazil (invited talk) 	2024
 "What can we learn from low-dimensional representations of networks?" ▷ NetSI, Boston MA, USA (invited seminar) ▷ Interaction Data Lab, Paris, France (invited seminar) 	2024
 "Modeling the Spread of Clostridioides Difficile in Hospitals" SIAM DS23, Portland, OR, USA (talk) 	2023
 "Quantifying Contagion Complexity" Dynamics of Interacting Contagions – Santa Fe Institute, NM, USA (talk) 	2023

• "Statistical Modeling and Inference for Higher-Order Network Science" 2023 KAIS-Vermont Workshop, Seoul, Korea (invited talk) • "Uncertain Network Science" 2021-2023 ▷ Channing Network Science Seminar, Boston MA, USA (invited seminar) ▶ NERCCS 2022 conference, Buffalo, NY, USA (invited plenary) ▷ University of Vermont — Mechanical Engineering Seminars, Burlington VT, USA (invited seminar) ▷ Central European University—Department of Network and Data Science, online (invited seminar) ▷ CNRS, Centre d'Écologie Fonctionnelle et Évolutive, Montpelier, France (invited talk) ▶ University of Maastricht – Department of Data Analytics and Digitalisation, Maastricht, Netherlands (invited seminar) • "Which contributions count? Analysis of attribution in open source" 2021-2022 ▶ MSR2021, online (talk) ▷ BTV Data Science Meet-up, Burlington, VT, USA (talk) • "Inference with growing networks" 2021 CNWW2020, online (invited talk) "Bayesian approaches to network epidemiology" 2020 HONS 2020, online (invited talk) • "Paper Unwind: Network archaeology" 2020 School of the NERCCS 2020 conference, Buffalo, NY, USA (invited talk) "Efficient and fully bayesian inference of complex networks from noisy data" 2019-2020 ▶ Indiana University — CNETS, Bloomington, IN, USA (invited seminar) ▷ Université Laval — CIMMUL, Québec, QC, Canada (invited seminar) Netsci-X 2020, Tokyo, Japan (talk) ▷ NERCCS 2020, Buffalo, NY, USA (talk, best presentation award) ▷ University of Michigan — Jacobs Lab (UMSI), Ann Arbor MI, USA (invited seminar) ▶ Indiana University — Betzel Lab, Bloomington, IN, USA (invited seminar) Netsci 2020, online (talk) • "Compression of treelike complex networks using layered configuration models" 2019 Netsci 2019, Burlington, VT, USA (talk) • "Bayesian inference of effective contagion models from population level data" 2019 SINM 2019, Burlington, VT, USA (talk) • "Universality of the stochastic block model" 2019 SYNS Warm-up Event 2019, Burlington, VT, USA (invited talk) • "The statistical physics of inference for Complex Networks" 2018 Department of Physics Colloquium Oakland University, Rochester, MI, USA (invited seminar) • "Network archaeology: phase transition in the recoverability of network history" 2018 ▶ University of Colorado Boulder — StatOptML seminar, Boulder, CO, USA (invited seminar) ▶ Univeristy of Vermont — Vermont Complex Systems Center, Burlington, VT, USA (invited seminar) ▷ Sentinel North 2018 Annual Meeting, Québec, Canada (plenary) ▶ Univeristy of Bath — Centre for Networks and Collective Behaviour, Bath, UK (invited seminar) ▷ Connected Past 2018, Oxford, UK (talk) • "Construction of and efficient sampling from the simplicial configuration model" 2017 ▶ HONS 2017, Indianapolis, IN, USA (invited talk) ▶ Indiana University — School of Informatics, Bloomington, IN, USA (invited seminar) ▶ University of Michigan — Center for the Study of Complex Systems, Ann Arbor, MI, USA (invited talk) • "Statistical mechanics of mesoscopic structure extraction" 2017 Netsci 2017, Indianapolis, IN, USA (talk) • "Finite size analysis of the detectability limit of the stochastic block model" 2016 ▶ Netsci 2016, Seoul, Korea (lightning talk) ▷ SINM 2016, Seoul, Korea (talk) ▷ ISI Foundation, Torino, Italy (invited seminar) • "Structural preferential attachment: scale-free benchmark for overlapping community detection algorithms" 2015

Netsci 2015, Zaragoza, Spain (poster)

 "Structural preferential attachment of community structure and its relation to Dunbar's number" Netsci 2014, Berkeley, CA, USA (talk) 	2014
• "Complex networks are an emerging property of hierarchical preferential attachment" NetSci 2014 Science, Berkeley, CA, USA (poster)	2014
• "Local and global solutions to community detection: when resolution matters" NetSci 2013, Copenhagen, Denmark (poster)	2013

LEADERSHIP AND SERVICE

Organizer

• Program Chair, NetSci 2024 (School and Conference on Network Science)	2024
Co-director, CNWW2023, Complex Networks Winter Workshop, Québec, Canada	2023
Chair, CCSS23 (Contagion on Complex Social Systems)	2023
Organizer, SINM (Statistical Inference for Network Models)	2021, 2022, 2023
• Satellite location organizer (UVM), NERCCS 2022	2022
• Organizer, SIAM DS 21 Mini-Symposium on Dynamics in Higher-Order Networks, online	2021
Co-director, CNWW2021, Complex Networks Winter Workshop, Québec, Canada	2021
Program co-chair, First OpenNetSci Hackathon, Burlington VT, USA	2019
• Adjacent Activities Committee, NetSci 2019, Burlington VT, USA	2019

Service

AUR Maintainer, Several python packages	ongoing
Contributor, Several open-source projects	ongoing
• Seminar chair, STAT@UVM	2022-
Seminar chair, Vermont Complex Systems Center	2021–2023
Board member, Student Investment Fund, Université Laval	2013–2016
• Technical Director, Coupe de Science (Science Cup), Université Laval	2011–2014
• Technical Director, Festival de Sciences et Génies (Science and Engineering Festival)	2010–2012

Reviewer

- *Grants*: Panelist, NSF, IIS Division (2019).
- Journals (34): Science Advances, Nature Communications, SIAM Review, Physical Review X, Physical Review Letters, Psychological Methods, PLOS Computational Biology, JMIR Public Health Surveillance, The Annals of Applied Statistics, Physical Review E, Physical Review Research, EPJ Data Science, Scientific Data, Cambridge Elements, EPL, Journal of Open Source Software, Journal of Physics: Complexity, Journal of Physics A, Journal of Applied and Computational Topology, NPJ Complexity, Scientific Reports, PLOS Complex Systems, PLOS ONE, Palgrave Communications, Journal of Complex Networks, Physics Letter A, Chaos Solitons & Fractals, Entropy, Network Science, Animal Behaviour, Applied Network Science, Knowledge and Information Systems, Journal of Computational Science, Chaos.

Program committee

 Northeast Regional Conference on Complex Systems (NERCCS) 	2020, 2021, 2022
• International School and Conference on Network Science (NetSci)	2019, 2020, 2023, 2024(X), 2025
International Conference on Complex Networks and their Applications	2023
SIAM Workshop on Network Science (SIAM NS)	2018, 2020

PhD thesis comittees

Damin Zhu, Statistics. Advisor: Jeffrey S. Buzas	2023
Michael Arnolds, Complex Systems. Advisor: Peter Dodds	2023

^{||} Outstanding poster award

•	Samuel Rosenblatt, Computer Science. Advisor: Laurent Hébert-Dufresne	2024
•	Mariah Bourdreau, Mathematics. Advisor: Laurent Hébert-Dufresne	2024
•	Nicolò Ruggeri (ETH), Machine Learning and Network Science, Advisor: Caterina de Bacco	2024

SELECTED SOFTWARE

(Complete list available online)

- Bayesian inference of networks from noisy data (stan)
- Bayesian inference of effective contagion models from population level data (stan)
- Reconstruction of plant–pollinator networks from observational data (stan + python)
- Sequential MC sampler for Network Archaeology (python + C++)
- MCMC sampler for the Simplicial Configuration Model (C++)
- MCMC sampler for the Stochastic Block Model (C++)
- Structural Preferential Attachment community detection benchmark (C++)

VARIA

Selected media coverage

• "Are ideas contagious?." Phys.org	2024
• "A selection of 2020's highlighted research." Nature	2021
• "To find the right network model, compare all possible histories." Phys.org	2021
"Fighting Hate Speech with AI & Social Science," Complexity Podcast	2020
• "How you talk about coronavirus actually impacts its spread," cnet	2020
• "Neue Studie zeigt Wirksamkeit von Gegenrede im Netz," netzpolitik.org	2020
• "When coronavirus is not alone," Phys.org	2020
• "The shape of randomness." Physics Central	2017
• "What algae can tell us about political strategy." Phys.org	2017
• "L'univers complexe de Jean-Gabriel Young." Le Soleil (French)	2017