

Tyler Bonnell, Ph.D.

Department of Psychology, University of Lethbridge
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Research Profile

Fields: Computational Ecology, Statistics, Data Science, Collective behaviour, Movement Ecology, Behavioural Ecology, Landscape Ecology, Disease Ecology, GIScience.

Interests: Socio-spatial networks, propagation of infectious disease, human-environment interactions, reinforcement-learning, complex adaptive systems.

Languages: Fluent in English with working knowledge of French

Citizenship: Canadian

Professional and Academic Appointments

2020-Present Research Associate – University of Lethbridge

2018-Present Research Fellow – Université du Québec en Outaouais (MFFP fellowship)

2014-2020 Post-Doctoral Fellow – University of Lethbridge (FQNRT fellowship, NSERC CRC allocation)

Education

2010-2014 Ph.D. in Geography, McGill University.

Thesis title: “*Spatial simulations of infectious disease: environment, behaviour, and their interaction in a primate population.*” Co-Advised by: Raja Sengupta (Geography), and Colin Chapman (Anthropology/School of Environment).

2008-2010 M.Sc. in Geography, McGill University.

Thesis title: “*Agent-based modeling for use in wildlife diseases: a case study on how environmental variables can affect host-parasite interactions in the red colobus monkey.*” Co-Advised by: Raja Sengupta (Geography), and Colin Chapman (Anthropology/School of Environment)

2004-2008 B.Sc. in Agriculture and Environmental sciences, McGill University.

Major: Environmetrics, Minor: Geographic information systems. Supervised by: Pierre Dutilleul (Plant Science)

External course:

2010 Geographical Epidemiology – Ontario Veterinary College

Peer-reviewed Publications

- [34] Blersch, R., **Bonnell, T.R.**, Barrett, L., Henzi, S.P. (2021) “Seasonal Effects in Gastrointestinal Parasite Prevalence, Richness and Intensity in Vervet Monkeys Living in a Semi-Arid Environment” *In-Press at the Journal of Zoology*.
- [33] Adams, F., Arseneau-Robar, T.J., **Bonnell, T.R.**, Stead, S., Teichroeb, J. (2021) “Temporal patterns in the social network of core units in Rwenzori Angolan colobus monkeys: effects of food availability and inter-unit dispersal” *Ecology and Evolution*: 11: 3251– 3263.
- [32] Piefke, T., **T.R. Bonnell**, G. DeOliveira, H. Janeski, S.E. Border, T. Brown, P.D. Dijkstra (2021) “Social network stability is impacted by removing a dominant male in replicate dominance hierarchies of a cichlid fish” *Journal of Animal Behaviour*: 175 (2021): 7-20.
- [31] Nord, C., **Bonnell, T.R.**, S.P. Henzi, L. Barrett (2021) “Tolerance of muzzle contact underpins the acquisition of foraging information in vervet monkeys (*Chlorocebus pygerythrus*)” *In press at the Journal of Comparative Psychology*.
- [30] Green S.J., B.J. Boruff, **T.R. Bonnell**, C.C. Grueter (2020) “Chimpanzees Use Least-Cost Routes to Out-of-Sight Goals” *Current Biology*: 30(22), 4528-4533.
- [29] **Bonnell, T.R.**, C. Vilette, Young, C., S.P. Henzi, L. Barrett (2020) “Formidable females redux: male social integration into female networks and the value of dynamic multilayer networks” *Current Zoology*, z0aa041.
- [28] Vilette C., **T.R. Bonnell**, S.P. Henzi, L. Barrett (2020) “Comparing dominance hierarchy methods using a data-splitting approach with real-world data.” *Behavioural Ecology*, araa095.
- [27] **Bonnell, T.R.**, C. Vilette (2020) “Constructing and analyzing time-aggregated networks: the role of bootstrapping, permutation, and simulation.” *Methods in Ecology and Evolution*, 00, 1– 13.
- [26] Jarrett, J. D., **T.R. Bonnell**, M. J. Jorgensen, C. A. Schmitt, C. Young, M. Dostie, L. Barrett, and S. P. Henzi (2020) "Modeling variation in the growth of wild and captive juvenile vervet monkeys in relation to diet and resource availability." *American Journal of Physical Anthropology*, 171, 89– 99.
- [25] Young C., **T.R. Bonnell**, L.R. Brown, M.J. Dostie, A. Ganswindt, S. Kienzle, R. McFarland, S.P. Henzi, and L. Barrett (2019) “Climate induced stress and mortality in vervet monkeys.” *Royal Society Open Science*, 6, 191078.
- [24] **Bonnell, T.R.**, S.P. Henzi., L. Barrett. (2019). “Functional social structure in baboons: Modelling interactions between social and environmental structure in group-level foraging.” *Journal of Human Evolution*, 126, 14-23.

- [23] Kessler, S., **T.R. Bonnell**, J. Setchell, and C.A. Chapman. (2018). "Social Structure Facilitated the Evolution of Care-giving as a Strategy for Disease Control in the Human Lineage." *Scientific Reports*, 8, 13997.
- [22] **Bonnell, T.R.**, R.R. Ghai, T.L. Goldberg, Raja Sengupta, and C.A. Chapman (2018) "Spatial configuration becomes more important with increasing habitat loss: a simulation study of environmentally-transmitted parasites" *Landscape Ecology*, 33 (8), 1259-1272.
- [21] Chapman, C.A., K. Valenta, **T.R. Bonnell**, K. Brown, L.J. Chapman (2018) "Solar radiation drives fruit phenology: Evaluating a 16 year record from Kibale National Park, Uganda" *Biotropica*. 50 (3), 384-395.
- [20] Jarrett, J.D., **T.R. Bonnell**, C.J. Young, L. Barrett and S.P. Henzi (2018) "Network integration and limits to social inheritance in vervet monkeys" *Proceedings of the Royal Society B*. 285 (1876), 20172668.
- [19] Reyna-Hurtado, R., J.A. Teichroeb, **T.R. Bonnell**, R.U. Hernández-Sarabia, S.M. Vickers, J.C. Serio-Silva, P. Sicotte, and C.A. Chapman (2017) "Primates adjust movement strategies due to changing food availability" *Behavioral Ecology*. 29 (2), 368–376.
- [18] **Bonnell, T.R.**, Clarke, P.M., Henzi, S.P. & Barrett, L. (2017) Individual-level movement bias leads to the formation of higher-order social structure in a mobile group of baboons. *Royal Society Open Science*. 4 (7), 170148.
- [17] Kessler, S.E., **T.R. Bonnell**, R.W. Byrne, C.A. Chapman (2017) "Selection to outsmart the germs: The evolution of disease recognition and social cognition." *Journal of Human Evolution*. 108, 92-109.
- [16] **Bonnell, T.R.**, S.P. Henzi, L. Barrett (2016) "Direction matching for sparse movement datasets: determining interaction rules in social groups." *Behavioural Ecology*. 28 (1), 193-203.
- [15] **Bonnell, T.R.**, R.R. Ghai, T.L. Goldberg, R. Sengupta, and C.A. Chapman (2016) "Spatial patterns of persistence for environmentally transmitted parasites: Effects of regional climate and local landscape" *Ecological modelling*. 338, 78-89.
- [14] Dostie, M., D. Lusseau, **T.R. Bonnell**, P. Clarke, G. Chaplin, S. Kienzle, L. Barrett, S.P. Henzi, (2016) "Proof of principle: the adaptive geometry of social foragers." *Animal Behaviour*. 119, 173-178.
- [13] **Bonnell, T.R.**, C.A. Chapman, and R. Sengupta (2016) "Interaction between scale and scheduling choices in simulations of spatial agents" *International journal of Geographic Information Science*. 30 (10), 2075-2088.

- [12] Schoof, V. A. M., **T.R. Bonnell**, K.M. Jack, T.E. Ziegler, A.D. Melin, L.M. Fedigan (2016) "Male endocrine response to seasonal varying environmental and social factors in a Neotropical primate, *Cebus capucinus*." *American Journal of Physical Anthropology*. 159 (4), 671-682.
- [11] Joseph, N., **T.R. Bonnell**, M. Dostie, L. Barrett, P. Henzi (2016) "Working the crowd: Sociable vervets benefit by reducing exposure to risk" *Behavioral Ecology*. 27 (4), 988-994.
- [10] Reyna-Hurtado, R., H. Beck, M. Altrichter, C.A. Chapman, **T. R. Bonnell**, A. Keuroghlian, A.L.J. Desbiez, J. Moreira, G. O'Farrill, J. Fragoso, and E. J. Naranjo. (2015). "What ecological and anthropogenic factors affect group size in white-lipped Peccaries (*Tayassu pecari*)?" *Biotropica*. 48 (2), 246-254.
- [9] Chapman, C.A., V.A.M. Schoof, **T.R. Bonnell**, J.F. Gogarten, and S. Calmé. (2015) "Competing pressures on populations: how disease may interact with food availability and stress to influence animal abundance." *Philosophical Transaction of the Royal Society. B* 370, 20140112.
- [8] Gogarten J.F., **T.R. Bonnell**, L.M Brown, M. Campenni, M.D. Wasserman, and C.A. Chapman. (2014) "Increasing group size alters behaviour of a folivorous primate." *International Journal of Primatology* 35,590-608.
- [7] Jacob A.L., **T.R. Bonnell**, N. Dowhaniuk, and J. Hartter. (2014) "Topographic and spectral data resolve land cover misclassification to distinguish and monitor wetlands in western Uganda." *ISPRS Journal of Photogrammetry and Remote Sensing* 94, 114-126.
- [6] **Bonnell, T.R.**, M. Campenni, C.A. Chapman, J.F. Gogarten, R.A. Reyna-Hurtado, J.A. Teichroeb, M.D. Wasserman, and R. Sengupta. (2014) "Emergent group level navigation: an agent-based evaluation of movement patterns in a folivorous primate." *PLoS One* 8(10):e78264.
- [5] Chapman, C.A., **T.R. Bonnell**, R. Sengupta, T.L. Goldberg, and J.M. Rothman. (2013) "Is *Markhamia lutea*'s abundance determined by animal foraging?" *Forest Ecology and Management* 308, 62-66.
- [4] **Bonnell, T.R.**, P. Dutilleul, C.A. Chapman, R. Reyna-Hurtado, R. Sengupta, and U. Sarabia. (2013) "Analyzing small-scale aggregation in animal visits in space and time: the ST-BBD method." *Animal Behaviour* 85 (2), 483-492.
- [3] Chapman, C.A., **T.R. Bonnell**, J.F. Gogarten, J.E. Lambert, P.A. Omeja, D. Twinomugisha, M.D. Wasserman, and J.M. Rothman. (2012) "Are primates ecosystem engineers?" *International Journal of Primatology* 34 (1), 1-14.

- [2] **Bonnell, T.R.**, R. Reyna-Hurtado, C. A. Chapman. (2011) “Post-logging recovery time is longer than expected in an East African tropical forest.” *Forest Ecology and Management* 261 (4), 855-864.
- [1] **Bonnell, T.R.**, R. Sengupta, C. A. Chapman, T. L. Goldberg (2010) “An agent-based model of red colobus resources and disease dynamics implicates key resource sites as hot spots of disease transmission.” *Ecological Modelling* 221 (20), 2491-2500.

Submitted or Under Review Publications

- [5] McFarland, R., Henzi, S.P., Barrett, L., **Bonnell, T.R.**, Fuller, A., Young, C., Hetem, R.S. (2021) “Fevers and the social costs of acute infection in wild vervet monkeys” *Under review at PNAS*.
- [4] **Bonnell, T.R.**, Michaud, R., Dupuch, A., Lesage, V., Chion, C. (2021) “Extracting socio-spatial networks from photo-ID data using multilevel multinomial models” *bioRxiv* 2021.05.06.442957.
- [3] Rosemary Blerch, R., **Bonnell T.R.**, Ganswindt, A., Young, C., Barrett, L., and Henzi, S.P. (2021) “Sick and Tired: Polyparasitism, Food Stress and Sickness Behaviour in a Gregarious” *Under review at Behavioral Ecology and Sociobiology*.
- [2] **Bonnell, T.R.**, Ostner, J., Barrett, L., Henzi, S.P., Schülke, O (2020) “Sleeping sites as basins of attraction: when and where are movements more predictable?” *Under review: Oikos*.
- [1] **Bonnell, T.R.**, C. Vilette, S.P. Henzi, L. Barrett (2019) “Network reaction norms: taking into account network position and network plasticity in response to environmental change.” *bioRxiv* 705392.

Statistical Package Development

- [3] **Bonnell, T.R.**, C. Vilette, J.D. Jarrett. “netTS: Extraction of network measures as time series.” (<https://github.com/tbonne/netTS>)
- [2] **Bonnell, T.R.** “moveStan: Posterior predictive checks for Bayesian movement models using STAN.” (<https://github.com/tbonne/moveStan>)
- [1] **Bonnell, T.R.** “SocialIntegrationNet: Collection of network models for simulating social integration.” (<https://github.com/tbonne/SocialIntegrationNet>)

Conference Presentation (* denotes presenter)

Bonnell, T.R.*, P. Henzi, L. Barrett, J. Bradbury, S. L. Vehrencamp. “Functional social structures in mobile social groups: consequences of individual differences in social biases.” *The International Society for Behavioural Ecology*: 11-16 August 2018, Minneapolis, Minnesota, USA.

Bonnell, T.R.*, P. Henzi, L. Barrett. “Extracting movement behaviour of individuals in groups with sparse data.” *Association of American Geographers*: 5-9 April 2016, San Francisco, California, USA.

Bonnell, T.R.*, P. Henzi, L. Barrett. “Marching and meandering: individual behaviours leading to group level movement in baboons.” *American Society of Primatologist*: 17-20 June 2015, Bend, Oregon, USA.

Bonnell, T.R.*, R. Sengupta, C.A. Chapman & T.L. Goldberg. “Linking Landscapes to Disease: An Agent-Based Model simulating the impact of forest composition on spread of disease in red colobus populations.” *Association of American Geographers*: 24-28 February 2012, New York, USA.

Bonnell, T.R.*, P.R. Dutilleul, C.A. Chapman, R. Sengupta, R. Reyna-Hurtado. “Measuring spatial-temporal home range use using the beta-binomial distribution.” *Quebec center for Biodiversity Science*: 7-9 December 2011, Montreal, Quebec, Canada.

Bonnell, T.R.*, R. Sengupta, C.A. Chapman & T.L. Goldberg. “Linking Landscapes to Disease: An Agent-Based Model simulating the impact of forest composition on spread of disease in red colobus populations” *4th ICA Workshop on Geospatial Analysis and Modeling*: 10-12 August 2011, Simon Fraser University, Vancouver, BC, Canada.

Bonnell, T.R.*, R. Sengupta & C.A. Chapman. “Spatial Epidemiology and GIS/ABM: a case study of the red colobus monkey.” *Spatial Knowledge and Information*: 4-6 March 2011, Ferney, BC, Canada.

Bonnell, T.R.*, C.A. Chapman & R. Sengupta. “Red colobus foraging behaviour and its implications for the spread of disease.” *Société Québécoise pour l'Étude Biologique du Comportement*: 5-7 Nov 2010, Ste Anne de Bellevue, Quebec, Canada.

Bonnell, T.R.*, C.A. Chapman & R. Sengupta. “Linking landscapes to disease: red colobus foraging behaviour and its implications for the spread of disease in logged forests.” *Quebec center for Biodiversity Science*: 30 Nov – 2 Dec 2010, Montreal, Quebec, Canada.

Invited talks

Bonnell, T.R.*, P. Henzi, L. Barrett. “Social Influences on Individual Movement and Their Foraging Consequences.” *Presented at the Canadian Society of Zoologists: 7-11 May 2018, St-John’s, Newfoundland, Canada.*

Bonnell, T.R.*, C.A. Chapman. “The synergy between nutrition, stress, and disease as determinants of animal abundance.” *Presented at the Canadian Society for Ecology and Evolution: 12-15 May 2013, Kewlona, BC, Canada.*

Teaching and Professional Contributions

Teaching

2020 Applied Bayesian Statistics (PSYC 4850, 5850)

Graduate Student instruction

2014-Present Statistical methods in research (multilevel models, Bayesian statistics)

2014-Present Introduction to computational approaches (R, Python, Java, Stan)

2014-Present Static and dynamic social network analysis (igraph, custom R packages)

2014-Present Geocomputation in ecology (GIS, GPS, RS, and agent-based modeling)

Graduate Student Supervision

Ph.D. Co-Advising

- Rosemary Blerch, University of Lethbridge, 2017-Present. *Infectious disease and its transmission in vervet monkeys.*
- Deanna Forrester, University of Lethbridge, 2012-2019. *The value of Children: Alloparenting in Samoa.*

Ph.D. Committee member

- Chloé Vilette, University of Lethbridge, 2016-Present. *Rank, sociability and the determination of female vervet monkey reproductive success.*
- Leila Armstrong, University of Lethbridge, 2016-Present. *The art of urban ecology.*
- Christina Nord, University of Lethbridge, 2015-Present. *Dynamic networks and attention structure in vervet monkeys.*
- Jonathan Jarrett, University of Lethbridge, 2014-2019. *Vervet monkey development in life historical perspective.*

M.Sc. Committee member

- Stephanie Varsanyi, University of Lethbridge, 2018-2021. *Maternal investment and offspring viability in vervet monkeys.*

Graduate Teaching Assistant

2013	Primate behaviour and ecology (ANTH 311)
2012	Primate behaviour and ecology (ANTH 311)
2011	Environmental research design (ENVR 301)
2011	Socio-Economics and GIS (GEOG 307)
2010	Statistics and spatial analysis (GEOG 202)
2010	Socio-Economics and GIS (GEOG 307)
2009	Introduction to geographical information science (GEOG 201)
2008	Introduction to geographical information science (GEOG 201)

Reviewer for Journal

PLoS One, Animal Conservation, Behavioral Ecology, Animal Behaviour, Biotropica, Ecological Modelling, African Journal of Ecology, International Journal of Primatology, Remote Sensing Applications: Society and Environment, Movement Ecology, Landscape and Urban Planning, Behavioural Ecology and Sociobiology, Journal of Human evolution, Journal of Animal Ecology, Current Zoology.

Funding / Awards (>\$335,000)

2018-Present	Ministère des Forêts, de la Faune et des Parcs: Research Fellowship	\$20,000/yr
2015	American Association of Geographers: William L. Garrison Award for Best Dissertation in Computational Geography (<i>Finalist</i>)	
2014-2020	Canadian Research Chair - allocations: Post-Doctoral Fellowship	\$49,999/yr
2014	FQRNT: Post-Doctoral Fellowship	\$65,000
2013	D. Stewart Memorial Fellowship	\$7,000
2012	Rathlyn GIS award	\$5,000
2011	FQRNT: Doctoral Fellowship	\$46,666
2011	SQBC Student Fellowship Award	\$2,355
2010	Principle's graduate fellowship	\$2,500
2010	Provost's Graduate Fellowship	\$5,000
2008	Warren Fellowship in GIS	\$5,000