

# Charley M. Wu

## Curriculum Vitae

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Nationality: Canadian

## Academic Background

### Current Position

2016- **Pre-Doctoral Research Fellow**, *Center for Adaptive Rationality (ARC)*, Max Planck  
Present Institute for Human Development, Berlin, Germany.

### Previous Positions

- 2018 **Visiting Research Fellow**, *Computational Cognitive Neuroscience Lab*; hosted by Samuel J. Gershman), Harvard University, Cambridge MA, USA.
- 2014-2015 **Research Assistant**, *Center for Adaptive Behavior and Cognition (ABC)*, Max Planck Institute for Human Development, Berlin, Germany.
- 2014-2015 **Lead Machine Learning Developer**, *SportsManias*, Miami, FL.
- 2014 **Student Research Scientist**, *PetaByte Research*, Budapest, Hungary.
- 2013-2014 **Research Assistant**, *Intelligent Software Agents and New Media Group*, Austrian Institute for Artificial Intelligence (OFAI), Vienna, Austria.
- 2009 **Research Assistant**, *Center for Human Evolution, Cognition, and Culture (HECC)*, University of British Columbia, Vancouver, Canada.

## Education

- 2016-2019 **PhD Candidate**, Max Planck Institute for Human Development; Humboldt University; (Expected) International Max Planck Research School on Adapting Behavior in a Fundamentally Uncertain World, Berlin, Germany.
- 2013-2015 **M.Sc. Cognitive Science**, *University of Vienna*, Vienna, Austria, *with Distinction*.
- 2004-2009 **B.A. Philosophy**, *University of British Columbia*, Vancouver, Canada, *Dean's List*.

## Honors and Awards

- 2016- **Pre-Doctoral Fellowship**, *International Max Planck Research School on Adapting Behavior in a Fundamentally Uncertain World (Joint PhD Fellowship in Psychology, Economics, and Law)*, Germany.
- 2014 **Interdisciplinary College (IK) Stipend**, Günne, Germany.
- 2011-2012 **Joseph-Armand Bombardier Canada Graduate Scholarship**, *Social Sciences and Humanities Research Council of Canada (SSHRC)*, Canada, *Declined*.
- 2004 **President's Entrance Scholarship**, *University of British Columbia*, Canada.

## Publications

### In Prep

- under review Novaes Tump, A., Wu, C. M., Bouhlel, I., & Goldstone, R. L. (under review). The evolutionary dynamics of cooperation in collective search. Retrieved from [pdf link](#)
- Schulz, E., Wu, C. M., Ruggeri, A., & Meder, B. (under review). Searching for rewards like a child means less generalization and more directed exploration. *bioRxiv preprint*. Retrieved from [pdf link](#)
- Wu, C. M., Schulz, E., Gerbaulet, K., Pleskac, T. J., & Speekenbrink, M. (under review). Under pressure: the influence of time limits on human exploration. Retrieved from [pdf link](#)
- Wu, C. M., Schulz, E., & Gershman, S. J. (under review). Generalization as diffusion: human function learning on graphs. Retrieved from [pdf link](#)

- in press Analytis, P. P., Wu, C. M., & Gelastopoulos, A. (in press). Make-or-break: chasing risky goals or settling for safe rewards? *Cognitive Science*. Retrieved from [pdf link](#)

### Peer reviewed articles

- 2018 Bouhlel, I., Wu, C. M., Hanaki, N., & Goldstone, R. L. (2018). Sharing is not erring: pseudo-reciprocity in collective search. In T. T. Rogers, M. Rau, X. Zhu, & C. W. Kalish (Eds.), *Proceedings of the 40th annual conference of the cognitive science society* (pp. 156–161). Austin, TX: Cognitive Science Society. Retrieved from [pdf link](#)
- Schulz, E., Wu, C. M., Huys, Q. J., Krause, A., & Speekenbrink, M. (2018). Generalization and search in risky environments. *Cognitive Science*, 42, 2592–2620. doi:[10.1111/cogs.12695](https://doi.org/10.1111/cogs.12695)
- Wu, C. M., Schulz, E., Garvert, M. M., Meder, B., & Schuck, N. W. (2018). Connecting conceptual and spatial search via a model of generalization. In T. T. Rogers, M. Rau, X. Zhu, & C. W. Kalish (Eds.), *Proceedings of the 40th annual conference of the cognitive science society* (pp. 1183–1188). Austin, TX: Cognitive Science Society. Retrieved from [pdf link](#)
- Wu, C. M., Schulz, E., Speekenbrink, M., Nelson, J. D., & Meder, B. (2018). Generalization guides human exploration in vast decision spaces. *Nature Human Behaviour*, 2, 915–924. doi:[10.1038/s41562-018-0467-4](https://doi.org/10.1038/s41562-018-0467-4)
- 2017 Wu, C. M., Meder, B., Filimon, F., & Nelson, J. D. (2017). Asking better questions: how presentation formats influence information search. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 8, 1274–1297. doi:<https://doi.org/10.1037/xlm0000374>
- Wu, C. M., Schulz, E., Speekenbrink, M., Nelson, J. D., & Meder, B. (2017). Mapping the unknown: the spatially correlated multi-armed bandit. In G. Gunzelmann, A. Howes, T. Tenbrink, & E. J. Davelaar (Eds.), *Proceedings of the 39th annual meeting of the cognitive science society* (pp. 1357–1362). Austin, TX: Cognitive Science Society. Retrieved from [pdf link](#)
- 2016 Barkoczi, D., Analytis, P. P., & Wu, C. M. (2016). Collective search on rugged landscapes: a crossenvironmental analysis. In A. Papafragou, D. Grodner, D. Mirman, & J. Trueswell (Eds.), *Proceedings of the 38th annual conference of the cognitive science society* (pp. 918–923). Austin, TX: Cognitive Science Society. Retrieved from [pdf link](#)

## Presentations

### Invited Talks

- Jan. 2019 **Wu, C.M.**, *The Successor Representation*, NeuroCode, Max Planck Institute for Human Development, Berlin, Germany.
- Nov. 2018 **Wu, C.M.**, *Guiding Exploration Through Generalization*, Cog Lunch, Department of Brain and Cognitive Sciences, MIT, Cambridge, MA.
- Nov. 2018 **Wu, C.M.**, *Generalization in Vast Spaces*, Concats, New York University, New York City, NY.
- Nov. 2018 **Wu, C.M.**, *Generalization Guides Exploration in Vast Spaces*, Fiery Cushman and Joshua Greene labs, Harvard University, Cambridge, MA.
- Sept. 2018 **Wu, C.M.**, *Guiding Exploration Through Generalization*, Samuel Gershman Lab, Harvard University, Cambridge, MA.
- May. 2018 **Wu, C.M.**, Schulz, E., Speekenbrink, M., Nelson, J.D., & Meder, B., *Generalization and Exploration: Insights from a spatial search task*, Department of Psychiatry and Psychotherapy, Charité - Universitätsmedizin, Berlin, Germany.
- Sept. 2017 **Wu, C.M.**, Schulz, E., Speekenbrink, M., Nelson, J.D., & Meder, B., *Generalization and Exploration in Vast Spaces*, Centre for Mind/Brain Sciences (CIMEC), University of Trento, Trento, Italy.
- May. 2017 **Wu, C.M.**, Schulz, E., Speekenbrink, M., Nelson, J.D., & Meder, B., *Active Learning and Search in Unexplored Environments*, iSearch Lab, Max Planck Institute for Human Development, Berlin, Germany.
- Apr. 2017 **Wu, C.M.**, Schulz, E., Speekenbrink, M., Nelson, J.D., & Meder, B., *Generalization Across Vast State Spaces: Human Exploration in Unknown Environments*, Cognition Lab, University of Zürich, Zürich, Switzerland.
- Mar. 2017 **Wu, C.M.**, *Terra Incognita: Adaptive Learning and Information Search in Unknown Environments*, The Center for Adaptive Rationality (ARC), Max Planck Institute for Human Development, Berlin, Germany.
- Feb. 2017 **Wu, C.M.**, Nelson, J.D., & Meder, B., *Adaptive Learning for Language Education*, Babbel, Berlin, Germany.
- Nov. 2016 **Wu, C.M.**, Schulz, E., Speekenbrink, M., Nelson, J.D., & Meder, B., *Mapping the Unknown: Human Spatial Exploration-Exploitation*, Learning & Decision Making Lab, University College London, London, UK.
- Feb. 2016 **Wu, C.M.**, Nelson, J.D., & Meder, B., *Functional Entropy for Understanding Ruggedness in Fitness Landscapes*, Entropy Workshop (DFG SPP 1516), Ludwigsburg, Germany.

### Conference Presentations, Workshops, and Seminars

- Dec. 2018 **Wu, C.M.**, *Inference over graph structures using a diffusion kernel*, Berlin Machine Learning Seminar, Berlin, Germany.
- Jul. 2018 **Wu, C.M.**, Schulz, E., Garvert, M.M., Meder, B., & Schuck, N.W., *Connecting conceptual and spatial search*, CogSci 2018, Madison, WI.
- Jul. 2018 Bouhlel, I., **Wu, C.M.**, Hanaki, N., & Goldstone, R.L., *Sharing is not erring: Pseudo-reciprocal sharing in collective search*, CogSci 2018, Madison, WI.
- Jul. 2018 **Wu, C.M.**, & Meder, B., Nelson, J.D., *Navigating uncertainty through information search*, Poster presented at CogSci 2018, Madison, WI.

- Jul. 2018 **Wu, C.M.**, Schulz, E., Speekenbrink, M., Nelson, J.D., & Meder, B., *Guiding exploration through generalization*, MathPsych 2018, Madison, WI.
- Mar. 2017 **Wu, C.M.**, Schulz, E., Speekenbrink, M., Nelson, J.D., & Meder, B., *Mapping the Unknown: The spatially correlated multi-armed bandit.*, CogSci 2017, London, UK.
- Mar. 2017 **Wu, C.M.**, Schulz, E., Speekenbrink, M., Nelson, J.D., & Meder, B., *Mapping the Unknown: Model-based and Model-free Approaches Towards Spatial Reinforcement Learning*, TeaP 2017, Dresden, Germany.
- Mar. 2017 **Wu, C.M.**, *Everybody GANs Now: Tutorial on Generative Adversarial Networks*, Berlin Machine Learning Seminar, Berlin, Germany.
- Mar. 2017 **Wu, C.M.**, *Voyage into the Unknown: Adaptive Learning and Information Search*, IMPRS Thesis Workshop, Gut Gremmelin, Germany.
- Mar. 2017 **Wu, C.M.**, *Adversarial Training: Math and Methods Tutorial*, Center for Adaptive Behavior and Cognition (ABC), Berlin, Germany.
- Oct. 2016 **Wu, C.M.**, *Model Comparison: Statistical Workshop*, ABC Research Retreat, Gut Gremmelin, Germany.
- Aug. 2016 **Wu, C.M.**, Jurányi, Z., Gulyas, L., & Kamps, G., *Blindfolded NLP: Unsupervised Learning for Automatically Generating Topic Labels*, Identification, Location and Temporal Evolution of Topics Workshop, Budapest, Hungary.
- Jul. 2016 **Wu, C.M.**, Schulz, E., Speekenbrink, M., Nelson, J.D., & Meder, B., *Exploring the Unknown: Modeling Human Exploration-Exploitation Behavior*, Poster presented at Computational and Mathematical Modeling of Cognition, Dobbiaco, Italy. [\[PDF\]](#).
- Mar. 2016 **Wu, C.M.**, *Gaussian Process Models: What do you do when you can't optimize?*, Berlin Machine Learning Seminar, Berlin, Germany.
- Feb. 2016 **Wu, C.M.**, *Exploring Fitness Landscapes: How to discover good solutions to complex problems*, IMPRS Thesis Workshop, Berlin, Germany.
- Feb. 2016 **Wu, C.M.**, Nelson, J.D., & Meder, B., *Characterizing Ruggedness in Fitness Landscapes*, ABC Conference, Berlin, Germany.
- Aug. 2015 **Wu, C.M.**, Meder, B., Nelson, J.D., & Filimon, F., *The effect of presentation formats on rational information search*, SPUDM 25, Budapest, Hungary..
- Jun. 2015 **Wu, C.M.**, Meder, B., Filimon, F., & Nelson, J.D., *The medium is the message: How presentation formats help people ask better questions*, MEi: CogSci Conference, Ljubljana, Slovenia.
- Feb. 2015 Meder, B., **Wu, C.M.**, Nelson, J. D., & Filimon, F., *Presentation formats and information search*, Workshop on "Information, search, and causes: Rational and cognitive approaches", Turin, Italy.
- Jun. 2014 **Wu, C.M.**, Skowron, M., & Petta, P., *Reading between the lines: a vector space model of language using semantic role structures*, Poster presented at MEi:CogSci Conference 2014, Kraków, Poland. [\[PDF\]](#).

## Teaching

- Jan. 2018 **Seminar**, *Computational Modeling Workshop*, MPRG iSearch Research Retreat, Bensdorf, Germany.
- Sep. 2017 **Seminar**, *Computational Models of Cognition*, Berlin School of Mind and Brain (Cognitive Science Graduate Course), Humboldt University, Berlin, Germany.

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## Professional Service

**Organizer** of the 17th annual Summer Institute on Bounded Rationality, Berlin, Germany (2018)

**PhD Representative** for the Max Planck Institute for Human Development (2017-2018)

**Ad-hoc Reviewer** for Nature Human Behaviour (1), Cognitive Science Society (11), Mind & Society (1), and Futures & Foresight Science (1)

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## Technical Skills

**Programming Languages:** R, Python, Matlab, JavaScript, HTML, jQuery, PHP, CSS, and  $\text{\LaTeX}$ .

**Additional Software Skills:** MongoDB, MySQL, Tensorflow, SKlearn, GenSim, NLTK, Redis, and Adobe Creative Suite.

**Other:** Sound engineer, musician, and recording artist with five albums of original music and experience booking tours across Canada and the US.

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## References

Dr. Björn Meder  
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