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GOOGLE SCHOLAR 

SEBASTIAN MUSSLICK

Education	2014–present	PHD CANDIDATE, Princeton University, Neuroscience, Quantitative and Computational Neuroscience Track, Advisor: Jonathan D. Cohen
	2014–2016	M.A., Princeton University, Neuroscience,
	2008–2014	DIPLOM, Technische Universität Dresden, Psychology (<i>Graduated with Distinction</i>), Diplom Thesis: <i>The Role of Task-Feature Bindings in Cued Task Switching</i> , Advisor: Thomas Goschke
Pre-Doctoral Research Experience	2013–2014	Visiting Student Research Scholar, Princeton University, PI: Jonathan D. Cohen
	2012–2013	Short-Term Scholar, Colorado University at Boulder, PI: Randall C. O’Reilly
	2011–2013	Student Research Assistant, TU Dresden, PI: Clemens Kirschbaum
	2011–2012	Student Research Assistant, TU Dresden, PI: Thomas Goschke
	2008–2012	Freelance Work, Software Development and Design
Honors & Awards	2019	Cognitive Science Society 2019 Travel Grant
	2019	ICPS 2019 Travel Grant
	2018	Princeton ReMatch award for undergraduate mentoring, Princeton University
	2017–2018	Graduate Fellow in Cognitive Science, Princeton University
	2015	Ehrenfried-Walter-von-Tschirnhaus-Award for best graduates of the School of Science, Technische Universität Dresden
	2015–2014	McDonnell Fellowship in Neuroscience, Princeton University
	2014	Werner-Straup-Award for distinctive achievements in scientific qualification, Technische Universität Dresden
	2014	Doctoral Scholarship of the Collaborative Research Center Volition and Cognitive Control, Technische Universität Dresden
	2012–2014	National Scholarship (Deutschlandstipendium)
	2012–2013	PROMOS Global Scholarship, DAAD
2011,2012	Karl-und-Charlotte-Bühler-Preis for excellent teaching, Technische Universität Dresden	
Publications	<i>Forthcoming</i>	
	7.	Grahek, I., Shenhav, A., Musslick, S. , Krebs, R. M., & Koster, E. H. W. (in press). Motivation and cognitive control in depression. <i>Neuroscience & Biobehavioral Reviews</i> .

6. Grahek*, I., **Musslick***, S., & Shenhav, A. (in press). A computational perspective on the roles of affect in cognitive control. *Journal of Psychophysiology*. [***equal contribution**]
5. Dey, B., Öczimder, K., **Musslick**, S., Petri, G., Willke, T., & Cohen, J. D. (in preparation). A formal approach to the requirements for cognitive control in network architectures.
4. **Musslick**, S., Öczimder, K., Dey, B., Saxe, A., Petri, G., Reichman, D., ... Cohen, J. D. (in preparation). On the rational boundedness of cognitive control: Interactive versus independent parallelism.
3. **Musslick**, S., Shenhav, A., Botvinick, M. M., & Cohen, J. D. (in preparation). A computational model of control allocation based on the expected value of control.
2. Ravi, S., **Musslick**, S., Hamin, M., Willke, T., & Cohen, J. D. (in preparation). Navigating the tradeoff between multi-task learning and learning to multitask in deep neural networks.
1. Petri, G., **Musslick**, S., Öczimder, K., Dey, B., Ahmed, N., Willke, T., & Cohen, J. D. (under review). Universal limits to parallel processing capability of network architectures.

Peer-Reviewed Journal Articles

3. Lieder, F., Shenhav, A., **Musslick**, S., & Griffiths, T. L. (2018). Rational metareasoning and the plasticity of cognitive control. *PLOS Computational Biology*, **14**(4), 1–27. DOI: [10.1371/journal.pcbi.1006000](https://doi.org/10.1371/journal.pcbi.1006000) 14 CITATIONS
2. Shenhav, A., Straccia, M., **Musslick**, S., Cohen, J. D., & Botvinick, M. (2018). Dissociable neural mechanisms track evidence accumulation for selection of attention versus action. *Nature Communications*, **9**(1), 2485. DOI: [10.1038/s41467-018-04841-1](https://doi.org/10.1038/s41467-018-04841-1) 3 CITATIONS
1. Shenhav, A., **Musslick**, S., Lieder, F., Kool, W., Griffiths, T. L., Cohen, J. D., & Botvinick, M. M. (2017). Toward a rational and mechanistic account of mental effort. *Annual Review of Neuroscience*, **40**, 99–124. DOI: [10.1146/annurev-neuro-072116-031526](https://doi.org/10.1146/annurev-neuro-072116-031526) 139 CITATIONS

Peer-Reviewed Conference Articles

15. **Musslick**, S., Bizyaeva, A., Agaron, S., Naomi, E. L., & Cohen, J. D. (in press). Stability-flexibility dilemma in cognitive control: A dynamical system perspective. In *Proceedings of the 41st Annual Meeting of the Cognitive Science Society*. Montreal, CA. [**Poster**]

14. **Musslick, S.**, & Cohen, J. D. (in press). A mechanistic account of constraints on control-dependent processing: Shared representation, conflict and persistence. In *Proceedings of the 41st Annual Meeting of the Cognitive Science Society*. Montreal, CA. [**Contributed Talk**]
13. **Musslick, S.**, Cohen, J. D., & Shenhav, A. (in press). Decomposing individual differences in cognitive control: A model-based approach. In *Proceedings of the 41st Annual Meeting of the Cognitive Science Society*. Montreal, CA. [**Poster**]
12. Spitzer, M., **Musslick, S.**, Shvartsman, M., Shenhav, A., & Cohen, J. D. (in press). Asymmetric switch costs as a function of task strength. In *Proceedings of the 41st Annual Meeting of the Cognitive Science Society*. Montreal, CA. [**Contributed Talk**]
11. Willke, L. T., Yoo, S. B. M., Capota, M., **Musslick, S.**, Hayden, B. Y., & Cohen, J. D. (in press). A comparison of non-human primate and deep reinforcement learning agent performance in a virtual pursuit-avoidance task. In *Reinforcement Learning and Decision Making Conference 2019*. Montreal, CA. [**Poster**]
10. Bustamante, L., Lieder, F., **Musslick, S.**, Shenhav, A., & Cohen, J. D. (2018). Learning to (mis)allocate control: Maltransfer can lead to self-control failure. In *Proceedings of the Computational Cognitive Neuroscience Conference*. [**Poster**]
9. **Musslick, S.**, Cohen, J. D., & Shenhav, A. (2018a). Estimating the costs of cognitive control: Theoretical validation and potential pitfalls. In *Proceedings of the 40th Annual Meeting of the Cognitive Science Society* (pp. 800–805). Madison, WI. [**Contributed Talk**] [1 CITATIONS](#)
8. **Musslick, S.**, Jang, J. S., Shvartsman, M., Shenhav, A., & Cohen, J. D. (2018a). Constraints associated with cognitive control and the stability-flexibility dilemma. In *Proceedings of the 40th Annual Meeting of the Cognitive Science Society* (pp. 806–811). Madison, WI. [**Contributed Talk**] [1 CITATIONS](#)
7. Sagiv, Y., **Musslick, S.**, Niv, Y., & Cohen, J. D. (2018). Efficiency of learning vs. processing: Towards a normative theory of multitasking. In *Proceedings of the 40th Annual Meeting of the Cognitive Science Society* (pp. 1004–1009). Madison, WI. [**Contributed Talk, Awarded for Best Modeling Work in Higher-Level Cognition**] [2 CITATIONS](#)
6. Alon, N., Reichman, D., Shinkar, I., Wagner, T., **Musslick, S.**, D., C. J., ... Özcimder, K. (2017). A graph-theoretic approach to multitasking. advances in neural information processing systems. In *Advances in Neural Information Processing Systems* (pp. 2097–2106.). Long Beach, CA. [**Contributed Talk**] [3 CITATIONS](#)
5. Bustamante, L., Lieder, F., **Musslick, S.**, Shenhav, A., & Cohen, J. D. (2017a). Learning to (mis)allocate control: Maltransfer can lead to self-control failure. In *Proceedings of the Reinforcement Learning and Decision Making Conference 2017*. [**Poster**] [1 CITATIONS](#)

4. **Musslick, S.**, Saxe, A., Özcimder, K., Dey, B., Henselman, G., & Cohen, J. D. (2017). Multitasking capability versus learning efficiency in neural network architectures. In *Proceedings of the 39th Annual Meeting of the Cognitive Science Society* (pp. 829–834). London, UK. [Contributed Talk] 6 CITATIONS
3. Özcimder, K., Dey, B., **Musslick, S.**, Petri, G., Ahmed, N. K., Willke, T., & Cohen, J. D. (2017). A formal approach to modeling the cost of cognitive control. In *Proceedings of the 39th Annual Meeting of the Cognitive Science Society* (pp. 895–900). London, UK. [Contributed Talk]
2. **Musslick, S.**, Dey, B., Özcimder, K., Patwary, M., Willke, T. L., & Cohen, J. D. (2016a). Controlled vs. automatic processing: A graph-theoretic approach to the analysis of serial vs. parallel processing in neural network architectures. In *Proceedings of the 38th Annual Meeting of the Cognitive Science Society* (pp. 1547–1552). Philadelphia, PA. [Contributed Talk] 17 CITATIONS
1. **Musslick, S.**, Shenhav, A., Botvinick, M. M., & Cohen, J. D. (2015). A computational model of control allocation based on the expected value of control. In *Reinforcement Learning and Decision Making Conference 2015*. [Poster, selected for spotlight presentation] 10 CITATIONS

Peer-Reviewed Workshop Contributions

3. Cherkaev, A., **Musslick, S.**, Cohen, J. D., Srikumar, V., & Flatt, M. (2017). Sweet-pea: A language for designing experiments. In *The 45th Symposium on Principles of Programming Languages (POPL)*. [Contributed Talk]
2. **Musslick, S.**, Dey, B., Özcimder, K., Patwary, M., Willke, T. L., & Cohen, J. D. (2016b). Parallel processing capability versus efficiency of representation in neural networks. In *15th Neural Computation and Psychology Workshop*. [Contributed Talk]
1. **Musslick, S.**, & Cohen, J. D. (2015). The computational tradeoff between multiuse and multitasking in neural networks. In *NIPS Workshop on Bounded Optimality and Rational Metareasoning*. [Poster]

Conference Abstracts

20. Bizyaeva, **Musslick, S.**, Agaron, S., Naomi, E. L., & Cohen, J. D. (accepted). Stability-flexibility dilemma in cognitive control: A dynamical system perspective. In *52nd Society for Mathematical Psychology Meeting*. Montreal, CA. [Poster]
19. Rosendahl, L., **Musslick, S.**, & Cohen, J. D. (accepted). A quantum dynamical model of task landscapes. In *52nd Society for Mathematical Psychology Meeting*. Montreal, CA. [Poster]

18. **Musslick, S.**, Öczimder, K., Dey, B., Saxe, A., Petri, G., Reichman, D., . . . Cohen, J. D. (2019). On the rational boundedness of cognitive control. In *International Convention of Psychological Science*. Paris, FR. [**Poster**]
17. **Musslick, S.**, Cohen, J. D., & Shenhav, A. (2018b). Estimating the costs of cognitive control: Theoretical validation and potential pitfalls. In *Society for Neuroscience (SfN) Annual Meeting*. San Diego, CA. [**Poster**]
16. **Musslick, S.**, Jang, J. S., Shvartsman, M., Shenhav, A., & Cohen, J. D. (2018b). The cost of cognitive control as a solution to the stability-flexibility dilemma. In *Society for Neuroeconomics Annual Meeting*. Philadelphia, PA. [**Poster, selected for spotlight presentation**]
15. **Musslick, S.**, Öczimder, K., Dey, B., Saxe, A., Petri, G., Reichman, D., . . . Cohen, J. D. (2018). On the rational boundedness of cognitive control. In *Annual Convention of Association for Psychological Science*. San Francisco, CA. [**Poster**]
14. Novick, A., **Musslick, S.**, Iordan, C., & Cohen, J. D. (2018). Why we struggle to multitask: Converging evidence from computational modeling, human behavior, and neuroimaging. In *Society for Neuroscience (SfN) Annual Meeting*. San Diego, CA. [**Poster**]
13. Shenhav, A., **Musslick, S.**, Botvinick, M., & Cohen, J. (2018). Weighing the costs and benefits of mental effort. In *Annual Convention of Association for Psychological Science*. San Francisco, CA. [**Contributed Talk**]
12. Bustamante, L., Lieder, F., **Musslick, S.**, Shenhav, A., & Cohen, J. D. (2017b). Learning to (mis)allocate control: Maltransfer can lead to self-control failure. In *Society for Neuroscience (SfN) Annual Meeting*. [**Contributed Talk**]
11. **Musslick, S.**, Cohen, J. D., & Shenhav, A. (2017). Estimating the costs of cognitive control: Theoretical validation and potential pitfalls. In *Society for Neuroeconomics Annual Meeting*. Toronto, CA. [**Poster**]
10. **Musslick, S.**, Jang, J. S., Shvartsman, M., Shenhav, A., & Cohen, J. D. (2017). Constraints associated with cognitive control and the stability-flexibility dilemma. In *Society for Neuroscience (SfN) Annual Meeting*. Washington, D.C. [**Contributed Talk**]
9. Petri, G., **Musslick, S.**, Öczimder, K., Dey, B., Ahmed, N., Willke, T. L., & Cohen, J. D. (2017a). Diminishing returns with size for parallel computation capacity of neural architectures. In *NetSci 2017*. Indianapolis, IN. [**Contributed Talk**]
8. Petri, G., **Musslick, S.**, Öczimder, K., Dey, B., Ahmed, N., Willke, T. L., & Cohen, J. D. (2017b). Universal limits to parallel processing capability of neural systems. In *Conference on Complex Systems 2017*. Cancun, MX. [**Contributed Talk**]

7. Shenhav, A., **Musslick, S.**, Botvinick, M., & Cohen, J. (2017a). Weighing the costs and benefits of mental effort. In *Control Processes Conference*. Amsterdam, NL. [**Contributed Talk**]
6. Shenhav, A., **Musslick, S.**, Botvinick, M., & Cohen, J. (2017b). Weighing the costs and benefits of mental effort. In *Society for Personality and Social Psychology Conference*. San Antonio, TX. [**Contributed Talk**]
5. Momennejad, I., Reverberi, C., **Musslick, S.**, Cohen, J. D., & Haynes, J.-D. (2016). The role of task similarity in encoding and executing planned task sequences. In *Society for Neuroscience (SfN) Annual Meeting*. San Diego, CA. [**Poster**]
4. **Musslick, S.**, Dey, B., Özcimder, K., P., M., K., P. Willke, T. L., & Cohen, J. D. (2016). Multitasking capacity versus efficiency of representation in neural network architectures. In *Computational models of decision making nanosymposium, Society for Neuroscience (SfN) Annual Meeting*. San Diego, CA. [**Contributed Talk**]
3. **Musslick, S.**, Dey, B., Özcimder, K., Patwary, M., Willke, T. L., & Cohen, J. D. (2015). A computational model of control allocation based on the expected value of control. In *Society for Neuroscience (SfN) Annual Meeting*. [**Poster**]
2. Shenhav, A., **Musslick, S.**, Botvinick, M., & Cohen, J. (2015). Anterior cingulate and the expected value of control. In *Society for Psychophysiological Research*. Seattle, WA. [**Contributed Talk**]
1. Zimmermann, U., **Musslick, S.**, Ruge, H., & Goschke, T. (2013). The multidimensional nature of flexible task-control. In *Spring School CRC 940 Volition and Cognitive Control*. [**Poster**]

Invited Talks	07/25/2019	Symposium “Understanding interactions amongst cognitive control, learning and representation”. 41st Cognitive Science Society Meeting. Montreal, CA.
	05/17/2019	Symposium at the Control Processes Meeting 2019. Brown University. Providence, RI, USA.
	03/15/2019	Psychiatry and Psychotherapy Colloquium. University Hospital Ulm, DE.
	03/14/2019	General Psychology Colloquium. University of Freiburg, DE.
	03/11/2019	Donders Colloquium. Donders Institute for Brain, Cognition and Behaviour, NL.
	03/09/2019	Symposium on the “Neural Mechanisms of Effort Mobilization and Cognitive Control” at the International Convention of Psychological Science. Paris, FR.
	03/07/2019	Psychology Colloquium. Ghent University, BE.
	03/07/2019	Cognitive Psychology Colloquium. Leiden University, NL.
	03/04/2019	Workshop on “Continual learning in biological and artificial neural networks”. Cosyne. Cascais, PT.

- 12/10/2018 Laboratory for Neural Computation and Cognition Meeting. Brown University. Providence, RI, USA.
- 07/30/2018 Lunch Talk at the Center for Magnetic Resonance Research. University of Minnesota. Minneapolis, MN, USA.
- 03/20/2018 Joint Symposium on “The Mathematical Theory of Deep Neural Networks”. Institute for Advanced Study - Princeton University. Princeton, NJ, USA.
- 07/08/2017 Psychiatry and Psychotherapy Symposium of University Hospital Ulm. Hildesheim, DE.
- 05/17/2017 Princeton Neuroscience Institute Retreat. Avalon, NJ, USA.
- 03/01/2017 Laboratory for Neural Computation and Cognition Meeting. Brown University. Providence, RI, USA.
- 02/27/2017 Shenhav Lab Meeting. Brown University. Providence, RI, USA.
- 11/16/2016 Computational Cognitive Science Lab Meeting. Berkeley University. Berkeley, CA, USA.
- 11/16/2016 Redwood Center for Theoretical Neuroscience. Berkeley University. Berkeley, CA, USA.
- 05/28/2014 General Psychology Colloquium. Technische Universität Dresden. Dresden, DE.

Teaching *Princeton University*

From Molecules to Systems to Behavior (lab). Assistant Instructor. Spring 2016 (grad).

Animal Learning and Decision Making: Psychological, Computational and Neural Perspectives (precept). Assistant Instructor. Fall 2015 (undergrad).

Technische Universität Dresden

Biological Psychology (tutorial seminar). Lecturer. Summer 2011, Fall 2011, Fall 2012, Summer 2013 (undergrad). *Received “Karl-und-Charlotte-Bühler-Preis” for excellent teaching.*

- Student Mentoring
- 2019–present William Meara (Biology Major), James Madison University
- 2018–present Louis Andre (Psychology Major), University College London
- 2018–present Thea Zalabak (Psychology Major), Princeton University
- 2018–present Baran Cimen (Physics Major), Princeton University
- 2018–present Maia Hamin (Computer Science Major), Princeton University
- 2018–present Susan Liu (Neuroscience Major), Princeton University
Senior Thesis: “A Model of Learning the Optimal Balance Between Cognitive Stability and Flexibility”.
- 2017–present Shamay Agaron (Neuroscience Major), Princeton University
Senior Thesis: “Investigating Cognitive Control Adaptations to Different Reward Environments”.

- 2017–present Tolupe Adetayo (Psychology Major), Princeton University
Senior Thesis: “Human Adaptation to Demand for Cognitive Flexibility in a Three-Task Environment”.
- 2018–2019 Sumedh Sontakke (Electrical Engineering Major), College of Engineering in Pune, IN
- 2018 Katie Tam (Freshman), Princeton University
- 2017–2018 Oliver Whang (Physics Major), Princeton University
- 2016–2018 Seong Jun Jang (Neuroscience Major), Princeton University
Senior Thesis: “Explaining Cognitive Control Constraints from the Perspective of the Flexibility-Stability Dilemma”.
- 2016–2018 Markus Spitzer (Psychology, Graduate), University of Innsbruck
Master Thesis: “Exploring feature overlap in a task switching paradigm”.
- 2016–2018 Yotam Sagiv (Computer Science Major), Princeton University
Senior Thesis: “Learn Fast or Multitask Well: First Steps Towards a Normative Theory of Multitasking”.
- 2016–2017 Penina Krieger (Neuroscience Major), Princeton University
Senior Thesis: “Why We Can’t Text and Drive: An Experimental Study of the Tradeoff of Learning and Multitasking Capacity in Human Cognition”.
- 2016–2017 Mariam Pogosyan (Computer Science Major), Rutgers University
- 2016 Keith Perkins (Biology Major), Southern University at New Orleans
- 2014–2016 Aileloreuan Ohiwerei (Sophomore), Princeton University
- 2014 Franziska Kessler (Psychology Major), Technische Universität Dresden

Professional Activities

- 2019–present *Editor:* Special issue on “Meta-control: From psychology to computational neuroscience” in [Cognitive, Affective and Behavioral Neuroscience \(CABN\)](#).
- 2018–present *Co-Organizer:* [Conference on the Mathematical Theory of Deep Neural Networks 2019](#) (Oct 31 - Nov 1, 2019). New York City, NY.
- 2019 *Student Volunteer:* Cognitive Science Society Conference 2019. Montreal, CA.
- 08/19/2016 *Conference Symposium Chair:* Computational models of decision making and confidence. Society for Neuroscience. Nanosymposium. San Diego, CA.

Ad Hoc Reviewer (alphabetical order):

APSSC Student Research Award - Brain and Cognition - Cognitive Science Society Conference - Cortex - Journal of Cognitive Neuroscience - Journal of Neuroscience - Nature Communications - Neuropsychologia - Psychonomic Bulletin & Review - SIAM Journal on Discrete Mathematics -

Professional Affiliations

- 2018–present Association for Psychological Science
- 2017–present Society for Neuroeconomics

2016-present **Cognitive Science Society**
2014-present **Society for Neuroscience**