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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   | ICPS 2019 Travel Grant   |
|                                  | 2019   | 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  |
| 2019                             | Karl-und-Charlotte-Bühler-Preis for excellent teaching, Technische Universität Dresden |  |
| Publications                     | <i>Forthcoming</i>   |  |
|                                  | 10.  | <b>Musslick, S.</b> , Bizyaeva, A., Agaron, S., Naomi, E. L., & Cohen, J. D. (conference article submitted for CogSci 2019). Stability-flexibility dilemma in cognitive control: A dynamical system perspective. |

9. **Musslick, S.**, & Cohen, J. D. (conference article submitted for CogSci 2019). A mechanistic account of constraints on control-dependent processing: Shared representation, conflict and persistence.
8. **Musslick, S.**, Cohen, J. D., & Shenhav, A. (conference article submitted for CogSci 2019). Decomposing individual differences in cognitive control: A model-based approach.
7. Spitzer, M., **Musslick, S.**, Shvartsman, M., Shenhav, A., & Cohen, J. D. (conference article submitted for CogSci 2019). Asymmetric switch costs as a function of task strength.
6. Willke, L. T., Yoo, S. B. M., Capota, M., **Musslick, S.**, Hayden, B. Y., & Cohen, J. D. (conference article submitted for RLDM 2019). A comparison of non-human primate and deep reinforcement learning agent performance in a virtual pursuit-avoidance task.
5. Petri, G., **Musslick, S.**, Öczimder, K., Dey, B., Ahmed, N., Willke, T., & Cohen, J. D. (submitted for publication). Universal limits to parallel processing capability of network architectures.
4. **Musslick, S.**, Bizyaeva, A. S., Agaron, S., Jang, J. S., Leonard, N., & Cohen, J. D. (in preparation). Constraints on cognitive control and the stability-flexibility dilemma.
3. **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.
2. **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.
1. Grahek, I., Shenhav, A., **Musslick, S.**, Krebs, R. M., & Koster, E. H. W. (under review). Motivation and cognitive control in depression.

#### *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: [10.13140/RG.2.2.24500.14721](https://doi.org/10.13140/RG.2.2.24500.14721) [10 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) [2 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)  
121 CITATIONS

*Peer-Reviewed Conference Articles*

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] 1 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] 5 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**] [15 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*

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.**, Özcimder, 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.**, Özcimder, 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.**, Özcimder, 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]

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| Invited Talks | 05/17/2019 | Symposium at the Control Processes Meeting 2019. Brown University. Providence, RI, USA.  |
|               | 03/11/2019 | Colloquium Talk. 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 | Computational Cognitive Neuroscience Meeting. Ghent University, BE.  |
|               | 03/07/2019 | Colloquium Talk. 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. Hildensee, 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       | 2018–present   | Louis Andre (Psychology Major), University College London, UK   |
|                         | 2018–present   | Sumedh Sontakke (Electrical Engineering Major), College of Engineering in Pune, IN  |
|                         | 2018–present   | Thea Zalabak (Psychology Major), Princeton University   |
|                         | 2018–present   | Susan Liu (Neuroscience Major), Princeton University  |
|                         | 2018–present   | Baran Cimen (Physics Major), Princeton University   |
|                         | 2017–present   | Shamay Agaron (Neuroscience Major), Princeton University  |
|                         | 2018–present   | Maia Hamin (Computer Science Major), Princeton University   |
|                         | 2017–present   | Tolupe Adetayo (Psychology Major), Princeton University   |
|                         | 2018   | Katie Tam (Freshman), Princeton University  |
|                         | 2017–2018  | Oliver Whang (Physics Major), Princeton University  |
|                         | 2016–2018  | Seong Jun Jang (Neuroscience Major), Princeton University<br><i>Senior Thesis: “Explaining Cognitive Control Constraints from the Perspective of the Flexibility-Stability Dilemma”.</i>                          |
|                         | 2016–2018  | Markus Spitzer (Psychology, Graduate), University of Innsbruck<br><i>Master Thesis: “Exploring feature overlap in a task switching paradigm”.</i>   |
|                         | 2016–2018  | Yotam Sagiv (Computer Science Major), Princeton University<br><i>Senior Thesis: “Learn Fast or Multitask Well: First Steps Towards a Normative Theory of Multitasking”.</i>                                       |
|                         | 2016–2017  | Penina Krieger (Neuroscience Major), Princeton University<br><i>Senior Thesis: “Why We Can’t Text and Drive: An Experimental Study of the Tradeoff of Learning and Multitasking Capacity in Human Cognition”.</i> |
|                         | 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 | 2018–present   | <i>Co-Organizer: <a href="#">Conference on the Mathematical Theory of Deep Neural Networks 2019</a> (Oct 31 - Nov 1, 2019). New York City, NY.</i>  |
|                         | 08/19/2016   | <i>Conference Symposium Chair: Computational models of decision making and confidence. Society for Neuroscience. Nanosymposium. San Diego, CA.</i>  |

*Ad Hoc Reviewer (alphabetical order):*

*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 -*

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|------------------------------|--------------|---------------------------------------|
| Professional<br>Affiliations | 2018–present | Association for Psychological Science |
|                              | 2017–present | Society for Neuroeconomics            |
|                              | 2016–present | Cognitive Science Society             |
|                              | 2014–present | Society for Neuroscience              |