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Sebastian Musslick

Contents

Keywords	*Research Areas:* computational cognitive neuroscience, cognitive science, machine learning, automated scientific discovery
	Research Topics: computational limitations of natural and artificial neural systems, artificial neural networks, representation learning, cognitive control, decision-making

Academic Appointments	2023-current	Assistant Professor of Computational Neuroscience (TT), Institute of Cognitive Science, Osnabrück University
	2021-current	Assistant Professor (Research), Department of Cognitive, Linguistic, and Psychological Sciences, Brown University
	2021-current	Schmidt Science Fellow and BRAINSTORM Innovator, Carney Institute for Brain Science, Brown University

Education	2021	PhD, Princeton University, Neuroscience, Quantitative and Computational Neuroscience Track, Doctoral Thesis: *On the Rational Bounds of Cognitive Control*, Advisor: Jonathan D. Cohen
	2016	M.A., Princeton University, Neuroscience
	2014	Diplom, Technische Universität Dresden, Psychology, Diplom Thesis: *The Role of Task-Feature Bindings in Cued Task Switching (Graduated with Distinction)*, Advisor: Thomas Goschke

Pre-Doctoral Research Experience	2013–2014	Visiting Student Research Scholar, Princeton University, PI: Jonathan D. Cohen
	2012–2013	Short-Term Scholar, University of Colorado at Boulder, PI: Randall C. O'Reilly
	2011–2013	Student Research Assistant, Technische Universität Dresden, PI: Clemens Kirschbaum
	2011–2012	Student Research Assistant, Technische Universität Dresden, PI: Thomas Goschke
	2008–2012	Freelance Work, Software Development and Design

Awards & Fellowships	2022	Glushko Dissertation Prize, Cognitive Science Society and Glushko-Samuelson Foundation
	2021–2023	Schmidt Science Fellowship, Schmidt Science Fellows, in partnership with the Rhodes Trust
	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
	2014–2015	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
2012–2013	Deutschlandstipendium, Bundesministerium für Bildung und Forschung, Gesellschaft von Freunden und Förderern der TU Dresden e.V.
2012	PROMOS Global Scholarship, DAAD
2011,2012	Karl-und-Charlotte-Bühler-Preis for excellent teaching, Technische Universität Dresden

Grants & Third-Party Funding

2022	William K. and Katherine W. Estes Fund for the advanced training program entitled "3rd Workshop on Mental Effort: One Construct, Many Faces?", Psychonomic Society and the Association for Psychological Science (13,850 USD)
2021	Personal Grant for the project proposal "Autonomous Empirical Research" as part of the Schmidt Science Fellowship, Schmidt Science Fellows, in partnership with the Rhodes Trust (200,000 USD)
2021	William K. and Katherine W. Estes Fund for the advanced training program entitled "2nd Workshop on Mental Effort: One Construct, Many Faces?", Psychonomic Society and the Association for Psychological Science (4,080 USD)
2019	Graduate Research Grant, Cognitive Science Program, Princeton University (4,320 USD)
2019	Travel Grant, Cognitive Science Society (500 USD)
2018	Travel Grant, International Convention of Psychological Science (300 USD)

Publications

Legend: **(F)** first author, **(S)** senior author, **(C)** co-author

Preprints (available upon request)

9. **(F)** Lesnick*, M., **Musslick***, **S**., Dey, B., & Cohen, J. D. (in submission for peer-review). A formal framework for cognitive models of multitasking. DOI: https://doi.org/10.31234/osf.io/7yzdn [***equal contribution**]

8. **(F)** **Musslick**, **S**., Bizyaeva, A., Jongkees, B., Goschke, T., Leonard, N. E., & Cohen, J. D. (in submission for peer-review). On the rational boundedness of cognitive control: Cognitive stability versus cognitive flexibility.

7. **(C)** Petri, G., **Musslick**, **S**., & Cohen, J. D. (in submission for peer-review). An information-theoretic approach to reward rate optimization in the tradeoff between controlled and automatic processing in neural network architectures. [***equal contribution**]

6. **(C)** Ravi, S., **Musslick**, **S**., Hamin, M., Willke, T., & Cohen, J. D. (in submission for peer-review). Navigating the tradeoff between multi-task learning and learning to multitask in deep neural networks. arXiv: 2007.10527   6 CITATIONS

5. **(C)** Shenhav, A., **Musslick**, **S**., Botvinick, M. M., & Cohen, J. D. (in submission for peer-review). Misdirected vigor: Differentiating the control of value from the value of control. DOI: https://doi.org/10.31234/osf.io/5bhwe   4 CITATIONS

4. Spitzer, M., **Musslick**, **S**., Janz, J., Kiesel, A., & Dignath, D. (in submission for peer-review). The influence of errors and rewards on voluntary task choices.

3. **(F) Musslick, S.**, Saxe, A., Novick, Y., A. Sagiv, Reichman, D., Petri, G., & Cohen, J. D. (submitted for peer-review). On the rational boundedness of cognitive control: Shared versus separated representations. DOI: https://doi.org/10.31234/osf.io/jkhdf   8 CITATIONS

2. **(S)** Spitzer*, M., Strittmatter*, Y., Manning, K., Ruiz-Garcia, M., Ging-Jehli, N., & **Musslick, S.** (in preparation). A jspsych touchscreen extension for crowd-sourced behavioral research on mobile phones and tablets. [***equal contribution**]

1. **(S)** Spitzer*, M., Strittmatter*, Y., & **Musslick, S.** (in preparation). Asymmetric switch costs as a function of signal-to-noise ratio. [***equal contribution**]

Peer-Reviewed Journal Articles

13. **(S)** Spitzer, M., Moeller, K., & **Musslick, S.** (in press). Assignment strategies modulate students' academic performance in an online learning environment during the first and second Covid-19 related school closures. *PLOS One.*

12. **(F) Musslick, S.**, Cherkaev, A., Draut, B., Butt, A., Srikumar, V., Flatt, M., & Cohen, J. D. (2022). Sweetpea: A standard language for factorial experimental design. *Behavior Research Methods*, **54**, 805–829. DOI: https://doi.org/10.3758/s13428-021-01598-2   1 CITATIONS

11. **(S)** Silvestrini, N., **Musslick*, S.**, Berry*, A., & Vassena*, E. (2022). An integrative effort: Bridging psychological, cognitive and neuro-computational theories of effort and control allocation. *Psychological Review.* DOI: https://doi.org/10.31234/osf.io/gn37y [***equal contribution**]

10. **(C)** Bustamante*, L., Lieder*, F., **Musslick, S.**, Shenhav, A., & Cohen, J. D. (2021). Learning to overexert cognitive control in a Stroop task. *Cognitive Affective & Behavioral Neuroscience*, **21**, 453–471. DOI: 10.3758/s13415-020-00845-x [***equal contribution**]   15 CITATIONS

9. **(S)** Eppinger, B., Goschke, T., & **Musslick, S.** (2021). Meta-control: From psychology to computational neuroscience. *Cognitive Affective & Behavioral Neuroscience*, **21**(3), 447–452. DOI: https://doi.org/10.3758/s13415-021-00919-4   5 CITATIONS

8. **(F) Musslick, S.**, & Cohen, J. D. (2021). Rationalizing constraints on the capacity for cognitive control. *Trends in Cognitive Sciences*, **25**(9), 757–775. DOI: https://doi.org/10.1016/j.tics.2021.06.001   20 CITATIONS

7. **(F)** Petri*, G., **Musslick*, S.**, Dey, B., Öczimder, K., Turner, D., Ahmed, N., … Cohen, J. D. (2021). Topological limits to parallel processing capability of network architectures. *Nature Physics*, **17**(5), 646–651. DOI: 10.1038/s41567-021-01170-x [***equal contribution**]   9 CITATIONS

6. **(S)** Spitzer, M., & **Musslick, S.** (2021). Academic performance of K-12 students in an online-learning environment for mathematics increased during the shutdown of schools in wake of the Covid-19 pandemic. *PLOS One*, **16**(8), e0255629.   23 CITATIONS

5. **(F)** Grahek*, I., **Musslick*, S.**, & Shenhav, A. (2020). A computational perspective on the roles of affect in cognitive control. *Journal of Psychophysiology*, **151**, 25–34. DOI: https://doi.org/10.1016/j.ijpsycho.2020.02.001 [***equal contribution**]   16 CITATIONS

4. **(C)** Grahek, I., Shenhav, A., **Musslick**, **S.**, Krebs, R. M., & Koster, E. H. W. (2019). Motivation and cognitive control in depression. *Neuroscience & Biobehavioral Reviews*, **102**, 371–381. DOI: https://doi.org/10.1016/j.neubiorev.2019.04.011   91 CITATIONS

3. **(C)** 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.1006043   107 CITATIONS

2. **(C)** 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   20 CITATIONS

1. **(C)** 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   591 CITATIONS

Peer-Reviewed Conference Articles

21. **(F)** **Musslick**, **S.**, Hewson, J., Andrew, B., Strittmatter, Y., Williams, C. C., Dang, G., ... Holland, J. G. (in press). An evaluation of experimental sampling strategies for autonomous empirical research in cognitive science. In *Proceedings of the 45th Annual Conference of the Cognitive Science Society*. Sydney, AU.

20. **(S)** Williams, C. C., Weinhardt, D., Wirzberger, M., & **Musslick**, **S.** (in press). Augmenting eeg with generative adversarial networks enhances brain decoding across classifiers and sample sizes. In *Proceedings of the 45th Annual Conference of the Cognitive Science Society*. Sydney, AU.

19. **(S)** Huang, H., Grahek, I., Bustamante, L., Daw, N., Caplin, A., & **Musslick**, **S.** (2022). Leveraging psychometrics of rational inattention to estimate individual differences in the capacity for cognitive control. In *Proceedings of the 44th Annual Conference of the Cognitive Science Society* (pp. 2222–2229). Toronto, CA.

18. **(C)** Zerroug, A., Vaishnav, V., Colin, J., **Musslick**, **S.**, & Serre, T. (2022). A benchmark for compositional visual reasoning. In *36th conference on neural information processing systems (neurips)*.

17. **(C)** Masis, J., **Musslick**, **S.**, & Cohen, J. D. (2021). The value of learning and cognitive control allocation. In *Proceedings of the 43rd Annual Conference of the Cognitive Science Society* (pp. 1837–1843). Vienna, AT.   2 CITATIONS

16. **(F)** **Musslick**, **S.** (2021d). Recovering quantitative models of human information processing with differentiable architecture search. In *Proceedings of the 43rd Annual Conference of the Cognitive Science Society* (pp. 348–354). Vienna, AT. arXiv: 2103.13939

15. **(F)** **Musslick**, **S.**, Bizyaeva, A., Agaron, S., Naomi, E. L., & Cohen, J. D. (2019). Stability-flexibility dilemma in cognitive control: A dynamical system perspective. In *Proceedings of the 41st Annual Conference of the Cognitive Science Society* (pp. 2420–2426). Montreal, CA.   12 CITATIONS

14. **(F)** **Musslick, S.**, & Cohen, J. D. (2019a). A mechanistic account of constraints on control-dependent processing: Shared representation, conflict and persistence. In *Proceedings of the 41st Annual Conference of the Cognitive Science Society* (pp. 849–855). Montreal, CA. 13 CITATIONS

13. **(F)** **Musslick, S.**, Cohen, J. D., & Shenhav, A. (2019). Decomposing individual differences in cognitive control: A model-based approach. In *Proceedings of the 41st Annual Conference of the Cognitive Science Society* (pp. 2427–2433). Montreal, CA. 12 CITATIONS

12. **(F)** Spitzer*, M., **Musslick*, S.**, Shvartsman, M., Shenhav, A., & Cohen, J. D. (2019). Asymmetric switch costs as a function of task strength. In *Proceedings of the 41st Annual Conference of the Cognitive Science Society* (pp. 1070–1076). Montreal, CA. [***equal contribution**] 3 CITATIONS

11. **(C)** Willke, L. T., Yoo, S. B. M., Capota, M., **Musslick, S.**, Hayden, B. Y., & Cohen, J. D. (2019). 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. 2 CITATIONS

10. **(C)** 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.* Philadelphia, PA. 2 CITATIONS

9. **(F)** **Musslick, S.**, Cohen, J. D., & Shenhav, A. (2018a). Estimating the costs of cognitive control from task performance: Theoretical validation and potential pitfalls. In *Proceedings of the 40th Annual Conference of the Cognitive Science Society* (pp. 798–803). Madison, WI. 12 CITATIONS

8. **(F)** **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 Conference of the Cognitive Science Society* (pp. 806–811). Madison, WI. 33 CITATIONS

7. **(C)** 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 Conference of the Cognitive Science Society* (pp. 1004–1009). Madison, WI. [*Awarded for Best Modeling Work in Higher-Level Cognition*] 45 CITATIONS

6. **(C)** Alon, N., Reichman, D., Shinkar, I., Wagner, T., **Musslick, S.**, Cohen, J. D., ... 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. 13 CITATIONS

5. **(C)** 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.* Ann Arbor, MI. 2 CITATIONS

4. **(F)** **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 Conference of the Cognitive Science Society* (pp. 829–834). London, UK. 62 CITATIONS

3. **(C)** 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 Conference of the Cognitive Science Society* (pp. 895–900). London, UK.   1 CITATIONS

2. **(F)** **Musslick***, **S.**, Dey*, B., Özcimder*, K., Patwary, M., Willke, T. L., & Cohen, J. D. (2016). 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 Conference of the Cognitive Science Society* (pp. 1547–1552). Philadelphia, PA. [***equal contribution**]   61 CITATIONS

1. **(F)** **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*. Edmonton, CA.   49 CITATIONS

Peer-Reviewed Letters and Commentaries

2. **(S)** Dubova, M., Sloman, S. J., Andrew, B., Nassar, M. R., & **Musslick**, **S**. (in press). Explore your experimental designs and theories before you exploit them! *Behavioral and Brain Sciences*.

1. **(F)** **Musslick***, **S.**, & Masís*, J. (2023). Pushing the bounds of bounded optimality. *Cognitive Science*, **47**(4), e13259. DOI: http://doi.org/10.1111/cogs.13259 [***equal contribution**]

Peer-Reviewed Workshop Contributions

6. **(F)** **Musslick**, **S.**, Hewson, J., Andrew, B., Li, S., Dang, G., & Holland, J. G. (2023). Evaluating computational discovery in the behavioral and brain sciences. In *AAAI Spring Symposium: Computational Approaches to Scientific Discovery*. San Francisco, CA. [**Talk**]

5. **(F)** **Musslick**, **S.** (2021c). Recovering quantitative models of human information processing with differentiable architecture search. In *2nd Workshop on Neural Architecture Search at ICLR 2021*. Virtual Meeting. [**Poster**]

4. **(F)** **Musslick**, **S.**, Wirzberger, M., Grahek, I., Bustamante, L., Shenhav, A., & Cohen, J. D. (2020). Mental effort: One construct, many faces? In *Proceedings of the 42nd Annual Virtual Meeting of the Cognitive Science Society* (pp. 1–2). Toronto, CA. [**Full-Day Workshop**]

3. **(C)** Cherkaev, A., **Musslick**, **S.**, Cohen, J. D., Srikumar, V., & Flatt, M. (2017). Sweetpea: A language for designing experiments. In *The 45th Symposium on Principles of Programming Languages (POPL)*. Los Angeles, CA. [**Contributed Talk**]

2. **(F)** **Musslick**, **S.**, Dey, B., Özcimder, K., Patwary, M., Willke, T. L., & Cohen, J. D. (2016). Parallel processing capability versus efficiency of representation in neural networks. In *15th Neural Computation and Psychology Workshop*. Philadelphia, PA. [**Contributed Talk**]   8 CITATIONS

1. **(F)** **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*. Montreal, CA. [**Poster**]

Conference Abstracts

30. **(S)** Spitzer, M., Strittmatter, K., Ruiz-Garcia, M., Gershman, S., & **Musslick**, **S**. (in press). Does a curriculum improve perceptual decision making? In *Proceedings of the 45th Annual Conference of the Cognitive Science Society*. Sydney, AU. [**Poster**]

29. **(C)** Williams, C. C., Weinhardt, D., Wirzberger, M., & **Musslick**, **S**. (2023). Enhancing eeg classification performance through generative adversarial networks: Investigating the impact of sample sizes and classifier selection. In *SimTech Conference*. Stuttgart, DE. [**Poster**]

28. **(S)** Ji, B., Strittmatter, Y., & **Musslick**, **S**. (2022). Automating the documentation of experimental designs with natural language processing. In *Psychonomics*. Boston, MA. [**Poster**]

27. **(F)** **Musslick**, **S**. (2022). Automating experimental psychology: A proof of concept. In *Teap 2022*. Virtual Conference. [**Talk**]

26. **(C)** Jongkees, B., **Musslick**, **S**., & Cohen, J. D. (2021). A mechanistic account of the trade-off between cognitive stability and flexibility. In *18th NVP Dutch Society for Brain and Cognition Winter Conference*. [**Poster**]

25. **(F)** **Musslick**, **S**. (2021a). Automated modeling of human information processing with differentiable architecture search. In *2021 APS Virtual Convention*. [**Flash Talk**]

24. **(F)** **Musslick**, **S**. (2021b). Automating the construction of scientific models to explain human information processing. In *PuG 2021*. Virtual Conference. [**Poster**]

23. **(C)** Henselman-Petrusek, G., Giallanza, T., Segert, S., **Musslick**, **S**., & Cohen, J. D. (2020). A nonparametric model of independence for cognitive feature representations. In *Conference on the Mathematical Theory of Deep Neural Networks*. Virtual Conference. [**Poster**]

22. **(C)** Bizyaeva, **Musslick**, **S**., Agaron, S., Naomi, E. L., & Cohen, J. D. (2019). Stability-flexibility dilemma in cognitive control: A dynamical system perspective. In *52nd Society for Mathematical Psychology Meeting*. Montreal, CA. [**Poster**]

21. **(F)** **Musslick**, **S**., & Cohen, J. D. (2019b). A mechanistic account of constraints on control-dependent processing: Shared representation, conflict and persistence. In *Motivation and Cognitive Control Conference*. Berlin, DE. [**Poster**]

20. **(F)** **Musslick**, **S**., Novick Hoskin, A., Webb, T., Frankland, S., Cohen, J. D., Jackson, R., ... Petrov, A. (2019). Understanding interactions amongst cognitive control, learning and representation. In *Proceedings of the 41st Annual Conference of the Cognitive Science Society* (pp. 35–36). Montreal, CA. [**Symposium**]

19. **(F)** **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**]

18. **(C)** Rosendahl, L., **Musslick**, **S**., & Cohen, J. D. (2019). A quantum dynamical model of task landscapes. In *52nd Society for Mathematical Psychology Meeting*. Montreal, CA. [**Contributed Talk & Poster**]

17. **(F)** **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. **(F)** **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. **(F)** **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. **(C)** 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. **(C)** Shenhav, A., **Musslick, S.**, Botvinick, M., & Cohen, J. D. (2018). Weighing the costs and benefits of mental effort. In *Annual Convention of Association for Psychological Science*. San Francisco, CA. [**Contributed Talk**]

12. **(C)** 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*. Washington, D.C. [**Contributed Talk**]

11. **(F)** **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. **(F)** **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. **(C)** 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. **(C)** 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. **(C)** Shenhav, A., **Musslick, S.**, Botvinick, M., & Cohen, J. D. (2017a). Weighing the costs and benefits of mental effort. In *Control Processes Conference*. Amsterdam, NL. [**Contributed Talk**]

6. **(C)** Shenhav, A., **Musslick, S.**, Botvinick, M., & Cohen, J. D. (2017b). Weighing the costs and benefits of mental effort. In *Society for Personality and Social Psychology Conference*. San Antonio, TX. [**Contributed Talk**]

5. **(C)** 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. **(F)** **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. **(F) Musslick, S.**, Shenhav, A., Botvinick, M., & Cohen, J. D. (2015). A computational model of control allocation based on the expected value of control. In *Society for Neuroscience (SfN) Annual Meeting*. Washington, D.C. [**Poster**]

2. **(C)** Shenhav, A., **Musslick, S.**, Botvinick, M., & Cohen, J. D. (2015). Anterior cingulate and the expected value of control. In *Society for Psychophysiological Research*. Seattle, WA. [**Contributed Talk**]

1. **(C)** Zimmermann, U., **Musslick, S.**, Ruge, H., & Goschke, T. (2013). The multi-dimensional nature of flexible task-control. In *Spring School CRC 940 Volition and Cognitive Control*. Dresden, DE. [**Poster**]

Software Development

AutoRA (Co-Designer and Co-Developer, Primary Maintainer)
Automated Research Assistant (AutoRA) is an open-source AI-based system for automating each aspect of empirical research in the behavioral sciences, from the construction of a scientific hypothesis to conducting novel experiments.
Co-Designers: John Holland (Brown University), George Dang (Brown University)
Repository: https://github.com/AutoResearch/autora/ (Python Package)
License: Non-Commercial Open Source

EEG-GAN (Co-Designer)
EEG-GAN is a data augmentation tool for electroencephalography (EEG). It leverages a Generative Adversarial Network (GAN) to obtain trial-level synthetic EEG samples from naturalistic samples that are conditioned on experimental manipulations. The resulting samples can be used to enhance the classification of EEG-Data with any classifier.
Co-Designers: Daniel Weinhardt (University of Stuttgart), Chad Williams (Brown University)
Repository: https://github.com/AutoResearch/EEG-GAN (Python Package)
License: Non-Commercial Open Source

SweetPea (Co-Designer and Co-Developer)
SweetPea is an open-source declarative language, in which researchers can describe their desired experiment as a set of factors and constraints. SweetPea leverages advances in areas of computer science to sample experiment sequences in an unbiased way.
Co-Designers: Annie Cherkaev (University of Utah), Jonathan Cohen (Princeton University), Matthew Flatt (University of Utah), Vivek Srikumar (University of Utah).
Repository: https://github.com/sweetpea-org/sweetpea-py (Python Package)
License: MIT License

Invited Talks

14/04/2023	ConCats. New York University, New York, US.
03/14/2023	Colloquium on Topics in Modelling Cognitive Processes. Ghent University, Ghent, BE.
01/17/2023	Experimental Psychology Colloquium. Regensburg University, Dresden, DE.
12/19/2022	Fraunhofer Institute for Material and Beam Technology. Fraunhofer Institute, Dresden, DE.
10/05/2022	Cognitive Colloquium Series. Purdue University, West Lafayette, US.
09/10/2022	[**Keynote**] Jahrestagung der Gesellschaft für Neuropsychologie. Philipps-University Marburg. Marburg, DE.

07/14/2022	Volition and Cognitive Control Symposium of the Collaborative Research Center 940. TU Dresden. Dresden, DE.
10/06/2021	Brown Bag Seminar at the Department of Psychological and Brain Sciences. University of Iowa. Iowa City, US (virtual).
07/08/2021	Appointment Procedure W1–TT–W2 Computational Modeling of Intelligent Behaviour. Philipps-University Marburg. Marburg, DE (virtual).
06/04/2021	Cognition Seminar Series. Brown University. Providence, RI (virtual).
04/27/2021	Cyber Valley Evening Colloquium on Autonomous Systems (Appointment Procedure for the Position of a Cyber Valley Research Group Leader on Autonomous Systems). University of Stuttgart. Stuttgart, DE (virtual).
12/03/2020	MetaConscious Group Meeting. MIT. Boston, WI, US (virtual).
10/09/2020	Virtual seminar on "Human and Machine Learning: Experiments and Theory". University of Wisconsin–Madison. Madison, WI, US (virtual).
09/24/2019	Neuroscience Seminar. Deepmind. London, UK.
09/23/2019	Oxford Experimental Psychology Seminar. Oxford University. Oxford, UK.
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, US.
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.
03/06/2019	Cognitive Psychology Colloquium. Leiden University, NL.
03/04/2019	Workshop on "Continual learning in biological and artificial neural networks". Cosyne. Cascais, PT.
07/30/2018	Lunch Talk at the Center for Magnetic Resonance Research. University of Minnesoata. Minneapolis, MN, US.
03/20/2018	Joint Symposium on "The Mathematical Theory of Deep Neural Networks". Institute for Advanced Study - Princeton University. Princeton, NJ, US.
07/08/2017	Psychiatry and Psychotherapy Symposium of University Hospital Ulm. Hiddensee, DE.
05/17/2017	Princeton Neuroscience Institute Retreat. Avalon, NJ, US.
11/16/2016	Redwood Center for Theoretical Neuroscience Seminar. UC Berkeley. Berkeley, CA, US.
05/28/2014	General Psychology Colloquium. TU Dresden. Dresden, DE.

Teaching   *Princeton University*

2016	**Practical Course**: From Molecules to Systems to Behavior (graduate class, 12 graduate students in neuroscience). Spring 2016.
2015	**Seminar**: Animal Learning and Decision Making: Psychological, Computational and Neural Perspectives (undergraduate class, 40 undergraduate students majoring in various disciplines).

Fall 2015.

Technische Universität Dresden

2011–2013 **Seminar**: Biological Psychology (undergraduate class, 100-120 undergraduate students majoring in psychology). *Received "Karl-und-Charlotte-Bühler-Preis" for excellent teaching (Summer 2011, Fall 2011).*
Summer 2011,
Fall 2011,
Fall 2012,
Summer 2013.

2nd Interdisciplinary Workshop on Mental Effort

09/09/2021 **Tutorial**: An Introduction to Neural Network Modeling (interdisciplinary workshop, 20 junior and senior researchers from computer science, neuroscience, and psychology).
September 9th, 2021.

Student
Mentoring

2023–present	Alessandra Brondetta (Master in Physics), Università di Torino
2022–present	Brian Ji (Computational Biology Major), Brown University
2022–present	Sida Li (Statistics & Computer Science Major), University of California, Berkeley
2021–present	Ioana Marinescu (Computer Science Major), Princeton University
2021–present	Kevin Phan (Computer Science Major), Princeton University
2021–2022	Mikako Inaba (Computer Science M.Eng.), Princeton University
2021–2022	Jessica Tao (Computer Science Major), Princeton University
2021–2022	Jessica-Ann Ereyi (Computer Science Major), Princeton University
2021–2022	Amar Abou-Hussein (Psychology Major), Princeton University
2021–2022	Hannah Even (Freshman), Princeton University
2021–2022	Isabella Pu (Computer Science Major), Princeton University
2021	Lauren Beugelsdyk (Psychology Major), Oklahoma State University
2020–2021	Anais Assi (Psychology Major), Towson University
2019	William Meara (Biology Major), James Madison University
2018–2019	Louis Andre (Psychology Major), University College London
2018–2019	Thea Zalabak (Psychology Major), Princeton University
2018–2019	Baran Cimen (Physics Major), Princeton University
2017–2019	Maia Hamin (Computer Science Major), Princeton University
2018–2019	Susan Liu (Neuroscience Major), Princeton University

2017–2019 Shamay Agaron (Neuroscience Major), Princeton University
Senior Thesis: "Investigating Cognitive Control Adaptations to Different Reward Environments".

2017–2019 Tolulope Adetayo (Neuroscience 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 Trade-off 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

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Professional Activities

General Service

2023   *Co-Organizer*: Conference on the Mathematical Theory of Deep Neural Networks 2023 (Nov 16 - Nov 17, 2022). Baltimore, MD, USA.

2022–present   *Dissertation Committee Member*: PhD Candidate Haley Keglovits (Co-Examiners: Michael Frank, David Badre), Brown University, Providence, US.

09/06/2022   *External Doctoral Thesis Examiner*: PhD Candidate Timo Flesch (Internal Examiners: Tim Behrens; Supervisor: Christopher Summerfield), University of Oxford, Oxford, UK.

2022   *Selection Committee Member for the Schmidt Science Fellowship*: Graduate School, Brown University, Providence, USA.

2021–2022   *Co-Organizer*: Conference on the Mathematical Theory of Deep Neural Networks 2022 (Nov 17 - Nov 18, 2022). San Diego, CA, USA.

2021–2022   *Co-Organizer*: 3rd Workshop on Mental Effort (Nov 21 - Nov 22, 2022). Carney Institute for Brain Science at Brown University, Providence, RI, USA.

2020–2021   *Co-Organizer*: Virtual Conference on the Mathematical Theory of Deep Neural Networks 2021 (Nov 4 - Nov 5, 2021).

2020–2021   *Co-Organizer*: 2nd Workshop on Mental Effort (Sept 9 - Sept 10, 2021). Virtual Meeting. *Supported by the William K. and Katherine W. Estes Fund.*

2019–2021	*Guest Editor*: Special issue on "Meta-control: From psychology to computational neuroscience" in Cognitive, Affective and Behavioral Neuroscience (CABN).
2019–2020	*Co-Organizer*: Virtual Conference on the Mathematical Theory of Deep Neural Networks 2020 (Nov 5 - Nov 6, 2020).
2019–2020	*Co-Organizer*: 1st Workshop on Mental Effort at the CogSci 2020 Virtual Meeting (Jul 29, 2020). Toronto, CA.
2018–2019	*Co-Organizer*: Conference on the Mathematical Theory of Deep Neural Networks 2019 (Oct 31 - Nov 1, 2019). New York City, US.
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 (SfN) Annual Meeting. Nanosymposium. San Diego, CA.

Ad Hoc Journal Reviewer (alphabetical order)

Acta Psychologica - Brain and Cognition - Cognition - Cognitive, Affective and Behavioral Neuroscience - Cognitive Science - Cortex - Current Research in Neurobiology - eLife - EPJ Data Science - Frontiers in Psychology - Journal of Cognitive Neuroscience - Journal of Experimental Psychology: Learning, Memory, and Cognition - Journal of Experimental Psychology: General - Journal of Neuroscience - Memory & Cognition - Motivation Science - Nature Communications - Nature Human Behavior - NeuroImage - Neuropsychologia - PLOS Computational Biology - PLOS One - Psychological Review - Psychonomic Bulletin & Review - SIAM Journal on Discrete Mathematics - Trends in Neurosciences -

Ad Hoc Conference Reviewer (alphabetical order)

Cognitive Science Society Conference (2017, 2018, 2019, 2020, 2021, 2022, 2023)
Conference on the Mathematical Theory of Deep Neural Networks (2019)

Ad Hoc Grant & Award Reviewer (alphabetical order)

National Science Foundation (NSF), Perception, Action, and Cognition Program
APSSC Student Research Award (2019)

Professional Affiliations	2021–present	Schmidt Science Fellows
	2016–present	Cognitive Science Society

Media Coverage	07/10/2021	Podcast Watercooler Neuroscience, Season 4, Episode 7
	08/11/2022	Commentary in Science Magazine Article "Mentally exhausted? Study blames buildup of key chemical in brain"

References

1. **Prof. Dr. Jonathan D. Cohen**
   PhD Supervisor, Collaborator

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   Co-Director, Robert Bendheim and Lynn Bendheim Thoman Professor in Neuroscience
   Princeton Neuroscience Institute, Princeton University,
   Princeton, NJ 08544, USA.

   Professor of Psychology
   Department of Psychology, Princeton University,
   Princeton, NJ 08544, USA.

2. **Prof. Dr. Amitai Shenhav**
   Collaborator

   amitai_shenhav@brown.edu

   Associate Professor
   Department of Cognitive, Linguistic, & Psychological Sciences, Brown University,
   Providence, RI 02912, USA.

3. **Prof. Dr. Matthew M. Botvinick**
   Collaborator

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   Director of Neuroscience Research, Team Lead in AI Research
   DeepMind,
   6 Pancras Square, London, UK.

   Honorary Professor
   Gatsby Computational Neuroscience Unit, University College London,
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4. **Prof. Dr. Naomi E. Leonard**
   Collaborator

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   Edwin S. Wilsey Professor
   Department of Mechanical and Aerospace Engineering, Princeton University,
   Princeton, NJ 08544, USA.

5. **Prof. Dr. Theodore L. Willke**
   Collaborator

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   Director of the Brain-Inspired Computing Lab, Senior Principal Engineer
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   2111 NE 25th Ave, Hillsboro, OR 97124, USA.

   Adjunct Assistant Professor
   Department of Electrical and Computer Engineering, Portland State University,
   1900 SW Fourth Avenue, Portland, OR 97204, USA.