

Erin Zaroukian

Curriculum Vitae

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Positions & Education

U.S. Army Research Laboratory, Aberdeen Proving Ground, MD

Sept 2018–present **Cognitive Scientist, Army Research Directorate (formerly Computational and Information Sciences Directorate)**

Dec 2017–Sept 2018 **Post-doctoral fellow, Computational and Information Sciences Directorate**

Oct 2014–Dec 2017 **Post-doctoral fellow, Human Research and Engineering Directorate**

École Normale Supérieure, Paris, France

Oct 2013–Sept 2014 **Post-doctoral researcher, Laboratoire de Sciences Cognitives et Psycholinguistique**

Johns Hopkins University, Baltimore, MD

Jan 2013–Aug 2013 **Lecturer, Center for Language Education**

2010–2013 **Ph.D., Cognitive Science**

Thesis: *Quantification and (un)certainty* [PDF]

Advisor: Kyle Rawlins

2007–2009 **M.A., Cognitive Science**

Thesis: *Form, Meaning, and Comprehension/Production Asymmetries in Agreement* [PDF]

Advisor: Geraldine Legendre

2003–2007 **B.M., Trumpet**

Publications

to appear Chandrasekaran, A. and **E. Zaroukian**. Understanding the Limitations of Large Language Models in Credibility-Tracking Tasks. In *Proceedings of Human-Computer Interaction (HCI) International*.

to appear **Zaroukian, E.**. Exploring cognitive biases in LLM predictions: Probability matching in GPT-4o mini. In *Proceedings of Human-Computer Interaction (HCI) International*.

- to appear Kumar, P., **E. Zaroukian**, D. Summers-Stay, A. Raglin, and J. Richardson. Directions for computational theory of mind: Data, Metrics, Models and Theoretical Formalization. In *Proceedings of Human-Computer Interaction (HCI) International*.
- 2024 Chandrasekaran, A., **E. Zaroukian**, J. Rawal, M. Mittrick, and A. Raglin. Developing a Framework to Evaluate Credibility Tracking in Large Language Models. DEVCOM Army Research Laboratory Technical Report ARL-TR-10041. [\[PDF\]](#)
- 2024 Hawkins, Thom, **E. Zaroukian**, and A. Raglin. “AI’s not to reason why (because we don’t know if it can).” *Modern War Institute*, mwi.westpoint.edu/ais-not-to-reason-why-because-we-dont-know-if-it-can/. Published 1 Nov 2024. [\[LINK\]](#) [\[PDF\]](#)
- 2024 **Zaroukian, E.**, R. Fernandez, and D. Asher. State-Space Perturbation to Assess Multi-Agent Coordination. DEVCOM Army Research Laboratory Technical Report ARL-TR-9961. [\[PDF\]](#)
- 2024 **Zaroukian, E.** Large Language Models for Tracking Reliability of Information Sources. In *Proceedings of Human-Computer Interaction (HCI) International*. [\[LINK\]](#)
- 2024 Fernandez, R., J. D. Adamson, M. Luo, **E. Zaroukian**, and D. Asher. Coordinated Maneuver in Ground Robotics for Multi-Agent Systems In *Proceedings of the Society of Photo-Optical Instrumentation Engineers (SPIE): Defense + Commercial Sensing*. [\[LINK\]](#)
- 2023 Asher, D. E., A. Basak, R. Fernandez, **E. Zaroukian**, M. Mittrick, J. Richardson, J. Z. Hare, R. Fernandez, N. Waytowich, and D. E. Asher. Doctrine informed maneuver in a large Starcraft2 environment. In *Proceedings of the Society of Photo-Optical Instrumentation Engineers (SPIE): Defense + Commercial Sensing*. [\[LINK\]](#)[\[PDF\]](#)
- 2023 Basak, A., **E. Zaroukian**, M. Mittrick, J. Richardson, J. Z. Hare, R. Fernandez, N. Waytowich, and D. E. Asher. Doctrine informed maneuver in a large Starcraft2 environment. In *Proceedings of the Society of Photo-Optical Instrumentation Engineers (SPIE): Defense + Commercial Sensing*. [\[LINK\]](#)[\[PDF\]](#)
- 2022 Rodriguez, S. S., **E. Zaroukian**, J. Hoye, and D. E. Asher. Mediating Agent Reliability with Human Trust, Situation Awareness, and Performance in Autonomously-Collaborative Human-Agent Teams. *Journal of Cognitive Engineering and Decision Making*. [\[LINK\]](#)
- 2022 **Zaroukian, E.** Theory of Mind and Metareasoning for Artificial Intelligence: A Review. DEVCOM Army Research Laboratory Memo Report ARL-MR-1054. [\[LINK\]](#)

- 2022 Sharma, P. K., **E. Zaroukian**, B. Howell, and D. E. Asher. Emergent Behaviors in Multi-Agent Target Acquisition. In *Proceedings of the Society of Photo-Optical Instrumentation Engineers (SPIE): Defense + Commercial Sensing*. [\[LINK\]](#)
- 2022 Basak, A., **E. G. Zaroukian**, K. Corder, R. Fernandez, C. D. Hsu, P. K. Sharma, N. R. Waytowich, and D. E. Asher. Utility of Doctrine with Multi-agent RL for Military Engagements. In *Proceedings of the Society of Photo-Optical Instrumentation Engineers (SPIE): Defense + Commercial Sensing*. [\[LINK\]](#)[\[PDF\]](#)
- 2022 Asher, D. E., A. Basak, R. Fernandez, P. K. Sharma, **E. G. Zaroukian**, C. D. Hsu, M. R. Dorothy, T. Mahre, G. Galindo, L. Frerichs, J. Rogers, and J. Fossaceca. Strategic Maneuver and Disruption with Reinforcement Learning Approaches for Multi-Agent Coordination. *Journal of Defense Modeling and Simulation*. [\[DRAFT\]](#) [\[LINK\]](#)
- 2021 Fernandez, R., D. E. Asher, A. Basak, P. K. Sharma, **E. G. Zaroukian**, C. D. Hsu, M. R. Dorothy, C. M. Kroninger, L. Frerichs, J. Rogers, and J. Fossaceca. Multi-Agent Coordination for Strategic Maneuver with a Survey or Reinforcement Learning. DEVCOM Army Research Laboratory Technical Note ARL-TN-9350. [\[LINK\]](#)
- 2021 Fernandez, R., **E. Zaroukian**, J. D. Humann, B. Perelman, M. R. Dorothy, S. S. Rodriguez, and D. E. Asher. Emergent Heterogeneous Strategies from Homogeneous Capabilities in Multi-Agent Systems. In *Advances in Artificial Intelligence and Applied Cognitive Computing*, pp 491–498 [\[LINK\]](#)
- 2021 Bakdash, J. Z., L. R. Marusich, K. R. Cox, M. N. Geuss, **E. G. Zaroukian**, and K. M. Morris. The Validity of Situation Awareness for Performance: A Meta-Analysis. *Theoretical Issues in Ergonomics Science*. [\[LINK\]](#)
- 2021 **Zaroukian, E.**, R. Fernandez, and D. E. Asher. Statistical Evaluation of Multi-Agent Reinforcement Learning Models under Different Versions of TensorFlow. DEVCOM Army Research Laboratory Technical Note ARL-TN-1053. [\[LINK\]](#)
- 2021 **Zaroukian, E.**, A. Basak, P. K. Sharma, R. Fernandez, and D. E. Asher. Emergent Reinforcement Learning Behaviors through Novel Testing Conditions. In *Proceedings of the Society of Photo-Optical Instrumentation Engineers (SPIE): Defense + Commercial Sensing*. [\[LINK\]](#)
- 2021 Sharma, P. K., **E. G. Zaroukian**, R. Fernandez, A. Basak, and D. E. Asher. Survey of Recent Multi-Agent Reinforcement Learning Algorithms Utilizing Centralized training. In *Proceedings of the Society of Photo-Optical Instrumentation Engineers (SPIE): Defense + Commercial Sensing*. [\[LINK\]](#)

- 2021 Fernandez, R., A. Basak, B. Howell, C. Hsu, **E. Zaroukian**, J. Perret, J. Humann, M. Dorothy, P. K. Sharma, S. Nivision, Z. Bell, and D. Asher. Multi-agent Collaboration in an Adversarial Turret Reconnaissance Task. In *Intelligent Human Systems Integration 2021, Advances in Intelligent Systems and Computing*, vol 1322. Springer, Cham, Ed. Russo D., Ahram T., Karwowski W., Di Bucchianico G., Taiar R. [\[LINK\]](#)
- 2020 Bakdash, J. Z., L. R. Marusich, J. B. Kenworthy, E. Twedt, and **E. G. Zaroukian**. Statistical Significance Filtering Overestimates Effects and Impedes Falsification: A Critique of Endsley (2019). *Frontiers in Psychology*. 11:609647. [\[LINK\]](#)
- 2020 Osgood, J. M., S. E. Kase, **E. G. Zaroukian**, and P. J. Quartana. Online intervention reduces hostile attribution bias, anger, aggressive driving, and cyber-aggression: results of two randomized trials. *Journal of Cognitive Therapy and Research*. [\[LINK\]](#)
- 2020 Rodriguez, S. S., J Chen, H. Deep, J. Lee, D. E. Asher, **E. Zaroukian**. Measuring Complacency in Humans Interacting with Autonomous Agents in a Multi-Agent System. In *Proceedings of the Society of Photo-Optical Instrumentation Engineers (SPIE): Defense + Commercial Sensing*. [\[LINK\]](#)
- 2020 Asher, D. E., **E. Zaroukian**, B. Perelman, J. Perret, R. Fernandez, B. Hoffman, and S. S. Rodriguez. Multi-Agent Collaboration with Ergodic Spatial Distributions. In *Proceedings of the Society of Photo-Optical Instrumentation Engineers (SPIE): Defense + Commercial Sensing*. [\[LINK\]](#)
- 2019 Asher, D., M. Garber-Barron, S. Rodriguez, **E. Zaroukian**, and N. Waytowich. Multi-Agent Coordination Profiles through State Space Perturbations. In *Proceedings of the International Conference on Computational Science and Computational Intelligence*, 249-252. [\[LINK\]](#)
- 2019 **Zaroukian, E.** Automated information extraction to facilitate comprehension across text difficulty levels. In *Proceedings of the International Command and Control Research and Technology Symposium*. [\[PDF\]](#)
- 2019 **Zaroukian, E.**, J. Caylor, M. Vanni, and S. Kase. Human Interaction with the Output of Information Extraction Systems. In *Proceedings of Advances in Artificial Intelligence, Software and Systems Engineering. Applied Human Factors and Engineering. Advances in Intelligent Systems and Computing*, vol 965. Springer, Cham, Ed. T. Ahram, 456-466. [\[PDF\]](#) [\[LINK\]](#)
- 2019 **Zaroukian, E.**, J. Caylor, M. Vanni, and S. Kase. Evaluating Improvement in Situation Awareness and Decision-Making Through Automation. In *Proceedings of the IEEE Conference on Cognitive and Computational Aspects of Situation Management (CogSIMA)*. [\[PDF\]](#) [\[LINK\]](#)

- 2019 **Zaroukian, E.**, S. S. Rodriguez, S. L. Barton, J. A. Schaffer, B. Perelman, N. R. Waytowich, B. Hoffman, and D. E. Asher. Algorithmically identifying strategies in multi-agent game-theoretic environments. In *Proceedings of the Society of Photo-Optical Instrumentation Engineers (SPIE): Defense + Commercial Sensing*. [\[LINK\]](#) [\[LINK\]](#)
- 2019 Asher, D. E., S. L. Barton, **E. Zaroukian**, and N. R. Waytowich. Effect of cooperative team size on adversarial coordination with adaptive multi-agent systems. In *Proceedings of the Society of Photo-Optical Instrumentation Engineers (SPIE): Defense + Commercial Sensing*. [\[LINK\]](#)
- 2019 Caylor, J., D. E. Asher, S. L. Barton, and **E. Zaroukian**. Classification of military occupation specialty codes for agent learning in human-agent teams. In *Proceedings of the Society of Photo-Optical Instrumentation Engineers (SPIE): Defense + Commercial Sensing*. [\[LINK\]](#)
- 2019 Barton, S., **E. Zaroukian**, D. Asher, and N. Waytowich. Evaluating the Coordination of Agents in Multi-Agent Reinforcement Learning. In *Proceedings of the International Conference on Intelligent Human Systems Integration (IHSI)*, Ed. W. Karwowski, T. Ahram, 765-770. [\[LINK\]](#)
- 2019 Barton, S., N. Waytowich, **E. Zaroukian**, and D. Asher. Measuring collaborative emergent behavior in multi-agent reinforcement learning. In *Proceedings of the International Conference on Human Systems Engineering and Design (IHSED): Future Trends and Applications*, Ed. W. Karwowski, T. Ahram, 422-427. [\[LINK\]](#) [\[LINK\]](#)
- 2018 Bakdash, J. Z., S. Hutchinson, **E. G. Zaroukian**, L. R. Marusich, S. Thirumuruganathan, C. Sample, B. Hoffman, G. Das. Malware in the future? Forecasting of analyst detection of cyber events. In *Journal of Cybersecurity, Volume 4, Issue 1*. [\[LINK\]](#)
- 2018 **Zaroukian, E.** Information extraction for optimized human understanding and decision making. In *Proceedings of the 23rd International Command and Control Research and Technology Symposium (ICCRTS)**. [\[PDF\]](#)
- 2018 Asher, D. E., **E. Zaroukian**, S. L. Barton. Adapting the Predator-Prey Game Theoretic Environment to Army Tactical Edge Scenarios with Computational Multiagent Systems. In *Proceedings of the 23rd International Command and Control Research and Technology Symposium (ICCRTS)**. [\[PDF\]](#)
- 2018 **Zaroukian, E.**, and J. Bakdash. Human understanding of information represented in natural versus artificial language. In *IEEE International Inter-Disciplinary Conference on Cognitive Methods in Situation Awareness and Decision Support (CogSIMA)*. IEEE.* [\[PDF\]](#) [\[LINK\]](#)

- 2018 Bakdash, J., C. Sample, M. Rankin, M. Kantarcioglu, J. Holmes, S. Kase, **E. Zaroukian**, and B. Szymanski. The Future of Deception: Machine-Generated and Manipulated Images, Video, and Audio?. In *2018 International Workshop on Social Sensing (SocialSens)*, 2-2. [\[LINK\]](#)
- 2017 Preece, A., W. Webberley, D. Braines, **E. Zaroukian**, and J. Bakdash. SHERLOCK: Experimental Evaluation of a Conversational Agent for Mobile Information Tasks. In *IEEE Transactions on Human-Machine Systems*, 1-12.* [\[LINK\]](#)
- 2017 Preece, A., I. Taylor, A. Dawson, D. Braines, N. O’Leary, A. Thomas, R. Tomsett, T. La Porta, J. Z. Bakdash, and **E. Zaroukian**. Coalitions of things: supporting ISR tasks via internet of things approaches. In *Proceedings of SPIE 10190, Ground/Air Multisensor Interoperability, Integration, and Networking for Persistent ISR VIII*, Ed. T. Pham and M. A. Kolodny, 101900A–101900A-9. [\[LINK\]](#)
- 2017 **Zaroukian, E.**, J. Bakdash, A. Preece, and W. Webberley. Automation Bias with a Conversational Interface. In *IEEE International Inter-Disciplinary Conference on Cognitive Methods in Situation Awareness and Decision Support (CogSIMA)*. IEEE.* [\[PDF\]](#)
- 2016 Preece, A., W. Webberley, D. Braines, **E. Zaroukian**, and J. Bakdash. Human Computer Collaboration at the Edge: Enhancing Collective Situation Understanding with Controlled Natural Language. In *Proceedings of the 21st International Command and Control Research and Technology Symposium (ICCRTS)*.* [\[PDF\]](#)
 – Awarded best paper in the track *Socio-technical Networks in Connected Battlespace*
- 2016 **Zaroukian, E.** Human Understanding of Controlled Natural Language in Simulated Tactical Environments. In *IEEE International Inter-Disciplinary Conference on Cognitive Methods in Situation Awareness and Decision Support (CogSIMA)*, 126-130. IEEE.* [\[PDF\]](#)
- 2016 Legendre, G., M. Putnam, H. de Swart, and **E. Zaroukian** (Eds). Optimality-theoretic syntax, semantics & pragmatics: From uni- to bi-directional optimization. Vol. 61. Oxford University Press. [\[LINK\]](#)
- 2015 Mott, D. and **E. Zaroukian** Studies in the Human Use of Controlled English. In *Annual Fall Meeting of the International Technology Alliance*. [\[PDF\]](#)
- 2015 Preece, A., W. Webberley, D. Braines, N. Hu, T. La Porta, **E. Zaroukian**, and J. Z. Bakdash. SHERLOCK: Simple Human Experiments Regarding Locally Observed Collective Knowledge. In *Annual Fall Meeting of the International Technology Alliance*. [\[PDF\]](#)

- 2014 **Zaroukian, E.** (*Just*) *about*: an analysis. In *Proceedings of the 43rd annual meeting of the North East Linguistic Society Volume Two*, Ed. H-L Huang, E. Poole, A. Rysling, 273-285. [\[PDF\]](#)
- 2014 Legendre, G., J. Culbertson, **E. Zaroukian**, L. Hsin, I. Barrière, and T. Nazzi. Is children's comprehension of subject-verb agreement universally late? Comparative evidence from French, English, and Spanish. In *Lingua (Special Issue), How children learn to detect and interpret agreement morphology: A cross-linguistic perspective*, Ed. A. Pérez-Leroux, 21-39.* [\[PDF\]](#)
- 2014 **Zaroukian, E.** and C. Beller. Licensing by modification in two classes of verbs. In *Proceedings of the 48th Annual Meeting of the Chicago Linguistic Society*, 619-633. [\[PDF\]](#)
- 2013 **Zaroukian, E.** and C. Beller. Not all *have*-clauses are alike. In *Proceedings of Sinn und Bedeutung 17 (online)*, ed. E. Chemla, V. Homer, and G. Winterstein, 635-652. Paris: ENS Paris. [\[PDF\]](#)
- 2012 **Zaroukian, E.** and C. Beller. Evaluating singular indefinites. In *Proceedings of the 40th Western Conference on Linguistics*, Ed. C. Galeano, Görgülü, E., Presnyakova, I., 127-138. California State University at Fresno. [\[PDF\]](#)
- 2012 **Zaroukian, E.** Gradable predicates and the distribution of approximators. In *Proceedings of the 40th Western Conference on Linguistics*, Ed. C. Galeano, Görgülü, E., Presnyakova, I., 115-126. California State University at Fresno. [\[PDF\]](#)
- 2012 Beller, C. and **E. Zaroukian**. Stage-level evaluativity is desiderativity. In *Proceedings of Sinn und Bedeutung 16*, ed. A. Aguilar-Guevara, A. Chernilovskaya, and R. Nouwen, 71-84. Cambridge, MA: MIT Working Papers in Linguistics. [\[PDF\]](#)
- 2012 **Zaroukian, E.** Approximative Inversion Revisited. In *Proceedings of the 19th annual workshop on Formal Approaches to Slavic Linguistics*, ed. J. F. Bailyn, E. Dunbar, Y. Kronrod, and C. LaTerza, 146-160. Ann Arbor, MI: Michigan Slavic Publications.* [\[PDF\]](#)
- 2012 **Zaroukian, E.** Homophony and Russian copular constructions. In *Proceedings of the 8.5th European Conference on Formal Description of Slavic Languages*, ed. M. Ziková and M. Dočekal, 255-268. Frankfurt: Peter Lang.* [\[PDF\]](#)
- 2011 **Zaroukian, E.** Divergent approximators. In *Proceedings of Sinn und Bedeutung 15*, ed. I. Reich, E. Horsch, and D. Pauly, 677-690. Saarbrücken, Germany: Universaar – Saarland University Press. [\[PDF\]](#)

- 2007 Legendre, G., T. Nazzi, I. Barriere, J. Culbertson, M. Lopez-Gonzalez, L. Goyet and **E. Zaroukian**. Acquiring subject-verb agreement in French: Evidence of early syntactic representations from comprehension. In *Proceedings of the 31st Annual Boston University Conference on Language Development*, ed. H. Caunt-Nulton, S. Kulatilake, and I. Woo, 370-381. Somerville, MA: Cascadilla Press. [\[PDF\]](#)

Manuscripts

- 2023 Shek, C., X. Wu, W. A. Suttle, C. Busart, **E. Zaroukian**, D. Manocha, P. Tokekar, and A. S. Bedi. LANCAR: Leveraging Language for Context-Aware Robot Locomotion in Unstructured Environments. [\[LINK\]](#)
- 2014 Bakdash, J., S. Hutchinson, **E. Zaroukian**, L. Marusich, S. Thirumuganathan, C. Sample, B. Hoffman, G. Das. Malware in the Future? Forecasting Analyst Detection of Cyber Events. [\[LINK\]](#)
- 2014 **Zaroukian, E.** Uncertainty, prosody, and their interaction: a case of modal concord?. [\[PDF\]](#)

Teaching

Instructor, Johns Hopkins University

- Summer 2013 **Semantics I**, *Cognitive Science Department*
Co-instructor: Mike Oliver
- Summer 2013 **Listening & Speaking**, *Center for Language Education*
- Spring 2013, **Accent Reduction**, *Center for Language Education*
- Summer 2013
- Intersession 2011, **Inventing Language**, *Cognitive Science Department*
2012, 2013

Teaching Assistant, École Normale Supérieure

- Spring 2014 **Formal Semantics**, *Institut d'Étude de la Cognition*
Instructors: Emmanuel Chemla and Vincent Homer

Teaching Assistant, Johns Hopkins University

- Fall 2012 **Semantics I**, *Cognitive Science Department*
Instructor: Kyle Rawlins
- Spring 2011 **Cognitive Neuroscience**, *Cognitive Science Department/Neuroscience*
Instructor: Brenda Rapp
- Spring 2011 **World of Language**, *Cognitive Science Department*
Instructor: Geraldine Legendre

- Fall 2010 **Intro to Cognitive Development**, *Cognitive Science Department*
Instructor: Barbara Landau
- Spring 2010 **Language and Advertising**, *Cognitive Science Department*
Instructor: Kyle Rawlins
- Fall 2009 **Syntax I**, *Cognitive Science Department*
Instructor: Geraldine Legendre
- Spring 2009 **Language & Mind**, *Cognitive Science Department*
Instructor: Joan Chen-Main
- Fall 2008 **Formal Methods in Cognitive Science: Language**, *Cognitive Science Department*
Instructor: Kyle Rawlins
- Spring 2008 **Phonology I**, *Cognitive Science Department*
Instructor: Colin Wilson

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