Bradly Alicea

Email:

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Website:

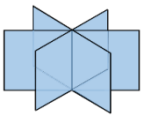
http://bradly-alicea.weebly.com

2023-present Instructor, University of Illinois Urbana-Champaign iSchool.

2014-present Senior Contributor and Community Development, OpenWorm Foundation (http://www.openworm.org).

Description. Major contributor to an open-source organization committed to building the first virtual organism. Duties include project leader of **DevoWorm** (computational developmental biology of the nematode *C. elegans*), member of the Community committee, and leader of several educational initiatives.

2014-present Head Scientist and Founder, Orthogonal Research and Education Laboratory.



Description. An independent research organization focused on basic research, statistical analysis, and computational modeling. Directing the organizational research and education agenda. Current projects include the Saturday Morning NeuroSim series, **Reconstructing Cybernetics**, and **Representational Brains and Phenotypes** (development and learning in computational agents).

2020-2022 Open-source Community Manager, Rokwire Initiative (https://rokwire.org/).

Description. Manager of open-source community for a campus mobile application. Duties include creating documentation, instruction in version-control techniques, technical demos, building open-source computational resources supervising contributor/student intern activities, and moderating video calls/discussion channels.

January-May 2019 Open Leader (OL7), Mozilla Foundation. (https://foundation.mozilla.org/en/opportunity/mozilla-open-leaders/).

Description. Participant in the Open Leaders Program (OL7), where I learned to manage virtual distributed projects in an open fashion. Project: OpenWorm/DevoWorm Curriculum: https://tinyurl.com/y2w2bkv7

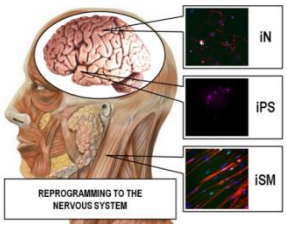
2018-present Ambassador, eLife Early Career Advisory program. (https://elifesciences.org/inside-elife/912b0679/early-career-advisory-group-elife-welcomes-150-ambassadors-of-good-practice-in-science).

Description. Collaborative research and efforts in promoting and Open Science, Meta-science, and Reproducibility. Initiatives: Reproducibility for Everybody (http://tiny.cc/g4hu4y) and Data Reuse (https://data-reuse.weebly.com/).

2014-2016 Postdoctoral Work, Schroeder Lab, University of Illinois Urbana-Champaign.

Description. Research in the areas of Evolution, Developmental Biology, and Neurobiology using the nematode *C. elegans*.

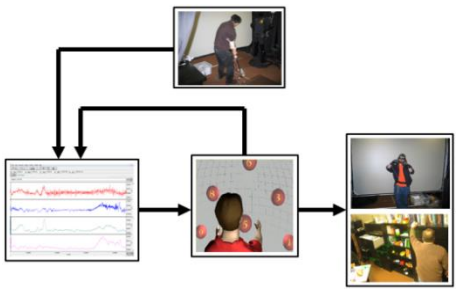
2009-2014 PhD and Postdoctoral work in Cell/Molecular and Quantitative Biology. Michigan State University, East Lansing, MI. Thesis title: **Reprogramming to the nervous system: a computational and candidate gene approach.** ProQuest/MMI.



Description. Research involving the fundamental properties, cellular mechanisms, and applications of cellular plasticity and artificially-induced neuronal cells (neurons and muscle).

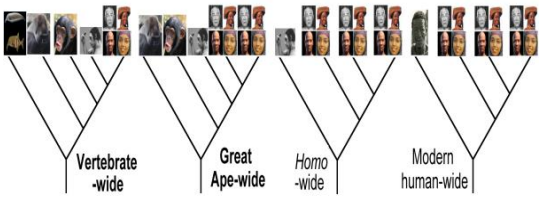
2011-2013 Technology commercialization analyst, MSU Technologies, East Lansing, MI. Assessment of technological innovations in terms of marketability and start-up potential. Areas of expertise: computational biology, nanotechnology, robotics.

2003-2009 PhD specialization in Cognitive Science (Computing and Cognitive Neuroscience). Media Interface and Network Design (MIND) Lab, Michigan State University, East Lansing, MI. Thesis topic: **Augmented Cognition, Neuromechanics, and Adaptive Variation in Virtual Environments.**



Description: Application of kinematic, behavioral, and electrophysiological measurements to a host of problems at the intersection of virtual environments and human performance.

1999-2002 Masters in Anthropology and Zoology. Mulligan Human Genetics Lab, Department of Anthropology, University of Florida, Gainesville, FL. Thesis title: **Evaluating Intraspecific Variation and Interspecific Diversity: comparing humans, non-human Primates, and fish species.** arXiv Repository, arXiv:0807.3350v1 [q-bio.PE, q-bio.QM]



Description: research on comparative taxonomic, demographic, and molecular variance.

1997 Bachelors in Anthropology. Michigan State University, East Lansing, MI.

Review Publications, Book Reviews, and Editorials

Auer, S., Haelterman, N., Weissgerber, T., Erlich, J., Susilaradeya, D., Julkowska, M., Gazda, M., Abitua, A., Niraulu, A., Shah, A., Clyburne-Sherin, A., Guiquel, B., Alicea, B., LaManna, C., Ganguly, D., Perkins, E.J., Jambor, H., Li, I., Tsang, J., Kamens, J., Teytelman, L., Paul, M., Phuyal, S., Schmelling, N., Crisp, P., Sarabipour S., Roy, S., Bachle, S., Tran, T., Ford, T., Steeves, V., Ilangovan, V., Schwessinger, B., and Jadavji, N. Reproducibility for everyone: a community-led initiative with global reach in reproducible research training. *eLife*, 10, e64719 (2021).

't Hart, B.M. **et.al** (156 co-authors). Neuromatch Academy: a 3-week, online summer school in computational neuroscience. *Journal of Open Source Education*, 4(44), 118 (2021).

Igamberdiev, A.U., Gordon, R., **Alicea, B.**, Cherdantsev, V.G. Editorial. Special Issue: Computational, Theoretical, and Experimental Approaches to Morphogenesis. *BioSystems*, 173, 1-3 (2018).

Sarma, G.P., Lee, C-W., Portegys, T., Ghayoomie, V., Jacobs, T., **Alicea, B.**, Cantarelli, M., Currie, M., Gerkin, R.C., Gingell, S., Gleeson, P., Gordon, R., Hasani, R.M., Idili, G., Khayrulin, S., Lung, D., Palyanov, A., Watts, M., Larson, S.D. OpenWorm: overview and recent advances in integrative biological simulation of *Caenorhabditis elegans*. *Philosophical Transactions of the Royal Society B*, 373, 20170382 (2018).

Alicea, B. An Integrative Introduction to Human Augmentation Science. *arXiv*, 1804.10521 (2018).

Alicea, B. The Long Road to Theoretical Synthesis: Review of "Embryogenesis Explained". *International Journal of Developmental Biology*, 61(1-3) (2017).

Bohil, C., **Alicea, B.**, and Biocca, F. Virtual Reality in Neuroscience Research and Therapy**.** *Nature Reviews Neuroscience*, 12, 752-762 (2011).

Empirical Papers

Grover, A., Yadav, V., and **Alicea, B.** (2023). Flipping the Switch on Local Exploration: Genetic Algorithms with Reversals. *Lecture Notes in Networks and Systems*, 608, 719–734.

Kulkarni, H. and **Alicea, B.** Sentiment Progression based Searching and Indexing of Literary Textual Artefacts. *Lecture Notes in Computer Science*, 18201, 264-271 (2021).

Jambor, H., Antonietti, A., **Alicea, B.**, Audisio, T.L., Auer, S., Bhardwaj, V., Burgess, S.J., Ferling, I., Gazda, M.A., Hoeppner, L.H., Ilangovan, V., Lo, H., Olson, M., Mohamed, S.Y., Sarabipour, S., Varma, A., Walavalkar, K., Wissink, E., and Weissgerber, T.L. Creating Clear and Informative Image-based Figures for Scientific Publications. *PLoS Biology*, 19(3), e3001161 (2021).

Alicea, B., Parent, J., and Singh, U. Periodicity in the Embryo: emergence of order in space, diffusion of order in time. *Biosystems*, 104405 (2021).

Alicea, B., Gordon, R., and Portegys, T.E. Data-theoretical Synthesis of the Early Developmental Process. *Neuroinformatics,* 20, 7-23. (SI: NeuroCommons). (2021).

Alicea, B. Raising the Connectome: the emergence of neuronal activity and behavior in *Caenorhabditis elegans*. *Frontiers in Cellular Neuroscience,* 14, 524791. (2020).

Alicea, B., Portegys, T.E., Gordon, D., and Gordon, R. Morphogenetic processes as data: Quantitative structure in the *Drosophila* eye imaginal disc.. *BioSystems*, 173, 256-265 (2018).

Alicea, B., and Gordon, R. Cell Differentiation Processes as Spatial Networks: identifying four-dimensional structure in embryogenesis. *BioSystems*, 173, 235-246 (2018).

Weber, R., **Alicea, B.**, Huskey, R., and Mathiak, K. Network Dynamics of Attention During a Naturalistic Behavioral Paradigm. *Frontiers in Human Neuroscience*, doi:10.3389/fnhum.2018.00182 (2018).

Alicea, B. The Emergent Connectome in *Caenorhabditis elegans* Embryogenesis. *BioSystems*, 173, 247-255 (2017).

Alicea, B. and Gordon, R. Quantifying mosaic development: towards an Evo-Devo Postmodern Synthesis via differentiation trees of embryos [invited]. *Biology*, 5(3), 33. (2016).

Alicea, B. Genotype-specific developmental plasticity shapes the timing and robustness of reproductive capacity in *Caenorhabditis elegans. bioRxiv,* doi:10.1101/045609 (2016).

Alicea, B. Evolution in Eggs and Phases: experimental selection on fecundity and reproductive timing in *Caenorhabditis elegans. Royal Society Open Science*, 3, 160496. doi:10.1098/rsos.160496 (2016).

Alicea, B., McGrew, S., Gordon, R., Larson, S., Warrington, T., and Watts, M. DevoWorm: differentiation waves and computation in *C. elegans* embryogenesis. *bioRxiv,* doi:10.1101/009993 (2014).

Alicea, B. Modeling Cellular Information Processing Using a Dynamical Approximation of Cellular mRNA. *bioRxiv,* doi:10.1101/006775 (2014).

Alicea, B. with input from S.T. Suhr and J.B. Cibelli Using Polysome Isolation with Mechanism Alteration to Uncover Transcriptional and Translational Dynamics in Key Genes. *bioRxiv,* doi:10.1101/006213 (2014).

Alicea, B. Cellular decision-making bias: the missing ingredient in cell functional diversity. *arXiv,* 1310:8268 [q-bio.QM] (2013).

Alicea, B., Murthy, S., Keaton, S.A., Cobbett, P., Cibelli, J.B., and Suhr, S.T. Defining phenotypic respecification diversity using multiple cell lines and reprogramming regimens. *Stem Cells and Development*, 22(19), 2641-2654 (2013).

Alicea, B. Collective properties of cellular identity: a computational approach. *arXiv,* 1302:0826. [q-bio.GN, q-bio.QM] (2013).

Alicea, B. Naturally Supervised Learning in Motion and Touch-driven Technologies. *arXiv,* 1106:1105. [cs.HC, q-bio.NC] (2011).

Alicea, B. Stochastic Resonance (SR) can drive adaptive physiological processes. *Nature Precedings*, npre.2009.3301.1 [http://precedings.nature.com/documents/3301/version/1] (2009).

Alicea, B. Range-based techniques for discovering optimality and analyzing scaling relationships in neuromechanical systems. *Nature Precedings*, npre.2009.2845.2 [http://precedings.nature.com/documents/2845/version/2] (2009).

Alicea, B. Performance Augmentation in Hybrid Systems: techniques and experiment. *arXiv*, 0810.4629 [q-bio.NC, q-bio.QM] (2008).

Carvallo-Pinto, M.A., **Alicea, B.**, and Rodrigues, J.L.M. Towards a "core" genome: pairwise similarity searches on interspecific genomic data. *arXiv,* 0807.3353 [q-bio.GN, q-bio.PE] (2008).

Biocca, F., **Alicea, B.**, Bohil, C., Owen, C.B., and Xiao, F. Targeting and motor learning in augmented reality: Optimal spatial positions for remembering. *Proceedings of the International Communication Association* (2006). PsyArXiv, doi:10.31234/osf.io/7z9q6.

Yang, M-J., **Alicea, B.**, Clark, C., and Larose, R. Does E-Trust Matter? A Social Cognitive Theory of Online Shopping Behavior. *Proceedings of the International Communication Association* (2005).

Theoretical Papers

Alicea, B., Pang, A., and Parent, J. Intelligence Offloading and the Neurosimulation of Developmental Agents. *International Workshop on Embodied Intelligence, IOP Conference Series: Materials Science and Engineering*, 1292, 012019.

Alicea, B., Gordon, R., and Parent, J. Embodied cognitive morphogenesis as a route to intelligent systems. *Royal Society Interface Focus*, 13(3), 20220067 (2023).

Alicea, B. and Parent, J. Layers, Folds, and Semi-Neuronal Information Processing. *Procedia Computer Science*, 213, 443-452 (2022).

Alicea, B. and Parent, J. Meta-brain Models: biologically-inspired cognitive agents. *International Workshop on Embodied Intelligence, IOP Conference Series: Materials Science and Engineering*, 1261, 012019 (2022).

Dvoretskii, S., Gong, Z., Gupta, A., Parent, J., and **Alicea, B.** Braitenberg Vehicles as Developmental Neurosimulation. *Artificial Life*, 28(3), 369-395 (2022).

Alicea, B., Cialfi, D., Lim, A., and Parent, J. Gibsonian Information: a new approach to quantitative information. In "Biologically Inspired Cognitive Architectures". *Studies in Computational Intelligence*, 1032. Straive Publishing, Singapore (2022).

Alicea, B., Yuan, C. Complex Temporal Biology: towards a unified multi-scale approach to predict the flow of information. *Integrative and Comparative Biology*, doi:10.1093/icb/icab163 (2021).

Alicea, B., Cialfi, D., Lim, A., Parent, J. Allostasis Machines: a model for understanding internal states and technological environments. Emergent Interaction Workshop, SIGCHI (2021).

Alicea, B. Developmental Incongruity as a Dynamical Representation of Heterochrony. *bioRxiv*, doi:10.1101/2020.07.31.231456 (2020).

Stone, R., Portegys, T., Mikhailovsky, G., and **Alicea, B.** Origins of the Embryo: self-organization through cybernetic regulation. *BioSystems*, 173, 73-82 (2018).

Alicea, B. Data Reuse as a Prisoner's Dilemma: the social capital of open science. *bioRxiv*, doi:10.1101/093518 (2016).

Stone, R. and **Alicea, B.** The Foundations of Control and Cognition: The Every Good Regulator Theorem. *Figshare*, 10.6084/m9.figshare.1559095.v2 (2015).

Alicea, B. Animal-oriented Virtual Environments: illusion, dilation, and discovery. *F1000 Research*, 3:202. doi: 10.12688/f1000research.3557.1 (2015).

Alicea, B. and Gordon, R. Toy Models for Macroevolutionary Patterns and Trends. *BioSystems,* 122, 25-37 (2014).

Alicea, B. Contextual and Structural Representations of Market-mediated Economic Value. *arXiv,* 1403.7021 [q-fin.GN] (2014).

Alicea, B. The Emergence of Animal Social Complexity: theoretical and biobehavioral evidence. *arXiv,* 1309.7990 [q-bio.PE, q-bio.NC] (2013).

Alicea, B. Contextual Geometric Structures: modeling the fundamental components of cultural behavior. *Proceedings of Artificial Life*, 13, 147-154 (2012).

Alicea, B. Relativistic Virtual Worlds: an emerging framework. *arXiv,* 1104:4586 [cs.HC, cs.CG, q-bio.NC] (2011).

Alicea, B. The 'Machinery' of Biocomplexity: understanding non-optimal architectures in biological systems. *arXiv,* 1104.3559 [nlin.AO, q-bio.QM, q-bio.PE] (2011).

Alicea, B. Lagrangian Coherent Structures (LCS) may describe evolvable frontiers in natural populations. *arXiv,* 1101.6071 [nlin.AO, physics.bio-ph, q-bio.PE] (2011).

Alicea, B. Natural Variation and Neuromechanical Systems. ASME International Mechanical Congress and Exposition (IMECE 2009). Lake Buena Vista, FL., Published in *Cogprints*, http://cogprints.org/6698/ (2009).

Alicea, B. The adaptability of physiological systems optimizes performance: new directions in augmentation. *arXiv,* 0810.4884 [cs.HC, cs.NE] (2008).

Alicea, B. Hierarchies of Biocomplexity: modeling life's energetic complexity. *arXiv,* 0810.4547 [q-bio.PE, q-bio.OT] (2008).

Alicea, B. Towards a theory of human intraspecific variation for ergonomics and human modeling. *Society for Automotive Engineering (SAE) Digital Human Modeling*, #2007-01-2461 (2007).

Alicea, B. Real-time representations of whole brain dynamics: towards a computational model for hybrid systems and human performance. *Understanding Complex Systems Symposium* (2007).

Alicea, B. Broad-Spectrum Mitigation and the Cognitive Neurobiological Interface: considering biological rhythms in Augmented Cognition. *Proceedings of the Human Factors and Ergonomics Society,* 50(16), 1629-1633 (2006).

Alicea, B. Filling up the tree: considering the self-organization of avian roosting behavior. *Understanding Complex Systems Symposium* (2006). Also *bioRxiv*, doi:10.1101/000349.

Biocca, F. and **Alicea, B.** Is nanotechnology a communication technology? *Proceedings of the International Communication Association* (2004).

Book Chapters

Alicea, B., Gordon, R., and Parent, J. The Psychophysical World of the Motile Diatom *Bacillaria paradoxa*. *Mathematics and Biology of Diatoms* (Chapter 9), J. Pappas ed. Scrivener, New York (2023).

Alicea, B., Gordon, R., Harbich, T., Singh, U., Singh, A., and Varma, V. Towards a Digital Diatom: image processing and deep learning analysis of *Bacillaria paradoxa* dynamic morphology. *Diatom Gliding Motility* (Chapter 10), S.A. Cohn, K.M. Manoylov, and R. Gordon, eds. Scrivener Publishing, New York (2021).

Alicea, B. Virtual Reality for Communication Neuroscience. *Handbook of Communication Neuroscience* (Chapter 32), K. Floyd and R. Weber eds. Routledge Press (2020).

Portegys, T., Pascualy, G., Gordon, R., McGrew, S., and **Alicea, B.** Morphozoic: cellular automata with nested neighborhoods as a novel representation for morphogenesis. *Multi-Agent Based Simulations Applied to Biological and Environmental Systems*, D.F. Adamatti, ed. IGI Global, Philadelphia (2016).

Alicea, B. and Cibelli, J.B. Comparing indirect-derived ES cells and directly-derived iPS cells. In "*Principles of Cloning*". Elsevier, Amsterdam (2013).

Bohil, C., Owen, C.B., Jeong, E.J., **Alicea, B.**, and Biocca, F. Virtual Reality and Presence. In "21rst Century Communication: a reference book". Sage Publications, Washington, D.C (2009).

Workshops and Conferences (Organizer or Co-organizer)

"Rokwire Lecture Series". Siebel Center for Design and Virtual. University of Illinois Urbana-Champaign, October-November 2021.

(with A. Lim, J. Parent, and A. Sharma). "Trajectories in Cognitive Science". Discussion Group at CogSci 2021.

(with M. Fumasoni, I. Puebla, Y. Ravichandran, and S. Stryeck). "The past, the present and the future of preprints". ASAPBio, October 19, 2020. Website: http://asapbio.org/preprints-past-present-future

(with T. Weissgerber, A. Abitua, and A. Clyburne-Sherin). "Reproducibility for Everybody". eLife Ambassadors virtual workshop, May 3, 2019. https://zoom.us/recording/play/-hwrcoOnIARmT9D-1TEVG0HPTRdozRcUahHGKLLsi-53PjAU6BWBcbw4Ie4DvULj

(with S. Larson, B. Shih, and C-W. Lee) OpenWorm Open House. Cyberspace, October, 2016. Website: https://www.youtube.com/watch?v=ROoZHLemRAs&list=PL8ACJC0fGE7Ax7Yjj-PIYimZMYToVE6D4

(with I. Berteletti, R. Andresen-Eguiluz, M. Shakiba, and B. Mosby) 6th Annual Society for Postdoctoral Scholars (SOPS) Postdoctoral Research Symposium. Beckman Institute, Urbana, IL. Website: http://sops.beckman.illinois.edu/symposia/

(with L. Grabowski) Hard-to-Define-Events (HTDE) 2012. Held in conjunction with Artificial Life 13, East Lansing, MI. Website: http://syntheticdaisies.blogspot.com/p/htde-workshop-2012.html

Figures, Infographics, and Code Releases

2019 History of Open Science. Infographic for OAWeek, 2019. Figshare, doi:10.6084/m9.figshare.9975713.

2019 Dvoretskii, S. and **Alicea, B.** Modeling Neural Development with Braitenberg Vehicles. INCF Neuroinformatics Conference, University of Warsaw, Poland.

2018 **Alicea, B.**, Gordon, R., and Banerjee, A. Embryo networks and connectomes in *Caenorhabditis elegans*. *Open Science Framework*, doi:10.17605/ OSF.IO/Q9JVB.

2017 Jupyter Notebooks from the DevoWorm Project. Github Release, Figshare, doi:10.6084/m9.figshare.4667848.

2016 **Alicea, B.** and Gordon, R. *Ciona intestinalis* Embryonic Differentiation Tree (1- to 112-cell stage). doi: 10.6084/m9.figshare.2117152, *Caenorhabditis elegans* Embryonic Differentiation Tree (10 division events). doi:10.6084/m9. figshare.2118049.

2016 **Alicea, B.** Data from: Evolution in eggs and phases: experimental evolution of fecundity and reproductive timing in *Caenorhabditis elegans*. *Dryad Digital Repository,* doi:10.5061/dryad.c96md.

2016 **Alicea, B.** and Cibelli, J. Secondary data and results of analyses for "Comparing indirect-derived ES cells and directly-derived iPS cells". *Figshare*, doi:10.6084/m9.figshare.3972483.v2

2016 **Alicea, B.** Data from: "Collective properties of cellular identity: a computational approach". *Figshare*, doi:10.6084/m9.figshare.4082400.v1

2016 **Alicea, B.** Reproductive Capacity, Developmental Plasticity, and Evolution in *C. elegans*. Figshare, doi:10.6084/m9.figshare.3122113.v3

2016 **Alicea, B.** and Gordon, R. *Ciona intestinalis* Embryonic Differentiation Tree (1- to 112-cell stage). doi: 10.6084/m9.figshare.2117152, *Caenorhabditis elegans* Embryonic Differentiation Tree (10 division events). *Figshare*, doi:10.6084/m9. figshare.2118049.

2015 **Alicea, B.** Data from: "Mechanism Alteration Reveals Patterns of Cellular Information Processing". *Figshare*, doi:10.6084/m9.figshare.689894.v3.

2015 **Alicea, B.**, Suhr, S.T., and Keaton, S. Data from: Fibroblast Reprogramming Diversity. *Figshare*, doi:10.6084/m9.figshare.1320528.v1

2015 **Alicea, B.** Physical Intelligence Experiments. *Figshare*, doi:10.6084/m9.figshare.1320529.v1

Invited Lectures and Presentations

2022 **Reconfigure From All Over: the case of interdisciplinary open-source communities.** FOSDEM, Virtual Lightning talk.

2021 **Generative Divergent Integration as a Theory of the Emergent Connectome.** Advanced Computational Neuroscience Network, Beckman Institute, University of Illinois, Urbana-Champaign, IL.

2020 **Game Theory of Developmental Processes.** Dynamics Days XL Conference, Nice, France and Virtual.

2021 **Open-source Campus.** Fall IT Pro Forum, University of Illinois Urbana-Champaign.

2021 (with J. Parent and A. Risius) **Developmental Model of Intelligence Offloading.** Cognitive Offloading Conference, Virtual.

2021 (with J. Parent) **Meta-brain Models.** IGSS Conference in Agent-based Models, Virtual.

2021 **Growing Open-source Networks.** NetOpen (satellite of Networks conference), Virtual.

2021 **Euler Cycles for Life: developing biological structure using multi-cell networks.** TopoNets (satellite of Networks conference), Virtual.

2021 **Embryo Networks as Generative Divergent Integration.** Networks (NetSci) conference, Virtual.

2021 (with J. Parent). **Charting the Future of Academic Fields with Cultural Evolutionary Trajectories.** Cultural Evolution Society Conference, Sapporo, Japan (virtual).

2021 (with E. Higgs and J. Parent). **Examining Cultural Evolution with Contextual Geometric Structures.** Cultural Evolution Society Conference, Sapporo, Japan (virtual).

2021 **Open Source Communities: why, how, and ethos.** Spring IT Pro Forum, University of Illinois Urbana-Champaign.

2021 (with D. Cialfi, A. Lim, and J. Parent) **Allostasis Machines: a model for understanding internal states and technological environments.** Emergent Interaction workshop, SIGCHI.

2020 **Observer-dependent Models.** Presentation to the *Philosopher's Web Cafe*.

2020 (with R. Chakrabarty, A. Gopi, A. Lim, F. Özçelik, and J. Parent). **Approaching Artificial Intelligence as an Embodied Developmental Process.** Neuromatch 3 Conference (http://neuromatch.io).

2020 (with A. Gopi, R. Gordon, T. Harbich, J. Parent, A. Singh, and U. Singh). **The Psychophysics of Non-neuronal Cognition.** Neuromatch 3 Conference (http://neuromatch.io).

2020 (with K. Katyal). **Contrast Between Biological and Artificial Neural Networks**. Neuromatch 3 Conference (http://neuromatch.io).

2020 (with I. Galvan). **From Vision to System: Prototyping with Ease**. Fall IT Pro Forum, University of Illinois Urbana-Champaign.

2020 (with S. Dvoretskii, S. Felder, Z. Gong, A. Gupta, and J. Parent). **Developmental Embodied Agents as Meta-brain Models.** DevoNN Workshop, Artificial Life 2020, Montreal (virtual: https://www.irit.fr/devonn/2020/07/13/alicea.html)

2020 **Computational Virtuality as a Form of Artificial Intelligence.** Short talk presentation, Neuromatch Conference (http://neuromatch.io).

2020 (with J. Parent). **Epistemological Directories (EDs) for Research Development and Education.** csv,conf v5, Washington, DC (virtual: https://www.crowdcast.io/e/csvconf5-0-session-5).

2020 **Process as Connectivity: towards biology-specific complex networks.** Short Talk presentation, Neuromatch Conference (http://neuromatch.io).

2018 **Process as Connectivity: models of interaction in cellular systems.** Invited Platform Presentation, "Finding your Inner Modeler" (NSF-sponsored workshop), University of Illinois-Chicago.

2018 **Human-Assisted AI: an intelligence augmentation approach.** Champaign-Urbana Data Science Users Group, Research Park, Urbana-Champaign, IL.

2017 (with R. Gordon). **The Network Architecture of Embryo Developmental Regulation.** NetSci Conference, Indianapolis, IN.

2017 (with R. Stone and T. Portegys). **Cybernetic Representations of Suboptimal Regulatory Systems**. NetSciReg (satellite of NetSci), Indianapolis, IN.

2016 **Open Data Science and Theory.** Champaign-Urbana Data Science Users Group, Research Park, Urbana-Champaign, IL.

2016 **DevoWorm: developing the worm (and Ascidian, and graph, and digital embryo).** OpenWorm Journal Club, Google Hangouts. https://www.youtube.com/watch?v=UScuEonzYVs

2015 **The Role of Web 2.0 Tools and Digital Practice in Doing Open-Science**. Webmaster Workshop, University of Illinois Webmasters, Urbana-Champaign, IL.

2015 **DevoWorm: raising the (Open)Worm (with data).** Biocomplexity Institute, Indiana University, Bloomington, IN.

2015 **Contextual Geometric Structures: abstractions of cognition and culture.** Society of Postdoctoral Scholars (SOPS) Conference, Beckman Institute, University of Illinois, Urbana-Champaign, IL.

2014 **DevoWorm: raising the (Open)Worm.** OpenWorm Journal Club, Google Hangouts. http://www.youtube.com/channel/UCF76f-eS1QW8OsnkOQFpp1g

2013 **From Switches to Convolution to Tangled Webs: evolving sub-optimal, subtle biological mechanisms.** Network Frontiers Workshop, Northwestern University, Evanston, IL.

2013 **Adventures in Quasi-Evolution: evolutionary modulus and evolutionary through the looking glass.** BEACON Center, Michigan State University.

2013 **Multiscale Integration and Heuristics of Complex Physiological Phenomena.** Embryo Physics Course, Silver Bog Research, Second Life.

2013 **Discrete Dynamical Modeling of Inducible Cellular Phenotypes**. doi:10.6084/m9.figshare.106824 http://dx.doi.org/10.6084/m9.figshare.106824.

2013 **A New Route to Science Innovation**. doi:10.6084/m9.figshare.106823 http://dx.doi.org/10.6084/m9.figshare.106823.

2012 **Simulating the Dynamic Regulation of a Cell: Relevance to Cell Reprogramming.** 2nd Midwest Conference of Stem Cell Biology and Therapy, Oakland University, Rochester, MI.

2012 **Advancing Dynamic Models of Cellular Processes (and new ways to fund them).** Levin Lab, Institute for Developmental Biology and Regenerative Medicine, Tufts University.

2012 **Scenes From a Graphical, Parallel Biology**. Embryo Physics Course, Silver Bog Research, Second Life.

2012 **Behavioral Engineering and Brain Science in Virtual Reality**. Seminar, Department of Computer Science, Michigan State University.

2011 **Biocomplexity of Inducible Cells**. Embryo Physics Course, Silver Bog Research, Second Life.

2009-2011 Developmental, Stem Cell, and Regenerative Medicine Journal Club presentations, Cellular Reprogramming Laboratory, Michigan State University. Literature reviews and tutorials based on recently published papers and emerging scientific topics. http://www.msu.edu/~aliceabr/research.htm#jclub

2007 **Evolving "Physical" Intelligence: physiology, robotics, and computational biology**. Evolving Intelligence Research Group, DevoLab, Department of Computer Science, Michigan State University.

2007 **Introduction to Hybrid Bionic Systems**. Seminar. Department of Telecommunication, Information Studies, and Media, Michigan State University.

Slideshows and Posters

Alicea, B. Game Theory and Developmental Processes. Dynamics Days, Atlanta, GA and virtual, (2022).

Alicea, B. The Role of Representation in Biological Modeling. Find Your Inner Modeler IV, Chicago, IL and Virtual (2021).

Alicea, B., Cantarelli, M., Ghayoomie, V., Idili, G., Khayrulin, S., Palyanov, A., Watts, M., and Larson, S. The OpenWorm Project: progress update, available resources, and future plans. International *C. elegans* Conference. Virtual. *Poster* (2021).

Alicea, B., Deb, May., Deb, Mai., Katyal, K., and Parent, J. Neurodevelopment and Deep Learning. NetNeuro (satellite of Networks conference), Virtual. *Poster* (2021).

Alicea, B. On Growth, Form, and System Dynamics: Heterochrony as a Complex System. Dynamics Days Digital, Virtual. *Poster* (2020).

Alicea, B. A New Kind of Developmental Biology. Find Your Inner Modeler III, Birmingham, AL (2019).

Alicea, B. Dynamical Representations of Heterochrony and the Developmental Process. Dynamics Days, Evanston, IL (2019).

Alicea, B. and Gordon, R. The Network Architecture of Embryo Developmental Regulation. Midwest Regenerative Medicine Meeting, Allerton Conference Center (Hosted by Washington University-St. Louis), Allerton, IL. *Poster* (2016).

Alicea, B., Androwski, R.A., and Schroeder, N.E. An Experimental Evolution Approach to Understanding *C. elegans* Adaptability. International *C. elegans* Conference. Los Angeles, CA. *Poster* (2015).

Alicea, B., Larson, S., McGrew, S., and Gordon, R. DevoWorm: raising the worm on datapoints, trees, and matrices. International *C. elegans* Conference. Los Angeles, CA. *Poster* (2015).

Alicea, B. Non-uniform Gene Networks. Symposium on Emerging Topics in Control and Modeling: Networked Systems. Coordinated Science Laboratory, University of Illinois, Urbana-Champaign. *Poster* (2012).

Alicea, B. Dynamical Cellular Encodings for Exploring Cellular Reprogramming. Dynamics Days 2012. Baltimore, MD. *Poster* (2012).

Alicea, B. Formal Systems Architectures for Biology. *Nature Precedings*, npre.2011.6369.1 [http://precedings.nature.com/documents/6369/version/1]. *Slideshow* (2011).

Alicea, B. Control in Technological Systems and Physical Intelligence: an emerging theory. Midwest Cognitive Science Conference, Michigan State University, East Lansing, MI. Nature Precedings, npre.2011.5910.1 [http://precedings.nature.com/documents/5910/version/1]. *Slideshow* (2011).

Alicea, B. Nano-enabled Biological Tissues. Nature Precedings, npre.2010.5448.1 [http://precedings.nature.com/documents/5448/version/1]. *Slideshow* (2010).

Alicea, B. Unmatched muscle power: mapping physiological control to virtual world physics. Symposium on Emerging Topics in Control and Modeling: Biomedical Systems. Beckman Institute, University of Illinois Urbana-Champaign. *Poster* (2010).

Alicea, B. Emergent Natural Selection for Engineering Living Systems. Early Career Scientists Symposium (ECSS) 2010: Experimental Evolution, University of Michigan. *Poster* (2010).

Alicea, B. Dynamical approximation of a reprogramming cell culture. Dynamic Days 2010. Evanston, IL. *Poster* (2010).

Alicea, B. Hierarchical Evolutionary Dynamics for Understanding Self-Assembly in Nano-Mechanical Systems. IEEE Fall Conference on Nanotechnology, Nanorobots, Nanobusiness, and Nanoeducation. Ypsilanti, MI. *Poster* (2009).

Alicea, B. Emergent natural selection and the evolution of novel biological surfaces. I2CAM Workshop, Soft Active Materials: from granular rods to flocks, cells, and tissues. Syracuse University. *Slideshow* (2009).

Alicea, B. Fundamental Elements of Muscle-generated Motion: developing a genomic modeling framework. Adaptive Movement and Adaptive Machines (AMAM) 2008, Case Western University, Cleveland, OH. *Poster* (2008).

Alicea, B. Environmental switching: characterizing the adaptable range of neuromechanical processes. Adaptive Movement and Adaptive Machines (AMAM) 2008, Case Western University, Cleveland, OH. *Poster* (2008).

Alicea, B. Reverse Distributed Computing: doing science experiments in Second Life. Simulation and Second Life Workshop, European Social Simulation Association/Artificial Life Group, Second Life. *Slideshow* (2007).

Alicea, B. and Grabowski, L. From Finding Home to Navigational Primitives: using path-integration and tracking technologies to achieve navigational mitigation. Augmented Cognition International, San Francisco, CA. *Poster* (2006).

Alicea, B. "Virtual" work: the D'Alembert principle and upper-body movement in mixed-reality systems. Dynamic Walking 2006, University of Michigan, Ann Arbor, MI. *Poster* (2006).

Blog Rolls, Short Papers, and Demos/Tutorials

Alicea, B., Deb, M., Singh, U., and Varma, V. DevoLearn: a platform for Computational Developmental Biology. INCF Neurinformatics Assembly, Virtual (2021).

Kulkarni, H. and **Alicea, B.** Cultural, Emotional, and Associative Traits to Determine Literary Inclination. *PsyArXiv*, doi:10.31234/osf.io/4xahc (2020).

Kulkarni, H. and **Alicea, B.** Cultural association based on machine learning for team formation. *Proceedings of the IEEE Conference on Computing, Communication, Control and Automation*, Pune, India (2019).

Dvoretskii, S. and **Alicea, B.** Modeling Neural Development with Braitenberg Vehicles. *INCF Neuroinformatics Conference*, University of Warsaw, Poland (2019).

Alicea, B. How to find a scientific revolution: intellectual field formation and the analysis of terms. *Psyarxiv*, doi:10.17605/OSF.IO/RHS9G (2017).

Alicea, B. Data Reuse as a Prisoner's Dilemma: the social capital of open science. *bioRxiv*, doi:10.1101/093518 (2016).

Alicea, B. Playing Games with Ideas: when epistemology pays off. *Journal of Brief Ideas*, doi:10.5281/zenodo.167647 (2016).

Alicea, B. Carnival of Evolution #70: the game of evolution. April 1, Synthetic Daisies Blog, http://syntheticdaisies.blogspot.com/2014/04/carnival-of-evolution-70-game-of.html doi: 10. 6084/m9.figshare.900957 (2014).

Alicea, B. A Semi-automated Peer-review System. arXiv repository, arXiv:1311.2504 [cs.DL, cs.HC, cs.SI, physics.soc-ph] (2013).

Alicea, B. Game Theory of Shutting Things Down. October 15, Synthetic Daisies Blog, http://syntheticdaisies.blogspot.com/2013/10/game-theory-of-shutting-things-down.html doi:10.6084/ m9.figshare.900957 (2013).

Alicea, B. Carnival of Evolution #58: Visions of the Evolutionary Future. April 1, Synthetic Daisies Blog. http://syntheticdaisies.blogspot.com/2013/04/carnival-of-evolution-number-58-vision.html doi:10.6084/ m9. figshare.661698 (2013).

Alicea, B. Independent features of quantified thermocycling reactions (qRT-PCR). Figshare, doi:10.6084/m9.figshare.649432 (2013).

Alicea, B. Genomic Signal Processing: one scientist's quest. Figshare, doi:10.6084/m9.figshare.155705 (2013).

Alicea, B. Carnival of Evolution #46: the Tree (Structures) of Life. April 1, Synthetic Daisies Blog. http://syntheticdaisies.blogspot.com/2012/04/carnival-of-evolution-number-46-tree.html doi:10.6084/m9.figshare.99887 (2012).

Popular Press

Interviews

(with S. Dvoretskii, Z. Gong, J. Parent, and A. Gupta) Developmental Braitenberg Vehicles. *OHBMx*, Talk #44, https://twitter.com/OHBMequinoX/status/1241012923755102212. (2020).

Interview with Sarah DeWeerdt for the article "How to map the brain". *Nature*, 571, S6-S8. doi:10.1038/d41586-019-02208-0 (2019).

Interview with Rob Schaefer, Revitalized Community Curriculum Breathes New Life into the Webs First Virtual Organism. *Mozilla Open Leaders Medium blog*, May 23 (2019).
Interview with Sujata Gupta, Virtual windows on brains at work. *New Scientist*, March 17 (2012).

Interview with Rachel Nuwer, Why Scientists are fooling animals with virtual reality. *Popular Mechanics*, April 10 (2012).

Editorial Work

Editor for: McMahon, B. AI is Ushering In a New Scientific Revolution. The Gradient, June 4 (2022).

Editor for: Mugan, J. Strong AI Requires Autonomous Building of Composable Models. The Gradient, October 30 (2021).

Editor for: Fawaz, A. Knocking on Turing's door: Quantum Computing and Machine Learning. The Gradient, January 2 (2021).

Editor for: Herbelot, A. How to Stop Worrying About Compositionality. The Gradient, July 19 (2020).

Editor for: Raff, E. Quantifying Independently Reproducible Machine Learning. The Gradient, February 6 (2020).

Blog posts and Twitter Conferences

Alicea, B. Meta-brain computational models for representing cultural diversity. *Brain TC*, Talk #139, https://twitter.com/RealBrainTC/status/1106306541148344329.

Alicea, B. Perceptual time and the evolution of informational investment. Published in *Machines Like Us*. http://machineslikeus.com/news/perceptual-time-and-evolution-informational-investment (2014).

Alicea, B. Triangulating Scientific "Truths": an ignorant perspective. Profiled in *Humanity+*. http://hplusmagazine.com/2012/12/19/triangulating-scientific-truths-an-ignorant-perspective/ (2013).

Alicea, B. Artificial Life Meets Geodynamics (Evo-Geo). Profiled in *Humanity+*. http://hplusmagazine.com/2012/12/07/artificial-life-meets-geodynamics-evogeo/ (2012).

Teaching History Profile (from most recent)

Creator of badges for OpenWorm Foundation badge system: Literature Mining (I and II), Hackathon (I, II, and III), and Worm Development I and II. http://badgelist.com/openworm

Instructor for SciFund University short course "Introduction to Outreach". October-November 2015.

MMG 302: Laboratory Instructor, General Microbiology Laboratory, Department of Microbiology and Molecular Biology, Michigan State University, Spring and Summer 2012.

QB 828: Module on Evolutionary Systems Biology, Biology for the Interdisciplinary Scientist, Quantitative Biology Program, Michigan State University, Spring 2009 and Spring 2010.

CAS 992: Tutorial on physiological measurement techniques, Seminar on Minds and Media, College of Communication Arts and Sciences, Michigan State University, Fall 2008.

TC 491: Wearable Computing Module Coordinator, Human-Computer Interaction, Department of Telecommunication, Information Studies, and Media, Michigan State University, Spring 2005.

ANG 2000: General Anthropology, Department of Anthropology, University of Florida, Guest lectures on Evolution of Sex and Human Evolution, Spring 2001.

ANG 3141: Development of World Civilizations, Department of Anthropology, University of Florida, Spring 2000.

ANG 2301: Human Sexuality, Department of Anthropology, University of Florida, Fall 1999 and 2000.

Mentoring and Advising

* Google Summer of Code student

iSchool Mentorship program, University of Illinois Urbana-Champaign. 1 student in 2021 (Jinal Mehta), 1 student in 2022 (Christian Nnahibue).

Orthogonal Research and Education Laboratory Mentorship Program (co-mentor w/Jesse Parent): 7 students from the University of Albany (2022).

Mentor for Google Summer of Code 2017-2021. In conjunction with the International Neuroinformatic Coordinating Facility (INCF).

Mentor for Neuromatch Academy 2020 (three student projects: "Classifying Working Memory Performance", "Reward-specific activation in prefrontal cortex during a gambling task", "Complexity of Feedback Loops") and 2021 (two student projects: "Mapping artificial neural network to human visual system", "Distinguishing between Mathematics and Linguistic fMRI Networks").

* Mainak Deb*, Computer Science student at Amrita Vishwa Vidyapeetham University (India). Interested in Machine Learning and Data Science (2021).

* Krishna Katyal, Computer Science student at Amrita Vishwa Vidyapeetham University (India). Interested in Machine Learning and Data Science (2020).

* Avery Lim, (2020).

* Angela Risius, (2021).

* Ujjwal Singh*, Computer Science student at IIT Delhi, Interested in Machine Learning and Computational Biology (2019-present).

* Asmit Singh, Computer Science student at IIT Delhi, Interested in Machine Learning and Computational Biology (2019).

* Mayukh Deb*, Computer Science student at Amrita Vishwa Vidyapeetham University (India). Interested in Machine Learning and Data Science (2020).

* Ziyi Gong, Neuroscience student at the University of Pittsburgh. Interested in Digital Neuroscience (2019).

* Jesse Parent, Cognitive Science student at SUNY-Albany. Interested in Cybernetics and Social Cognition (2019).

* Vinay Varma*, Computer Science student at Amrita Vishwa Vidyapeetham University (India). Interested in Machine Learning, Computational Biology, and Mentorship (2019-2020).

* Stefan Dvoretskii*, Bioinformatics student at Technical University of Munich. Interested in Cognitive Science and Digital Neuroscience (2018-present).

* Hrishikesh Kulkarni, independent academic. Interested in Cognitive and Cultural Computing (2018-present).

* Sam Felder*, Computer Science student at the University of Illinois, Urbana-Champaign, interested in genetic algorithms and software engineering (2018).

* Cheng-Hsun (Jim) Hsueh*, Medical student at National Yang Ming University, interested in cultural evolution (2018).

* Arnab Banerjee*, Computer Science student at University of Pune, interested in Biological Computing and Community-building (2018).

* Siddharth Yadav*, Computer Science student at IIT-New Delhi, interested in Machine Learning and Computational Biology (2017).

* Robert Stone, independent academic. Interested in Cognitive Science and Cybernetics (2014-present).

Fellowships

2003-2007: CDEF Fellowship, Michigan State University (full financial support).

2000: FLAS Fellowship, University of Florida (international study – Rio De Janiero, Brasil).

1999-2002: Grinter Fellowship, University of Florida (partial financial support).

Professional Organizations and Activities

* Current or former member: Institute of Electronics and Electrical Engineers (IEEE), Society for Industrial and Applied Mathematics (SIAM), International Society for Computational Biology (ISCB), and International Society for Artificial Life (ISAL), Cognitive Science Society (CSS), and Human Factors and Ergonomics Society (HFES).

* Small Development Grant (SDG) committee member, NumFOCUS, https://numfocus.org/

* Special Issue Co-editor for *BioSystems* special issue "*Computational, Theoretical, and Experimental Approaches to Morphogenesis, in memoriam of Lev Beloussov*", 2018.

* President, Society of Postdoctoral Scholars, University of Illinois Urbana-Champaign (2015-2016).

* Journal article referee: *Stem Cells and Development*, *Brain and Cognition, PLoS One, Human Factors, Human Movement Science, Evolving Systems, Journal of Evolutionary Biology Research, Journal of Parallel and Distributed Computing, Entropy, Multimodal Technologies and Interaction,* and *High-throughput*. Publons profile: https://publons.com/author/1192281/

* Blog administrator, Synthetic Daisies (http://syntheticdaisies.blogspot.com, 2008-present) and academic website creator/administrator, Annotated Amazonia (bibliography website, 1998-2002).

* Editorial Supervisor, SciNote Science Blog (Fall 2014 – Spring 2015).

* Academic Journal Editorial Staff Assistant, Transforming Anthropology (2001-2002).

* Book chapter (Bio-Communication, University of Chicago, 2013), proposal (The Enculturated Brain, MIT Press, 2010), and book draft (Embryogenesis Explained, World Scientific Press, 2015) reviewer.

* Mentioned in: PLoS One 2014 Reviewer Thank You. PLoS One, 10(2), e0121093 doi:10.1371/journal.pone.0121093 and PLoS ONE 2015 Reviewer Thank You. PLoS One, 11(2), e0150341 doi:10.1371/journal.pone.0150341.

* Academic Conference Program Committee Member (Alife XIII, Alife XIV, and ECAL 2015) and paper referee (Human Factors and Ergonomics Society (HFES); ASME International Mechanical Engineering Congress and Exposition; IEEE Virtual Reality Conference).

* Crowdsource reviewer: "Starivore Extraterrestrials? Interacting Binary Stars as Macroscopic Metabolic Systems" by Clement Vidal (January 2015) and "Routes to Open-endedness in Evolutionary Systems" by Tim Taylor (June 2018), Organized on Academia.edu.

* Participant in Professorial Advancement Initiative (PAI), Committee on Institutional Cooperation (2015-2017).

* Certificate earned in "Proven Algorithmic Techniques for Parallel Computing". Virtual School of Computational Science and Engineering (VSCSE), National Center for Supercomputing Applications (NCSA), August 15-19 (2011).

* Certificate earned in "Big Data for Science". Virtual School of Computational Science and Engineering (VSCSE), National Center for Supercomputing Applications (NCSA), July 26-30 (2010).

* Honorable mention: Schmorrow, D.D. and Reeves, L.M. 21st Century Human-System Computing: augmented cognition for improved human performance. *Aviation, Space, and Environmental Medicine*, 78(1), B7-B11. Contributions to the developing field of Augmented Cognition (2007).

* Faculty Judge, UURAF (Undergraduate Research Forum) competition, Michigan State University (Spring 2013).

* Cognitive Science Speaker Series Selection Committee, Michigan State University (2007).