CURRICULUM VITAE

Elizabeth B Torres, PhD

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Research Interests: My research creates mathematical and computational models connecting perceptual and cognitive processes with movements and their sensations. I study the emergence of perceptual motor control as a precursor of autonomous intelligence accompanied by the inner sense of agency. I create and deploy technology and naturalistic experimental assays to scale and diversify research, sampling broadly across the human population. My research uses geometric and dynamic principles of motor control and coordination, stochastic analyses and information theory to bridge behavioral with cognitive/perceptual sciences. I want to understand the synthesis of creative thoughts and problem solving using a renovated embodied cognition approach that considers human somatic-sensory-motor development of autonomy and control as fundamental pillars of abstract thinking. To that end, I use the neurodevelopmental and neurodegenerative disorders across the human lifespan as a springboard to advance the various basic scientific aspects of this central quest of my research program. In collaboration with clinicians of multiple fields, I also build translational and highly scalable medical solutions informed by the critical needs of the community. My lab develops patents and shares technology to advance science dissemination and reproducibility. I educate the public to continue their trust and support of our science. I develop interdisciplinary collaborative networks to produce multiple revenue streams to support science and technology, and to train new generations of innovators for academia, R&D, and industry.

Lab https://sensorymotorintegrationlab.com/

Public Service https://sensorymotorintegrationlab.com/new-jersey-autism-center-of-excellence/

Innovation and Venture https://sensorymotorintegrationlab.com/innovation-and-commercialization/

https://orcid.org/0000-0002-4011-3611

Education and Training

2019-2020	Sabbatical	Genomics and Computational Modeling, The Salk Institute for Biological Studies	
2001-2005	Postdoctoral	Computational Neural Systems, Electrophysiology	CALTECH
1995-2001	PhD	Cognitive Science	UCSD
1991-1994	B.Sci.	Mathematics-Computer Science (Cum Laude)	SJSU

Professional Experience

2021-present	Full Professor, Rutgers University Psychology, Computer Science, Cognitive Science
2018-2023	Principal Investigator (Executive Director) New Jersey Autism Center of Excellence
2015-2021	Associate Professor, Rutgers University Psychology, Computer Science, Cognitive Science
2008-2015	Assistant Professor, Rutgers University Psychology, Computer Science, Cognitive Science
2005-2008	Research Associate Computational Neural Systems, CALTECH

Selected Academic Honors & Fellowships

2023-2026	Career Continuation Award by The Nancy Lurie Marks Family Foundation
2023	SAS External Engagement Award Program
2023	The Community Partner Award, International Association for Spelling as Communication
2021	The NJ Senate and General Assembly Joint Legislative Resolution for Meritorious Record of Service, Leadership, and Commitment to the Advancement of Science
2019-2020	Board of Trustees Award for Excellence in Research
2019-2020	Rutgers TechAdvance Smart technology for the treatments of nervous systems disorders
2018-2023	Dean Excellence Award (Leading PI for a PhD student at Rutgers)
2017-2020	Data Science Excellence Award (Leading PI for a PhD student at Rutgers)
2016-2017	(Education) Qualcomm Innovation Fellowship Finalist (Leading PI for 2 Rutgers Students)

2015-2016	The Board of Trustees Research Fellowship for Scholarly Excellence as one of the University's most distinguished young faculty members (by Rutgers President Barchi)
2014-2018	The Nancy Lurie Marks Family Foundation Early Career Development Award
2012-2013	(Education) NSF-IGERT Video and Poster Competition Students' Award
2010-2011	(Education) Rutgers SAS Best Undergraduate Student Research Poster Award
2009-2012	Academic Excellence Award, Rutgers University
2004-2007	Neuroscience Scholar Fellowship, The Society for Neuroscience
2004-2007	Della-Martin Fellow, Electro-physiology, CALTECH
2001-2004	Sloan-Swartz Fellow, Computational Neural Systems, CALTECH
1995-2001	F31 Pre-Doctoral Fellowship (NINDS)
1994-1995	Intramural Research and Training Award (Pre-IRTA), NIA, NIH
1992-1994	Maximizing Access to Research and Careers (MARC), San Jose State University

Pending Scientific Grant Support

1. 2025-2028 Lundbeck Foundation Development and validation of clinical tools and objective markers to improve diagnostic assessment of autism in adults (co-PI $1.406,489.00)
2. 2025-2030 NSF CRCNS Research Proposal: Collaborative Research: Computational Model of Neonatal Brainstem Auditory Responses as a Predictor of Motor Control Development in Infants Direct Costs (PI $1,583,082.00)
3. 2024-2028 National Telecommunications and Information Administration. Digital Equity Program ($800,000.00 NeuroDiversa LLC and $200,000.00 SAS Office of External Engagement.)

Current Scientific Grant Support

1. 2023-2026 The Nancy Lurie Marks Family Foundation Career Development Award – Torres Sensory Motor Integration Lab Continuation Research Program for Autism. (**$750,000.00**, Torres PI)
2. 2023-2025 SAS External Engagement Award Program (**$75,000.00**, Torres PI)
3. 2022-2023 Rutgers Global Grant (with Israel) - Characterization of mental, bodily, and shared awareness in dyadic Feldenkrais practices distinguishing spontaneous exploratory from deliberate goal-directed learning modes. (**$8,000.00**, Torres PI)
4. 2020-2025 "Measurement and manipulation of oscillatory biomarker of working memory in psychosis". R01 NIH (**$60,000.00, Sub Award**)
5. 2021-2023 "A pilot project to validate digital biomarkers as a tool to measure improvement in core symptoms of autism during sulforaphane treatment". Rutgers Busch Biomedical Grant (**$60,000.00 PI**)

Selected Completed Research Support

1. 2018-2023 The Autism Center of Excellence to transform Autism Research, Education and Services in NJ". The New Jersey Governor's Council for Autism Research and Treatment (**$4,000,000.00 PI**) The New Jersey Governor's Council for Autism Research and Treatment
2. 2021-2022 "Establishing Objective Behavioral Signatures of ASD in out-of-the-lab environments: A Micro-Movement Analysis Approach" (**$50,000.00 PI**) The New Jersey Governor's Council for Autism Research and Treatment.
3. 2020-2022 "Social skills and emotional rhythms in educational and vocational training to help develop autonomous and independent living". The New Jersey Governor's Council for Autism Research and Treatment (**$400,000.00, PI**)
4. 2018-2019 Rutgers TechAdvance Award "Smart shoes for biofeedback sensing and measurements of motor control and autonomy" Rutgers Office of Commercialization and Tech Transfer (**$100,000.00 PI**)
5. 2017-2019 "Characterization of the female phenotype of ASD using Big Data" The New Jersey Governor's Council for Autism Research and Treatment (**$387,846.00, PI**)
6. 2015-2017 "Bridging behavior and genetics through sensory-motor electrophysiology" The New Jersey Governor's Council for Autism Research and Treatment (**$385,838.00, PI**)
7. 2014-2017 "Using the plasticity of peripheral micro-movements to characterize and treat subtypes of disorders on a spectrum", Nancy Lurie Marks Family Foundation Career Development Award ($**636,000.00**, **PI** and matching endowment to the Torres lab)

8. 2014-2016 "The use of objective metrics to characterize social interactions and communication between child and therapist: towards tailored interventions for Sensory Processing Disorders", The Henry Wallace Foundation (**$36,000.00**, **PI**)
9. 2016-2018 "Exploring low cost vs. research grade wearable sensor to characterize patterns of sleep and activities of daily life in children with ASD" The New Jersey Governor's Council for Autism Research and Treatment (**$156,034.00**, **co-PI**)
10. 2014-2016 "New objective autism inventory to quantify peripheral plasticity during standardized ADOS-2 social exchange", The New Jersey Governor's Council for Autism Research and Treatment (**$398,908.00 PI**)
11. 2014-2016 The Gates Foundation Grand Challenge Explorations – Measuring brain and movement development in infants (**$100,000.00**, **co-PI**)
12. 2014-2015 NSF Innovative Corps "Versatile Statistical Platform to Analyze, Diagnose, Track, and Treat Neurological Disorders" (**$50,000.00, PI**)
    Video: https://www.youtube.com/watch?v=8VkMgR1pv1Q
    https://www.youtube.com/watch?v=t0QsFhFpPSE
13. 2013-2014 Department of Defense – SRI International Sub-contractor of the Strategic Social Interaction Module, "Transforming research, diagnosis and treatment effectiveness in ASD: Towards better social interactions" (**$35,000.00**, DARPA-SRI)
14. 2010-2012 The New Jersey Governor's Council Award for Medical Research and Treatment of Autism (co-PI) "Perceptual-motor anticipation in individuals with ASD" (**$650,000.00, co-PI**)
15. 2009-2011 Rutgers University Academic Excellence Award **($50,000.00 PI**)
16. 2009-2012 NSF Cyber Enabled Discovery and Innovation (CDI Type I) "A novel quantitative framework to study lack of social interactions in autism" (**$670,000.00, PI**)

Contributions to Science

Peer-Reviewed Manuscripts

Very Early (Neonatal) Neurodevelopment

1. Torres, EB., Hannah Varkey, Joe Vero, Eric London, Ha Phan, Phyllis Kittler, Anne Gordon, Rafael E. Delgado, Christine F. Delgado, Elizabeth A. Simpson, "Sensing Echoes: Temporal Misalignment as the Earliest Marker of Neurodevelopmental Derailment", PNAS nexus 2:2, 2023, pgac315, https://doi.org/10.1093/pnasnexus/pgac315

2. Torres, E.B., Smith, B., Mistry, S., Brincker, M., Whyatt, C.P., (2016) "Neonatal Diagnostics: Towards Dynamic Growth Charts of Neuro-motor control.", Front. Pediatr. 4:121. DOI 10.3389/fped.2016.00121

Autism and other neuropsychiatric disorders

3. Bermperidis, T., Rai, R., Torres, E.B., "Digital Screener of Socio-Motor Agency Balancing Autonomy and Control" (Frontiers in Human Neuroscience, 2024 *in press*)

4. Varkey, H., Phan, H., Kittler, P., Gordon, A., Torres, E.B., "Infants on the Move: Bibliometric Analyses of Observational versus Digital Means of Screening Infant Development", Frontiers in Integrative Neuroscience Front. Integr. Neurosci. 2023, Volume 17:1251252. doi: 10.3389/fnint.2023.1251252

5. Torres, EB., Twerski, G., Varkey, H., Elsayed, M., Katz, M.T., Tarlowe, J., "The Time is Ripe for the Renaissance of Autism Treatments: Evidence from Clinical Practitioners", Front Integr Neurosci, Volume 17 – 2023, https://doi.org/10.3389/fnint.2023.1229110

6. Bokadia, H., Rai, R., Torres, E.B. (2020) "Digitized ADOS: Social Interactions Beyond the Limits of the Naked Eye.", J. Pers. Med. 2020, 10(4), 159; https://doi.org/10.3390/jpm10040159

7. Caballero C., Mistry S., Torres E.B. (2020) "Age-dependent Statistical Changes of Involuntary Head Motion Signatures Across Autism and Controls of the ABIDE Repository.", Front. Integr. Neurosci. 14:23. https://doi: 10.3389/fnint.2020.00023

8. Torres E.B., Caballero C., Mistry S. (2020) "Aging with Autism Departs Greatly from Typical Aging.", Sensors-MDPI 20 (2), p 572; https://doi.org/10.3390/s20020572

9. Torres E.B., Rai R., Mistry S., Gupta B (2020) "Hidden Aspects of the Research-ADOS are Bound to Affect Autism Science." Neural Computation, 32, (3), doi.org/10.1162/neco_a_01263

10. Wu, D., Jose, J.V., Nurnberger, J.I., Torres, E.B., (2018) "A biomarker characterizing neurodevelopment with applications to autism.", Nature Scientific Reports 8, 614, DOI 10.1038/sreps41598-017-18902-w

11. Caballero, C., Mistry, S., Vero, J., Torres, E.B., (2018) "Characterization of noise signatures of involuntary head motion in the Autism Brain Imaging Data Exchange Repository.", Frontiers in Integrative Neuroscience, 12:7, doi: 10.3389/fnint.2018.00007

12. Whyatt, C., Torres E.B. (2018) "Autism Research: An Objective Quantitative Review of Progress and Focus Between 1994 and 2015.", Frontiers in Psychology, 9, 1526, doi: 10.3389/fpsyg.2018.01526

13. Torres, E.B., Mistry, S., Caballero-Sanchez, C., Whyatt, C.P., (2017) "Stochastic signatures of involuntary head micro-movements can be used to classify females of ABIDE into different subtypes of neurodevelopmental disorders.", Front. Integrative Neuroscience, 11:10. DOI 10.3389/fnint.2017.00010

14. Torres, E.B., Denisova, K., (2016) "Motor noise is rich signal in autism research and pharmacological treatments.", Nature Scientific Reports 6, Article number: 37422 (2016) DOI 10.1038/srep37422

15. Torres, E.B., Nguyen, J., Mistry, S., Whyatt, C., Kalampratsidou, V. and Kolevzon, A. (2016) "Characterization of the Statistical Signatures of Micro-Movements Underlying Natural Gait Patterns in Children with Phelan McDermid Syndrome: Towards Precision-Phenotyping of Behavior in ASD.", Front. Integr. Neurosci. 10:22. DOI 10.3389/fnint.2016.00022

16. Nguyen, J.; Majmudar, U.; Papathomas, T. V., Silverstein, S.M., Torres, E.B. (2016)," Schizophrenia: The Micro-movements perspective.", Neuropsychologia, ISSN: 0028-3932, Vol: 85, Page: 310-326. DOI10.1016/j.neuropsychologia.2016.03.003

17. Torres, E.B., Donnellan, A.M., (2013) "Editorial for research topic "Autism: the movement perspective" 9:12 DOI https://doi.org/10.3389/fnint.2015.00012

18. Brincker, M., Torres, E.B., (2013) "Noise from the periphery in autism.", Frontiers in Integrative Neuroscience, 7:34 DOI 10.3389/fnint.2013.00034

19. Torres, E.B., Yanovich, P., Metaxas, D., (2013) "Give spontaneity and self-discovery a chance in ASD: Spontaneous peripheral limb variability as a proxy to evoke centrally driven intentional acts.", Frontiers in Integrative Neuroscience 7:46 DOI 10.3389/fnint.2013.00046 Video: https://www.youtube.com/watch?v=gSOaq7A8aVw

20. Torres, E.B., (2013) "Signatures of movement variability anticipate hand speed according to levels of intent.", Journal of Behavioral Brain Functions 9:10 DOI:10.1186/174490819-10

21. Torres, E.B., Brincker, M., Isenhower, R.W., Yanovich, P., Stigler, K.A., Nurnberger, J., Jose, J.V., (2013) "Autism: The micro-movement perspective.", Frontiers in Integrative Neuroscience 7:32 DOI 10.3389/fnint.2013.00032

22. Torres, E.B., Isenhower, R.W., Yanovich, P., Rerigh, G., Stigler, K.A., Nurnberger JI, Jose JV, (2013) "Strategies to develop putative biomarkers to characterize the female phenotype with autism spectrum disorders.", The Journal of Neurophysiology, 110 (7): 1646-62 DOI: 10.1152/jn.00059.2013

23. Torres, E.B., (2015) "Commentary on: An exploration on sensory and movement differences from the perspective of individuals with autism.", 20 March 2015 | https://doi.org/10.3389/fnint.2015.00020

24. Torres, E.B., (2012) "Atypical signatures of motor variability found in an individual with ASD.", Neurocase 19 (2) p 150-165 DOI: 10.1080/13554794.2011.654224

Parkinson's Disease and other Neurodegenerative Disorders

25. Ryu, J., Torres, E.B., "Toward Interpretable Digital Biomarkers of Walking and Reaching in Parkinson's Disease.", Wearable Technologies (3), 2022, e21, https://doi.org/10.1017/wtc.2022.16

26. 26. Ryu J., Torres, E.B., "Motor signatures in digitized cognitive and memory tests enhances characterization of Parkinson's Disease.", Sensors 2022, 22(12), 4434; https://doi.org/10.3390/s22124434

27. Ryu J., Vero J., Dobkin R., Torres E.B. (2019) "Dynamic Digital Biomarkers of Motor and Cognitive Functions in Parkinson's Disease.", Vis.Exp. (149), e59827, doi:10.3791/59827

28. Hong, L., Isenhower, R.W., Jose, J.V., Torres, E.B., (2013) "Cognitive load results in motor overflow in essential tremor.", Neurocase 20 (4) p 397-406 DOI:10.1080/13554794.2013.791859

29. Yanovich, P., Isenshower, R., Sage, J., Torres, E.B., (2013) "Spatial-orientation priming impedes rather than facilitates the spontaneous control of hand-retraction speeds in patients with Parkinson's disease.", PLoS ONE 8(7): e66757 DOI.org/10.1371/journal.pone.0066757

30. Torres, E.B., Cole, J., Poizner, H., (2013) "Motor output variability, deafferentation, and putative deficits in kinesthetic reafference in Parkinson's disease.", Frontiers in Human Neuroscience 8:23 DOI:10.3389/fnint.2013.00823

31. Amano, S., Hong, L., Torres, E.B., (2015) "Behavioral inflexibility and motor dedifferentiation in persons with Parkinson's disease: bilateral coordination deficits during a unimanual reaching task.", Neuroscience Letters; 585:82-7, DOI: 10.1016/j.neulet.2014.10.007.

32. Torres, E.B., Heilman, K.M., Poizner, H. (2011) "Impaired endogenously evoked automated reaching in Parkinson's disease.", J of Neuroscience 31:17848-17863 DOI: 10.1523/JNEUROSCI.1150-11.2011

Pain and Autonomic Systems

33. Ryu J., Bar-Shalita T., Granovsky G., Weissman-Fogel I., Torres E.B. (2021) "Personalized Biometrics of Physical Pain Agree with Psychophysics by Participants with Sensory over Responsivity.", J. Pers. Med. 2021, 11(2), 93, https://doi.org/10.3390/jpm11020093

34. Ryu, J., Torres, E.B. (2020) "The Autonomic Nervous System Differentiates Between Levels of Motor Intent and End Effector.", J. Pers. Med. 2020, 10, 3, p 76.

35. Mona Elsayed and Elizabeth B Torres (2023), "Exploring Cardiac Responses of Pain and Distress.", Topics in Autonomic Nervous Systems, Eds. Dr. María Elena Hernández Aguilar and Dr. Gonzalo Emiliano Aranda Abreu. IntechOpen http://dx.doi.org/10.5772/intechopen.111890

Genomics and Precision Psychiatry

36. Torres, E.B., Editorial for Special Issue "Precision Medicine in Neurodevelopmental Disorders: Personalized Characterization of Autism from Molecules to Behavior", J. Pers. Med. 2022, 12(6), 918; doi.org/10.3390/jpm12060918

37. Bermperidis, T., Schafer S., Gage, F.H., Sejnowski, T., Torres, E.B., "Dynamic Interrogation of Stochastic Transcriptome Trajectories Using Disease Associated Genes Reveals Distinct Origins of Neurological and Neuropsychiatric Disorders.", Front Neuroscience, 16:884707, doi: 10.3389/fnins.2022.884707

38. Torres, E.B., "Precision Autism: Genomic Stratification of Disorders Making Up the Broad Spectrum May Demystify Its Epidemic Rates.", J. Pers. Med. 2021, 11(11), 1119, doi.org/10.3390/jpm11111119

39. Torres, E.B. (2020) "Reframing Psychiatry for Precision Medicine.", J. Pers. Med. 2020, 10, 4, p144.

40. Torres, E.B., Isenhower, R.W., Nguyen, J., Whyatt, C., Nurnberger, J.I., Jose, J.V., Silverstein, S.M., Papathomas, T.V., Sage, J. and Cole, J. (2016) "Toward Precision Psychiatry: Statistical Platform for the Personalized Characterization of Natural Behaviors.", Front. Neurol. 7:8. doi: 10.3389/fneur.2016.00008

Computational Neuroscience, Perceptual Science, Embodied Cognition and Motor Control

41. Ryu, J., Choi, J.W., Schnick, S., Torres, E.B., Pouratian, N., "Irregularity of instantaneous gamma frequency in the motor control network characterize visuomotor and proprioceptive information processing", J. Neural Eng. 2024, 21 026007, DOI 10.1088/1741-2552/ad2e1d

42. Vaskevich, A., Torres, E.B., "Rethinking statistical learning as a continuous dynamic stochastic process, from the motor systems perspective.", Front. Neurosci. 16:1033776. doi: 10.3389/fnins.2022.1033776

43. Bermperidis, T., Rai, R., Ryu, J., Zanotto, D., Agrawal, S.K., Lalwani, A.K., Torres, E.B., (2021) "Optimal Time Lags from Causal Prediction Model Help Stratify and Forecast Nervous System Pathology.", Nature Scientific Reports, 11, 20904, doi.org/10.1038/s41598-021-00156-2

44. Kalampratsidou, V.K., Kemper, S., Torres, E.B. (2021) "Real-Time Proxy Control of Re-Parameterized Peripheral Signals using a Closed-Loop Interface.", J.Vis. Exp. 2021, (171), e61943, doi: 10.3791/61943

45. Kalampratsidou, V., Torres E.B. (2018) "Peripheral Network Connectivity Analyses for the Real-Time Tracking of Coupled Bodies in Motion.", Sensors, 19(3127), doi: 10.3390/s 1893117

46. Torres, E.B., Vero, J., Rai, R. (2018) "Statistical Platform for Individualized Behavioral Analyses Using Biophysical Micro-Movement Spikes.", Sensors, 18(4), 1025, doi: 10.3390/s 18041025

47. Ryu, J., Torres, E.B., (2018) "Characterization of Sensory-Motor Behavior Under Cognitive Load Using a New Statistical Platform for Studies of Embodied Cognition.", Frontiers in Human Neuroscience, 12:115, doi: 10.3389/fnhum.2018.00116

48. Wu, D., Jose, J.V., Nurnberger, J.I., Torres, E.B., (2018) "A biomarker characterizing neurodevelopment with applications to autism.", Nature Scientific Reports 8, 614, DOI 10.1038/sreps41598-017-18902-w

49. Nguyen, J., Majmudar, U., Ravaliya, J., Papathomas, T.V., Torres, E.B., (2016) "Automatically Characterizing Sensory-Motor Patterns Underlying Reach-to-Grasp Movements on a Physical Depth Inversion Illusion.", Front. Hum. Neurosci. 9:694. DOI 10.3389/fnhum.2015.00694

50. Torres, E.B., (2015) "Objective and personalized longitudinal assessment of a pregnant patient with post severe brain trauma.", Front. Hum. Neurosci. 9:128. DOI: 10.3389/fnhum.2015.00128

51. Nguyen, J., Papathomas, T.V., Ravaliya, J., Torres, E.B., (2014) "Methods to explore the influence of top-down visual processes on motor behavior,". The Journal of Visual Experiments, (86) e51422 DOI:10.3791/51422

52. Torres, E.B., Cole J, Poizner H (2014). "Motor output variability, deafferentation and putative deficits in kinesthetic reafference in Parkinson's disease.", Front in Human Neuroscience, 8:823, 61-80, doi:10.3389/fnhum.2014.00823.

53. Choi, K., Torres, E.B. (2014) "Intentional signal in prefrontal cortex generalizes across different sensory modalities.", The Journal of Neurophysiology, DOI: 10.1152/jn.00505.2013

54. Torres, E.B., Quian Quiroga, R., Cui, H., Buneo, C., (2013) "Neural correlates of learning and trajectory planning in the posterior parietal cortex.", Frontiers in Integrative Neuroscience 7:39 DOI 10.3389/fnint.2013.00039

55. Torres, E.B., (2011) "Two classes of movements in motor control.", Experimental Brain Research 215:269-283 DOI: 10.1007/s00221-011-2892-8

56. Torres, E.B., Raymer, A., Rothi, L.G., Heilman, K.M., Poizner, H. (2010) "Sensory-Spatial Transformations in the Left Posterior Parietal Cortex May Contribute to Reach Timing" Journal of Neurophysiology 104:2375-2388 DOI: 10.1152/jn.00089.2010

57. Torres, E.B., (2010) "New symmetry of intended curved reaches.", Journal of Behavioral Brain Functions 6:31, p.1-20) DOI:10.1186/1744-9081-6-21

58. Torres, E.B., Ganguly, K., José, J.V., Carmena, J.M. (2008) "From multiple neural cortical networks to motor mechanical behavior: the importance of inherent learning over separable space-time length scales.", BMC Neuroscience, 9 (Suppl 1): p70 DOI:10.1186/1471-2202-9-S1-P70

59. Zipser, D., Torres, E.B., "Computing movement geometry: a step in sensory-motor transformations.", 165:411-24. doi: 10.1016/S0079-6123(06)65026-7

60. Torres, E.B., Andersen, R., (2006) "Space-time separation during obstacle-avoidance learning in monkeys.", Journal of Neurophysiology 96: 2613-2632 DOI: 10.1152/jn.00188.2006

61. Torres, E.B., Zipser, D. (2004) "Simultaneous control of hand displacements and rotations in orientation-matching experiments.", Journal of Applied Physiology 96: 1978-1987,

62. Selected for commentary in Highlighted Topic "Neural Control of Movement" DOI: 10.1152/japplphysiol.00872.2003

63. Torres, E.B., Zipser, D. (2002) "Reaching to grasp with a multi-jointed arm (I): A computational model.", Journal of Neurophysiology 88: 2355-2387 DOI:10.1152/jn.00030.2002

Conference proceedings (long peer reviewed papers)

64. Torres, E.B., Schaffer, S., Gage, F., Sejnowski, T., (Feb 2020), "Dynamic Interrogation of Stochastic Transcriptome Trajectories (DIST^2).", Information Theory and Applications Workshop, ITA2020, IEEE.

65. Gray, W., Perez, R., Rahman, R., Sims, C., Torres, E.B., Wiltshire, T., Invited Symposium at the Cognitive Science Society Conference (July 31, 2020). "New measures for the fundamentals of human performance.", CogSci and AI, 2020.

66. Kalampratsidou, V., Torres E.B. (2020) "Sonification of heart rate variability can entrain bodies in motion.", Proceedings of the Seventh International Conference on Movement Computing, MOCO '20 Association for Computing Machinery

67. Bockadia, H., Cole, J., Torres, E.B., (2020) "Neural Connectivity Evolution during Adaptive Learning with and without Proprioception.", Proceedings of the Seventh International Conference on Movement Computing, MOCO '20 Association for Computing Machinery

68. Kalampratsidou, V., Torres, E.B., (2019) "Bodies in Motion to The Sound of Music.", Proceedings of the Sixth International Conference on Movement Computing, MOCO '19 Association for Computing Machinery. Tempe, AZ, USA, ISBN:978-1-4503-7654-9

69. Ryu J., Vero, J., Torres, E.B., (2017) "Methods for Tracking Dynamically Coupled Brain-Body Activities during Natural Movement.", Proceedings of the Fourth International Conference on Movement Computing, MOCO '17, June 28-30, 2017, London, United Kingdom, Association for Computing Machinery ACM DOI10.1145/3077981.3078054

70. Whyatt, C.P., Torres, E.B., (2017) "The social dance: Decomposing Naturalistic dyadic interaction dynamics to the micro-level. ", Proceedings of the Fourth International Conference on Movement Computing, MOCO '17, June 28-30, 2017, London, United Kingdom, Association for Computing Machinery ACM DOI 10.1145/3077981.3078054

71. Kalampratsidou, V., Torres, E.B. (2016) "Outcome measures of deliberate and spontaneous motions.", Proceedings of the Third International Conference on Movement Computing, MOCO '16, July 5-6, 2016, Thessaloniki, Greece, Association for Computing Machinery ACM DOI 10.1145/2948910.2948930

72. Majmudar, U., Nguyen, J., Torres, E.B., (2015) "The use of graphical interfaces (GUIs) to analyze motion and temperature.", Journal of Vision. 2015; 15(12):491. doi: https://doi.org/10.1167/15.12.491.

73. Kalampratsidou, V., Torres, E.B., (2015) "Exploring new wearable sensing technology in perceptual experiments.", Journal of Vision. 2015; 15(12):979. doi: https://doi.org/10.1167/15.12.979.

74. Mistry, S., Yanovich, P., Torres, E.B., (2015) "Rethinking the Mirror Neuron System Theory.", Journal of Vision. 2015; 15(12):984. doi: https://doi.org/10.1167/15.12.984.

75. Nguyen, J., Ravaliya, J., Majmudar, U., Papathomas, T., Torres, E.B., (2014), "Blind prediction of perceptual states using patterns of motor variability.", Journal of Vision. 2014; 14(10):832. doi: https://doi.org/10.1167/14.10.832.

76. Kalampratsidou, V., Torres, E.B., (2014) "Invariant and variable relations emerge with degrees of difficulty within habitual and surprise touch-pointing motions.", Journal of Vision. 2014; 14(10):418. doi: https://doi.org/10.1167/14.10.418.

77. Warzer, R., Torres, E.B., Bachrach, A., (2014) "Micro-movement as physical signature of movement intention in work of choreographer Myriam Gourfink.", 2014, Proceedings of the 2014 International Workshop on Movement and Computing June 2014 Pages 156–157 Association for Computing Machinery ACM DOI https://doi.org/10.1145/2617995.2618024

78. Nguyen, J., Isenhower, R.W., Yanovich, P., Ravaliya, J., Papathomas, T., Torres, E.B., (2013) "Quantifying changes in the kinesthetic percept under a 3D perspective visual illusion.", Journal of Vision. 2013; 13(9):779. doi: https://doi.org/10.1167/13.9.779.

79. Ganguly, G., Torres, E.B., Jose J.V., Carmena, J.M., (2008) "From multiple neural cortical networks to motor mechanical behavior: The importance of inherent learning over separable space-time length scales.", BMC Neurosci 9 (Suppl 1), P70 (2008). https://doi.org/10.1186/1471-2202-9-S1-P70.

Peer-Reviewed Books

80. **(Book) Elizabeth B Torres, "Objective Biometric Methods for the Diagnosis and Treatments of Nervous Systems Disorders.", Elsevier Academic Press, July 2018, with companion website (sample data and code in Python and MATLAB)**

    a. Elizabeth B Torres Chapter 1: The Closed Feedback Loops Between the Peripheral and the Central Nervous Systems, the Principle of Reafference and Its Contribution to the Definition of the Self.

    b. Elizabeth B Torres Chapter 2: Critical Ingredients for Proper Social Interactions: Rethinking the Mirror Neuron System Theory.

    c. Elizabeth B Torres Chapter 3: The Case of Autism Spectrum Disorders: When One Cannot Properly Feel the Body and Its Motions from the Start of Life

    d. Elizabeth B Torres Chapter 4: The Case of Schizophrenia: Is that My Arm Moving on Purpose or Spontaneously Passing by

    e. Elizabeth B Torres Chapter 5: Learning to Detect Expertise in Sports Aided by the Gift of Our Students.

    f. Elizabeth B Torres Chapter 6: Rethinking Diagnoses and Treatments of Disorders: The Third (Objective) Neutral Observer Assessing the Interactions between the Examiner and the Examinee or the Therapist and the Client.

    g. Elizabeth B Torres Chapter 7: Different Biometrics for Clinical Trials That Measure Volitional Control

    h. Elizabeth B Torres Chapter 8: Adding Dynamics to the Principle of Reafference: Recursive Stochastic Feedback Closed Control Loops to Evoke Autonomy.

81. **(Book) Eds Elizabeth B Torres and Caroline Whyatt, "Autism: The Movement Sensing Perspective", Neuroscience Series, CRC Press, Taylor and Francis, Sept 2017**

    a. Elizabeth B Torres Section I Chapter 1, "Why Study Movement Variability in Autism".

    b. Elizabeth B Torres Section I "Concluding Remarks Top-Down vs. Bottom-Up Approaches to Connect Cognition and Somatic-Motor Sensations".

    c. Elizabeth B Torres Section II Chapter 4, "Dissecting a Social Encounter from Three Different Perspectives".

d. Elizabeth B Torres Section II Chapter 7, "ADOS: The Physiology Approach to Assess Social Skills and Communication in Autism Spectrum Disorder".

e. Elizabeth B Torres Section III Preface, "First Things First, Let Us Get the Math Right".

f. Elizabeth B Torres Section III Chapter 4, "Inherent Noise Hidden in Nervous Systems Rhythms Leads to New Strategies for Detection and Treatments of Core Motor-Sensing Traits in ASD".

g. Elizabeth B Torres Section III Chapter 13, "Contemporary Problems with Methods in Basic Brain Science Impede Progress in ASD Research and Treatments".

h. Elizabeth B Torres Section III Chapter 14, "Micro-Movements: The s-Spikes to Zoom-in the Motor Trajectories of Natural Goal-Directed Behaviors".

i. Elizabeth B Torres Section IV Preface, "Autism in the US".

j. Elizabeth B Torres Section IV Chapter 27, "Turning the Tables: Autism Shows the Social Deficit of Our Society".

82. **(Book) Ed Elizabeth B Torres, Special Issue: "Precision Medicine in Neurodevelopmental Disorders: Personalized Characterization of Autism from Molecules to Behavior", Journal of Personalized Medicine, MDPI e-Book https://www.mdpi.com/books/book/6039**

83. **(Book) Elizabeth B Torres, "Autism Autonomy: In Search of Our Human Dignity.", Elsevier Academic Press, Aug 2024.**

a. Elizabeth B Torres Chapter 1: The Supersystems and Human Neurodevelopment.

b. Elizabeth B Torres Chapter 2: From Pavlov to Skinner to Applied Behavioral Analyses: In Search of a New Cognitive Revolution Using AI, Open Data Science and Machine Learning.

c. Elizabeth B Torres Chapter 3: How Babies Attain Volitional Control.

d. Elizabeth B Torres Chapter 4: Screening and Diagnosing Autism.

e. Elizabeth B Torres Chapter 5: The Autistic Experience Revealed Through Digital Phenotyping.

f. Elizabeth B Torres Chapter 6: Autistic Adults.

g. Elizabeth B Torres Chapter 7: Building Autonomy to Regain Our Agency in Science.

h. Elizabeth B Torres Chapter 8: The Future Generation Got This.

Peer-Reviewed Book Chapters

84. (Book Chapter) Elizabeth B Torres, "Rethinking the Study of Volition for Clinical Use", Progress in Motor Control, Eds J Lazcko and M Latash Springer (2017)

85. (Book Chapter) Elizabeth B Torres, "Connecting Movement and Cognition Through Different Modes of Learning.", The Psychology of Learning and Motivation, Vol 76, Ed K. Ferdermeir Academic Press Elsevier (2022)

86. (Book Chapter) IntechOpen Mona Elsayed and Elizabeth B Torres, "Exploring Cardiac Responses of Pain and Distress.", Topics in Autonomic Nervous Systems, Eds. Dr. María Elena Hernández Aguilar and Dr. Gonzalo Emiliano Aranda Abreu.

a.
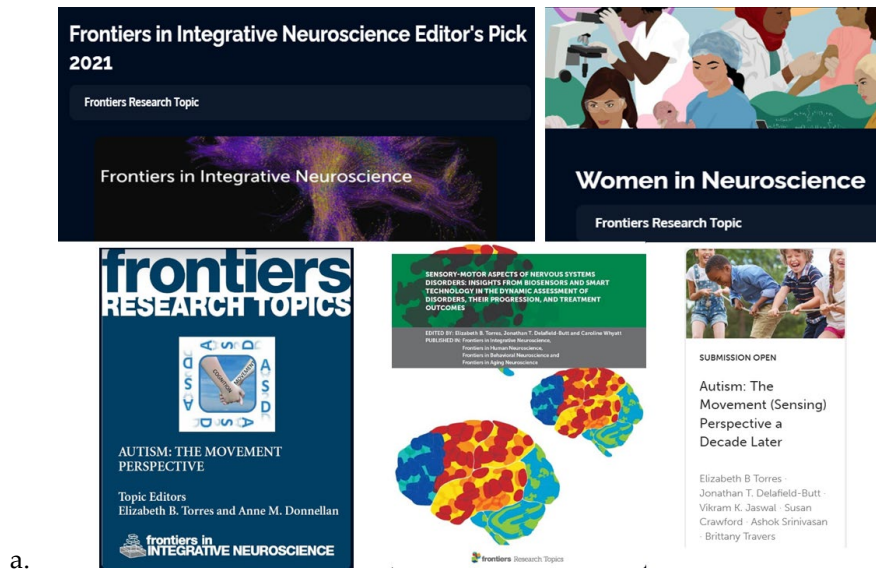
Selected e-Books https://www.frontiersin.org/my-frontiers/research-topics

87. Eds Elizabeth B Torres and Anne M Donnellan, "Autism: The Movement Perspective", Frontiers Research Topic e-Book (2015) https://www.frontiersin.org/research-topics/801/autism-the-movement-perspective.

88. Eds Elizabeth B Torres, Johnathan Delafield-Butt, Carolyne Whyatt, "Sensory-Motor Aspects of Nervous Systems Disorders: Insights from Biosensors and smart technology in the dynamic assessment of disorders, their progression, and treatment outcomes", Frontiers Research Topic e-Book (2020) https://www.frontiersin.org/research-topics/5953/sensory-motor-aspects-of-nervous-systems-disorders-insights-from-biosensors-and-smart-technology-in

89. Eds Maria-Eve Tremblay, Corette J Wierenga, Elizabeth B Torres, Lianna Fattore, Ariana Maffei, Michela Chiappalone, "Women in Neuroscience". Frontiers Research Topic e-Book (2021) https://www.frontiersin.org/research-topics/19592/women-in-neuroscience

90. Ed Elizabeth B Torres, "Frontiers in Integrative Neuroscience Editor's Pick 2021" Frontiers Research Topic e-Book (2021) https://www.frontiersin.org/research-topics/21835/frontiers-in-integrative-neuroscience-editors-pick-2021

91. Ed Elizabeth B Torres, "Insights in Integrative Neuroscience: 2021", Frontiers Research Topic e-Book (2021) https://www.frontiersin.org/research-topics/26676/insights-in-integrative-neuroscience-2021

92. Eds Elizabeth B Torres, Jonathan Delafield-Butt, Vikram K. Jaswal, Susan Crawford, Ashok Srinivasan, Brittany Travers, "Autism: The Movement (Sensing) Perspective a Decade Later" Frontiers Research Topic e-Book (2024) https://www.frontiersin.org/research-topics/55202/autism-the-movement-sensing-perspective-a-decade-later

Granted Patents by the US and EU Patent Offices

1. Torres, E.B., US20190333629A1 – Methods for the diagnosis and treatment of neurological disorders.
2. Torres, E.B., US20190254533A1 – Systems and methods for tracking neuro-development disorders.
3. Torres, E.B., US20190261909A1 – System and method for determining amount of volition in a subject.
4. Torres, E.B., US20211098912 – Objective and Personalized Longitudinal Assessment of Post-Severe Traumatic Brain Injury.
5. Torres, E.B., US20211098912 – Systems and Method for Measuring Physiologically Relevant Motion.
6. Torres, E.B., EP3229684B1 – Procédés de mesure d'un mouvement physiologiquement pertinent.

Provisional Patents by the US and EU Patent Offices

1. Torres, E.B., Provisional Patent - Connecting peripheral and central nerves output signatures of variability through the same statistical platform. US patent application 62/409,943 filed 10/19/2016 (International PCT/US17/57365 field 10/19/2017)
2. Torres, E.B., (2023) Provisional Patent - Techniques for measuring atypical neurodevelopment in neonates based on short video.
3. Torres, E.B., (2023) Provisional Patent - Techniques for measuring atypical neurodevelopment in neonates based on auditory brainstem response (ABR) tests.
4. Torres, E.B., Theodoros Bermperidis (2023) Provisional Patent - Stochastic signatures of autonomous and naive human learning for training artificial agents.
5. Torres, E.B., Mona Elsayed (2023) Provisional Patent - Systems and Methods for Detecting Individual Pain Threshold

Invited Talks International
2024

1. 2024 Nov 23, The Academy of Neurological Music Therapy and the University of **Toronto**, "Leveraging Ontogenetically Orderly Maturation on a Schedule: Scalable Biomarkers of Neurodevelopmental Disorders" (Live Webinar hosted by Corene and Michael Thaut)
2. 2024 Oct 22, "Leveraging Ontogenetically Orderly Maturation on a Schedule: Scalable Biomarkers of Neurodevelopmental Disorders" (Live Webinar Frontiers in Integrative Neuroscience, Frontiers **Geneva** Switzerland)
3. 2024 Oct 16, Hospital Nacional Posadas, **Buenos Aires**, https://www.argentina.gob.ar/salud/hospital-nacional-posadas "Biomarcadores tempranos con chronological ontogenetic order " (hosted by Silvia Baeti)
4. 2024 Oct 15, Universidad Pontificia Católica Argentina (UCA), **Buenos Aires,** "Scalable Technologies for Clinical and Home Use in the Screening, Monitoring and Treatments of Autism" (hosted by Daniel Orlievski)
5. 2024 July 8, University of Potsdam Hasso Platner Institute (**Potsdam**, Germany) "Leveraging Ontogenetically Orderly Maturation on a Schedule: Scalable Biomarkers of Neurodevelopmental Disorders" (hosted by Lothar Wieler)

2023

6. 2023 Nov 13-17, International Conference on Embodied Cognitive Science, **Okinawa Institute of Science and Technology (OIST)**, Japan, "On Human Agency: Balancing Bottom-Up Autonomy and Top-Down Control for Wellbeing" (Hosted by Tom Froese)
7. 2023 Oct 27, Invited talk and seminars, **Aix-Marseille University, Institut des Neurosciences de la Timone**, Marseille, France, "Human Agency Across the Lifespan: Scaling Power Laws and Their Applications", (Hosted by Thomas Brochier and Bjorg Kilavik)
8. 2023, Aug 11, Invited Talk and Training, **The Feldenkrais Method Workshop, Strigara, Italy**, "Characterizing the Feldenkrais Method with Highly Scalable Digital Phenotyping Means", (Hosted by Eilat Almagor)

2022

9. 2022 Sept, **Universidad Catolica Argentina**, "Interpretable Biophysical Markers of Autism", (Hosted by Dr. Damian Borda)

10. 2022 Apr 26, **University of London Birkbeck Center for Brain and Cognitive Development** Seminar "New Methods for Earliest Detection of Neurodevelopmental Derailment", (Hosted by Angelica Ronald)

2021

11. 2021 Oct, **International Conference of Computer Vision** (ICCV). Invited speaker to workshop on Understanding Social Behavior in Dyadic and Small Group Interactions

12. 2021 Dec, **Universidad Catolica Argentina**, "Intentional Actions in Autism" Invited Speaker to Workshop (Hosted by Daniel Orlievski)

2020

13. 2020 **Cognitive Science Society Conference** (Invited Symposium) New Measures for the Fundamentals of Human Performance, "Stochastic Shifts in Learning Performance Across the Lifespan" (Co-Organizer Ray Perez)

2019

14. 2019 **University of Naples Federico II** in **Naples, Italy** (Sept 26, 2019) - LANAS Workshop (Learning in Artificial and Natural Systems) "Challenges and Caveats Ahead of the Digital Revolution: Introducing New Approaches for Embodied Cognition and Social Dynamics in Basic and Translational Science" (hosted by Davide Marocco)

15. 2019 **Italian Conference on Autism and Atypical Neurodevelopment** (Sept 27, 2019) at Neapolisanit "A Transformative Model of Autism Research with Implications for Clinical Use"

2018

16. **2018 Hebrew University, The Israeli Institute for Advanced Studies, Jerusalem**, Israel "From Spontaneous Random Noise to Well-organized Signal During Cognitive Motor Learning", (Hosted by Dorit Aharonov Oct 21)

17. **2018 The 40th Anniversary of Hospital Italiano, Buenos Aires, Argentina** (August 20) "Opportunities for Collaboration in Autism Research and Treatments", (Hosted by Silvia Baetti)

18. **2018 Gordon Research Conference** Tuscany, Italy "Sensory-Motor Biometrics and Comprehensive CNS-PNS profiling of FX across generations", (Hosted by Mustafa Sahin June 10)

19. **2018 Haifa University,** Rambam Medical Center, Neurology Dept. Haifa, Israel "Assessing the Somatic-Sensory-Motor Systems Functions to Develop Autonomy and the Sense of Agency", (Hosted by David Yarnitski, March 20)

20. **2018 Tel Aviv University**, Tel Aviv Israel "Applications of our Work to Occupational Therapy" (Hosted by Tami Bar-Shalita, March 19)

21. **2018 Ben Gurion University,** Annual Karniel Motor Control Workshop Be'er Sheva, Israel "New Frontiers in Behavioral Neuroscience: Dynamic and Personalized Biomarkers to Habilitate Autonomy in Neurodevelopment and Beyond" (Hosted by Sandro Mussa-Ivaldi, March 15)

2017

22. **2017 Fourth International Conference on Movement Computing ACM-**MOCO'17 (June 2017, London, UK) Invited talks by the **Torres Team**
   o "Methods for tracking dynamically coupled brain-body activities during natural movement" J Ryu
   o "The Social Dance: Decomposing Naturalistic Dyadic Interaction Dynamics to the micro-level" C Whyatt
   o "Body-Brain Avatar Interface: A Tool to Study Sensory-Motor Integration and Neuroplasticity" V Kala

2016

23. **2016 Hospital Italiano de Buenos Aires, Argentina** "La Sensación del Movimiento y su Papel en los Trastornos del Espectro Autista (TEA)", (Hosted by Dra. Silvia Baetti, Sept 5)

24. **2016 Universidad Catolica Argentina** Latin American Symposium on ASD (Buenos Aires, Argentina) "Medición del Movimiento como Nuevo Enfoque Para la Investigación y el Tratamiento de los Trastornos del Espectro Autista (TEA)", (Hosted by PANAACEA y Autism Speaks Sept 1-3)

25. **2016 University of Strathclyde** Moving Autism Conference (Glasgow, Scotland) "New Data on the Autism Movement Disorder", (Hosted by Jonathan Delafield-Butt, June 2-3)

2015

26. **2015 Progress in Motor Control X (Budapest, Hungary)** "New Methods to Assess Levels of Kinesthetic Re-Afference in Diverse Pathological States of the Nervous System", (Hosted by Jozsef Laczko, July 21st)

2008

27. **2008 College de France**, Torres EB, "Time from space: A system that simulates itself" College de France – (Hosted by Alain Berthoz).

28. Invited Workshop "Movement into Actions" (Lecturer), Space and time decoupling for voluntary action planning, **Gulbenkian Institute**, Portugal (March 25th, 2008) http://www.igc.gulbenkian.pt/events/seminar/9161/abstract

2003

29. **2003 The Weizmann Institute**, Torres EB, A Geometric Model of Motion Control. The Weizmann Institute, Israel (June 19th 2003, hosted by Tamar Flash), http://www.wisdom.weizmann.ac.il/~vision/seminar/June19-2003.txt

Invited Talks Domestic

2025

30. 2025 March 14th, Medical Academy of Pediatrics & Special Needs, Myrtle Beach**, NC** "Regulation4ALL as a Scalable Model for Research and Treatments of ASD" (invited talk)

2024

31. 2024 Dec 18, Plastic and Aesthetic Research Journal and University of **Wisconsin** "CNS biometrics as outcome measures of targeted therapies in PNS injury/repair" (hosted by Samuel Poore and Aaron Dingle)

32. 2024 Oct 8th Minisymposium MIN21 Brainstem Development and Functioning: An Understudied Clue in the Understanding and Management of Autism and Related Disorders (ASD). "MIN21.05 - Ontogenetically layered scheduled milestones: Scaffolding temporal coincidences for social neurodevelopment" (The Society for Neuroscience, **Chicago**, US) (hosted by Eric London)

33. 2024 Apr 26-28, International Conference on Rethinking Autism, Keynote Speaker (Optimal Rhythms, **Indiana**, US) "The Autistic Experience Recounted Through the Digital Lens" (Hosted by Casey DePriest)

2023

34. 2023 July 23, International Association of Spell to Communicate Annual Conference, **Virginia**, US, "Regaining Human Agency: Lessons from the Autism Spectrum", (hosted by Elizabeth Vosseler)

2022

35. 2022 Nov 3, Autism Tree Annual Meeting, "The earliest detection of neurodevelopmental derailment leading to autism is now within our grasp", (**La Jolla**, CA. hosted by Roger Bingham at UCSD-Salk Institute of Biological Sciences)

36. 2022 May 27, Information Theory and Applications Workshop, "Sensing Echoes: Temporal Misalignment as the Earliest Marker of Neurodevelopmental Derailment", (**Pacific Beach**, CA, invited speaker to Workshop)

37. 2022 Apr 21-22 PESIs 2nd Annual Autism Symposium (Virtual, invited speaker Hosted by Cyndi Cathey)

38. 2022 July, International Sensory Integration Congress (Virtual, invited speaker hosted by Susanne Smith Roley)

2021

39. 2021 Oct, **International Conference of Computer Vision** (Virtual, ICCV). Invited speaker to workshop on Understanding Social Behavior in Dyadic and Small Group Interactions

40. 2021 Oct, **The Children's Specialized Hospital**, **New Brunswick**, NJ Pediatrics Round Grounds "Current Technological Advancements for Precision Medicine in Disorders of the Nervous Systems" (Hosted by Gina Freeman)

2020

41. 2020 **Rowan University** Autism Spectrum Research Committee (**Glassboro**, NJ US) Invited Symposium) "Working Together Across Research Methodologies", (Hosted by Amy Arcado)

42. 2020 **Cognitive Science Society Conference** (Invited Symposium) New Measures for the Fundamentals of Human Performance, "Stochastic Shifts in Learning Performance Across the Lifespan" (Virtual, Co-Organizer Ray Perez)

43. 2020 **Rutgers University** (Colloquium for Full Professorship) "New Model for the Personalized Characterization of Nervous Systems Disorders Across the Lifespan, from Molecules to Complex Social Behaviors to Policy Making" (**Piscataway**, NJ, US, Hosted by John McGann)

44. 2020 My Goal Autism (**Saint Peter University and Hospital**, Community NJACE event) "Autism Viewed as Neurological Disorder Across the Lifespan" (**New Brunswick**, NJ, US) Invited Talk hosted by Genevieve Kumaplay)

45. 2020 **Information Theory and Applications** Workshop "Dynamic Interrogation of Stochastic Transcriptome Trajectories (DIST^2)" (**Pacific Beach**, CA, invited talk)

46. 2020 **The Boggs Center of Developmental Disabilities** (LENDS Fellows Lecture) "Autism Across the Lifespan: Reframing Behaviors by their Neurological Underpinnings" (**New Brunswick**, NJ, US, hosted by Deborah Spitalnik)

2019

47. 2019 **Stevens University** (Distinguished Series Lecture Fall 2019) "Theoretical Modelling and Empirical Characterization of Biorhythms from Molecules to Complex Social Behaviors" (**Hoboken**, NJ, US, hosted by Hongjun Wang)
48. 2019 5th Annual **Neuroscience Conference** of the Autism Tree Project Foundation (Nov 1st, 2019) -**La Jolla**, CA, US, Sandford Consortium "Autism Across the Lifespan: Connecting the Knowledge Network from Behaviors to Genomics Under a Unifying Statistical Framework" (hosted by Alysson Muotri)
49. 2019 **Swartz Center for Computational Neuroscience at UCSD** (April 23, 2019) "Using the Nervous Systems Biorhythms to Evoke Agency in Autism " (**La Jolla**, CA, US, Hosted by Tzyy-Ping Jung)
50. 2019 **Harvard University Center of Mathematical Sciences and Applications**, Cambridge, MA, Workshop Invariance and Geometry in Sensation, Action and Cognition (April 15-17, 2019)
"Connecting Cognition and Biophysical Motions Through Geometric Invariants and Motion Variability " (**Cambridge** MA, US, Hosted by L. Mahadevan, O. Pourquie, A. Srivastava)
51. 2019 **NJIT** (NJACE PI office is building a Regional Consortium of Technology for Autism, April 10th) "Connecting Technology and Autism state-wide in NJ" (**Newark**, NJ, US, hosted by Antje Ihlefeld)
52. 2019 **Stevens University** (NJACE PI office is building a Regional Consortium of Technology for Autism, March 4st) "Connecting Technology and Autism state-wide in NJ" (**Hoboken**, NJ, US, hosted by Anthonia Zaferiou)
53. 2019 **The BOGGS Center on Developmental Disabilities**, Robert Wood Johnson Medical School (**New Brunswick**, NJ, US, March 1st) "Smart Health for Autism Across the Lifespan: The Emergent Roles of Digital Biomarkers and Personalized Medicine"
54. 2019 **Information Theory and Applications Conference** (ITA), **San Diego**, CA, US, (Feb 15, 2019) "Nervous Systems Driven Biometrics for Smart Personalized Health" (Hosted by Tatiana Sharpee)
55. 2019 **Kessler Institute for Rehabilitation**, Marlton, NJ, US (Feb 8th, 2019) "The NJACE: Building Synergies and Opening Opportunities for Collaborative Work in Autism" (Hosted by Helen Genova)
56. 2019 **Salk Institute for Neurobiological Research**, La Jolla, CA, US (Jan 10, 2019) "Unifying Analytical Platform to Classify, Track and Change Disorders of the Nervous System Across the Lifespan" (Hosted by Terry Sejnowski)

2018

57. **2018 Conference 0-3, Denver**, CO, US, (Oct 3) "Autism: Using the Sensory-motor Perspective to Dynamically Track Social and Cognitive Neurodevelopment", (Hosted by Bill McCall)
58. **2018 Robert Wood Johnson,** Grand Rounds Psychiatry, **Piscataway**, NJ, US, "Biometrics for Smart and Mobile Health", (Hosted by Matthew Menza, Sept 13)
59. **2018 IBM -** T.J. Watson Research Center **Yorktown**, NY, US, (August 3) "Opportunities for Collaboration Between the NJACE and IBM", (Hosted by Vittorio Caggiano, Yorktown, NY)
60. **2018 Rutgers University, New Brunswick**, NJ, US, Medical School Grand Rounds Psychiatry, Newark NJ "Nervous Systems Taxonomy to Create New Dynamic Classification of Autism Subtypes" (Hosted by Dr. Petros Levounis, Jan 19)

2017

61. **2017 IBM - T.J. Watson Research Center Yorktown,** NY, US**,** "From Precision Medicine to Precision Psychiatry: Personalized Biomarkers and Research Platform to Rehabilitate Autonomy and Mental Health" (Hosted by Vittorio Caggiano Dec 21)
62. **2017 Rutgers University** RUWINS**,** Nelson Labs, **New Brunswick**, NJ, US, "Theoretical and Experimental Study of How Primates Plan, Execute, Learn and Adapt to Natural Voluntary Motions" (Hosted by the Rutgers University Women in Neuroscience Nov 3)
63. **2017 Neuromorphic Engineering Workshop Computational Neuroscience (Telluride**, CO, US) "Autism: Opening Pandora's Box" (Hosted by Terry Sejnowski July 4-10)

2016

64. **2016 Annual Meeting of the Society for Neuroscience – Torres Chaired NanoSymposium** in Autism Physiology and Behavior (Nov 2016, **San Diego**, CA, US)
    o "Index of Neuromotor and Physical Development Marks Early Risk of Neurodevelopmental Derail in the Newborn", S Mistry, B Smith, CP Whyatt, **EB Torres**

- o "Micro-movements Statistical Signatures Across Multiple Joints Unveil Connections with Autism" D Wu, J Nguyen, S Mistry, A Kolevzon, JV Jose, **EB Torres**
- o "Intentionality in Action from the Brain to the Heart During Biofeedback Training" J Ryu,
- o "On Mirrors, Dancers and Avatars: A platform to Habilitate, Rehabilitate and Enhance Voluntary Control in Autism Spectrum Disorders" V Kalampratsidou, **EB Torres**
- o "A Change in Stance on the Social Dance: A New Framework to Examine Nonlinear, Dynamic Temporal Interdependence Across a Social Dyad" CP Whyatt, **EB Torres**

65. **2016 Rethinking Autism Conference (Evansville,** IN, US**)** "Autism in the Context of Precision Psychiatry", (Hosted by Casey de Priest, April 1-2)

66. **2016 Pennsylvania State University** (Colloquium Series in Motor Control) "Statistical Platform for the Personalized Analyses of Behaviors: Towards Precision Medicine from Birth to Adulthood", (**University in Centre County**, PA, US, Hosted by Robert Sainburg, Feb 5th)

2015

67. **2015 National Pediatrics Developmental Differences** (**Chicago**, IL, US) "Technology Meets Science: Towards a New Quantitative Path in Autism Spectrum Disorders", (Hosted by Erik Larson, October 23rd)

68. **2015 Rutgers University -** Scotch Plains Campus, School of Health-Related Professions "New Outcome Measures of Intervention Efficacy", (**Scotch Plains**, NJ, US, hosted by Cathy Colucci, February 27th)

69. **2015 Arizona State University -** Workshop on Robotics and Rehabilitation "Using Behavioral Statistics During Sensory-Motor Learning to Help Interpret Neural Spiking Patterns", (**Tempe**, AZ, US, hosted by Marco Santello, February 14th)

70. **2015 Children Hospital of Philadelphia (CHOP)** "Bridging Behavior and Genetics in Autism Spectrum Disorders", (**Philadelphia**, PA, US, hosted by Ashley deMarchena, Jan 29th)

2014

71. **2014 Computer Vision and Pattern Recognition CVPR-** Workshop on Computational Models of Social Interactions and Behavior: Scientific Grounding, Sensing and Applications (June 28) "Movement Based Perspective on Social Interactions", (**Columbus**, OH, US, Session 3 Chairs Maneesh Singh/ Saad Khan)

72. **2014 Boston Club at the Nancy Lurie Marks Family Foundation** (Proprioception Theme) "Using the plasticity of peripheral micro-movements to characterize and treat subtypes of disorders on a spectrum", (**Boston**, MA, US, hosted by Clarence Schutt, Cambridge May 21)

73. **2014 Harvard University -** Medical School - Systems Biology "Using the plasticity of peripheral micro-movements diagnose and treat autism", (**Cambridge**, MA, US, Jeremy Gunawardena, April 4)

74. **2014 Autism Profectum Conference** "Using movements to close sensory feedback loops and scaffold cognition in ASD", (**Pasadena**, CA, US, hosted Serena Wieder, March 23)

75. **2014 CALTECH** Biology and Engineering Division "Towards true personalized medicine: Statistical Platform for Individualized Behavioral Analysis, Dynamic Diagnosis and Real-time Tracking of Intervention Outcomes", (**Pasadena**, CA, US, hosted by Richard Andersen, March 23)

76. **2014 The Eli Lilly and Company**, Torres, E.B Statistical Platform for Individualized Behavioral Analyses: Towards a New Era for Clinical Trials. (**Indianapolis**, IN, US, Hosted by Scott M. Sheehan July 30th 2014)

2013

77. **2013 NYU**, Torres, E.B Towards a new objective Psychological Science: A unifying framework to study the brain and body interactions in real time. (**NY City**, NY, US, Hosted by Michael Landy)

78. 2013 **Brown University**, Torres, E.B Bridging cognition and action through the re-afferent kinesthetic percept. (**Providence**, RI, US, Hosted by Joo-Hyun Song)

79. **2013 DARPA**, Torres, E.B Transforming research, diagnosis and treatment effectiveness in ASD: Towards better social interactions. DARPA Strategic Social Interaction Module Meeting – (**Washington DC**, US, Hosted by William Casebeer)

80. 2013 **CUNY Graduate Center**, Torres, E.B Unifying statistical framework to study real-time brain and body interactions in natural settings. (**NY City**, NY, US, Hosted by Tony Ro)

81. **2013 NJ CHS**, Torres, E.B Autism: The Micro-movement perspective. Children's Specialized Hospital – (**New Brunswick**, NJ, US, Hosted by Michael Dribbon)

82. **2013 NIMH**, Torres, E.B 22q13 Deletion Syndrome: The importance of quantitative analyses of gait and motor impairments. In Ground Rounds - National Institute of Mental Health – (**Bethesda**, MA, US, Hosted by Audrey Thurm)

83. **2013 Cal State San Marcos**, Torres, E.B Give spontaneity and self-discovery a chance in ASD. Summer Workshop Cal State San Marcos – (**San Marcos**, CA, US, Keynote Speaker)

84. **2013 Sarnoff-SRI Princeton**, Torres, E.B Movement as a kinesthetic percept: Potential uses in clinical and sports applications. Sarnoff-SRI Corporation, Princeton Branch – (**Princeton**, NJ, US, Hosted by Ajay Divakaran)

85. **2013 J&J**, Torres, E.B Novel diagnostic tool to quantify signatures of movement in subjects with neurological disorders, autism and autism spectrum disorders. Johnson & Johnson, Titusville Campus New Jersey – (**Titusville**, NJ, US, Hosted by Eric Yang)

2012

86. **2012 Indiana University**, Torres, E.B Transforming the diagnostics criteria in Autism Spectrum Disorders. Indiana University Medical School – (**Bloomington**, IN, US, Hosted by John I. Nurnberger)

87. **2012 CUNY Graduate Center**, Torres, E.B, Inherent connection between cognition and movement serves to objectively measure unconscious processes. CUNY Graduate Center – (**NY City**, NY, US, Hosted by David Rosenthal)

2011

88. **2011 Johns Hopkins University**, Torres, E.B, Autism: The Movement Perspective. Johns Hopkins University, The Kennedy- Krieger Center – (**Baltimore**, MA, US, Hosted by Stewart Mostofsky)

89. **2011 UCSD-INC**, Torres, E.B Two Movement Classes in Motor Control. UCSD, Institute for Neural Computation – (**La Jolla**, CA, US, Hosted by Howard Poizner)

2010

90. **2010 Indiana University Psychology**, Torres, E.B, "Geometric characterization of sensory-motor integration: predictions, empirical results and clinical applications " Indiana University at Bloomington, Department of Psychology – (**Bloomington**, IN, US, Hosted by Linda Smith)

91. **2010 UCSD-Institute of Neural Computation**, Torres EB, "Funneling attention in automated behavior" University of California, San Diego, Institute for Neural Computation – (**La Jolla**, CA, US, Hosted by Howard Poizner)

92. **2010 SFN Nano-Symposium**, Torres, E.B., Ganguly, K., Jose, J.V., Carmena, J.M. Society for Neuroscience (SFN), Directional and temporal selectivity in motor cortex (**San Diego**, CA, US, Nano-symposium)

93. **2010 Rutgers University Mechanical Engineering**, Torres, E.B., "Intended and automated modes of control are separable with dynamics manipulations", Rutgers University, Mechanical Engineering and Aerospace – (**New Brunswick**, NJ, US, Hosted by Jingang Yi)

2009

94. **2009 NCM Society**, Torres EB, Neural Control of Movement (NCM) Framing time for action: allocentric vs. egocentric references in the primate brain (**Waikoloa**, Hawaii, US).

95. **2009 COSYNE**, Torres, EB, K. Heilman, H. Poizner COSYNE, Complementary roles of the Left Posterior Parietal Lobe and Basal Ganglia in reference frame usage (**Salt Lake City**, UT, US)

2008

96. **2008 Duke University,** Torres EB, "Computing time from space in the Primate Posterior Parietal Cortex" Duke University – Psychology – Neuroscience, – (**Durham**, NC, US, Hosted by Henry Yin).

97. **2008 UT San Antonio**, Torres EB, "Internal Models in Sensory-Motor Integration",
University of Texas San Antonio, Department of Biology – (**San Antonio**, TX, US, Hosted by Nichole Wicha)
PodCast http://snrp.utsa.edu/Media/Torres_podcast.mp3

98. **2008 Wellesley College**, Torres EB, "Self-Supervision in the Representational Cortex" Wellesley College – Neuroscience, – (February 18th, 2008, **Wellesley**, MA, US, Hosted by Barbara Beltz)

99. **2008 COSYNE**, Invited Workshop "The cortical micro-circuit and cognitive function" (Lecturer), Computational Neural Systems (COSYNE, March 4th, 2008, **Salt Lake City**, UT, US)

2007

100. **2007 Northwestern University**, Torres EB, "Dynamics without movement" Northwestern University, Engineering and Applied Mathematics, – (February 19th, 2007, hosted by Sarah Solla).

101. **2007 Northwestern University,** Torres EB, "Movement Representation in the injured brain" Northwestern University, Rehabilitation Center of Chicago, – February 20th, 2007, hosted by Sandro Mussa-Ivaldi).

102. **2007 IBM-San Jose Research Campus**, Torres EB, Three building blocks of the mind to autonomously control the body
IBM-Research, San Jose – (July 25th, 2007, Hosted by Dharmendra S. Modha) http://p9.hostingprod.com/@modha.org/blog/2007/07/elizabeth_torres_three_buildin.html

103. **2007 UC Berkeley**, Torres EB, Postural information in visually responsive cells of the Posterior Parietal Cortex, UC Berkeley – (July 23rd, 2007, Hosted by Jose M. Carmena)

2006

104. **2006 UCSD**, Torres EB, Geometric Planning in the Posterior Parietal Cortex: Learning Time from Space Calit2-UCSD The Inaugural Lecture (May 17th 2006, **La Jolla**, CA, US, hosted by Javier Movellan)
http://www.calit2.net/events/popup.php?id=807, http://inc2.ucsd.edu/inc-calit2seminars.html

2005

105. **2005 COSYNE, Utah**, Torres EB, Buneo, C.A., Andersen R., "Parietal Reach Region Cell Classes have complementary planning responses" COSYNE (Computational Neural Systems, Contributed Talk) **Salt Lake City**, UT, US.

Academic Affiliations and Professional Memberships

2022-Present	Member of the AAAS
2010-Present	Member of the International Society for Autism Research
2010-Present	Member of the Vision Science Society
2009-Present	Member of the Movement Disorders Society
1998-Present	Member of the Neural Control of Movement Society
1995-Present	Member of the Society for Neuroscience

Professional Service

2022-Present	Associate Editor Scientific Reports, Nature Open Access
2019-Present	Associate Editor MDPI Journal of Precision Medicine
2016-Present	Chief Editor of the Journal of Frontiers in Integrated Neuroscience
2012-Present	Associate Editor Journal of Frontiers in Neuroscience
2006-Present	Panel Reviewer at the NSF (directorates include Information and Intelligent Systems (IIS); and Mathematical Sciences (DMS), Division of Behavioral and Cognitive Science)
2002-Present	Add Hoc Reviewer for Nature Neuroscience, Scientific Reports, Journal of Neuroscience, Journal of Neurophysiology, PloS ONE, several IEEE Journals, ACM Journals

Public Service

PI and Scientific Director of the New Jersey Governor's Council Autism Center of Excellence 2018-2023
https://sensorymotorintegrationlab.com/new-jersey-autism-center-of-excellence/

Innovation, Commercialization and Transfer

Two Rutgers spinoff companies have been founded from my work to produce new revenue streams:
- My technologies and patents have been licensed from Rutgers University to NeuroInversa LLC.
- My copyrighted educational materials have been licensed from Rutgers to NeuroDiversa LLC.

In both cases, COI management plans are kept by the Rutgers University COI committee.

Selected Teaching Experience

Classroom Teaching
- *(Undergraduate) Psychology 301: Sensation & Perception, a lecture course with enrollments up to 130 students*
- *(Graduate) Psychology 647: The World and the Body in the Brain: Maps and Codes, (Spring 2011).*
- *(Graduate) NSF-IGERT Class Integrative Methods in Perceptual Science (IMPS) Fall 2011 and Spring 2012*
- *(Graduate) Advanced Methods in Cognitive Science: Fall 2015, Fall 2019*
- *(Graduate) Digital Biomarkers for Brain Science (Intelligent Behavioral Analyses- iBA), Fall 2020, Spring 2025*

Selected Research Awards won by Student Advisees
Hannah Varkey (Pre-Med Student, now Medical Student at Hackensack Meridian)

- Community Award for Outstanding Service to the NJACE (2023)
- Hackensack Meridian Medical School Fellowship (2023)

Theodoros Bermperidis (PhD Student, now Postdoctoral Fellow at the SMIL)
- Nancy Lurie Marks Family Foundation Postdoctoral Scholar (2023)
- Greek Gerondelis Fellowship (2020)

Mona Elsayed (PhD Student, now Postdoctoral Fellow at the SMIL)
- Nancy Lurie Marks Family Foundation Postdoctoral Scholar (2023)

Richa Rai (PhD Student, now Postdoctoral Fellow at Northwestern University)
- Dean's Excellence Fellowship (2018)
- Northwestern University Shirley Ryan Ability Lab Postdoctoral Fellowship (2024)

Jihye Ryu (PhD Student, now Postdoctoral Fellow at UCLA)
- Fellowship of Excellence in Computational and Data Science, Rutgers Discovery Informatics Institute (2018)
- Qualcomm Innovative Fellowship Finalist (2016)
- K01 (2024) Mentored Research Scientist Career Development Award

Vilelmini Kalampratsidou (PhD Student, now lecturer at the University of the Aegean, Greece)
- Qualcomm Innovative Fellowship Finalist (2016)
- Greek Gerondelis Fellowship (2015)

Jillian Nguyen (PhD Student, now Director, Technical Research at RenMac, NY, US)
- NSF Graduate Fellowship (2014)

Sejal Mistry (undergraduate, now MD/PhD residency at University of Utah)
- Fulbright Fellowship (2018)
- Rutgers Research Aresty Travel Award

Ushma Majmudar (undergraduate, now MD Albert Einstein School of Medicine)
- Albert Einstein Medical School Fellowship (2019)
- Chancellor's Excellence Research Award (2018)
- Rutgers Research Aresty Travel Award

Uri Yarmush (undergraduate, now Adjunct Professor Rutgers University)
- First Place to Aresty Poster competition (2009)
- Rutgers Research Aresty Travel Award (2010)

PhD Theses

Jillian Nguyen (2015)," Towards novel, objective, behavioral analyses in the basic sciences and clinical research." Director Elizabeth B Torres

Vilelmini Kalampratsiduo (2017), "Co-adaptive multimodal interfaces guided by real-time multisensory stochastic feedback", Director Elizabeth B Torres

Di Wu (2018), "Nearly imperceptible fluctuations in movement correspond to autism diagnoses." Director Jorge V Jose (co-Director Elizabeth B Torres)

JIhye Ryu (2019), "Characterization of sensory-motor behavior under cognitive load." Director Elizabeth B Torres

Theodoros Bermperidis (2023), "A Unifying Theoretical and Empirical Framework to Study Disorders of the Nervous Systems from Molecules to Complex Social Behaviors" (one provisional patent Rutgers University) https://www.youtube.com/watch?v=wCmSaiBWD3g&t=1970s

Mona Elsayed (2024), "Framework of Interpretable Biometrics to Assess Internal Psychophysiological States of Distress in Autism and the General Population" (one provisional patent Rutgers University) https://www.youtube.com/watch?v=6CAU0yT-G0A&t=254s

Richa Rai (2024), "From Heart Rhythms to Scheduled Motor Milestones: A Novel Approach to Early-Stage Neurodevelopmental Monitoring" (one app has been copyrighted to the Torres-SMIL)

https://www.youtube.com/watch?v=yY_wejU9GI8

Selected Employment Record of Trainees

Industry
Dr. Di Wu, Theoretical Physics – Apple (Cupertino, CA, US)
Dr. Jillian Tarlowe, Biomedical Engineering and Cognitive Science (Director, Technical Research at RenMac, NY, US)
MSci. Electrical Computer Engineering, Neha Tadimeti (NVIDIA, Chicago Branch, US)
MSci. Biomedical Engineering, Jay Ravaliya – Apple (Cupertino, CA, US)

Medical Field
Dr. Ushma Majmudar (Medical School and Residency, Albert Einstein Medical School)
Fulbright Fellow Sejal Mistry (attained Fulbright Fellowship in my lab, MD/PhD, University of Utah, US)
Dr. Kywan Choi (Research Associate Blythesale Children's Hospital, NY, US)
Gabriela Defvukaj (Saint George University Medical School, Grenade, West Indies)
Swathi Balaji (undergraduate trainee, now Genetic Counseling at Columbia University NY, US)
Hannah Grace Varkey (Meridian Hackensack School of Medicine, NJ, US)

Academic Path Toward Professorship and Research Labs
Dr. Robert W. Isenhower (Tenure track Assistant Professor Psychology Rider University, NJ, US)
Dr. Carla Caballero (Tenure track Assistant Professor (EU Lecturer) Miguel Hernandez University, Elche, Spain)
Dr. Caroline Whyatt (Tenure track Assistant Professor (EU Lecturer) University of Hertfordshire, UK)
Dr. Vilelmini Kalampratsiduo, Computer Science, (Lecturer University of the Aegean, Greece)
Dr. Jihye Ryu (Postdoctoral Fellow at UCLA Health Sciences)
Richa Rai (Postdoctoral Fellow at Northwestern University from Jan 2024)
Mona Elsayed (Postdoctoral Fellow at Rutgers University from Jan 2024)
Theodoros Bermperidis (Postdoctoral Fellow at Rutgers University from Jan 2024)

Cornelius Muntazar (undergraduate trainee, now PhD Candidate Psychology-Cognitive Science at the University of Copenhagen, Denmark)
Christina Wilson (Kean University Doctorate Program of Occupational Therapy)