

## CURRICULUM VITAE

### Elizabeth B Torres, PhD

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<https://sensorymotorintegrationlab.com/>

**Research Experience and Interest:** My research creates mathematical and computational models connecting cognition with movements and their sensations. I create and deploy technology and in-house developed experimental assays to scale research and sample broadly across the human population. My research aims to ultimately uncover how human autonomous intelligence and agency spontaneously self-emerge and coexist with voluntary actions. I want to understand the synthesis of creative thoughts and problem solving using a renovated embodied cognition approach. 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 to help various communities. My lab develops patents and shares technology to advance science dissemination and reproducibility. I also strive to educate the public to continue their trust and support of our science. Further, I develop interdisciplinary collaborative networks to produce multiple revenue streams for 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/>

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### **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**

2023-2025	Career Development 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. 2023-2026 DOD – A Pilot Study on Auditory Brainstem Response (ABR) as a Very Early Screening Tool for ASD (**\$750,000.00**, Torres PI) – **Awarded with Excellent Score** towards FY 2024
2. 2023-2027 Binational Science Foundation – Collaborative Project with Israel: Precision Phenotyping of Pain Neurobiology in Autism: Does Sex Matter? (**\$250,000.00** Torres US PI)

### **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**, **Consultant**)
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”. (**\$4,000,000.00** PI)
2. 2021-2022 “Establishing Objective Behavioral Signatures of ASD in out-of-the-lab environments: A Micro-Movement Analysis Approach” (**\$50,000.00** PI)
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=8VkmGpR1pv1Q>  
<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**

### ***Pre-prints***

Bermperidis, T., Rai, R., Torres, E.B., “Digital Screener of Socio-Motor Agency Balancing Autonomy and Control”, <https://www.medrxiv.org/content/10.1101/2023.10.25.23297428v1>

### ***Peer-Reviewed Manuscripts***

1. 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
2. **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>
3. **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>
4. 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
5. 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>

6. **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>
7. **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](https://doi.org/10.3390/jpm12060918)
8. 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
9. **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](https://doi.org/10.3390/jpm11111119)
10. 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](https://doi.org/10.1038/s41598-021-00156-2)
11. 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
12. 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>
13. 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>
14. **Torres, E.B.** (2020) "Reframing Psychiatry for Precision Medicine", *J. Pers. Med.* 2020, 10, 4, p144.
15. 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.
16. 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. doi: 10.3389/fnint.2020.00023
17. **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>
18. **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](https://doi.org/10.1162/neco_a_01263)
19. 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
20. 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
21. 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
22. **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
23. 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
24. 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
25. 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

26. **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
27. **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
28. **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
29. **Torres, E.B.**, Isenhower, R.W., Nguyen, J., Whyatt, C., Nurnberger, J.I., Jose, J.V., Silverstein, S.M., Papatomas, 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
30. Nguyen, J.; Majmudar, U.; Papatomas, 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
31. Nguyen, J., Majmudar, U., Ravaliya, J., Papatomas, 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
32. **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
33. **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>
34. **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
35. 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.
36. Nguyen, J., Papatomas, 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
37. **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.
38. 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
39. **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>
40. Brincker, M., **Torres, E.B.**, (2013) "Noise from the periphery in autism" *Frontiers in Integrative Neuroscience*, 7:34 DOI 10.3389/fnint.2013.00034
41. **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>
42. **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
43. **Torres, E.B.**, (2013) "The rates of change of stochastic trajectories of acceleration variability are a good predictor of normal aging and of the state of Parkinson's disease" *Frontiers in Integrative Neuroscience* 7:50 DOI 10.3389/fnint.2013.00050

44. **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
45. **Torres, E.B.**, Isenhower, R.W., Yanovich, P., Rerigh, G., Stigler, K.A., Nurnberger II, 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
46. 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
47. Yanovich, P., Isenhower, 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
48. **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
49. **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
50. **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
51. **Torres, E.B.**, (2011) "Two classes of movements in motor control" *Experimental Brain Research* 215:269-283 DOI: 10.1007/s00221-011-2892-8
52. **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
53. **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
54. **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
55. **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
56. **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
57. **Torres, E.B.**, Zipser, D. (2004) "Simultaneous control of hand displacements and rotations in orientation-matching experiments" *Journal of Applied Physiology* 96: 1978-1987,  
Selected for commentary in Highlighted Topic "Neural Control of Movement"  
DOI: 10.1152/jappphysiol.00872.2003
58. **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)**

59. **Torres, E.B.**, Schaffer, S., Gage, F., Sejnowski, T., (Feb 2020), "Dynamic Interrogation of Stochastic Transcriptome Trajectories (DIST<sup>2</sup>)", Information Theory and Applications Workshop, ITA2020, IEEE.
60. 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.

61. 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
62. 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
63. 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
64. 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
65. 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
66. 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
67. 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>.
68. 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>.
69. 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>.
70. 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>.
71. 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>.
72. 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>
73. 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>.
74. 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 and Book Chapters**

75. (Book) **Elizabeth B Torres**, "*Objective Biometric Methods for the Diagnosis and Treatments of Nervous Systems Disorders*", Elsevier July 2018, with companion website (sample data and code in Python and MATLAB)
76. **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.



77. **Elizabeth B Torres** Chapter 2: Critical Ingredients for Proper Social Interactions: Rethinking the Mirror Neuron System Theory.
78. **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
79. **Elizabeth B Torres** Chapter 4: The Case of Schizophrenia: Is that My Arm Moving on Purpose or Spontaneously Passing by
80. **Elizabeth B Torres** Chapter 5: Learning to Detect Expertise in Sports Aided by the Gift of Our Students.
81. **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.
82. **Elizabeth B Torres** Chapter 7: Different Biometrics for Clinical Trials That Measure Volitional Control
83. **Elizabeth B Torres** Chapter 8: Adding Dynamics to the Principle of Reafference: Recursive Stochastic Feedback Closed Control Loops to Evoke Autonomy.
84. (Book) Eds **Elizabeth B Torres** and Caroline Whyatt, *“Autism: The Movement Sensing Perspective”*, Neuroscience Series, CRC Press, Taylor and Francis Sept 2017
85. **Elizabeth B Torres** Section I Chapter 1, *“Why Study Movement Variability in Autism”*.
86. **Elizabeth B Torres** Section I *“Concluding Remarks Top-Down vs. Bottom-Up Approaches to Connect Cognition and Somatic-Motor Sensations”*.
87. **Elizabeth B Torres** Section II Chapter 4, *“Dissecting a Social Encounter from Three Different Perspectives”*.
88. **Elizabeth B Torres** Section II Chapter 7, *“ADOS: The Physiology Approach to Assess Social Skills and Communication in Autism Spectrum Disorder”*.
89. **Elizabeth B Torres** Section III Preface, *“First Things First, Let Us Get the Math Right”*.
90. **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”*.
91. **Elizabeth B Torres** Section III Chapter 13, *“Contemporary Problems with Methods in Basic Brain Science Impede Progress in ASD Research and Treatments”*.
92. **Elizabeth B Torres** Section III Chapter 14, *“Micro-Movements: The s-Spikes to Zoom-in the Motor Trajectories of Natural Goal-Directed Behaviors”*.
93. **Elizabeth B Torres** Section IV Preface, *“Autism in the US”*.
94. **Elizabeth B Torres** Section IV Chapter 27, *“Turning the Tables: Autism Shows the Social Deficit of Our Society”*.
95. (Book Ch) **Elizabeth B Torres**, *“Rethinking the Study of Volition for Clinical Use”*, Eds J Lazcko and M Latash Springer (2017)
96. (Book Ch) **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)
97. (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>
98. (e-Book) Eds **Elizabeth B Torres** and Anne M Donnellan, *“Autism: The Movement Perspective”*, Frontiers E-Book (2015) <https://www.frontiersin.org/research-topics/801/autism-the-movement-perspective>
99. (e-Book) **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 E-Book (2020) <https://www.frontiersin.org/research-topics/5953/sensory-motor-aspects-of-nervous-systems-disorders-insights-from-biosensors-and-smart-technology-in>



100. (e-Book) 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>
101. (e-Book) Ed **Elizabeth B Torres**, “Frontiers in Integrative Neuroscience Editor’s Pick 2021” (e-Book 2021) <https://www.frontiersin.org/research-topics/21835/frontiers-in-integrative-neuroscience-editors-pick-2021>
102. (e-Book) Ed **Elizabeth B Torres**, “*Insights in Integrative Neuroscience: 2021*” (e-Book 2021) <https://www.frontiersin.org/research-topics/26676/insights-in-integrative-neuroscience-2021>
103. Book Chapter IntechOpen Mona Elsayed and Elizabeth B Torres, “Exploring Cardiac Responses of Pain and Distress” Eds. Dr. María Elena Hernández Aguilar and Dr. Gonzalo Emiliano Aranda Abreu.
104. (Book) Elizabeth B Torres, “Autism Autonomy: In Search of Our Human Dignity”, Academic Press Elsevier upcoming Sept 2023

#### *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 filed 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.**, (2023) *Provisional Patent* - Stochastic signatures of autonomous and naive human learning for training artificial agents.
5. **Torres, E.B.**, (2023) *Provisional Patent* - Systems and Methods for Detecting Individual Pain Threshold

#### **Invited Talks (Since 2005)**

##### **2023**

1. 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)
2. 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)

3. 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)
4. 2023 July 23, International Association of Spell to Communicate Annual Conference, VA, US, “Regaining Human Agency: Lessons from the Autism Spectrum”, (hosted by Elizabeth Vosseler)

## 2022

5. 2022 Nov 3, Autism Tree Annual Meeting, “The earliest detection of neurodevelopmental derailment leading to autism is now within our grasp”, (hosted by Roger Bingham at UCSD-Salk Institute of Biological Sciences)
6. 2022 Sept, Universidad Catolica Argentina, “Interpretable Biophysical Markers of Autism”, (Hosted by Dr. Damian Borda)
7. 2022 May 27, Information Theory and Applications Workshop, “Sensing Echoes: Temporal Misalignment as the Earliest Marker of Neurodevelopmental Derailment”, (invited speaker to Workshop)
8. 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)
9. 2022 Apr 21-22 PESIs 2<sup>nd</sup> Annual Autism Symposium (invited speaker Hosted by Cyndi Cathey)
10. 2022 July, International Sensory Integration Congress (invited speaker hosted by Susanne Smith Roley)
11. 2022 Nov, **International Conference on Embodied Cognitive Science 2022** (invited Keynote Speaker)

## 2021

12. 2021 Oct, **International Conference of Computer Vision (ICCV)**. Invited speaker to workshop on Understanding Social Behavior in Dyadic and Small Group Interactions
13. 2021 Oct, **The Children’s Specialized Hospital**, NJ Pediatrics Round Grounds “Current Technological Advancements for Precision Medicine in Disorders of the Nervous Systems” (Hosted by Gina Freeman)
14. 2021 Dec, **Universidad Catolica Argentina**, “Intentional Actions in Autism” Invited Speaker to Workshop (Hosted by Daniel Orlievski)

## 2020

15. 2020 **Rowan University** Autism Spectrum Research Committee (Invited Symposium) “Working Together Across Research Methodologies”, (Hosted by Amy Arcado)
16. 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)
17. 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” (Hosted by John McGann)
18. 2020 My Goal Autism (**Saint Peter University and Hospital**, Community NJACE event) “Autism Viewed as Neurological Disorder Across the Lifespan” (Invited Talk hosted by Genevieve Kumaplay)
19. 2020 **Information Theory and Applications** Workshop “Dynamic Interrogation of Stochastic Transcriptome Trajectories (DIST<sup>2</sup>)” (invited talk)
20. 2020 **The Boggs Center of Developmental Disabilities** (LENDs Fellows Lecture) “Autism Across the Lifespan: Reframing Behaviors by their Neurological Underpinnings” (hosted by Deborah Spitalnik)

## 2019

21. 2019 **Stevens University** (Distinguished Series Lecture Fall 2019) “Theoretical Modelling and Empirical Characterization of Biorhythms from Molecules to Complex Social Behaviors” (hosted by Hongjun Wang)
22. 2019 5th Annual **Neuroscience Conference** of the Autism Tree Project Foundation (Nov 1<sup>st</sup>, 2019) -*La Jolla, CA Sandford Consortium* “Autism Across the Lifespan: Connecting the Knowledge Network from Behaviors to Genomics Under a Unifying Statistical Framework” (hosted by Alysson Muotri)

23. 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)
24. 2019 Italian Conference on Autism and Atypical Neurodevelopment (Sept 27, 2019) at Neapolisnit "A Transformative Model of Autism Research with Implications for Clinical Use"
25. 2019 **Swartz Center for Computational Neuroscience at UCSD** (April 23, 2019) "Using the Nervous Systems Biorhythms to Evoke Agency in Autism " (Hosted by Tzzy-Ping Jung)
26. 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 " (Hosted by L. Mahadevan, O. Pourquie, A. Srivastava)
27. 2019 **NJIT** (NJACE PI office is building a Regional Consortium of Technology for Autism, April 10<sup>th</sup>) "Connecting Technology and Autism state-wide in NJ" (hosted by Antje Ihlefeld)
28. 2019 **Stevens University** (NJACE PI office is building a Regional Consortium of Technology for Autism, March 4<sup>st</sup>) "Connecting Technology and Autism state-wide in NJ" (hosted by Anthonia Zaferiou)
29. 2019 **The BOGGS Center on Developmental Disabilities**, Robert Wood Johnson Medical School (March 1<sup>st</sup>) "Smart Health for Autism Across the Lifespan: The Emergent Roles of Digital Biomarkers and Personalized Medicine"
30. 2019 **Information Theory and Applications Conference (ITA)**, San Diego, CA (Feb 15, 2019) "Nervous Systems Driven Biometrics for Smart Personalized Health" (Hosted by Tatiana Sharpee)
31. 2019 **Kessler Foundation**, NJ (Feb 8<sup>th</sup>, 2019) "The NJACE: Building Synergies and Opening Opportunities for Collaborative Work in Autism" (Hosted by Helen Genova)
32. 2019 **Salk Institute for Neurobiological Research**, La Jolla, CA (Jan 10, 2019) "Unifying Analytical Platform to Classify, Track and Change Disorders of the Nervous System Across the Lifespan" (Hosted by Terry Sejnowski)

## 2018

33. **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)
34. **2018 Conference 0-3**, Denver, CO (Oct 3) "Autism: Using the Sensory-motor Perspective to Dynamically Track Social and Cognitive Neurodevelopment", (Hosted by Bill McCall)
35. **2018 Robert Wood Johnson**, Grand Rounds Psychiatry, Piscataway, NJ "Biometrics for Smart and Mobile Health", (Hosted by Matthew Menza, Sept 13)
36. **2018 The 40th Anniversary of Hospital Italiano, Buenos Aires, Argentina** (August 20) "Opportunities for Collaboration in Autism Research and Treatments", (Hosted by Silvia Baetti)
37. **2018 IBM** - T.J. Watson Research Center Yorktown, NY (August 3) "Opportunities for Collaboration Between the NJACE and IBM", (Hosted by Vittorio Caggiano, Yorktown, NY)
38. **2018 Gordon Research Conference** Tuscany, Italy "Sensory-Motor Biometrics and Comprehensive CNS-PNS profiling of FX across generations", (Hosted by Mustafa Sahin June 10)
39. **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)
40. **2018 Tel Aviv University**, Tel Aviv Israel "Applications of our Work to Occupational Therapy" (Hosted by Tami Bar-Shalita, March 19)
41. **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)

42. **2018 Rutgers University**, New Jersey 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

43. **2017 IBM - T.J. Watson Research Center Yorktown, NY** "From Precision Medicine to Precision Psychiatry: Personalized Biomarkers and Research Platform to Rehabilitate Autonomy and Mental Health" (Hosted by Vittorio Caggiano Dec 21)
44. **2017 Rutgers University** RUWINS, Nelson Labs "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)
45. **2017 Neuromorphic Engineering Workshop Computational Neuroscience** (Telluride, Colorado) "Autism: Opening Pandora's Box" (Hosted by Terry Sejnowski July 4-10)
46. **2017 Fourth International Conference on Movement Computing ACM-MOCO'17** (June 2017, London, UK)

### Invited talks by the **Torres Team**

- "Methods for tracking dynamically coupled brain-body activities during natural movement" J Ryu
- "The Social Dance: Decomposing Naturalistic Dyadic Interaction Dynamics to the micro-level" C Whyatt
- "Body-Brain Avatar Interface: A Tool to Study Sensory-Motor Integration and Neuroplasticity" V Kala

## 2016

47. **2016 Annual Meeting of the Society for Neuroscience – Torres Chaired NanoSymposium** in Autism Physiology and Behavior (Nov 2016, San Diego, CA)
- "Index of Neuromotor and Physical Development Marks Early Risk of Neurodevelopmental Derail in the Newborn", S Mistry, B Smith, CP Whyatt, **EB Torres**
  - "Micro-movements Statistical Signatures Across Multiple Joints Unveil Connections with Autism" D Wu, J Nguyen, S Mistry, A Kolevzon, JV Jose, **EB Torres**
  - "Intentionality in Action from the Brain to the Heart During Biofeedback Training" J Ryu,
  - "On Mirrors, Dancers and Avatars: A platform to Habilitate, Rehabilitate and Enhance Voluntary Control in Autism Spectrum Disorders" V Kalamratsidou, **EB Torres**
  - "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**
48. **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)
49. **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)
50. **2016 University of Strathclyde** Moving Autism Conference (Glasgow, Scotland) "New Data on the Autism Movement Disorder", (Hosted by Jonathan Delafield-Butt, June 2-3)
51. **2016 Rethinking Autism Conference (Evansville, Indiana)** "Autism in the Context of Precision Psychiatry", (Hosted by Casey de Priest, April 1-2)
52. **2016 Pennsylvania State University** (Colloquium Series in Motor Control) "Statistical Platform for the Personalized Analyses of Behaviors: Towards Precision Medicine from Birth to Adulthood", (Hosted by Robert Sainburg, Feb 5<sup>th</sup>)

## 2015

53. **2015 National Pediatrics Developmental Differences** (Chicago, IL) "Technology Meets Science: Towards a New Quantitative Path in Autism Spectrum Disorders", (Hosted by Erik Larson, October 23<sup>rd</sup>)
54. **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 21<sup>st</sup>)
55. **2015 Rutgers University** - Scotch Plains Campus, School of Health-Related Professions "New Outcome Measures of Intervention Efficacy", (hosted by Cathy Colucci, February 27<sup>th</sup>)
56. **2015 Arizona State University** - Workshop on Robotics and Rehabilitation "Using Behavioral Statistics During Sensory-Motor Learning to Help Interpret Neural Spiking Patterns", (hosted by Marco Santello, February 14<sup>th</sup>)
57. **2015 Children Hospital of Philadelphia (CHOP)** "Bridging Behavior and Genetics in Autism Spectrum Disorders", (hosted by Ashley deMarchena, Jan 29<sup>th</sup>)

## 2014

58. **2014 Computer Vision and Pattern Recognition CVPR-** Workshop on Computational Models of Social Interactions and Behavior: Scientific Grounding, Sensing and Applications (June 28, Ohio) "Movement Based Perspective on Social Interactions", (Session 3 Chairs Maneesh Singh/ Saad Khan)
59. **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", (hosted by Clarence Schutt, Cambridge May 21)
60. **2014 Harvard University** - Medical School - Systems Biology "Using the plasticity of peripheral micro-movements diagnose and treat autism", (Jeremy Gunawardena, April 4)
61. **2014 Autism Profectum Conference** "Using movements to close sensory feedback loops and scaffold cognition in ASD", (Pasadena, hosted Serena Wieder, March 23)
62. **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", (hosted by Richard Andersen, March 23)
63. **2014 The Eli Lilly and Company**, Torres, E.B Statistical Platform for Individualized Behavioral Analyses: Towards a New Era for Clinical Trials. (Hosted by Scott M. Sheehan July 30<sup>th</sup> 2014)

## 2013

64. **2013 NYU**, Torres, E.B Towards a new objective Psychological Science: A unifying framework to study the brain and body interactions in real time. (Hosted by Michael Landy)
65. **2013 Brown University**, Torres, E.B Bridging cognition and action through the re-afferent kinesthetic percept. (Hosted by Joo-Hyun Song)
66. **2013 DARPA**, Torres, E.B Transforming research, diagnosis and treatment effectiveness in ASD: Towards better social interactions. DARPA Strategic Social Interaction Module Meeting – (Hosted by William Casebeer)
67. **2013 CUNY Graduate Center**, Torres, E.B Unifying statistical framework to study real-time brain and body interactions in natural settings. (Hosted by Tony Ro)
68. **2013 NJ CHS**, Torres, E.B Autism: The Micro-movement perspective. Children's Specialized Hospital – (Hosted by Michael Dribbon)
69. **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 – (Hosted by Audrey Thurm)
70. **2013 Cal State San Marcos**, Torres, E.B Give spontaneity and self-discovery a chance in ASD. Summer Workshop Cal State San Marcos – (Keynote Speaker)
71. **2013 Sarnoff-SRI Princeton**, Torres, E.B Movement as a kinesthetic percept: Potential uses in clinical and sports applications. Sarnoff-SRI Corporation, Princeton Branch – (Hosted by Ajay Divakaran)

72. **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 – (Hosted by Eric Yang)

## 2012

73. **2012 Indiana University**, Torres, E.B Transforming the diagnostics criteria in Autism Spectrum Disorders. Indiana University Medical School – (Hosted by John I. Nurnberger)
74. **2012 CUNY Graduate Center**, Torres, E.B, Inherent connection between cognition and movement serves to objectively measure unconscious processes. CUNY Graduate Center – (Hosted by David Rosenthal)

## 2011

75. **2011 Johns Hopkins University**, Torres, E.B, Autism: The Movement Perspective. Johns Hopkins University, The Kennedy- Krieger Center – (Hosted by Stewart Mostofsky)
76. **2011 UCSD-INC**, Torres, E.B Two Movement Classes in Motor Control. UCSD, Institute for Neural Computation – (Hosted by Howard Poizner)

## 2010

77. **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 – (Hosted by Linda Smith)
78. **2010 UCSD-INC**, Torres EB, "Funneling attention in automated behavior" University of California, San Diego, Institute for Neural Computation – (Hosted by Howard Poizner)
79. **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 (Nano-symposium)
80. **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 – (Hosted by Jingang Yi)

## 2009

81. **2009 NCM Society**, Torres EB, Neural Control of Movement (NCM) Framing time for action: allocentric vs. egocentric references in the primate brain.
82. **2009 COSYNE**, Torres, EB, K. Heilman, H. Poizner COSYNE, Complementary roles of the Left Posterior Parietal Lobe and Basal Ganglia in reference frame usage

## 2008

83. **2008 College de France**, Torres EB, "Time from space: A system that simulates itself" College de France – (Hosted by Alain Berthoz).
84. **2008 Duke University**, Torres EB, "Computing time from space in the Primate Posterior Parietal Cortex" Duke University – Psychology – Neuroscience, – (Hosted by Henry Yin).
85. **2008 UT San Antonio**, Torres EB, "Internal Models in Sensory-Motor Integration", University of Texas San Antonio, Department of Biology – (Hosted by Nichole Wicha) PodCast [http://snrp.utsa.edu/Media/Torres\\_podcast.mp3](http://snrp.utsa.edu/Media/Torres_podcast.mp3)
86. **2008 Wellesley College**, Torres EB, "Self-Supervision in the Representational Cortex" Wellesley College – Neuroscience, – (February 18th, 2008, Hosted by Barbara Beltz)
87. **2008 COSYNE**, Invited Workshop "The cortical micro-circuit and cognitive function" (Lecturer), Computational Neural Systems (COSYNE, March 4th, 2008) 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>

## 2007

88. **2007 Northwestern University**, Torres EB, "Dynamics without movement" Northwestern University, Engineering and Applied Mathematics, – (February 19th, 2007, hosted by Sarah Solla).

89. **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).
90. **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](http://p9.hostingprod.com/@modha.org/blog/2007/07/elizabeth_torres_three_buildin.html)
91. **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

92. **2006 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>
93. **2006 UCSD**, Torres EB, Geometric Planning in the Posterior Parietal Cortex: Learning Time from Space Calit2-UCSD The Inaugural Lecture (May 17th 2006, hosted by Javier Movellan)  
<http://www.calit2.net/events/popup.php?id=807>, <http://inc2.ucsd.edu/inc-calit2seminars.html>

## 2005

94. **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.

## 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

My technologies and patents have been licensed from Rutgers University to SiLAS Solutions (Social Interactive Learning Avatar Software for Social Emotional Learning curricula) <https://www.silassolutions.com/> serving over 150 schools and over 22,141 students (22% with disabilities) across the US and Canada.



## **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

### *Selected Research Awards won by Student Advisees*

Hannah Varkey (Pre-Med Student)

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

Theodoros Bermperidis (PhD Student)

- Nancy Lurie Marks Family Foundation Postdoctoral Scholar (2023)
- Greek Gerondelis Fellowship (2020)

Mona Elsayed

- Nancy Lurie Marks Family Foundation Postdoctoral Scholar (2023)

Richa Rai (PhD Student)

- Dean's Excellence Fellowship (2018)
- Northwestern University Shirley Ryan Ability Lab Postdoctoral Fellowship (2024)

Jihye Ryu (PhD Student)

- Fellowship of Excellence in Computational and Data Science, Rutgers Discovery Informatics Institute (2018)
- Qualcomm Innovative Fellowship Finalist (2016)

Vilemini Kalampratsidou (PhD Student)

- Qualcomm Innovative Fellowship Finalist (2016)
- Greek Gerondelis Fellowship (2015)

Jillian Nguyen (PhD Student)

- NSF Graduate Fellowship (2014)

Sejal Mistry (undergraduate)

- Fulbright Fellowship (2018)
- Rutgers Research Aresty Travel Award

Ushma Majmudar (undergraduate)

- Albert Einstein Medical School Fellowship (2019)
- Chancellor's Excellence Research Award (2018)
- Rutgers Research Aresty Travel Award

Uri Yarmush

- First Place to Aresty Poster competition (2009)
- Rutgers Research Aresty Travel Award (2010)

## **Selected Employment Record of Trainees**

### *Industry*

Dr. Di Wu, Theoretical Physics – Apple (Cupertino, CA, US)

Dr. Vilemini Kalampratsidou, Computer Science, (Computer Analyst at Athena Research & Innovation center in Athens, Greece)

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. Jihye Ryu (Postdoctoral Fellow at UCLA Health Sciences)

Richa Rai (doctoral student graduating Dec 2023, Postdoctoral Fellow at Northwestern University from Jan 2024)

Mona Elsayed (doctoral student graduating Dec 2023, Postdoctoral Fellow at Rutgers University from Jan 2024)

Theodoros Bermperidis (doctoral student graduating Dec 2023, 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)