

BIOGRAPHICAL SKETCH

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NAME Sanger, Terence David	POSITION TITLE Assistant Professor of Neurology and Neurological Sciences, Division of Child Neurology		
eRA COMMONS USER NAME SANGER.TERRANCE			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
Harvard College	AB	1985	Applied Mathematics
Harvard University	SM	1986	Applied Mathematics
Harvard Medical School	MD	1993	Medicine
Massachusetts Institute of Technology	PhD	1993	Electrical Engineering

A. Positions and Honors**Positions and Employment**

1993-1994 Intern in Pediatrics, USC/Los Angeles County Medical Center, Los Angeles.

1993-1994 Research Staff, NASA Jet Propulsion Laboratory, Pasadena.

1995 Resident in Pediatrics, USC/Los Angeles County Medical Center, Los Angeles.

1995-1996 Clinical fellow, Children's Hospital Department of Neurology, Boston.

1995-1996 Postdoctoral Research Assistant, MIT, Boston.

1996-1999 Resident, Children's Hospital Department of Neurology, Boston.

1999-2000 Clinical Fellow, Movement Disorders Unit, Toronto Western Hospital.

2000- Assistant Professor of Child Neurology, Dept. Neurology and Neuroscience, Stanford Medical School. Director, pediatric movement disorders clinic and research laboratory

Other Experience and Professional Memberships

2001- Steering committee; Taskforce on childhood motor disorders.

2001- Steering committee; Childhood motor study group.

2001- Medical education committee; Worldwide Education for Movement Disorders (WE-MOVE)

2002- Research committee; Child Neurology Society.

2004- Scientific Advisory Board; Dystonia Medical Research Foundation

Professional Memberships: ASCAP, Sigma Xi, AMA, AAP, AAAS, IEEE, SFN, APS, CNS, AAN, AACPDM

Honors

1981 Westinghouse Science Talent Search 6th place winner

1985 Highest departmental honors in Applied Mathematics Magna Cum Laude

1985 Hoopes Prize for undergraduate thesis

1985 National Science Foundation Graduate Fellowship

1988 Medical Scientist Training Program Fellowship

1990 National Defense Science and Engineering Fellowship

1995 McDonnell-Pew Postdoctoral Fellowship

1996-1998 von Meyer Travelling Fellowship

2000 Dystonia Medical Research Foundation Millennium Award

2001 Pfizer scholars in pediatric research award

2003 United Cerebral Palsy Leaves of Hope award

2003 Hume scholars award

2004 Stanford Biodesign fellowship teaching award

B. Peer-reviewed publications

1. Sanger T.D., 1989, Optimal unsupervised learning in a single-layer linear feedforward neural network, *Neural Networks*, 2:459-473.
2. Sanger T.D., 1990, Analysis of the two-dimensional receptive fields learned by the generalized Hebbian algorithm in response to random input, *Biological Cybernetics*, 63:221-228.
3. Sanger T.D., 1991, A tree-structured adaptive network for function approximation in high dimensional spaces, *IEEE Trans. Neural Networks*, 2(2):285-293.
4. Sanger T.D., 1991, Optimal hidden units for two-layer nonlinear feedforward neural networks, *International Journal of Pattern Recognition and Artificial Intelligence*, 5(4):545-561, Reprinted in C. H. Chen, ed., *Neural Networks in Pattern Recognition and Their Applications*, World Scientific, 1991, pp. 43-59.
5. Sanger T.D., 1991, A tree-structured algorithm for reducing computation in networks with separable basis functions, *Neural Computation*, 3(1):67-78.
6. Dornay M., Sanger T.D., 1993, Equilibrium point control of a monkey arm simulator by a fast learning artificial neural network, *Biological Cybernetics*, 68(6):499-508.
7. Sanger T.D., 1994, Neural network learning control of robot manipulators using gradually increasing task difficulty, *IEEE Trans. Robotics and Automation*, 10(3):323--333.
8. Sanger T.D., 1994, Optimal unsupervised motor learning for dimensionality reduction of nonlinear control systems, *IEEE Trans. Neural Networks*, 5(6):965--973.
9. Sanger T.D., 1994, Theoretical considerations for the analysis of population coding in motor cortex, *Neural Computation*, 6(1):12--21. Reprinted in L. Abbott and T. Sejnowski, ed.s, *Neural codes and distributed representations*, MIT Press, 1999, pp. 45--53.
10. Sanger T.D., 1996, Probability density estimation for the interpretation of neural population codes, *J. Neurophysiology*, 76(4):2790--2793.
11. So G.M., Thiele E.A., Sanger T.D., Schmid R., Riviello J.J., 1998, Electroencephalogram and clinical focalities in juvenile myoclonic epilepsy, *J. Child Neurology* 13(11):541-545
12. Sanger T.D., Jain K.D., MERRF syndrom with overwhelming lactic acidosis, *Pediatric Neurol.* 14(1):57-61.
13. Sanger T.D., 1998, Probability density methods for smooth function-approximation and learning in populations of tuned spiking neurons, *Neural Computation*, 10:1567-1586.
14. Bara-Jimenez W., Shelton P., Sanger T.D., Hallett M., 2000, Sensory discrimination capabilities in patients with focal hand dystonia, *Ann Neurol*, 47(3):377-380.
15. Sanger T.D., Merzenich M.M., 2000, Computational model of the role of sensory disorganization in focal task-specific dystonia, *J. Neurophysiology*, 84(5):2458-2464.
16. Sanger T.D., 2000, Human arm movements described by a linear superposition of principal components, *J. Neuroscience*, 20(3):1066-1072.
17. Sanger T.D., Tarsy D.M., Pascual-Leone A., 2001, Abnormalities of spatial and temporal sensory discrimination in writer's cramp, *Movement Disorders*, 16(1):94-99.
18. Sanger T.D., Garg R. R., Chen R., 2001, Interactions between two different inhibitory systems in human motor cortex revealed by transcranial magnetic stimulation, *J. Physiology*, 530(pt. 2):307-317.
19. Sanger T.D., Pascual-Leone A., Tarsy D.M., Schlaug G., 2002, Nonlinear sensory cortex response to simultaneous tactile stimuli in Writer's Cramp, *Movement Disorders*, 17(1):105-111.
20. Sanger T.D., 2002, Decoding neural spike trains: calculating the probability that a spike train and an external signal are related, *J. Neurophysiology*, 87(3):1659-1663.
21. Sanger T.D., Taskforce on Childhood Motor Disorders, 2003, Classification and Definition of Disorders causing Hypertonia in Childhood, *Pediatrics*, 111:e89-e97.
22. Sanger T.D., Lang A.E., 2003, Case Studies in Pediatric Movement Disorders (video CD-ROM), *Movement Disorders special supplement*.
23. Thelen D.D., Riewald S.A., Asakawa D.S., Sanger T.D., Delp S.L., 2003, Abnormal coupling of knee and hip moments during maximal exertions in persons with cerebral palsy, *Muscle Nerve* 27(4):486-493.
24. Sanger T.D., 2003, Childhood-onset generalized dystonia can be modeled by increased gain in the indirect basal ganglia pathway, *J. Neurol Neurosurg Psychiatr*, 74(11):1509-15.
25. Sanger, T.D., 2004, Failure of motor learning for large initial errors., *Neural Comput.*, 16(9):1873-86.
26. Sanger, T.D., Kaiser, J., Placek, B., 2005, Reaching movements in childhood dystonia contain signal-dependent noise, *J Child Neurol*, 20:489-496.

27. Ben-Pazi, H., Kukke, S., Sanger, T.D., 2006, Poor penmanship in children correlates with abnormal rhythmic tapping: A broad functional temporal impairment, *J Child Neurol*, in press.
28. Sanger, T.D., Kukke, S., 2006, Abnormalities of Tactile Sensory Function in Children with Dystonic and Diplegic Cerebral Palsy, *J Child Neurol*, in press.
29. Sanger, T.D., 2006, Arm trajectories in dyskinetic cerebral palsy have increased random variability, *J Child Neurol*, in press.
30. Malfait, N., Sanger, T.D., 2006, Does dystonia always include co-contraction? A study of unconstrained reaching in children with primary and secondary dystonia, *Exp Brain Res*, in press.
31. Sanger, T.D., Kukke, S.N., Sherman-Levine, S., 2006, Botulinum toxin B improves speed of reaching in children with cerebral palsy and arm dystonia: an open-label dose-escalation pilot study, *J Child Neurol*, in press.
32. Sanger, T.D., taskforce on childhood motor disorders, 2006, Definition and classification of negative motor signs in childhood, *Pediatrics*, 118;2159-2167.