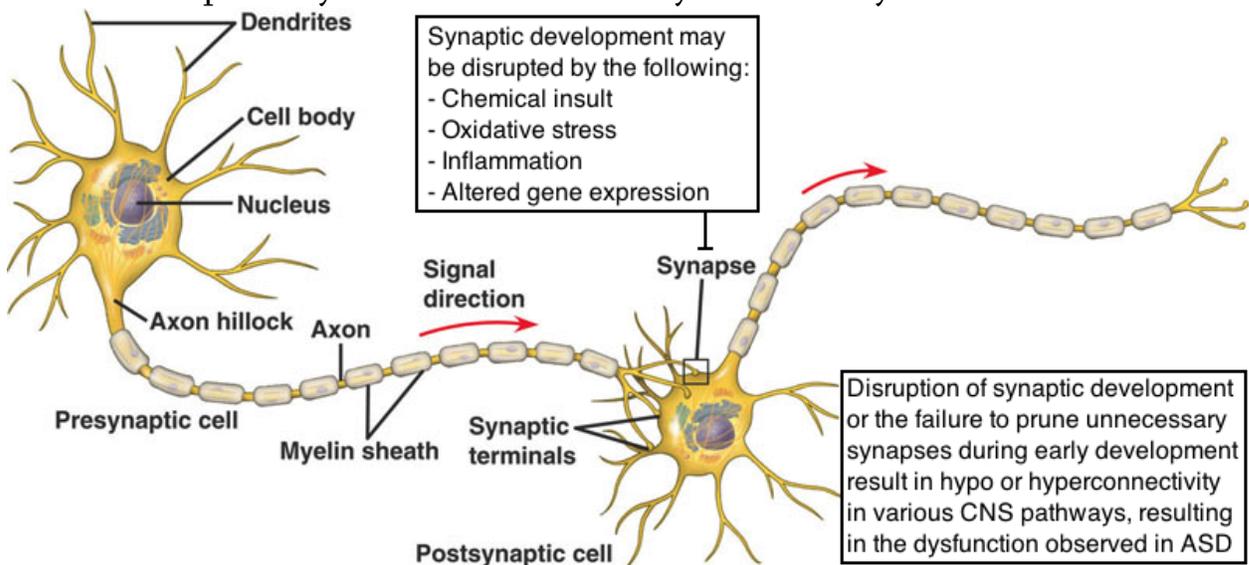


## How does **Connectivity Guided Neurofeedback** improve the Autism brain?

- 1) Autism Spectrum Disorder (ASD) is a developmental disorder in which neuronal pathways do not form correctly in the first years of life.



- 2) Coherence/connectivity measurements determine the strength of a neuronal pathway. Ensuring accurate measurements of these pathways is of the utmost importance for developing accurate neurofeedback training protocols.
- 3) Traditionally, neurofeedback practitioners use pairwise coherence that assume a flat, 2-dimensional space when the space is actually 3-dimensional. Traditional measurements do not correctly identify the abnormalities that have been discovered in ASD.
- 4) Connectivity Guided Neurofeedback uses Principal Component Analysis (PCA) of the EEG with *NeuroRep* software to accurately measure multivariate coherence.

“EEG coherence between two points is strongly related to the distance between them, being inflated by volume conduction effects at short distances and reduced by signal phase differences at larger distances....Adjusting coherence values to remove systematic variability due to inter-electrode distances better represents cortico-cortical coupling and allows more efficient statistical analysis.”

Barry, R.J., Clarke, A.R., McCarthy, R., & Selikowitz, M. (2005). Adjusting EEG coherence for inter-electrode distance effects: An exploration in normal children. *International Journal of Psychophysiology*, 55, 313-321.

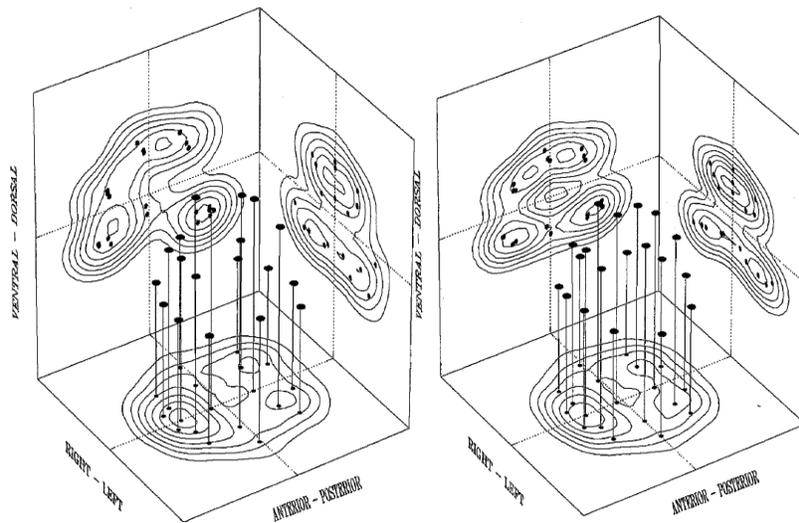
“In particular, the differences between pair-wise and multichannel...results show unequivocally that in most cases, the pair-wise estimates are incorrect and

a complete set of signals involved in a given process has to be used to obtain the correct pattern of EEG flows.”

Kus, R., Kaminski, M., Blinowska, K.J. (2004) Determination of EEG activity propagation: pair-wise versus multichannel estimate. *IEEE Trans Biomed Eng.* 51(9):1501-10.

- 5) **NeuroRep**, a multivariate coherence measurement tool, correctly assesses the 3-dimensional waveforms in the Autism brain.

**NeuroRep QEEG Analysis**  
Principle Component Analysis of EEG Waveforms



(Hudspeth, 1987, 1990)

- 6) By using the proper measurements with **NeuroRep** and doing neurofeedback training based off of these measurements, the neuronal messenger delivery system is enhanced to improve overall cognitive, social, and behavioral, and language functioning in Autism.
- 7) **Connectivity Guided Neurofeedback** improves the symptoms of Autism by improving undeveloped neuronal pathways and the ability of the brain to relay messages.
- 8) **NeuroRep** QEEG maps allow for pre and post comparisons and reveal improved outcomes of corrected 3-dimensional coherence.

**Contact Information**

[www.theneuroconnection.com](http://www.theneuroconnection.com)

Ann L. Rigby, LCSW, BCN

[arigby@theneuroconnection.com](mailto:arigby@theneuroconnection.com)

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