A patient case study by Dr. Robert Coben, 2007.

The patient presented as a 5-year, 11-month-old boy with a diagnosis of pervasive developmental disorder, not otherwise specified. According to his parents, he showed regression at the age of 18 months, became echolaliac with flapping hands, and did not develop speech utterances until the age of 4 years (echolalia involves the parrot-like echoing of the sounds and words made by another and is a symptom of ASDs and also of schizophrenia). Symptom presentation included problems with attention, communication, pragmatics, social skills, eye contact, hyperfocusing, and poor transitioning. Neuropsychological testing, performed in our office, resulted in average intelligence and cognitive impairments related to attention, comprehension, and executive functions. Autistic rating scales were elevated consistent with his diagnosis and related symptoms. Selected findings from his baseline QEEG are shown in Figure 3. These data are significant for elevations of theta activity (relative power) over the posterior frontal cortex, especially on the right side over F4. No significant findings are present for power asymmetry. Coherence findings show some excessive coherence over central derivations.

Based on these data, excessive coherence appears evident between central and lateral frontal locations across theta, alpha, and beta bands. Considering this information, we chose the site between C4 and F8 and C3 and F7 as the most critical sites of training. According to the 10/10 system of electrode placement, these locations would be FC6 and FC5. These would roughly correspond to Brodmann (Brodmann, 1909) areas 8–6, the premotor–supplementary motor cortices (superior frontal gyrus). The neurofeedback protocol included an active electrode at FC6, reference electrode at FC5, and ground on the left ear (A1). Figure 5 shows the placement of these electrodes on a schematic of the 10/10 system. The reward band included 7 to 12 Hz, and inhibit were set for 1- to 7-Hz and 20- to 30-Hz bands. This protocol was followed, without change or addition, for 15- minute sessions, twice per week for a total of 20 sessions.

Following this period of 10 weeks, a reevaluation was conducted, including another QEEG. The participant’s mother reported that he had improved and stated that he is definitely more focused and his concentration is better. His schoolwork has improved, he listens to directions, and now follows two- and three-step directions. He does not get upset like he used to. His teachers also report improvements in math and other work.
Readministration of autistic ratings scales to his parents showed a 45% reduction in such symptoms. These included problems related to communication, socialization, and restricted patterns of behavior. Neuropsychological testing showed improvements on tests of attention, comprehension, and sequencing/motor planning to average levels for his age group. Figure 6 shows the difference or change scores for QEEG connectivity. These difference scores reflect changes in cerebral connectivity between the baseline and follow-up QEEG measurements. These findings clearly show a reduction in connectivity in theta, alpha, and beta bands across temporal, central, and especially frontal regions. These are exactly the regions of hyperconnectivity seen in the participant’s initial QEEG. As a result of these changes, significant clinical improvements have occurred as reviewed above.

**Conclusions**
Recent research has shown that autistic disorders have as their basis disturbances of neural connectivity. Neurofeedback seems capable of remediating such disturbances when these data are considered as part of treatment planning. Connectivity-guided neurofeedback is capable of significantly remediying these anomalies and reducing autistic symptoms. The case study reviewed above is an example of how this can be done. The emphasis was on hyperconnectivity. Likewise, hypoconnectivity can be remedied with coherence training and other neurofeedback approaches.
References


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