

Case Report: Neurofeedback to deal with Behavior Difficulties

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Abstract

This case report presented a subject, client J who exhibited emotional and behavioral problems which affected his socialization and learning significantly. This client undertook 20 sessions of clinical neurofeedback. The clinical neurofeedback protocols were designed according to a Bottom-up approach with Quantitative Electroencephalogram (QEEG) as a reference. Client J showed significant changes in EEG at the training sites along with changes in problematic behaviors. This finding, while preliminary, suggests that a bottom-up approach may be useful one for designing effective protocols. However, there are other factors likely to have contributed to positive outcomes in this case. In particular, the subject had undertaken early intervention and also participated in other therapies. The parents support and commitment during the period that neurofeedback took place is also likely a significant factor.

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Keywords: Clinical Neurofeedback; Quantitative Electroencephalogram (qEEG brain mapping); Trauma Resilient Model (TRM); Social; Emotional, Behavior

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1. Introduction

Emotional and behavioral problems amongst children has increased over the past few years with a prevalence of 10% to 20% amongst children in 11 Asian countries (Srinath, Kandasamy & Golhar, 2010). Emotional problems such as anxiety, irritability, and fear along with behavioral problems such as aggression and sleep problems have been found to affect the quality of life and well-being of children (Idris, 2017).

Cognitive-behavioral therapy (CBT) is a prominent treatment for emotional and behavioral issues amongst children as well as adolescents (Higa-McMillan et al., 2016), yet, it might not be suitable for individuals who lack cognitive maturity or the necessary operational thinking (Kurniawan, 2018). Clinical neurofeedback, on the other hand, can be applied with children of almost any age. (Duric et al., 2012).

2. Case History

A 13 years old teen, client J was recruited for this case report. J underwent a natural birth, and no early physical developmental problems were reported. However, J experienced language delayed when he was young. He can speak fluently in English.

Currently, J could be described as having poor coordination and rather limited physical abilities. In school, he has only a few friends. He lacks confidence when dealing with his peer group and displays avoidant behaviour. Emotionally, he gets tense very easily when facing problems especially during exams and home tuition. He can be agitated and displays some behaviour problems which seem to relate to underlying anxiety. J also has significant difficulty with sleep onset.

Between the ages of 3 and 8, J had Occupational Therapy (OT). He has undergone ongoing therapy sessions in order to prepare him for participating fully at school and in social situations. He also underwent speech therapy as he suffered from language delays. Speech therapy aimed to improve his language development, communication, and pragmatic language skills.

3. Assessment and Treatment

3.1. *Quantitative Electroencephalogram (qEEG) Brain Mapping*

The QEEG indicated a dominance of slow frequencies relative to the database. This is consistent with the possibility of difficulties in maintaining external focus and difficulty with detail and language processing. There was a high Theta to Beta ratio which can correlate with an internal focus of awareness. The QEEG also indicated a high beta peak frequency that may be associated with hyper-vigilance.

The QEEG also indicated poor Alpha blocking at posterior sites. This can be associated with sensory processing issues. Furthermore, low alpha connectivity is found at C3/C4 and P3/P4. This is consistent with possible difficulties in maintaining a quiet awareness state.

3.2. *Neurofeedback Protocol*

J's clinical neurofeedback protocol focused on increasing amplitudes in the SMR (12-15hz) and Alpha range. The first module of 10 sessions aimed to improve self-control, sleep, and processing skills. For the second module, clinical neurofeedback training aimed to reduce anxious feelings and improve social behavior. 2 modules of clinical neurofeedback session included 10 sessions training at C3 and C4 with the aim of improving his self-control. 15 sessions at O1 and O2 with the aim of improving his processing skills, 10 sessions at F7 and F8 with the aim of reducing anxiety and 5 sessions at T5 and T6 with the aim of improving his social behavior by understanding social cues. The details regarding the 20 sessions of clinical neurofeedback are shown in Table 1.

Table 1. Clinical Neurofeedback training protocols.

Module	Session	Training Protocol			Training Mode
Module 1	1-10	C3 + C4	+	SMR	Game
		O1 + O2	+	Low Beta (12-15hz)	Movie
Module 2	11-15	O1 + O2	+	Low Beta (12-15hz)	Movie
		F7	+	Low Beta (12-15hz)	Movie
	F8		Alpha 1		
	16-20	F7	+	Low Beta (12-15hz)	Movie
		F8		Alpha 1	
		T5 + T6	+	Low Beta (12-15hz)	Movie

3.3. Outcome of Intervention

Throughout the training, there were significant changes in brainwave activity that were consistent with the neurofeedback training. J also showed some positive changes in his emotions and behaviors. A post QEEG whole-brain mapping was conducted which showed the changes in brain pattern after the training session. For detailed information, refer to Table 2 for the outcome of training.

Table 2. The outcome of clinical neurofeedback training.

Presenting Problem	Outcome
Hard to fall asleep at night.	Fall asleep easier at night with better sleep quality.
Feel tired during daytime.	Feel more energetic during daytime.
Feel agitated easily.	Reduced frequency of agitation.
Sudden outbursts when facing some problems.	Less impulsive and willing to listen to others.
Feel anxious easily when sitting for an exam.	Feel calm and less impulsive during the exam period.
Inappropriate social behavior.	No noticeable change in social behavior.

4. Conclusion

In conclusion, J showed good progress and his mother was very satisfied with the improvements. It is my view that stabilization in the posterior cortex and across the sensorimotor strip ideally precedes training at frontal sites (Bottom-up approach). This order of training may have influenced positive outcomes in this case. It is conceded however, that this is only single case and there are other factors that may well have contributed to the outcomes. It is also my view that J is likely to have benefited from further neurofeedback sessions.

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