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Neurointegral Methodology in Adaptive Neurosciences (Case Study - 2)

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ABSTRACT: Brain is the most complex organ in the human body. Brain is responsible for everything we do, from thinking and feeling to moving and breathing. This paper presents a clinical study on mental well – being and how neurointegral methodology-based adaptive neurosciences can be a catalyst in how neurointegral intervention program can be optimally exploited towards achieving mental health. This new ‘Innovative Wave’, combines virtual reality therapies, relaxation techniques, cognitive stimulation, and other neuroscience-based strategies. Study depicts and opines that that with firm determination, personalized neuroscience-based therapies, and solid family support, it is possible to achieve positive and lasting changes in mental health. This paper is a testament to the transformative potential of adapted neurosciences in improving mental health and highlights the importance of the collaboration between science and compassion in finding effective solutions. Paper envisions a future decades ahead, recognizing the need for advancements in science and technology that would propel humanity forward.

KEYWORDS: Neurointegral Methodology, Adaptive Neurosciences, Mental Health, Neurofeedback and PTSD.

I. INTRODUCTION

Physical wealth is fine but mental health needs to be fine; at all costs and at all times. The world of VUCA, BANI, RUPT and TUNA will definitely impose pressures on mental health. It is the degree of resilience that would define the mental health quotient of an(y) individual. Whatever be the case; anxiety, depression, OCD, bipolar disorder or another debilitating condition, etc. a mental health endoscopic view is the order of the day. Neurointegral methodology in adaptive neurosciences pertaining to mental health, neurofeedback and PTSD, is a necessity today. Furthermore having a mental illness doesn’t mean you can’t accomplish a state of emotional or mental well-being. “You are not alone. You are seen. I am with you. You are not alone” ... said Shonda Rhimes. The new ‘Innovative Wave’ has commenced and the call is to adopt it in its entirety.

Aim

Why do human beings suffer? Aim of this paper is to advocate for the catalytic role of neurointegral methodology in adaptive neurosciences pertaining to mental health geometry. A real – life case study has been adopted to make an in depth analysis and draw inferences.

The Case

‘The challenge for the next century is going to be what we don't do rather than what we do. And in the history of our species so far, progress has been a function of what we do. Progress has never been a function of what we say no to. And now the strange reality is that we actually need to learn when and how to say no, collectively’

..... Mustafa Suleyman

This is the case of a Subject (name concealed for obvious reasons and hereafter called as Subject), aged @ 37 years (DOB: 28 Oct 1987), resident of Pitalito, Huila, Colombia, and a College student by Profession. As regards social

background, the Subject has problems of being emotional and being angry. There are no symptoms or case history of problems in relationship, problems of death of family member / friend, problems in job loss, problems in financial problems, problems of housing / school, legal problems, problems in arrests, problems in divorce, problems in parenting, problems in victim of physical abuse, problems in forced to have sex, problems in victim of sexual abuse, being afraid of partner and being a member of family. The Subject is a University educated person. Subject has a brother and father as part of his family environment and support. However, there is a psychological observation of difficulty in speech (suspected case of Dysarthria assumed to be a result of brain changes occurring in some conditions affecting the nervous system), movements of the right leg and both hands. Subject has received psychological or psychiatric treatment.

This Subject has communication difficulties and PTSD symptoms. Subject presented difficulty in effective communication and symptoms caused by post-traumatic stress (PTSD). Some suspected areas are; Agitation, Nervousness and anxiety, Problems with concentration or thinking, Problems with memory, Headaches, Depression and crying spells, Suicidal thoughts or attempts, Mood swings, Obsessive-compulsive tendencies, Panic episodes, Paranoia, Shakiness, Substance abuse, Flashbacks, Hyper vigilance, Nightmares, and Sleep disturbances. Subject was the victim of a traffic accident at the age of 13, which caused skull fractures, very serious traumatic brain injuries, and large-scale injuries to his body. Subject was in a coma for 11 months and, upon awakening, was a quadriplegic for approximately four years. This case presented different triggering consequences. In addition to gait problems, the Subject's language ability was affected. Different rehabilitation sessions were carried out in a constant and disciplined manner and at no time was a history of diseases that could alter cognitive and motor development reported. He also had no history of difficulties in learning at school. Subject has a delay in the mobility of the upper extremities, which makes it difficult for him to perform daily living tasks such as dressing, eating or washing himself. Subject has a mobility deficit in one of his lower extremities, which makes it difficult for him to walk independently. In addition, Subject has a speech deficit, which makes it difficult for him to communicate effectively.

There have been no complaints or presentation of Nervous system: Headaches, Seizures, Dizziness, Paralysis, Mental Disorders, Cardiovascular: Hypertension, Heart Attacks, Angina, Murmurs, Arrhythmias, Coronary Heart Disease, Hemo-Lymphatic System: Anemia, Blood Disorders or Coagulation Problems. Digestive system: Ulcer, Gastritis, Cirrhosis, Diverticula, Colitis, Hemorrhoids, Respiratory: Asthma, Emphysema, Laryngeal or Bronchi Affection, Urinary: Kidney Failure, Stones, Bloody Urine, Frequent Infections, Diseased Prostate, Sense Organs: Cataracts, Terygium, Nearsightedness, Otitis, Deviated Septum, Sinusitis, Tonsillitis, Endocrine - Metabolic: Diabetes, Thyroid Diseases, Alterations In Blood Fats or Uric Acids, Osteo-Articular: Spine Diseases, Knee Pain, Deformities, Immunological: Lupus, Rheumatoid Arthritis, Infectious: Hepatitis, Tuberculosis, AIDS or HIV (+), Sexually Transmitted Diseases, Cancer, Tumors, Radiotherapy or Chemotherapy, Surgeries, Traumas, (Accidents), Gynecological: Tumors or Masses in the Ovaries, Uterus, Abnormal Menstruation, Mammary glands: Pains, Masses, Secretions, Pathological or Abnormal Vaginal Cytology, Allergic Reactions, and Skin Infections.

Provisional Orientation: The experience of trauma (constant tiredness, exhaustion, confusion, sadness, anxiety, agitation, numbness, dissociation, confusion, physical arousal, and blunted affect) has long-lasting effects on brain development and results in a variety of clinical manifestations (valuable observable symptoms) related to the nervous system's ability to cope with it (Roxana Sasu). 'It's important to learn about the impact of trauma and what a diagnosis of PTSD means. Not everyone who has had an experience of trauma will meet criteria for PTSD. In some instances, there can be a delayed reaction to trauma which might lead to a PTSD diagnosis some time after the trauma has occurred' (Bisma Anwar). Post-traumatic stress disorder (PTSD) is a mental health condition that can develop in response to PTSD causes such as extreme trauma. To understand the differences between PTSD and trauma, know that PTSD is marked by repeated flashbacks, nightmares, and a range of other symptoms in response to experiencing a trauma. A PTSD diagnosis may follow a traumatic event, but not all traumatic events result in PTSD. When considering research options for PTSD, including EEG, QEEG (Quantitative EEG), and fNIRS (functional Near-Infrared Spectroscopy), it's important to weigh their respective advantages and limitations. Dealing with PTSD can be challenging, especially if you're trying to do it without therapy or knowledge of self-help resources that can help. PTSD is often manifested in the back of the head (parietal lobe): 'the back regions of the brain inhibit the front regions, while in people with damage to the back regions, the front regions become too active, which may lead to mental illness and tissue shrinkage' (Taylor). PTSD develops in a different way from person to person for the reason that everyone's nervous structure and acceptance for tension is a little dissimilar. For PTSD, cognitive therapy frequently is used all along with exposure psychoanalysis along with psychotherapy, medications, or a combination of psychotherapy and medications. Subject's communication difficulties are a result of the traumatic brain injuries he suffered in the accident.

PTSD symptoms are also a consequence of trauma. It is recommended to continue rehabilitation to improve the Subject's communication skills and quality of life.

Session No. 1

In the first provisional observation session, a complete interview was conducted about the different aspects and background of his pathology. Subject was guided about sequence of sessions and exercises that Subject should perform on an inter-daily basis, as well as habits that Subject should practice to reinforce the movement of extremities and improve their mobility. A sequence of activities was established to be carried out on an inter-daily basis to improve the sessions. This sequence included a virtual and in-person package. Objective of the session was to evaluate anxiety levels, interview and case analysis.

Subject stated that he has been treated by various professionals, but that his symptoms have not improved significantly. Subject also stated that he has gone through anxiety since he cannot communicate fluently and tends to be stressful, which causes moments of despair and frustration. Under persistent stress, the body continuously produces high amounts of cortisol, the main glucocorticoid that is released from the adrenals HPA axis (hypothalamus hypophyses adrenal axis) is an integral part of the body's stress response. While short-term stress and the activation of the HPA axis can actually have benefits by preparing the body for challenges (such as a “fight or run” reaction), chronic or long-term stress can have damaging consequences. Upon receipt of these information, clinical interview and neuro and biofeedback sampling (Electromyogram; EMG) to measure muscle tension, Electro Dermal activity (EDA) to measure changes in perspiration rate, Finger pulse measurements to measure blood pressure and heartbeat and Electroencephalogram (EEG) to measure the electrical activity of brain was resorted to.

Provisional Interventions

Neuro - and biofeedback sampling revealed high levels of anxiety, measured by increased activity in the medial prefrontal cortex. Low levels of attention and concentration were also observed, measured by decreased activity in the superior parietal cortex. Muscle tension was evidenced by increased activity in the neck and shoulder muscles. These results suggest that the Subject is experiencing a high state of anxiety, which could be affecting his ability to pay attention and concentrate. Muscle tension could also be contributing to these symptoms.

Diagnosis	Signs and Symptoms	Consequences
Neurological & cognitive effects related to traumatic brain injury & post-traumatic stress disorder (PTSD)	<ul style="list-style-type: none"> • Limited mobility in left upper & left lower extremities • Intelligible language • Weakness 	<ul style="list-style-type: none"> • Difficulty carrying out activities of daily living • Limitations at work or school • Communication problems • Difficult to focus.

Head trauma can cause a variety of neurological and cognitive effects, which can include problems with mobility, language, memory, and concentration. Post-traumatic stress disorder (PTSD) can also cause a variety of symptoms, which can include anxiety, flashbacks, and difficulty sleeping. In this case, the Subject has limited mobility in the left upper and lower extremities, suggesting damage to the central nervous system. Subject has intelligible speech and weakness, suggesting that damage is not severe enough to cause significant disability. Mobility, language and concentration problems can have a significant impact on a Subject's life. They can make activities of daily living, such as dressing, eating, and bathing, difficult. They can also limit the Subject's ability to work or study. In this case, generalized anxiety is a consequence of head trauma and PTSD. Anxiety can cause a variety of symptoms, which can include nervousness, restlessness, difficulty concentrating, and difficulty sleeping.

Session No. 2

Emotions saturate personal, community, and practiced spheres of people's lives. “*Emotions are conscious mental reactions (such as anger or fear) subjectively experienced as strong feelings usually directed toward a specific object and typically accompanied by physiological and behavioral changes in the body*”. In the second provisional observation session, aim was to manage emotions via. in - person sessions. Use of virtual reality, as a therapeutic tool

to explore emotions in a new and safe way, was adapted to Subject's physical mobility disability. Some activities adopted and experimented were; Subject preparation with virtual reality headset and headset, introduction to a serene and peaceful environment, exposure to challenging emotional situations, such as arguments with friends or job interviews, guidance in the recognition and management of emotions in these situations, presentation of situations that allowed him to express positive emotions, such as time with family and friends and time for reflection and dialogue.

Provisional Interventions

The session was an important step in Subject's journey toward emotional management and well-being. It gave him a unique way to explore and understand his emotions. Adapting the session to his needs was essential so that he could participate fully. The training was a valuable resource for Subject, helping him identify his emotions and develop strategies to manage them.

Session No. 3

Many studies have shown that relaxing one's muscles markedly reduces anxiety. Over time, people learn to be anxious and tense; in the same way, people can teach themselves how to relax. In the third provisional observation session, aim was to reinforce diaphragmatic breathing and muscle relaxation techniques via. in - person sessions. During this session, exercises focused on diaphragmatic breathing and muscle relaxation was carried out, with the purpose of helping Subject manage stress and encourage relaxation. The session was carefully tailored to address the specific needs of his physical mobility disability. Some activities adopted and experimented were; Subject was placed in a comfortable position and given support to maintain proper posture, benefits of diaphragmatic breathing and muscle relaxation techniques for his physical and emotional well-being were reiterated, clear instructions were offered on how to perform deep breathing, focusing on expanding the abdomen rather than the chest, and Subject was guided to identify muscle groups in your body that he could consciously tense and then relax.

Provisional Interventions

When the diaphragm is functioning effectively in its role as the primary muscle of inspiration, ventilation is efficient and the oxygen consumption of the muscles of ventilation is low during relaxed (tidal) breathing. The session was an important step toward Subject's emotional and physical well-being. He was provided with valuable tools to manage stress and promote relaxation. Adapting the session to Subject's needs was essential for him to fully participate. The booster session was an opportunity for Subject to practice and consolidate the diaphragmatic breathing and muscle relaxation techniques he had learned in Session 2. The session was carefully adapted to address his physical mobility disability, allowing Subject to participate fully. Diaphragmatic breathing and muscle relaxation exercises can be valuable tools to help people manage stress and promote relaxation. Subject was grateful for the techniques he learned and expressed his desire to continue working on them to improve his overall well-being.

Session No. 4

In the fourth provisional observation session, aim was to train Subject in self-control (ability to not show your feelings or not do the things that your feelings make you want to do) techniques. Self-control techniques were performed to help Subject control his emotions and reactions in challenging situations. The session was carefully adapted to address Subject's physical mobility and speech disabilities. Some activities adopted and experimented were; Deep breathing exercises were performed, appropriate for comfort in the chair, Exploration of challenging situations that Subject had previously faced, practicing applying the self-control techniques learned in those circumstances and Identification of signs of stress and anxiety, with the development of strategies to manage them constructively.

Provisional Interventions

The session represented a significant advance towards emotional control (regulating thoughts, feelings, and behaviors to achieve specific goals or avoid undesirable outcomes) and well-being, providing valuable tools for emotional self-control. Meticulous adaptation to individual needs was essential to ensure full participation. The training offered the opportunity to learn and practice self-control techniques effectively. The session was carefully adjusted to address speech and physical mobility impairment, allowing for full participation. Self-management techniques can play an essential role in helping people manage their emotions and responses in challenging situations. Gratitude was

expressed for the techniques learned and a desire to continue working on them to improve overall well-being. Especially, progressive visualization exercises can be a valuable tool to help control emotions and responses. The use of a videoconferencing platform facilitated a meaningful and personalized interaction, allowing concerns to be expressed and questions asked about self-control techniques.

Session No. 5

In the fifth provisional observation session, aim was to monitor reactions to virtual scenarios and high tension (egg on nervous system regulation) via. in - person sessions. High-tension virtual scenarios (realistic scenario-based training scenario) were used to help Subject develop his emotional self-control skills. The session was carefully adapted to address speech and physical mobility disabilities. Some activities adopted and experimented were; Subject was presented with a series of virtual scenarios designed to elicit emotional responses and high-tension situations, Subject was encouraged to share his thoughts and emotions, including his visual communication and worked with Subject to develop strategies to more effectively deal with these high-tension virtual situations.

Provisional Interventions

This session represented a significant milestone in Subject's progress toward emotional self-control and effective management (reference towards experience of distress, dissociation, addiction, or desensitization) of stressful situations. In this safe and controlled environment, he was able to practice his self-control skills effectively. Accurately tailoring the session to individual needs was essential to ensure their full participation. This facilitated his ability to share his thoughts and emotions in response to high-tension virtual scenarios. In summary, this session not only strengthened self-management skills but also highlighted the importance of a personalized and tailored approach to addressing individual needs in the process of emotional and personal development. High-tension virtual scenarios offered an opportunity to experience various emotional situations in a safe and controlled manner. This allowed him to learn to identify signs of stress and anxiety, as well as develop constructive strategies to manage them. The use of a virtual reality platform enriched the experience, allowing him to immerse himself in the scenarios in a more immersive and realistic way. This contributed to his learning and helped him apply his experiences to real-world situations. Subject expressed gratitude for the opportunity to participate in the session and expressed confidence that the skills acquired would greatly assist him in dealing with emotional challenges in the future.

Session No. 6

In the sixth provisional observation session, aim was to monitor reactions to cognitive work and relaxation (lead to changes in cognition and behaviour) via. in - person sessions. Cognitive and relaxation exercises were performed to help Subject maintain his emotional and cognitive well-being. The session was carefully adapted to address speech and physical mobility disabilities. Some activities adopted and experimented were; Subject participated in cognitive stimulation exercises focused on logical thinking, memory and problem solving and relaxation exercises were also carried out, including deep breathing techniques and meditation.

Provisional Interventions

This session represented a significant milestone in Subject's journey toward a better quality of life. It provided Subject with valuable tools (cognitive-behavior therapy) to keep mind active and find moments of calm, despite the physical challenges he faces. Accurately tailoring the session to Subject's needs was critical to ensuring his full participation. The cognitive work and relaxation exercises offered Subject the opportunity to practice and consolidate the skills acquired in previous sessions. Careful adaptation to address his physical mobility disability allowed for his full participation. Cognitive exercises helped keep Subject's mind active and prevented cognitive decline (reduce physical and emotional disability). On the other hand, relaxation techniques helped him reduce stress and anxiety (coping skills seem to be effective), improving his concentration and his ability to enjoy life. Subject expressed her gratitude for the opportunity to participate in the session and expressed confidence that the skills gained (skills cognitive restructuring and relaxation) improved his overall well-being in the future. In particular, brain gymnastics exercises can be useful for people with disabilities, as they can improve cognitive function and stimulate communication (driving mechanisms of change) between neurons. Likewise, desensitization exercises in the neck, head and acupressure can be beneficial in reducing pain and muscle tension in people with disabilities, contributing to the release of muscle tension and improving blood circulation.

Session No. 7

In the seventh provisional observation session, aim was to monitor reactions to cognitive exercises (boost and maintain brain function) performed to help Subject improve his memory, attention, concentration, and problem solving. The session was carefully adapted to address Subject's physical mobility and speech disabilities. Some activities adopted and experimented were; Subject participated in exercises involving memory, attention and problem solving. Subject used visual and tactile tools to stimulate his memory and cognition. Subject answered questions that challenged his logical thinking and creativity.

Provisional Interventions

This session represented a significant advance in Subject's cognitive development. It provided Subject with valuable tools to keep mind active and engaged in learning. Accurately tailoring the session to Subject's needs was critical to his effective participation. The session focused on consolidating memory and enhancing his cognition, allowed Subject to practice and reinforces the skills acquired in previous sessions. Careful adaptation to address Subject physical mobility disability ensured his full participation. The cognitive exercises contributed significantly to the improvement of their memory, attention, concentration and problem-solving skills. This allowed Subject to think more clearly and effectively, generating a feeling of achievement and motivation. Subject expressed his gratitude for the opportunity to participate in the session and expressed confidence that the skills acquired would greatly assist Subject in improving overall well-being in the future. Particularly, exercises focused on memory, attention and problem solving proved to be beneficial for Subject's cognitive progress. These activities contributed to the development of mental skills essential for learning, critical thinking and problem solving. Additionally, exercises that made use of visual and tactile tools proved to be a valuable addition, stimulating his mind in diverse and enriching beneficial ways, especially for people with disabilities.

Session No. 8

*By "guts" I mean, grace under pressure.
..... Ernest Hemingway*

In the eighth provisional observation session, aim was to undertake behavioral evaluation and control under pressure ('choking under pressure'). During this session, simulations were conducted for the purpose of evaluating Subject's behavior and handling of situations under pressure (fear of negative evaluation). Some activities adopted and experimented were; Subject participated in simulations of stressful situations (self-consciousness, trait anxiety, and coping styles). His reactions and behavior under pressure were observed. Visual and gestural indicators were used to assess his level of stress (say; decrements to outcome accuracy and kinematics of motor skills)and the strategies he used to deal with pressure.

Provisional Interventions

Why do people choke and what can we do about it? This session marked a significant step forward in Subject's path toward emotional management and effective handling of stressful situations. Subject was able to apply the self-control and relaxation techniques he had learned in previous sessions to manage his stress in real time. Accurately tailoring the session to Subject's needs was critical to ensuring his effective participation. The behavior assessment and driving under pressure session offered Subject the opportunity to practice and reinforce skills acquired in previous sessions. Detailed attention to his physical mobility disability ensured his full participation. The simulations provided Subject a space to experience stressful situations in a safe and controlled manner, allowing him to learn to identify his stress signals and develop strategies to manage them constructively. Observing Subject's behavior allowed for an objective assessment of his progress, identifying areas for improvement and providing valuable feedback. In summary, the session was a success and Subject demonstrated significant progress in his ability to handle stressful situations effectively.

Session No. 9

In the ninth provisional observation session, aim was to conduct training with virtual reality in mindfulness (stakes are extremely high). A virtual reality experience was employed to improve Subject's mindfulness and awareness. Some

activities adopted and experimented were; Subject was immersed in a virtual reality environment designed to encourage mindfulness and awareness. Subject was instructed to focus on his breathing and the sensation of his body in the chair. Subject had the opportunity to explore the virtual environment, interact with virtual elements, and practice mindfulness in various contexts within the experience

Provisional Interventions

The session represented a unique and enriching experience. It gave Subject the chance to strengthen his capacity for mindfulness and awareness in the present, despite his physical challenges. Accurately tailoring the session to Subject's needs was essential to ensure his effective participation. The virtual reality mindfulness training session allowed Subject to practice and consolidates the skills acquired in previous sessions. Careful accommodation to his physical mobility disability ensured his full participation. The virtual reality experience offered Subject an innovative way to experience mindfulness, which contributed to the development of his ability to focus on the present and increase his awareness of his surroundings. Overall, the session was successful, with Subject showing notable progress in his mindfulness and awareness abilities (references to neuro-stimulation and psychopharmacology). In addition to the previously mentioned Provisional Interventions, it is relevant to highlight that the virtual reality session also provided Subject with the opportunity to explore his environment in a safe and controlled manner, which contributed to the development of his confidence and autonomy.

Session No. 10

“Contemplative practice is the activity of paying attention in particular way. Integrating contemplative practice into one’s life is like exercise for the mind and heart. That may sound vague, and that’s because the potential objects of attention are as broad as our world, as deep as our minds and hearts, and, in some religious traditions, greater than either” ... Rev. Dr. Monica Sanford. In the tenth provisional observation session, aim was to focus on contemplative work (nurture a decisive, first-person focal point, from time to time with undeviating practice, while at other times focused on multifaceted thoughts or situations). A virtual environment was used to encourage inner peace and reflection (“realistic, deep-seated, and transformative, developing capacity for deep attention and quiet the brain in the middle of the exploit and disruption”) in Subject. Some activities adopted and experimented were; Subject was immersed in a tranquil virtual environment, with panoramic views of nature and soft music. He was given instructions to focus on your breathing and observe your surroundings. Subject was able to explore the virtual environment at his own pace.

Provisional Interventions

Dialogue about interactions of contemplative practices with spirituality and religion is non contested. The session represented a unique and enriching experience for Subject, who, despite the physical challenges he faced, found a space conducive to inner peace and reflection. Accurately tailoring the session to Subject's needs was essential to ensure his effective participation. This contemplative work exercise in a virtual environment offered him the opportunity to practice and consolidate the skills he had acquired in previous sessions, in an environment that suited his physical limitations. The virtual reality experience gave him an innovative perspective on contemplation, which contributed significantly to the development of his ability to focus on the present and increase his awareness of his surroundings. Overall, the session was a success, as Subject demonstrated notable progress in his contemplation skills. In addition to the previously mentioned Provisional Interventions, it is relevant to highlight that the virtual reality session also provided Subject with the opportunity to explore his environment in a safe and controlled manner, which contributed to the development of his confidence and autonomy. Based on the description of the session, it is evident that Subject experienced a positive impact, showing interest in exploring the virtual environment and highlighting how this experience helped him find inner peace and encourage reflection. Subject emphasized perceived improvements in his sensations and ability to control impulses, reflecting encouraging progress in his personal development journey.

Session No. 11

In the eleventh provisional observation session, aim was to focus and observe cognitive stimulation. Cognitive and brain gym exercises were used to help Subject improve his attention, concentration, hand-leg coordination, and overall cognition. Some activities adopted and experimented were; Subject was immersed in a serene virtual environment,

offering panoramic views of nature and soft music to promote a state of relaxation and mindfulness. Subject was given precise instructions to focus on his breathing and to carefully observe his virtual environment. Subject had the opportunity to explore this environment at his own pace, allowing for a personalized experience.

Provisional Interventions

The session represented a unique and enriching experience for Subject, who, despite the physical challenges he faced, found a space conducive to inner peace and reflection. The contemplative work exercise in a virtual environment offered Subject the opportunity to practice and consolidate the skills he had acquired in previous sessions, in an environment that accommodated his physical limitations. The virtual reality experience provided Subject with an innovative perspective on contemplation, which contributed significantly to the development of his ability to focus on the present and increase his awareness of his surroundings. Overall, the session was a success, as Subject demonstrated notable progress in his contemplation skills. In addition to the previously mentioned Provisional Interventions, it is relevant to highlight that the virtual reality session also provided Subject with the opportunity to explore his environment in a safe and controlled manner, which contributed to the development of his confidence and autonomy. Based on the description of the session, it is evident that Subject experienced a positive impact, showing interest in exploring the virtual environment and highlighting how this experience helped him find inner peace and encourage reflection. He also emphasized perceived improvements in his sensations and ability to control impulses, reflecting encouraging progress in his personal development journey.

Session No. 12

In the twelfth provisional observation session, aim was to analyze perspectives of mindfulness and self-control exercises. Deep breathing exercises, progressive visualization, and virtual reality were used to help Subject improve his mindfulness and self-control. Some activities adopted and experimented were; Subject participated in deep, mindful breathing exercises. Subject performed guided progressive visualization. At the end of the session, Subject experienced a virtual reality session designed to promote calm and relaxation.

Provisional Interventions

The session was a unique and enriching experience for Subject. It provided him with valuable tools to find calm and well-being in the face of any challenge. Adapting the session to Subject's needs was essential for him to fully participate. The session of mindfulness, self-monitoring exercises and progressive visualization was an opportunity for Subject to practice and consolidate the skills he had learned in previous sessions. The session was carefully adapted to address his physical mobility disability, allowing Subject to participate fully. Deep breathing, progressive visualization, and virtual reality exercises helped Subject improve his mindfulness and self-control. This allowed him to learn to manage stress and find moments of calm. Subject was grateful for the opportunity to take part in the session and expressed confidence that the skills he had learned would help him improve his overall wellbeing in the future. In addition to the Provisional Interventions made, the session provided Subject with an opportunity to relax and enjoy a positive experience. Subject was excited to try virtual reality and found the experience very relaxing. This is a good indicator that Subject is open to new experiences and willing to try new things.

Session No.13

In the thirteenth provisional observation session, aim was to evaluate cognitive behavioral work. Combinations of cognitive and behavioral techniques were used to help Subject identify and challenge his negative thoughts, and develop new, more adaptive behaviors. Some activities adopted and experimented were; Subject and the therapist worked together to identify recurring negative thinking patterns. Subject gained skills in recognizing how these thought patterns influence his emotions and actions. Subject was instructed in cognitive strategies to challenge and change his negative thinking patterns. Subject identified behaviors he wanted to change or improve. Subject set specific, achievable goals related to those behaviors and created a detailed action plan to achieve goals.

Provisional Interventions

This session provided Subject with the opportunity to consolidate and practice previously acquired skills. Subject was equipped with valuable tools to address his negative thoughts and behaviors, positively impacting his overall well-

being. The cognitive-behavioral work session allowed Subject to deepen his understanding of the principles of this therapy. In addition, his physical mobility disability was carefully accommodated, ensuring his full participation in all activities. The cognitive and behavioral techniques taught to Subject in this session gave him the tools to identify and challenge his negative thinking patterns. In addition, they allowed Subject to develop more adaptive behaviors, which improved his ability to deal with stress and negative emotions. Subject expressed gratitude for the opportunity to participate in the session and expressed confidence that the skills acquired would serve Subject well in improving overall well-being in the future. In addition to the aforementioned provisional interventions, it is important to note that Subject was also able to reflect on his progress. In this session, Subject was able to identify the changes he had experienced since the beginning of therapy and felt motivated to continue working toward goals. In summary, the session was a success and Subject demonstrated significant progress in his ability to address negative thoughts and behaviors, which contributed to his emotional and mental well-being.

Session No.14

In the fourteenth provisional observation session, aim was to desensitize and reprocess the mental state. Adapted neuro-integral therapy was used to help Subject process a past traumatic experience. Some activities adopted and experimented were; Subject was exposed to the traumatic memory while focusing on visual and tactile stimuli provided during therapy. Subject shared his emotions and sensations as he worked on processing the traumatic experience. Multiple cycles of exposure and bilateral stimulation were conducted to allow Subject to process and reorganize thoughts and emotions related to the traumatic experience.

Provisional Interventions

This session provided Subject with the opportunity to therapeutically address a past traumatic experience. Adapting the session to Subject's needs was essential for his full participation. The adapted EMDR exposure session represented a significant step forward in Subject's recovery process. The session was meticulously adjusted to ensure Subject could fully participate despite his physical mobility disability. EMDR therapy facilitated the processing of Subject's past traumatic experience, allowing him to release the emotional burden that this experience had generated. Subject expressed gratitude for the opportunity to participate in the session and expressed confidence that EMDR therapy would contribute to his continued recovery process. In addition to previous Provisional Interventions, it is important to note that the session also provided Subject with a sense of support and understanding throughout the therapeutic process. The constant presence of a therapist gave him security and confidence. In summary, the session was successful, and Subject demonstrated notable progress in his ability to process past traumatic experiences, which contributed significantly to his emotional and mental well-being.

Session No.15

In the fifteenth provisional observation session, aim was to induce cognitive training. Cognitive training with apps was used to help Subject improve his cognitive skills, such as memory, attention, and problem solving. The session was carefully adapted to address his physical mobility disability. Some activities adopted and experimented were; Subject participated in memory games, puzzles, and eye-tracking exercises, all tailored to his specific abilities and needs. The complexity of the exercises was gradually increased to progressively challenge and stimulate their cognitive abilities. Subject had the ability to track his own progress and set goals to improve his cognitive skills.

Provisional Interventions

This session provided Subject with the opportunity to practice and consolidate skills previously acquired in previous sessions. Adapting the session to Subject's individual needs was essential to his full participation and success in app-based cognitive training. Cognitive training with apps allowed Subject to significantly improve his cognitive skills, including memory, attention, and problem solving. This progress gave him greater mental clarity and a sense of accomplishment. Subject expressed gratitude for the opportunity to participate in this session and expressed confidence that app-based cognitive training would continue to benefit him in the future. In addition to the previous Provisional Interventions, it is relevant to highlight that Subject experienced the session as a positive and stimulating experience. His enthusiasm for using technology in his rehabilitation process was evident, and he found the app-based cognitive training session both challenging and rewarding.

Session No. 16

In the sixteenth provisional observation session, aim was to conduct progress evaluation and observe reinforcement. A reinforcement session was held to evaluate Subject's progress and reinforce the skills he has learned. Some activities adopted and experimented were; the results obtained by Subject in his first session were compared with the results of this reinforcement session to evaluate his development throughout the treatment. Biofeedback was implemented to evaluate changes in the galvanic response of the skin and its resistance. Specific exercises and activities were carried out to reinforce Subject's cognitive and emotional skills.

Provisional Interventions

During this session, significant progress was evident in Subject's ability to regulate his emotions and emotional responses. Subject demonstrated a high level of interest in continuing his training and applying neuroscience concepts in his senior thesis, showing his commitment to his personal and academic growth. This booster session provided Subject the opportunity to reflect on his progress throughout treatment and reinforce acquired skills. Comparison of the results revealed evident improvements in Subject's emotion regulation, which was reflected in the changes observed in his galvanic response and skin resistance. Subject expressed satisfaction with the results of the session and demonstrated his desire to continue his training and application of knowledge in neuroscience in the academic field. This is a good indicator that Subject is committed to his recovery and is motivated to continue improving.

Session No. 17

“While diverse contemplative techniques are employed across plethora of traditions around the world, contemplative research over the years has not reflected this variety. Despite exponential growth in contemplative research in recent decades, it has largely been dominated within relatively narrow and inadequately-defined construct of contemplative practice (CP) under the umbrella term “mindfulness.” The aim was to provide an avenue for understanding CP from a more diverse and inclusive perspective. This could be done by studying common systems of practice (like mindfulness) in novel settings, studying a wider variety of contemplative traditions and practices, and finally, drawing on psychological/phenomenological/neurobiological similarities and differences between the varieties of practices and experiences to arrive at theoretical abstractions that provide novel insight into contemplation, and more generally, human mind and consciousness”. Sucharit Katyal (2023). *Tobin Hart states, “Inviting the contemplative simply includes the natural human capacity for knowing through silence, looking inward, pondering deeply, beholding, and witnessing the contents of our consciousness.... These approaches cultivate an inner technology of knowing....” This cultivation is the aim of contemplative pedagogy, teaching that includes methods “designed to quiet and shift the habitual chatter of the mind to cultivate a capacity for deepened awareness, concentration and insight.”*

In the seventeenth provisional observation session, aim was to design training of contemplative techniques. Chi Kung was used to help Subject improve overall well-being, through gentle movements, conscious breathing and concentration. Some activities adopted and experimented were; Subject participated in deep, mindful breathing exercises. Subject performed gentle, fluid Chi Kung movements designed to promote energy circulation and improve flexibility. Throughout the session, Subject focused on the movements and breathing, allowing him to enter a state of deep relaxation.

Provisional Interventions

Contemplative practice could shed new light on how people can find meaning in their life despite challenges and identify sustainable solutions for individual, but global challenges. The session was an opportunity for Subject to experience the benefits of Chi Kung, despite his physical mobility challenges. Subject left the session with a feeling of serenity and renewed energy. The Chi Kung training session was an opportunity for Subject to experience the benefits of this ancient practice. The session was carefully adapted to address his physical mobility disability, allowing Subject to participate fully. Chi Kung helped Subject improve his overall well-being, through gentle movements, conscious breathing and concentration. This allowed him to feel more relaxed and balanced, giving him a sense of overall well-being. Subject was grateful for the opportunity to participate in the session and expressed confidence that Chi Kung would help him improve his overall well-being in the future. In addition to the provisional interventions made, the session provided Subject with opportunity to learn about new cultural practice. Subject showed interest in learning more about Chi Kung and how it has been used for centuries in Chinese culture. This is a good indicator that Subject is curious and open to new experiences.

Session No. 18

In the seventeenth provisional observation session, aim was to schedule the next steps of the process. A review meeting was held with Subject's family to discuss the progress he had made up to that point and the treatment ahead. Some activities adopted were; Subject's progress was reviewed from sessions 13-18. Treatment goals were discussed. Subject's family members were involved in treatment planning.

Provisional Interventions

Review indicates that Subject has shown significant progress in his recovery. Subject's family is very involved in the treatment and supports the Subject. The next steps programming session was an opportunity to evaluate Subject's progress and plan treatment next. Subject's progress review showed that he had made significant progress in his ability to control anxiety, his speech pronunciation, his attention and his relaxation. The treatment goals discussion below focused on continuing to work on these areas to help Subject reach his full potential. The involvement of Subject's family members in treatment planning was important to ensure that the treatment was effective and sustainable. Overall, the session was a success and Subject is on track to continue his recovery. In addition to the Provisional Interventions you have made, I would like to add that the session also provided Subject's family an opportunity to learn more about Subject's recovery process. Subject's family members were grateful for the opportunity to participate in the session and expressed confidence that Subject's treatment will be successful. This is a good indicator that Subject's family is committed to Subject's recovery and is willing to support him throughout the process.

Treatment Finales

Neurofeedback has been used as a cognitive training tool to improve brain functions for clinical or recreational purposes. It is based on providing participants with feedback about their brain activity and training them to control it, initiating directional changes (Wikipedia).

Subject has responded positively to the techniques used in his treatment and is anticipated to continue to improve with additional treatment. Treatment results reflect significant progress in Subject's mental health and overall well-being. These significant advances have allowed Subject to not only resume his university studies, but also become a professor at the same university and an active collaborator at the institute where he received treatment. Subject has shared his experience and testimony about the beneficial effects of therapy with other Subjects and maintains a regular practice of contemplative and cognitive exercises. Specifically, Subject has seen notable improvements in the following areas:

Anxiety Control: Over a period of six months, Subject has achieved effective control over his anxiety attacks, allowing him to lead a fuller and more productive life, without the constant fear of anxiety attacks.

Speech Pronunciation: In just three months, Subject has significantly improved his speech pronunciation and fluency, allowing him to communicate more effectively in both his work environment and his personal life.

Attention and concentration: Over a period of two months, Subject has improved his ability to pay attention and concentrate, which has resulted in more efficient and productive completion of tasks.

Relaxation: In just one month, Subject has gained skills to relax and reduce her stress level, giving him the opportunity to enjoy life more fully.

Success Factors

At this point, Subject has demonstrated incredible progress on his journey to recovery and wellness. His dedication, active participation and the support of his family have been key factors for his success. As we conclude this stage of treatment, it is important to remember that recovery is an ongoing process and there are always opportunities to grow and improve. The success of Subject's treatment is attributed to a number of determining factors, including:

Applying Assorted Techniques: Subject benefited from combination of techniques, such as virtual reality, neurofeedback, biofeedback, brain gymnastics, and progressive visualization, allowing him to address his PTSD symptoms from multiple perspectives.

Active Subject Participation: Subject's willingness and active participation in his treatment were essential to his progress. His commitment and dedication to learning and applying the techniques were key to his recovery.

Family Engagement: Subject's family's active involvement in his treatment provided a strong support system, which contributed significantly to his motivation and success in the recovery process.

Future Recommendations

'We are on the cusp of a new era where humans and machines will collaborate more closely than ever before. The question is, are we ready to seize this opportunity and turn it into an engine for inclusive growth? As technology advances, it will become increasingly affordable and accessible, thereby improving not only productivity but also the quality of life for people across the globe'.
..... Mustafa Suleyman

1. **Maintain Regular Practice:** Continue practicing the techniques and skills you have learned during treatment. Consistency in applying these techniques in your daily life will help you maintain and strengthen your mental well-being.
2. **Self-Awareness:** Continue to explore and understand your own emotional triggers and thought patterns. The more you know yourself, the more effectively you will be able to handle challenges that may arise.
3. **Set Sustainable Goals:** Define realistic and sustainable goals for your future. As you move forward, it is important that you set goals that are achievable and allow you to maintain balance in your life.
4. **Maintain Social Support:** Continue to maintain a strong support network. Family, friends, and loved ones can play a vital role in your ongoing well-being.
5. **Self-Care:** Don't underestimate the importance of self-care. Take time regularly to rest, relax, and take care of yourself physically and emotionally.
6. **Learn From Relapses:** If you experience relapses or difficult times in the future, remember that they are opportunities to learn and grow. Don't beat yourself up for backing down occasionally; instead, look for constructive ways to address these challenges.
7. **Open Communication:** Maintain open and honest communication with your healthcare team, friends and family. Whenever you need additional support or face challenges, don't hesitate to reach out for help.
8. **Positive Contribution:** Continue to share your experience and knowledge with others. Your success story can inspire and support people facing similar challenges.
9. **Celebrate Accomplishments:** Don't forget to celebrate your achievements, no matter how small they may seem. Recognize your progress and allow yourself to enjoy your successes.
10. **Remember; Growth Is Continuous:** Recovery and personal growth are continuous processes. Throughout life, one can continue to learn, develop and achieve new goals.

II. CONCLUSIONS

Neurofeedback is a kind of biofeedback, which teaches self-control of brain functions to subjects by measuring brain waves and providing a feedback signal. Neurofeedback usually provides the audio and or video feedback. Positive or negative feedback is produced for desirable or undesirable brain activities, respectively (Hengameh Marzbani; 2016). Neurofeedback therapy, in particular, is used to help teach self-control of brain functions by indicating to patients how their brains react to certain triggers. Over time, patients learn to recognize when their brain is in a certain state. Then, they can learn to recreate the desired state, such as relaxation, or avoid undesired states, such as agitation, in their daily lives (Lauren Silva).

SCP-Neurofeedback, or Slow Cortical Potential Neurofeedback, differs significantly from traditional neurofeedback approaches. Its distinctiveness lies not just in its methodology, but also in the underlying philosophy that parallels certain aspects of meditation practices. Neurofeedback is a form of biofeedback therapy in which individuals learn to modulate their brain wave activity through real-time feedback. It is often used as a noninvasive method to treat a variety of conditions and problems, including stress and anxiety-related disorders. By training the brain to produce or avoid certain patterns of brain wave activity, neurofeedback can help modulate the body's stress response and increase resilience to stressful situations. It provides an active way for those affected to control and optimise their brain function, which can ultimately lead to better stress management and improved overall wellbeing (Thomas Feiner).

- **Deep Level Brainwave Regulation:** While traditional neurofeedback often focuses on faster frequencies like alpha, beta, and theta, SCP-Neurofeedback zeroes in on slow cortical potentials (SCPs). These are slow, direct current shifts in the EEG that represent deep regulatory processes in the brain, which requires a more nuanced understanding and control (Thomas Feiner).
- **Learning Patience:** The subtlety of SCP-Neurofeedback demands a heightened level of patience, much like meditation. The participant learns to wait, observe, and then act, fostering a more deep-rooted understanding of their own neural processes (Thomas Feiner).
- **Active Engagement:** Engaging in SCP-Neurofeedback isn't a passive process. It's comparable to mastering a new skill. Much like meditation requires active participation and awareness, SCP-Neurofeedback asks the participant to be thoroughly engaged, forging a strong bond between intention and outcome (Thomas Feiner).
- **Enhanced Focus:** One of the primary outcomes of SCP-Neurofeedback training is enhanced focus and concentration. This is reminiscent of mindfulness meditation, where the practitioner learns to focus on the present moment, and open focus meditation, which promotes a broad, flexible attention (Thomas Feiner).
- **Mastery over Brainwave Control:** SCP-Neurofeedback is like an advanced meditation technique for the brain. Just as long-term meditators can achieve heightened states of awareness and control, regular practitioners of SCP-Neurofeedback can learn to exert control over specific brainwave patterns. This mastery can lead to improved cognitive function, emotional regulation, and overall brain health (Thomas Feiner).
- **Parallel with Meditation:** SCP-Neurofeedback, in essence, becomes a meditative practice on its own. The deep self-awareness, attention regulation, and focus required for both are strikingly similar. Hence, it can be a complementary tool for those who practice meditation or a gateway for those unfamiliar with mindfulness techniques (Thomas Feiner).

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