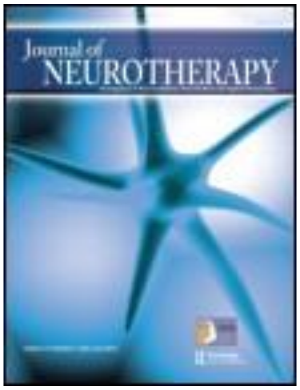

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The Effects of Negative Emotional Stimuli on Alpha Blunting

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Blunted alpha response at locations O1 and Cz has been found to be associated with exposure to severe emotional stressors. Subjects exposed to an emotionally negative photograph had alpha blunting, whereas controls shown a pastoral scene with similar color tones and those not shown any pictures did not have alpha blunting. Braindriving neurotherapeutic treatment procedures found effective for restoring the alpha response and correlated trauma "release" are discussed.

INTRODUCTION

During my tenure as attending psychologist at McLean Hospital, I was involved in the treatment of hospitalized combat veterans diagnosed with posttraumatic stress disorder (PTSD). The two consistent, remarkable features of the QEEG with these veterans were a severely blunted, or most often negative, alpha response at locations O1 and Cz and a marked deficiency in the ratio of the amplitude of 3–7 Hz/16–25 Hz (theta/beta) at location O1.

Every one of the hospitalized veterans with PTSD had theta/beta ratios that were below 1.10. Based on the *clinical* database (Swingle, 2008), ratios below 1.80 are often associated with self-reports from clients of poor stress tolerance, anxiety, sleep quality problems, mind "chatter," self-medicating behavior, and fatigue.

The "alpha response" is defined as the elevation of alpha amplitude between eyes-open and eyes-closed as measured at locations O1 and Cz. Based on the clinical database, the elevation in amplitude should be above 30.0% at Cz and above 50.0% at O1. In private practice clinical settings, blunted alpha at either or both of these locations is often associated with a client's admission of exposure to severe emotionally stressful situations. These stressful situations include serious automobile accidents, sexual assault/abuse, physical assault/abuse, assault/death/suicide/terminal illness of a loved one, and the like. Clients presenting with an independent diagnosis of PTSD all had a negative alpha response at one or both of these locations. As well, all hospitalized combat veterans just mentioned had negative alpha responses at both locations.

Conceptualized in the context of learning theory, it is plausible that blunted alpha can be a conditioned response to a negatively valenced unconditioned stimulus. Previous research has shown that alpha amplitude can be classically conditioned. Jasper and Shagass (1941) reported that pairing light (an unconditioned stimulus [UCS] for alpha amplitude suppression) with a sound (conditioned stimulus) resulted in sound alone suppressing alpha amplitude after nine pairing trials. Further, subvocal commands by the subject to suppress alpha likewise suppressed amplitude. Alpha was also suppressed after time-constant light presentations such that after 54 trials, alpha was suppressed at the UCS presentation time in the absence of the UCS.

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If negatively valenced experience is indeed an UCS for alpha blunting, then dose relationship effects would be expected. Hence, a potent UCS would be expected to give rise to greater alpha blunting than a less severe UCS. Moreover, if the UCS is the emotion associated with the stimulus, then one might expect emotional recall to be associated with alpha blunting. Further, if the relationship is nonrecursive, then alpha blunting may serve to suppress emotional emergence associated with the recall of the traumatic event.

Swingle (1998) presented a similar theory associated with seizure occurrence in nonepileptic (pseudoseizure) seizure disorder. The pseudoseizure disordered clients showed blunted alpha and deficiency in the theta/beta ratio at location O1. One of these clients went into seizure mode whenever her electrodermal response exceeded 6 micromhos on both hands during therapy sessions. The hypothesis then was that seizure manifestation could be a mechanism for preventing emotional recall (flashback) of traumatic events.

Neurological effects of negatively valenced stimuli have been reported by Tomarken, Davidson, and Henriques (1990). They reported elevated alpha amplitude in the left frontal cortex while experiencing or expressing negative emotions. This alpha asymmetry is also a condition associated with self-reported depressed mood states (Henriques & Davidson, 1990). In clinical settings, any neurological condition that is associated with elevated activity of the right frontal cortex relative to the left is associated with self-reported depressed mood states. From a group of 86 patients reporting that depression was the reason they were seeking treatment, 73% had one or more of the conditions associated with right dominant activity (Swingle, 2008). Of course, many clients label a condition as depression when it is more appropriately defined as anxiety, sleep problems and fatigue; hence, the right/left disparity may not be apparent.

The present study was designed to determine if alpha blunting is associated with brief exposure to a negatively valenced photograph.

METHODS

Subjects

The population consisted of 35 male and female clients from ages 31 to 46 years receiving midtreatment evaluations. Stimuli (photos) were assessed for therapeutic use with clients in treatment for trauma-related conditions. Consent for exposure to these stimuli (and other stimuli not reported here) was included in the treatment consent documentation obtained from all patients at the clinic.

Procedure

As part of the ClinicalQ assessment (Swingle, 2008, 2010a), QEEG recordings were obtained at locations Cz, O1, F3, Fz, and F4 (International 10-20 system for EEG site locations). The locations relevant for the present study were Cz and O1. Alpha (8–12 Hz) amplitude in microvolts was recorded for 15 s eyes open, followed by 15 s eyes closed. After 30 s of continuous recording, clients were shown a negative photograph, a positive photograph, or no photograph for 10 s. A second 15-s eyes-closed recording of alpha was then obtained.

The negative photograph was taken from Kogon (1958). It is a picture of two concentration camp workers dragging the body of a severely emaciated, unclothed, dead male with ice tongs at the skull. All clients exposed to this photograph stated that they had seen similar, equally disturbing pictures of the Nazi concentration camp victims but not, to their recollection, the one shown. The positive photograph was of a man and a horse plowing in a field. The positive photograph was degraded to similar gray-tone quality as the negative photograph taken from the 1958 publication.

RESULTS

The amplitude of alpha (8–12 Hz) was recorded for the 15-s eyes open and 15-s eyes closed pre- and postexperimental manipulation. The differences between these eyes-open and eyes-closed EC averages were calculated as absolute difference and percentage difference in amplitude, as shown in

TABLE 1. Absolute and Percentage Differences in Alpha Response Between First and Second Eyes-Closed Measurements

Condition	Absolute difference	% difference
No picture	11.9 (18.4)	23.5 (33.3)
Positive picture	34.9 (29.8)	105.3 (108.9)
Negative picture	−16.2 (9.4)	−62.3 (48.5)

Shown in *M* (*SD*).

TABLE 2. Absolute Differences Between Conditions

Comparison	*t*	*df*	SED	*p*
No picture vs. positive picture	2.44	24	9.4	.022
No picture vs. negative picture	4.25	23	6.6	.0003
Positive picture vs. negative picture	4.92	17	10.4	.0001

Note. SED = Standard Error of Difference.

TABLE 3. Percentage Differences Between Conditions

Comparison	*t*	*df*	SED	*p*
No picture vs. positive picture	2.83	24	28.9	.0093
No picture vs. negative picture	5.24	23	16.4	.0001
Positive picture vs. negative picture	4.24	17	39.5	.0005

Note. SED = Standard Error of Difference.

Table 1. The differences between these conditions are all significant (see Tables 2 and 3).

As the data indicate, the second alpha response was, on average, greater than the first recorded alpha response in both the no picture and the positive picture conditions. There were significant differences in both the absolute and percentage data for these two groups in that the positive picture group had stronger second alpha responses than the no picture condition. In the negative picture condition, all nine clients had lower alpha response on the second recorded alpha response. For the positive picture condition, all 10 clients had a stronger alpha response during the second recording. In the no picture condition, 13 of the 16 clients had a stronger alpha response at the second recording.

DISCUSSION

These data suggest that an emotionally negative event can be an unconditioned stimulus for an alpha blunting response. This has been an operational guideline in clinical practice for many practitioners for years. In bona fide PTSD with disabling flashback episodes, the negative alpha response, often observed clinically, may be a one-trial learning condition associated with a severe emotional traumatic event experienced by a person with neurologically based poor stress tolerance (i.e., deficient theta/beta ratio at location O1). This blunting may also be, to some extent, functional in that it could increase flashback threshold.

There are certainly other factors involved that mitigate or exacerbate the effects of exposure to traumatic stress. These factors can be psychological in nature such as having or not having strong family or social emotional support. Core emotional beliefs about one's existential security or self-worth are also certainly relevant. These factors can also be neurological in nature such as predispositions to depressed mood states, anxiety, poor stress tolerance, or perseverative thought processes.

When clients admit to traumatic stress, clinicians can choose from a wide variety of effective treatment procedures, depending on training and experience, of which neurotherapy is one. One's license dictates if one is qualified to treat these complex conditions. The licensed practitioner's training will, of course, guide the clinician's treatment metaphor, and there is a voluminous literature associated with clinical treatment of these conditions. My purpose here is to point out that classical conditioning parameters are likely to be important in the manifestation of PTSD as well as the sequellae of exposure to less traumatic stress. Further, classical conditioning methods can be used to treat these conditions by restoring the alpha response. In our experience, the restoration of the alpha response is usually associated with emotional response of the type described by Peniston and Kulkosky (1989) during successful alpha/theta training. Clinical training is, of course, essential for treating these emotional abreactions in that neurotherapy is not a stand-alone treatment for these difficult clinical conditions.

Neurofeedback is an operant conditioning procedure, whereas braindriving is a classical conditioning procedure. The braindriving procedure involves selecting UCS that either suppress or enhance selected brainwave amplitude. These UCS are presented contingently on changes in brainwave amplitude (i.e., crossing of training threshold). The UCS can be light (e.g., 11 Hz flashing lights), sound (e.g., subthreshold binaural frequencies), and stimulation of acupuncture points, all of which have been shown to affect brainwave amplitudes (Swingle, 1996a, 1996b, 2006, 2008, 2010b, 2010c; Swingle, Pulos & Swingle, 2005). Emotional abreactions are expected either during or shortly after braindriving treatments, which makes the psychotherapeutic process remarkably efficient for the treatment of PTSD and less severe consequences of emotional stress.

CASE EXAMPLES

Five Clients with Recent Trauma

The short version of the ClinicalQ (Swingle, 2008) is administered routinely to clients over the course of their treatment. The ClinicalQ is a clinical, database-structured instrument and is sensitive to many situational events clients experience such as bullying at school or in the workplace, reactive depression, fretting, and irritability. Because the ClinicalQ is also sensitive to exposure to emotional stress, anecdotal evidence lends further credence to the alpha-blunting/emotional trauma relationship.

Five clients ranging in age from 17 to 72, while under treatment for a variety of conditions including depression, sleep disturbance, and attention problems, experienced severe emotionally distressing events. These events included the death of a pet, murder of a relative, suicide of a best friend, and a home invasion. The five clients were selected because they had a pre-event ClinicalQ and a second ClinicalQ within 2 weeks postevent. In all cases, the alpha response postevent was at least 30% below the pre-event alpha response.

Blunted Alpha in a Sleep-Disturbed Client

A 70-year-old female client under treatment for anxiety-related conditions showed significant alpha blunting at intake. She admitted to several episodes of severe emotional distress, one recently, and reported that her sleep disturbances became considerably more severe after the recent disturbing event. Her initial ClinicalQ indicated a blunted alpha response at O1. After 10 s with eyes closed, her alpha had increased in amplitude by only 8.3% and peaked at 40.0% after 20 s. The ClinicalQ database guideline is an alpha response at O1 of at least 50% within 10 s of eyes closed.

The braindriving protocol for this client included the following UCS: 10 Hz flashing red lights (around the lens perimeter of occluded eyeglass frames) when alpha was above training threshold and 100 Hz electrical stimulation of acupuncture point Heart (H6) when alpha dropped below training threshold. The training threshold started at 6 μV. H6 is located about 0.5 finger widths above the wrist crease, bilaterally, on the medial side just above the little finger. Microamperage (below .5 μA) stimulation of this location has been found to increase slow frequency amplitude at location O1. Threshold electrical stimulation was determined by adjusting intensity to a level where the client detected stimulation, then dropping to a nondetected level.

UCS presentation contingent on EEG amplitude for the braindriving protocol was controlled with the Braindryvr Cascade™ (Soundhealthproducts.com). The UCS light stimulation source was a Nova Pro 100™ with occluded lens goggles with amber-colored LEDs (Photosonix.com). The electrical source for the low amperage stimulation of the acupuncture points was a CES PLUS™(Soundhealthproducts.com).

The pre–post recordings of the alpha response are shown in Table 4. During the

TABLE 4. Braindriving Alpha at Location O1

	Pre	α	%	Post	α	%
	EO	6.0		EO	6.2	
10 s	EC	6.5	8.3	EC	7.3	17.7
20 s	EC	8.4	40.0	EC	9.5	53.2

Note. Alpha increase during braindriving = 148.3%. EO = eyes open; EC = eyes closed.

braindriving session, the peak alpha amplitude increased by 148.3%. The 10-s alpha response on the ClinicalQ increased from 8.3% to 17.7%, an increase of 113.2% and the 20-s alpha response increased from 40.0% to 53.2%, an increase of 33.0%. The client's 20-s alpha response was within normative range after the 20-min braindriving session.

The client reported intensified sleep disturbance the first evening after the braindriving treatment. The second night, she reported improved sleep but recalled portions of several fretful dreams. She reported ''much'' improved sleep and less daytime unease after the first few nights following the braindriving session. It is hypothesized that releasing the alpha response facilitates mentally restorative REM stage sleep that functionally facilitates the emotional dispensation of blocked emotional trauma. Research exploring these issues is in progress.

REFERENCES

Henriques, J. B., & Davidson, R. J. (1990). Regional brain electrical asymmetries discriminate between previously depressed subjects and healthy controls. *Journal of Abnormal Psychology*, *199*, 22–31.

Jasper, H., & Shagass, C. (1941). Conditioning the alpha rhythm in man. *Journal of Experimental Psychology*, *28*, 373–388.

Kogon, E. (1958). *The theory and practice of hell*. New York, NY: Berkley.

Peniston, E. G., & Kulkosky, P. J. (1989). Alpha-theta brainwave training and beta endorphin levels in alcoholics. *Alcoholism, Clinical and Experimental Research*, *13*, 271–279.

Swingle, P. G. (1996a, March). *Clinical application of auditory and somatosensory subthreshold stimulation*. Invited workshop presented at the Association of Applied Psychophysiology and Biofeedback Meeting, Albuquerque, NM.

Swingle, P. G. (1996b). Subthreshold 10 Hz sound suppresses EEG theta: Clinical application for the potentiation of neurotherapeutic treatment of ADD/ADHD. *Journal of Neurotherapy*, *2*, 15–22.

Swingle, P. G. (1998). Neurofeedback treatment of pseudoseizure disorder. *Biological Psychiatry*, *44*, 1196–1199.

Swingle, P. G. (2006, June). *Assessment and treatment of emotional trauma*. Paper presented at the Association of Applied Psychophysiology and Biofeedback Meeting, Portland, OR.

Swingle, P. G. (2008). *Basic neurotherapy: The clinician's guide*. Vancouver, Canada: Soundhealth.

Swingle, P. G. (2010a). *Biofeedback for the brain* (Rev. paperback ed.). New Brunswick, NJ: Rutgers University Press.

Swingle, P. G. (2010b). Emotional Freedom Technique (EFT) as an effective adjunctive treatment in the neurotherapeutic treatment of seizure disorders. *Energy Psychology*, *2*, 1–11.

Swingle, P. G. (2010c). Potentiating neurotherapy: Techniques for stimulating the EEG. *Psychophysiology Today*, *7*, 13–19.

Swingle, P. G., Pulos, L., & Swingle, M. K. (2005). Neurophysiological indicators of EFT treatment of post-traumatic stress. *Subtle Energies & Energy Medicine*, *5*, 75–86.

Tomarken, A. J., Davidson, R. J., & Henriques, J. B. (1990). Resting frontal brain asymmetry predicts affective responses to films. *Journal of Personality and Social Psychology*, *59*, 791–801.