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# **International Journal of Behavioral Consultation and Therapy**

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# International Journal of Behavioral Consultation and Therapy

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***Joe Cautilli and BAO Journals***

# A Preliminary Investigation of Continuous and Intermittent Exposures in the Treatment of Public Speaking Anxiety

*Richard W. Seim, Stacey A. Waller and C. Richard Spates*

## ABSTRACT

It is often argued that exposure-based treatments for anxiety disorders are only effective if the exposures are presented continuously until a marked decrement in anxiety is achieved (e.g. Foa & Kozak, 1986). However, the data supporting this conclusion is limited. This study compared two treatments for public speaking anxiety: one requiring participants to give one long speech on 3-5 topics (i.e. prolonged exposure) and another treatment which required participants to give a series of 30 s speeches divided by 30 s breaks (i.e. dosed exposures). Results indicated that the series of brief exposures was equally efficacious to the prolonged exposure in reducing subjective feelings of anxiety, and it produced greater reductions in public speaking anxiety, physiological arousal (i.e. heart rate), and behavioral avoidance. In addition, fewer behavioral indices of distress, on average, were incurred by this treatment. If shown to be effective across a larger sample and a wider range of anxiety disorders, this method of exposure therapy may provide a less aversive alternative to traditional exposure-based interventions.

Keywords: Public speaking anxiety, dosed exposure, exposure durations

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## INTRODUCTION

Since the nascence of exposure-based interventions for the treatment of anxiety disorders in the mid 20<sup>th</sup> century, much research has been devoted to dismantling these interventions, investigating the manipulation of different parameters of the exposure, and determining which parameters are most essential. Numerous parameters have been investigated, such as the targeted modality of the exposure (i.e. imaginal vs. in vivo vs. analog stimuli), the presentation of these stimuli (i.e. graduated vs. immediate presentations), and the length of time between exposures (i.e. massed vs. spaced exposures). One variable that has been under-studied, however, is the optimal duration of exposure trials. It is commonly assumed that exposures must be delivered in a protracted, continuous fashion until a decrement in anxiety is achieved (Foa & Kozak, 1986). However, empirical findings to support this notion have been mixed.

### *Extinction of Conditioned Avoidance*

The earliest work on the optimal duration of exposure trials came from research using animal models of anxiety using the conditioned avoidance paradigm. This design involves an avoidance-training phase, where subjects learn to run or jump to another area of a chamber in the presence of a conditioned stimulus (CS) (i.e. a light, a tone, or a buzzer) which has been paired with an unconditioned stimulus (US) (i.e. a footshock) until they become proficient at avoiding the US by responding in the presence of the CS alone. The avoidance-training phase is then followed by an extinction phase, involving the presentation of the CS in the absence of the US until the CS no longer elicits the avoidance response.

Several studies have investigated the efficacy of differing exposure lengths on the extinction of conditioned avoidance, using this paradigm. Research by Polin (1959) found that one 100 sec trial of exposure produced more rapid extinction than twenty 5 sec exposures with response prevention. Though this provided evidence for prolonged trials over brief trials, the interpretation was confounded by the use of response prevention in only the brief exposure condition. To control for response prevention, Shearman (1970) compared 100 sec presentations of a CS with and without response prevention against twenty 5 sec trials, with and without response prevention. Shearman found no differences between the lengths of the exposure trials and concluded that response prevention, not CS duration, was the critical variable. A follow-up study by Berman and Katsev (1972) which replicated the methodology of Shearman (1970) found that shorter durations were actually more effective than one prolonged duration. And further

research by Schiff, Smith, and Prochaska (1972) and Martasian, Smith, Neil, and Reig (1992), found that total duration time to the CS was the crucial variable in the extinction of conditioned avoidance, regardless of whether the individual exposures lasted 5 sec or 24 min in length.

#### *Extinction of Conditioned Fear*

While the conditioned avoidance paradigm offers a directly observable method for studying the reduction in physical avoidance, it does not permit an examination of extinction of the affective components of anxiety. When avoidance behaviors decrease in the presence of the CS after exposure training, it is assumed that the CS no longer elicits fear and no longer acts as a reflexive conditioned establishing operation (CEO-R) (see Michael, 1993) for the avoidance response. However, as Lang (1979) has argued, anxiety comprises three individual response systems (i.e. physiological, behavioral, and cognitive/affective) that are not always concordant. It has further been argued that fear in the presence of the CS often persists, despite the suppression of overt avoidance (Shipley, 1974).

In order to examine the extinction of the private events/affective components of anxiety, the conditioned fear paradigm was developed. In this animal model, acquisition of the CR is similar to the procedure used in the conditioned avoidance paradigm. The target response in the conditioned fear paradigm, however, is licking behavior in water-deprived subjects, and suppression of this behavior is an indication of a covert fear response.

Two studies on the extinction of conditioned fear using continuous and interrupted exposures have yielded conflicting findings. Shipley (1974) found that a series of trials of 100 s presentations of a CS produced more rapid extinction than a series of trials of 25 s durations. Conversely, Baum, Andrus, and Jacobs (1990) found that CS presentations of 10 s and 30 s produce more rapid extinction of conditioned fear than one presentation of 180 s.

Thus, in non-humans, the extinction of fear, whether using conditioned fear or conditioned avoidance analog paradigms, is a highly variable process. Evidence is inconsistent as to whether shorter or longer exposure trials produce the most rapid extinction. It appears that a number of procedural variables may interact with dose duration to produce differential outcomes. What is clear, however, is that under the right circumstances exposure trials can be delivered in either a continuous or intermittent manner to achieve successful extinction.

While these comparative analog studies provide a preliminary analysis of the temporal variables related to the extinction of fear, they are unlikely to adequately capture the etiological mechanisms underlying complex human anxiety disorders. In particular, these models cannot account for the focal role of verbal behavior in human suffering and its impact on extinction. Also, the conditioning history is always known in these analog studies, whereas in human anxiety the conditioning history is often unknown.

#### *Human Studies*

One of the first studies to examine the role of exposure durations was conducted by Ramsay, Barends, Breuker, and Kruseman (1966). This study compared the effects of 20 min periods of imaginal exposure delivered on four consecutive days with 40 min sessions spaced four days apart. The results indicated that the shorter exposures were more conducive to fear extinction. However, this study did not control for the length of inter-trial intervals between the exposures in the two conditions, so conclusions drawn from this research are limited.

A later study by Stern and Marks (1973) controlled for the length of time between exposure durations. The authors compared 20 min versus 40 min of imaginal exposure and 20 min versus 40 min of in vivo exposures for the treatment of agoraphobia and other travel-related anxieties. The results indicated

that neither varieties of imaginal exposure were helpful for these conditions, and the longer in vivo exposures were more effective than the short exposures at reducing anxiety.

Similar studies by Rabavilas, Boulougouris, and Stefanis (1976) on the treatment of OCD, Chaplin and Levine (1981) on the reduction of public speaking anxiety, and Marshall (1985) on the treatment of acrophobia all showed similar results: longer exposure durations seem to work better in the amelioration of human anxiety.

But there is no consensus behind this conclusion. Other studies have obtained results contrary to the aforementioned work. Mathews and Shaw (1973) compared six 8 min exposure trials to one 48 min exposure session on individuals with public speaking anxiety. They found that the shorter durations were equally efficacious in the reduction anxiety, as measured immediately after treatment and at one-month follow-up. Further research by Grey, Rachman, and Sartory (1981) found that ten in vivo exposures lasting two min each (divided by one minute breaks) were more effective than one 20 min exposure in the treatment of animal phobias. Finally, using even shorter durations, a study by Rubin, Spates, Johnson, and Jouppi (2009) demonstrated that a series of imaginal exposures lasting only 15 s long was more effective than one exposure lasting 2 min in the reduction of public speaking anxiety.

Clearly, the data needed to resolve this issue have been mixed, and further research needs to be conducted. One problem with the previous studies is the large inconsistency in the way “brief” and “prolonged” have been defined. Instead of adhering to a standard across studies, brevity was only relative to the comparison group in each experiment. However, a more careful analysis of these studies reveals an interesting dichotomy: In the studies that showed brief exposure to be inferior (i.e. Chaplin & Levine, 1981; Rabavilas et al. 1976; Stern & Marks, 1973), the “brief” trials were always equal to or longer than 10 min in length (usually >25 min). Yet, in the studies which showed brief exposures to be superior (i.e. Grey et al. 1981; Rubin et al. 2009), the “brief” trials were under eight minutes in length. In addition, treatment outcome research using a single-subject design has supported the findings of Rubin et al. (2009), that even exposures lasting under two minutes can be effective (Seim, Willerick, Gaynor, & Spates, 2008). These very brief “doses” (Spates & Seim, 2005) of exposure may offer certain advantages over traditional exposures in that they are less aversive to undergo and they evoke fewer avoidance behaviors in session. However, a well-controlled comparison had not been made.

To examine the differences between “dosed” exposures and prolonged exposures, a small study was designed to examine the process and outcomes of these treatment methods on behavioral, physiological, and self-report measures of public speaking anxiety.

## METHODS

### *Participants*

Participants were recruited via flyers and announcements made to undergraduate college classes. Sixteen individuals who expressed interest in receiving help for public speaking anxiety were screened for this study. Of these, seven met inclusionary criteria during the baseline measurement session and returned for the treatment session. Three individuals were excluded due to histories of asthma, one reported heart disease, and one reported a history of seizures. Four individuals reported that they were unavailable for additional sessions or failed to show for their treatment session. One additional participant was excluded during treatment due to equipment failure. Thus, a total of six individuals (2 male/4 female) between the ages of 23 and 41 completed the experiment. Each group contained two individuals below age 30 and one individual above age 30, and each group consisted of one male and two females. All participants met diagnostic criteria for social anxiety disorder, and all indicated that their fear of public speaking had significantly impacted their performance in work or school.

### *Setting*

All sessions were conducted in a therapy room in a clinical research setting on the campus of a large Midwestern university. The room was furnished with four chairs, a podium, and video recording equipment. In order to eliminate potential sources of distraction, all other objects and decorations were removed from the room. During behavioral assessments and treatment, participants were positioned at one end of the room behind a podium, and audience members were seated directly in front of them. The audience consisted of the experimenter and three individuals that the participant did not know. A video camera was positioned behind the audience, directly in the participant's line of vision.

### *Design*

Although originally designed as a series of single-subject designs, the present study employed between-subject analyses to examine differences between two treatment conditions: a Prolonged Exposure (PE) condition, which incorporated one continuous period of exposure, and a Dosed Exposure (DE) condition, which incorporated a series of several brief exposures. The experiment included two sessions: a baseline assessment session and a treatment session. The treatment session was further divided into three phases: pre-treatment assessment, treatment, and post-treatment assessment.

### *Procedures*

*Baseline Session.* After obtaining the informed consent of the participant, a trained assessor administered the Social Phobia subscale of the Anxiety Disorders Interview Schedule (ADIS-IV) (Brown, DiNardo, & Barlow, 1994), a semi-structured diagnostic interview based on the DSM-IV (American Psychiatric Association, 1994). This subscale has been shown to have excellent inter-rater reliability ( $\kappa = .77$ ) and diagnostic validity (Brown, DiNardo, Lehmann, & Campbell, 2001). Participants were also asked questions related to their demographic information and medical history. In addition, each participant completed the State-Trait Anxiety Inventory - State subscale (STAI-State) (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) and the Personal Report of Communication Apprehension (PRCA-24) (McCroskey, 1982), two paper-and-pencil measures which assess for one's current feelings of anxiety and fears of communication, respectively. Both measures have demonstrated good reliability and validity (Spielberger & Vagg, 1984; Beatty & Andriate, 1985), and the Public Speaking subscale of the PRCA-24 has been shown to be a valid measure of public speaking anxiety (McCroskey, Beatty, Kearney, & Plax, 1985).

Participants meeting the following criteria were invited to participate in the treatment session: (1) a score of 18 or higher on the Public Speaking subscale of the PRCA-24, (2) fear and avoidance scores of 6 or higher with respect to at least one social situation on the ADIS-IV, (3) at least two somatic symptoms scores of 4 or higher on the ADIS-IV, and (4) the absence of migraines, heart disease, asthma, seizures, ulcers, un-cued panic attacks, psychotic symptoms, or medications for anxiety or depression.

*Treatment Session.* Treatment was conducted one week after the baseline assessment session. Each participant was treated individually during a different time period. Before the treatment began, the participant re-completed the PRCA-24 and the STAI-State measures. The participant then attached a mobile heart rate monitor to his or her chest, and a baseline measurement of heart rate was recorded. Finally, a Behavioral Avoidance Test (BAT) was administered to assess behavioral and subjective manifestations of public speaking anxiety. Replicating the methodology of Beidel, Turner, Jacob, and Cooley (1989), the BAT required the participant to give an impromptu speech in front of an audience of three individuals. To prepare for the BAT, the participant was allowed to choose up to three topics from a list of five to speak about and three minutes to organize his or her ideas. The speech was then delivered. Participants were instructed to speak for ten minutes, but they were told that they could end the speech any time after three minutes by holding up an index card on which the word 'Stop' was written. Each participant's distress during the BAT was measured according to the Timed Behavioral Checklist (TBCL) (Paul, 1966), a 20 item checklist used to monitor behavioral indices of distress (e.g. pacing, throat

clearing, hand tremors), and each index was measured according to a specific operational definition. In addition, verbal reports of anxiety were monitored during the BAT using a 101-point (0 = no anxiety, 100 = the most anxiety possible) Subjective Units of Discomfort Scale (SUDS) (Wolpe, 1969). Between 15 and 45 minutes after completing the BAT, the treatment began.

#### *Prolonged Exposure (PE) treatment*

Treatment began with 15 min of psychoeducation presented via videotape. This video explained to the participant that anxiety is a learned behavior that affects three responses systems (physiological, cognitive, and behavioral), it is maintained through escape and avoidance behaviors, and, by confronting a feared situation in a safe setting without escaping or avoiding it, one's anxiety can be significantly reduced.

Following this didactic component, the therapist asked the participant to spend five minutes preparing a speech on 3-5 different topics chosen from a list. The audience was then brought into the room, and the participant began speaking, cycling through his or her chosen topics repeatedly until termination criteria (see below) were reached. Participants' heart rate, SUDS, and behavioral indices of distress were measured every five minutes during the treatment. Any time the participant stopped speaking for >10 s, the therapist prompted, "Please continue speaking." If the participant indicated he or she was unable to continue, he or she was able to say "Pause" and take a brief break while standing at the podium. Timing of the interval resumed when the participant began speaking again. The treatment was terminated when one of the following occurred: (1) SUDS levels fell to zero or remained below 20 points during two consecutive measurement periods, (2) the participant spoke for three hours, or (3) the participant exhibited excessive levels of anxiety or refused to continue. Immediately following treatment, the participant re-completed the PRCA-24, the STAI-State, and the BAT.

#### *Dosed Exposure (DE) treatment*

The DE condition proceeded identically to the PE condition except that, instead of requiring the participants to speak continuously, they were instructed to speak for only 30 s at a time, take a 30 s break while remaining at the podium, and then continue speaking for 30 s. This cycle was repeated until one of the three aforementioned termination criteria were met.

#### *Treatment Integrity*

In order to ensure that the treatments were properly administered, protocol outlines were supplied to each therapist after initial training. Behavioral observations were completed by research assistants who received intensive training on the indices of distress contained in the TBCL and were then asked to rate videotapes of confederates engaging in public speaking tasks. Observers were trained to at least 90% agreement for these speech samples, and, during the experiment, all speech samples were scored independently by two observers.

## RESULTS

#### *Behavioral Avoidance*

An average of four speeches (range 2-6) were given by each participant during the treatment. Though there was a wide range in treatment times, the average length of time to complete the PE treatment (M = 33.3 min; SD = 16.5) was only slightly shorter than the DE treatment (M = 40 min; SD = 18.7). Participants completed the BATs before and after treatment. The average amount of time participants in the PE group spent during the BAT increased 19% from pre-treatment (M = 312; SD = 94) to post-treatment (M = 372; SD = 162). Due to the wide variability of scores, this was not a statistically significant increase ( $t = -.425$ ,  $p = .712$ ). The average amount of time participants in the DE group spent in the BAT increased 43% from pre- (M = 304; SD = 123) to post-treatment (M = 433; SD = 120). Each participant in the DE group increased his or her score, making this a significant result ( $t = -59.2$ ;  $p < .0005$ ), with a large effect size ( $d = -1.06$ ). See Figure 1.

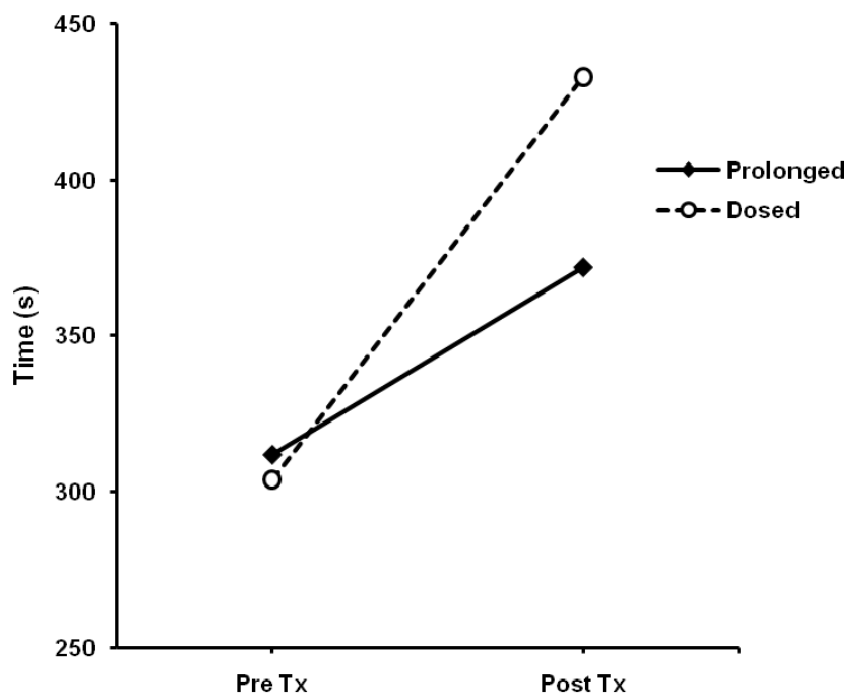


Figure 1. Changes in speech durations during the Behavioral Avoidance Test (BAT).

#### *Subjective Anxiety*

Though there were overall significant decreases in subjective anxiety (SUDS) from pre-treatment ( $M = 72.8$ ,  $SD = 26.9$ ) to post-treatment ( $M = 20.8$ ,  $SD = 11.7$ ), as measured using the Wilcoxon signed-rank test ( $z = -2.03$ ,  $p < .04$ ), there was not a significance difference in anxiety reductions between these two groups (Mann-Whitney  $U = 3$ ,  $z = -.66$ ,  $p = .5$ ). This lack of difference between the two exposure therapies may be due to the small sample size of the study, and more research will need to be conducted to determine if the two treatments are equally efficacious in reducing subjective anxiety.

#### *Heart Rate*

While the heart rates of participants in the PE group *increased* from the pre-treatment BAT to the post-treatment BAT (mean  $\Delta = 1.7$  bpm), the heart rates of participants in the DE group *decreased* from pre-treatment to post-treatment (mean  $\Delta = -5.7$  bpm). See Figure 2. There were no significant differences in heart rates between groups during the treatment phase itself.

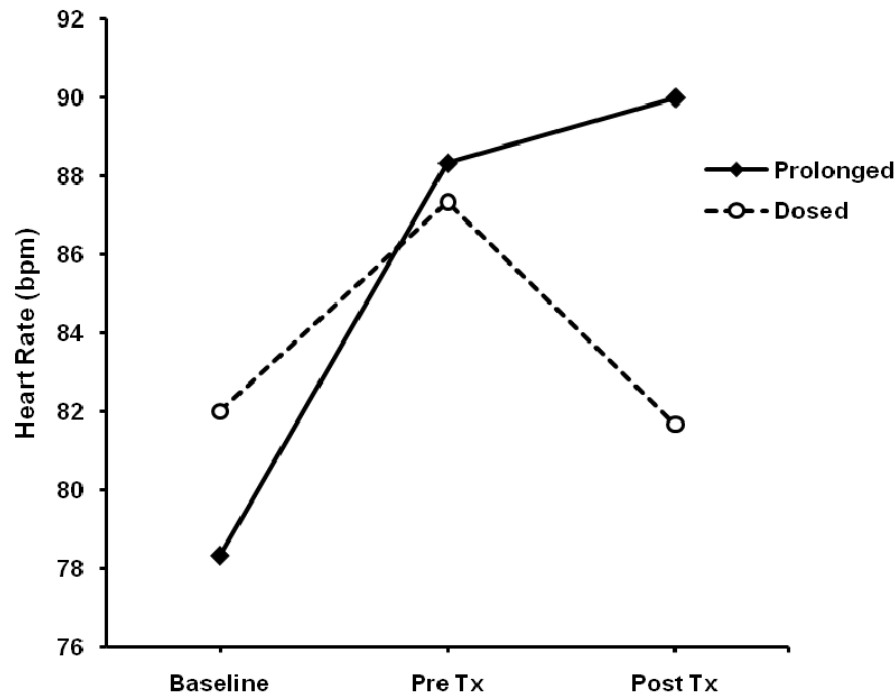


Figure 2. Average heart rates of participants.

#### *Indices of Distress*

Twenty behavioral indices of distress were measured throughout the experiment. As stated earlier, each occurrence of an index of distress was measured according to a strict operational definition, and two independent observers marked the occasion of these responses. Inter-observer agreement was calculated by dividing the number of agreements by the sum of agreements and disagreements for each pair of observers. The average inter-observer agreement was 0.87 ( $\kappa = 0.73$ ). An independent-samples t-test was conducted to compare the amount of distressful behaviors exhibited by participants receiving prolonged exposure and dosed exposure therapy. Results showed that participants in the prolonged exposure condition engaged in greater amounts of these behaviors on average during each time period ( $M = 3.81$ ,  $SD = 1.03$ ) than participants receiving dosed exposure therapy ( $M = 2.97$ ,  $SD = .54$ )  $t = 5.33$ ,  $p < .0005$  (two-tailed) ( $d = 1.02$ ).

#### *Paper-and-Pencil Measures*

Scores on the PRCA-24 indicated that only one participant in the prolonged exposure group experienced a reduction in public speaking anxiety from pre- to post-treatment, making the overall mean change quite minimal ( $M = 2\%$  decrease ( $SD = 7.3$ )). Conversely, all participants in the dosed exposure group experienced reductions in this measure of anxiety, exemplified by the larger mean change in scores ( $M = 22\%$  decrease ( $SD = 7.8$ ); see Table 1). Similarly, while only two out of three participants in the PE group experienced reductions in state anxiety from pre- to post-treatment, all participants in the DE group experienced reductions on this measure.

Table 1. Change in scores on measures of anxiety.

	<u>Prolonged</u>			<u>Dosed</u>		
	Pre	Post	% Change	Pre	Post	% Change
PRCA-24						
Group	21	19	-8%	24	18	-24%
Meeting	21	22	6%	24	22	-10%
Dyad	20	19	-3%	22	18	-15%
Public	24	23	-4%	28	18	-37%
Total	85	83	-2%	97	76	-22%
STAI-State	48	39	-19%	44	30	-31%
BAT (sec)	312	372	19%	304	433	43%

## DISCUSSION

This study was designed to compare two exposure-based interventions for anxiety and to determine which treatment elicited the most distress, as measured by behavioral and self-report measures. Currently, there is no consensus as to whether intermittent or continuous exposures are more effective treatments. While the results of some studies suggest that continuous exposures are more efficacious, a small body of research (e.g. Renfrey & Spates, 1994; Rubin et al. 2009; Seim et al. 2008) has demonstrated that, under certain conditions, a massed series of very brief exposures (i.e. “dosed” exposures) can also foster clinical benefit. This study provides further evidence for that conclusion.

These results suggest that the dosed exposure technique is at least as efficacious as the traditional, prolonged exposure method. Indeed, some measures suggest that dosed exposures may be more effective. While there were no differences between these techniques on within-session feelings of anxiety, within-session changes in heart rate, and pre- to post-session changes in subjective anxiety, participants in the dosed exposure group had more significant decreases in public speaking anxiety (as measured by the PRCA-24) and significant increases in the time they were willing to speak during the BAT. In addition, the dosed exposure technique was shown to be a less aversive, more tolerable treatment than prolonged exposures. Participants in the DE group showed greater reductions in heart rate from pre- to post-treatment, and they were less likely to show signs of distress during the treatment itself.

These results run counter to some information-processing theories of anxiety, which suggest that the entire spectrum of anxious responses (including physiological responses and other covert behaviors) must be elicited in order to achieve fear extinction (e.g. Foa & Kozak, 1986). These findings present the possibility that high levels of arousal are not required to achieve the extinction of anxiety.

Instead, it is likely that exposure-based interventions can proceed successfully without eliciting high levels of anxiety, and fewer behavioral indices of distress may be evoked by methods such as dosed exposures. Distressful responses as well as other in-session avoidance behaviors have been shown to negatively impact the effectiveness of exposure interventions (Powers, Smits, & Telch, 2004; Wells, Clark, Salkovskis, Ludgate, Hackmann, & Gelder, 1995). This is the first study to examine behavioral indices of distress between different durations of exposures, and its results demonstrate promise for dosed exposures as a more acceptable alternative to some other anxiety treatments.

Despite its favorable results, this study did carry some significant limitations. First, it was beleaguered with a relatively high rate of participant attrition from the initial screening session to the pre-treatment assessment. Of the 11 individuals who were scheduled to complete this assessment, only seven showed to their appointment and only six underwent the treatment (see above). It should be noted that while scheduling conflicts or fears of undergoing an anxiety treatment may have led to these failures to show, no participant dropped out of either treatment. A second limitation of this study was its small sample size. Although large effect sizes were detected with the current sample of participants and the DE condition produced consistent findings between its participants, a larger sample may have helped detect more minor nuances between the two treatments and strengthened the external validity of these results. Finally, though both interventions used in this experiment were able to reduce participants' fears, neither should be seen as a standalone treatment for public speaking, and it is likely that additional exposure-based practice would be needed to achieve long-term clinical benefit.

In conclusion, more research needs to be conducted using larger sample sizes to determine the effectiveness of dosed exposure as a clinical intervention for public speaking anxiety as well as other anxiety disorders. Although decades of research point to the effectiveness of protracted, uninterrupted exposures, many therapists trained in these techniques fail to use them (Becker, Zayfert, & Anderson, 2004) and clients may find the interventions too scary to enter, too aversive to stay with, and too distressful to recommend to others. In contrast, if the dosed exposure technique of presenting a massed series of very brief exposures continues to demonstrate efficacy, it could provide a less aversive alternative.

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# SOCIAL ANXIETY DISORDER AND SOCIAL SKILLS: A CRITICAL REVIEW OF THE LITERATURE

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## ABSTRACT

The objective of this article is to present a critical analysis of the research outlines used in empirical studies published between the years 2000 and March of 2007 about social anxiety disorder and its associations with social skills. Seventeen papers were identified and grouped into two classes for analysis, namely: Characterization of Social Skills Repertoire (N = 10) and Therapeutical Modalities – Application and Comparison of Clinical Intervention (N = 7). The critical analysis of the research outlines pointed to the necessity of new studies with clinical and non-clinical samples, with random allocation of individuals, with the proposition of contextualized interaction tasks, in order to support the generalization as to the association of the social skills and social anxiety disorder, and to demonstrate the functionality and process by which anxiety interferes with social performance.

Keywords: social anxiety disorder, phobia, social anxiety, social skills.

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## INTRODUCTION

Social skills are in general considered to be essential for the processes of social adjustment and functioning of individuals, whether they have psychiatric disorders or not (Angélico, 2004; Argyle, 1967/1994; Bandeira, 2003; Halford & Hayes, 1995; Morrison & Bellack, 1987; Turner, Beidel & Flood, 2003; Turner, Beidel & Townsley, 1992; Zigler & Phillips, 1962).

Social skills can be defined as “different classes of social behavior within the individuals repertoire to deal appropriately with demands of interpersonal situations” (Del Prette & Del Prette, 2001, p. 31), considering the situation in its wide meaning, including culture variables (Argyle, Furnham & Graham, 1981). Such concept comprehends the descriptive aspect of the verbal and non-verbal behavior displayed by the individual before different demands of the interpersonal situations. It is necessary to distinguish this concept from that of social performance, which refers to displaying a behavior or sequence of behaviors in a certain social situation. Del Prette and Del Prette (2001) add that both *cognitive abilities* of social perception and information processing which define, organize and guide social performance, and verbal and non-verbal *behavioral abilities* which implement the direction defined by the cognitive processes are grouped in the concept of social skills.

Social skills deficits are considered to hinder social functioning and the adaptative ability of individuals, with several implications and several impairments, especially for performance and social interactions. Impairment in social skills has been assumed as one of the paramount aspects of social anxiety disorder (SAD), which is considered a serious mental health problem because of its high prevalence and its resulting limitations on social interactions and performance. According to the diagnostic criteria from DSM-IV (APA, 1994), individuals with SAD or social phobia exhibit excessive, persistent and irrational fear of being seen behaving in a humiliating or embarrassing way – by the display of anxiety or inappropriate performance – and of disapproval consequences or rejection by others.

One might hypothesize that individuals with SAD lack appropriate verbal or non-verbal abilities which are necessary to deal with social interactions or performance situations. However, according to the review by Furmark (2000), research data have been inconsistent. Consequently, such direct association is arguable, considering that people with SAD, notwithstanding appearing to have inadequate performance, this might be due to behavioral inhibition, as opposed to actual lack of abilities. It is possible that social skills are just withdrawn during states of high anxiety, like those associated with situations of performance and interaction for individuals with SAD. In this case, in particular, it would be desirable to develop and encourage coping abilities in the repertoire of these

individuals, and in many cases the use of relaxation techniques or task concentration training would be indicated.

When evaluating the types of deficits that the individual may display in his or her repertoire of social skills, one can stress: a) *acquisition deficit*, characterized by the non-occurrence of social skills before the demands of the environment; b) *performance deficit*, characterized by the occurrence of a specific ability with lower frequency than the one expected for the demands of the environment; and c) *fluency deficit*, demonstrated by the occurrence of abilities with lower proficiency than the one expected for the social demands.

### OBJECTIVE

Considering the role of anxiety in the inhibition of socially competent performance and the inconsistency of data regarding the association between SAD and social skill, an examination was carried out to identify in the indexed literature, between the years 2000 and March of 2007, the empirical papers which cover this subject, aiming to realize a critical analysis of the research outlines used in these study. The procedure of analysis is supported by a review of the outlines and of the research results which aimed at characterizing the social skills repertoire of individuals with SAD, or with high levels of social anxiety, as well as the evaluation of the effectiveness of Social Skills Training (SST) as a therapeutical approach for the treatment of SAD.

### PROCEDURE

Relevant empirical studies concerning the subject “SAD and Social Skills” were identified based on systematic search in the literature, using the databases Medline, PsycINFO, Lilacs and Scielo, by means of combination of words *social phobia*, *social anxiety*, *social skills* and *social skills training*.

For the present review work, studies with participants of both sexes, adults, from clinical, university and community samples, were included. The following exclusion criteria were used for the studies: (a) other ages (children, adolescents, and elderly); (b) other diagnosis (other disorders and syndromes); (c) other approaches applied to the subject, such as pharmacological, or exclusively psychometric studies; (d) reports on programs about modalities of intervention; (e) research questions approaching the association of social anxiety and/or social skills with face disfigurement, endocrinological problems, cerebral lesion, cochlear implant, enuresis, and social adversities; and (f) association of social anxiety and/or social skills with variables such as self-image, locus of control, internalizing/externalizing behaviors, stress, and defense mechanisms.

A collection of 17 papers was selected by means of systematic search procedure, and the inclusion/exclusion criteria.

### RESULTS

The 17 papers included in this review were grouped into two classes: Characterization of the Social Skills Repertoire (N = 10), and Therapeutical Modalities – Application and comparison of clinical intervention (N = 7), which are analyzed below.

#### Characterization of the Social Skills Repertoire

As to the research methods used in the papers that were included in this class, a predominance of cross-sectional studies was observed (Baker & Edelmann, 2002; Bögels, Rijsemus & De Jong, 2002; Thompson & Rapee, 2002; Wenzel, Graff-Dolezal, Macho & Brendle, 2005; Alden & Mellings, 2004; Christensen, Stein & Means-Christensen, 2003; Stopa & Clark, 2000; Horley, Williams, Gonsalvez & Gordon, 2003; Sheffer, Penn & Cassisi, 2001), and only one longitudinal study (Strahan, 2003).

These studies had in common the description of profiles of social skills displayed by individuals with SAD or with high levels of social anxiety in self-reported measures. A characterization of specific aspects about the outlines adopted in these studies is presented in Table 1.

**Table 1.** Characterization of the outlines adopted in the studies of description of profiles

OUTLINES	STUDIES									
	1	2	3	4	5	6	7	8	9	10
N° of participants: - with generalized SAD	18	-	-	-	-	25	-	15	20	-
- with other anxiety disorders	18	-	-	-	-	-	-	-	20	-
- socially anxious	-	36	26	-	13	-	62	-	-	55
- non-clinical	18	36	24	29	14	26	62	15	20	198
Origin of the samples: - university	-	+	+	+	+	-	+	-	-	+
- clinic	-	-	-	-	-	+	-	+	+	-
- community	+	-	-	-	-	+	-	-	+	-
SS Indicators - social performance	+	+	+	+	+	-	-	-	-	-
- interpersonal perceptions	-	-	-	-	-	+	+	+	+	-
- academic performance	-	-	-	-	-	-	-	-	-	+
- communication skills	-	-	-	-	+	-	-	-	-	-
- social competence	+	-	-	+	+	-	-	-	-	+
Collecting context: a) social interaction tasks	+	+	+	+	+	+	+	-	-	-
- use of verbal prompts by confederate	+	-	+	+	-	+	-	-	-	-
- duration of social interaction (min.)	9	5	10	6	30	5	15	-	-	-
b) presentation of face pictures	-	-	-	-	-	-	-	+	-	-
c) filling of questionnaires and scales	+	+	+	+	+	+	+	+	+	+
d) use of physiological measures	-	+	-	+	-	-	-	-	-	-
Interlocutor in the social interaction: - confederate	+	+	+	+	-	+	-	-	-	+
- romantic partner	-	-	-	-	+	-	-	-	-	-
- other participant	-	-	-	-	-	-	+	-	-	-

1: Baker and Edelmann (2002); 2: Bögels et al. (2002); 3: Thompson and Rapee (2002); 4: Sheffer et al. (2001); 5: Wenzel et al. (2005); 6: Alden and Mellings (2004); 7: Christensen and cols (2003); 8: Horley et al. (2003); 9: Stopa and Clark (2000); 10: Strahan (2003).

SS: Social skills; (+) present in the study; (-) absent in the study.

The samples of the studies ranged between 27 and 253 participants (median = 52), which included patients diagnosed with generalized subtype of SAD or other anxiety disorders, socially anxious individuals, and non-clinical ones, of both sexes, with ages varying between 18 and 64 years. The origin of the participants was predominantly from university environment, followed by the clinical environment and the community.

The objectives of the studies that were analyzed focused the role of anxiety on different indicators of social skills, pointing out that high levels of social anxiety affect negatively: (a) social performance, defined as molecular and molar behavioral performance displayed during social interaction; (b) academic performance, evaluated by the drop-out rate and academic success; (c) communication skills, defined by the verbal content and speaking function displayed in the interaction with romantic partner; (d) interpersonal perceptions, defined as social judgments, self-perceptions, metaperceptions and perception of others, interpretation of social events, and processing of facial expressions; and (e) social competence, defined as the level of proficiency with which the verbal and non-verbal behavioral classes of an individual are articulated in successful social performance.

Amongst the several instruments and measures that were used in the studies, the *Beck Depression Inventory* (BDI) was used most frequently (Baker & Edelmann, 2002; Alden & Mellings, 2004; Christensen et al., 2003; Thompson & Rapee, 2002; Horley et al., 2003), followed by *Fear of Negative Evaluation Scale* (FNE) (Wenzel et al., 2005; Thompson & Rapee, 2002; Stopa & Clark, 2000; Horley et al., 2003).

Predominantly, the data of seven studies were collected in experimental situation of social interaction, i.e., of conversation with a confederate, with romantic partner, or other participants (socially anxious and nonanxious individuals). All the research assistants were previously trained for the tasks of social interaction. Except in the study by Thompson and Rapee (2002), the assistants were regarded as other participants, whereas in the other ones, they were identified as confederates. Although the interactions of the participants with their interlocutor ranged between 5 and 30 minutes, in most studies it was less than 10 minutes.

The confederates of four studies were instructed to initiate conversation or to give verbal prompts for its continuation every time a silence period occurred.

The measures used in the procedures of these studies were: (a) subjective; (b) objective; and (c) physiological. The objective measures were video recordings of the interactions; the subjective ones were the application of questionnaires, scales or inventories; and the physiological measures were the examination of skin conductance, level of cheek coloration and heart rate. Table 2 shows when such measures were taken during the experimental session.

**Table 2.** Moments of registration of the measures during the experimental sessions of the studies

Studies	Measures		
	Before	During	After
Bögels et al. (2002)	<ul style="list-style-type: none"> <li>• skin conductance;</li> <li>• cheek coloration;</li> <li>• <i>Visual Analogue Scales</i> (VAS).</li> </ul>	<ul style="list-style-type: none"> <li>• skin conductance;</li> <li>• cheek coloration.</li> </ul>	<ul style="list-style-type: none"> <li>• skin conductance;</li> <li>• cheek coloration;</li> <li>• VAS;</li> <li>• causal attributions of success and failure;</li> <li>• social skills rating scale.</li> </ul>
Sheffer et al. (2001)	<ul style="list-style-type: none"> <li>• <i>Subjective Units of Distress</i> (SUDS);</li> <li>• heart rate.</li> </ul>	<ul style="list-style-type: none"> <li>• heart rate.</li> </ul>	<ul style="list-style-type: none"> <li>• SUDS;</li> <li>• heart rate;</li> <li>• scale of impression.</li> </ul>
Wenzel et al. (2005)	<ul style="list-style-type: none"> <li>• <i>Fear of Negative Evaluation Scale</i> (FNE);</li> <li>• <i>Social Avoidance and Distress Scale</i> (SAD);</li> <li>• <i>Dyadic Adjustment Scale</i> (DAS);</li> <li>• <i>Couples' Problem Inventory</i> (CPI).</li> </ul>	<ul style="list-style-type: none"> <li>• video recordings of interactions</li> </ul>	-
Baker and Edelman (2002)	-	<ul style="list-style-type: none"> <li>• video recordings of interactions</li> </ul>	<ul style="list-style-type: none"> <li>• rating scales relating to perceived bodily sensation</li> </ul>
Alden and Mellings (2004)	-	-	<ul style="list-style-type: none"> <li>• <i>Social Judgment Questionnaire</i>;</li> <li>• <i>Focus of Attention Questionnaire</i> (FAQ)</li> </ul>
Christensen et al. (2003)	-	-	<ul style="list-style-type: none"> <li>• Traits ratings.</li> </ul>
Thompson and Rapee (2002)	-	<ul style="list-style-type: none"> <li>• video recordings of interactions</li> </ul>	<ul style="list-style-type: none"> <li>• levels of anxiety during the structured and unstructured situations.</li> </ul>

For better understanding the research outlines that were used, considering their specificities, the procedures for data collection will be detailed.

In four of these studies, the participants were given general instructions to act as if they were being introduced to another person with whom they would be interacting (Baker & Edelmann, 2002; Christensen *et al.*, 2003; Thompson & Rapee, 2002; Alden & Mellings, 2004). The participants of two other studies were given specific instructions to initiate and to keep conversation with the research assistants (Sheffer *et al.*, 2001; Bögels *et al.*, 2002).

In the procedure by Bögels *et al.* (2002), the participants interacted with the research assistants, one male and another female, and were informed that these assistants would judge their skill to initiate and to keep conversation, and also that this situation would be recorded in order to evaluate their behavior. During the interactions, the research assistants uncovered three large mirrors in which half of the participants could see their reflection during the conversation, favoring the condition of self-awareness.

In Wenzel *et al.* (2005), the couples were instructed to discuss three topics: neutral (an event of their day), negative (a problem), and positive, with a duration of ten minutes for each topic.

After each interaction, in turns, with other three individuals, the participants in the study by Christensen *et al.* (2003) were requested to rate themselves, their interaction partners, and their metaperceptions, that is, to evaluate how they thought they had been seen by their interaction partners, based on a variety of personality traits represented by adjectives such as sociable, friendly, nervous, and quiet, in 9-point ranking scales, anchored with 1 (*not at all*) and 9 (*very much*).

In Thompson and Rapee (2002), both participants and confederates were left by the researcher in the experimental room with the excuse that he or she would go and get some cassettes in order to record their role-playing interaction. A video camera would be visible to the participant, showing it was turned on, although there was no cassette in it. The resulting interactions were considered as unstructured task. After the researcher had returned, both participants and confederates were instructed to imagine they were in a party and that they were supposed to get to know one another as well as possible, and were informed that they were being recorded. This interaction was the structured task of the study. Both types of tasks were subjected to comparison.

In the study by Alden and Mellings (2004), after greeting the participants, the experimenter told she would be behind a one-way mirror. The confederate was introduced into the room and should start conversation with the participant. They were instructed to interact as if they had just been introduced. After that, the participants and confederates would independently fill in post-interaction questionnaires.

In Sheffer *et al.* (2001), the participants took part in two conversational probe role-play tasks corresponding to conditions of high and low image management demand. Each probe task was carried out with a different confederate. In the low demand condition, the participants were told that the confederates would be evaluated, and that they had been instructed to make the best impression possible on the participants and that they should evaluate them using the Impression Scale. In the high demand condition, the participants were told they would be evaluated and that they should make the best image possible on the confederate, and that both the confederate and a research assistant would evaluate them using the Impression Scale.

The procedures to collect data in the other three studies used objective measures (Horley *et al.*, 2003), subjective ones (Stopa & Clark, 2000), and both objective and subjective ones (Strahan, 2003).

In Horley *et al.* (2003), the objective measure was the monitoring, by means of a computer system, of the visual exploration of three pictures showing different facial expressions (neutral,

happy, and sad) that were presented to the participants. They were instructed to fixate on the centre of the screen until the picture appeared, and then, to look at it in any manner they chose. Each stimulus was presented for 10s, with an interval of 15s between them.

In the research by Stopa and Clark (2000), a package was sent to the participants containing the questionnaires and scales, and they were requested to complete them independently.

In Strahan (2003), the university students participating completed inventories and questionnaires comprehending anxiety evaluation, social skills, social and academic adjustment, and educational success test, in small groups (with 4-5 students by session), carried out in the first 4-6 weeks of classes. The information related to academic performance of the students was provided by the Registrar's office for each semester for two years.

As to the results of the studies included in this category, an agreement was observed among five studies suggesting that individuals with SAD and with high levels of social anxiety have poorer social skills repertoires, as compared to the non-clinical control group (Baker & Edelmann, 2002; Horley *et al.*, 2003; Strahan, 2003; Wenzel *et al.*, 2005; Thompson & Rapee, 2002), besides showing poorer social competence (Baker & Edelmann, 2002; Strahan, 2003; Wenzel *et al.*, 2005).

In the study by Horley *et al.* (2003), individuals with SAD showed avoidance of more important areas of the face, particularly the eyes. This impairment may be attributed to the more self-focused attention and negative self-perception shown by individuals with this disorder. The results of visual exploration in this study offered empirical evidence for the clinical observation that individuals with social phobia tend to avoid visual contact during social interaction.

In the study by Strahan (2003), social anxiety did not reach enough significance as a predictor for the academic performance and college persistence. However, as the author recognizes, it is possible that high levels of social anxiety exert indirect effects on academic performance and retention, considering that its negative correlation with academic adjustment was moderately significant, and academic adjustment had a clear effect on other academic success indicators.

Three studies checked the influence of the structure and demands of the situation on the social performance of individuals with social phobia, socially anxious and non-clinical. The results by Thompson and Rapee (2002) reveal that the structure of social interaction situations moderates differences between the social performance of socially anxious and non-anxious individuals, and that they show better social performance in structured situations as compared to unstructured situations. According to this conclusion, the results of the experiment by Sheffer *et al.* (2001) point out that high or low demands to produce a positive impression of oneself constitute an important mediating factor in the relationships between anxiety, heart rate and social competence in non-clinical individuals. In the condition of low demand to produce a good impression of oneself, higher social competence was consistently associated with lower heart rate and less self-reported anxiety. In the condition with high demands, higher social competence was only associated with higher heart rate.

The study by Stopa and Clark (2000), revealed that patients with SAD tend to interpret ambiguous social situations (e.g. "you have visitors round for a meal and they leave sooner than you expected") in a negative manner and show a specific tendency to interpret social events moderately negative (e.g. "you have been talking to someone for a while and it becomes clear that they are not really interested in what you are saying") in a more catastrophic way, as compared to control groups.

Three other studies focused on comparing self-evaluation of participants with an external evaluation. Two of the studies found agreement as to the negative self-perception of individuals with high levels of social anxiety. In Christensen *et al.* (2003), the participants with high levels of social anxiety saw themselves as less sociable, less likeable, more nervous, less intelligent and more distant in the interaction with other participants. Additionally, they were seen as less sociable, less relaxed, quieter, more nervous, more distant, and with a marginally significant trend to be seen as more

shallow by their interaction partners. However, the results showed that although other people are able to detect some discomfort in socially anxious individuals in social situations, they do not think less of them as a result. This kind of information may be used by different treatment modalities to change some negative beliefs kept by individuals with SAD, as to how they are perceived by others and the imagined consequences thereof. In the study by Bögels *et al.* (2002), the participants with high social anxiety evaluated their social skills, which they displayed during a conversation, as more deficient than those with low social anxiety. Nevertheless, the differences between people with high and low social anxiety with respect to the self-evaluated skills and evaluated by research assistants were due to differences in the display of anxiety symptoms (e.g. fidgeting), but not due to differences in socially skillful behavior. In Alden and Mellings (2004), the participants with generalized SAD were evaluated by themselves and by confederates as less skillful and feeling or appearing to be more anxious than the participants in the control group.

The analysis of the results obtained by the studies reveal that high levels of social anxiety affect negatively the social performance, communication skills, interpersonal perceptions, and social competence of individuals with social phobia and socially non-anxious. The results of the study that aimed at verifying the association between social anxiety and academic performance were inconclusive about that, and are the only restriction to the confirmation of the initial hypothesis.

Although one can assume that the element that is evaluated in the behavioral repertoire of an individual with SAD or with high levels of social anxiety in a planned situation is, in a general manner, representative of their behavior, one could argue if this element really represents their behavioral repertoire. Such a question suggests the necessity for studies supported by ecological validity (degree with which the conditions of study are factual or applicable to real life) and with the possibility of wider generalization of the results, which could not be afforded by anyone of the studies included in this category. Besides, the gender characteristics of the samples were restricted, including predominantly female participants. It is inevitable to assume that, in the development of many of these studies, the size of the samples was influenced by the nature of the population that was investigated. In spite of this limitation, it would be desirable to rely on more comprehensive samples including individuals with clinically confirmed diagnosis of SAD.

It was also observed the lack of any standard test, inventory or scale to evaluate social skills to be used in different studies in order to provide more validity and reliability to the results of the studies that were included.

The conclusion was drawn that the profile of individuals with generalized SAD or with high levels of social anxiety is characterized by the presence of impairment in their social skills.

### **Therapeutical Modalities – Application and Comparison of Clinical Intervention**

The studies that were included in this category used quasi-experimental outlines and aimed directly or indirectly at evaluating the effectiveness of Social Skills Training (SST) as a therapeutical approach to treat SAD.

The effectiveness of the use of SST was tested in diverse ways in the studies. In four of them, the effectiveness of treatment was compared with those of other therapeutical modalities, such as cognitive behavioral therapy (CBT) (Van Dam-Baggen & Kraaimaat, 2000a; Herbert *et al.*, 2005), supportive therapy (Cottraux *et al.*, 2000), and behavioral therapy (Stravynski *et al.*, 2000), which were used as methodological control. In the study by Cottraux *et al.* (2000), SST constituted a module composing the CBT. In Herbert *et al.* (2005), the SST component was completely integrated to cognitive restructuring and simulated exposure exercises which were the bases of the standard protocol of group CBT.

In another study, Van Dam-Baggen and Kraaimaat (2000b) investigated the effectiveness of group SST for patients with generalized SAD grouped in “reticent” and “non-reticent” subtypes. The authors defined as “reticent” the participants who reported performing low frequency of social behaviors, and as “non reticent” those who reported performing high frequencies of social behaviors.

Based on a case study, Espada, Quiles and Méndez (2002) presented a multi-component intervention in which SST constituted one modulus of treatment along with other cognitive-behavioral techniques, namely, cognitive restructuring, self-instructing, imagination and live exposure, instructions in distractions, and training in relaxation.

And yet another study, Bishop (2003) tested the applicability of online SST distant learning system to help the participants to better cope with their social difficulties, converting phrases and sentences which they judged to be confusing and offensive in more concise and understandable definitions.

In the comparison studies (Van Dam-Baggen & Kraaimaat, 2000a; Cottraux *et al.*, 2000; Stravynski *et al.*, 2000), the authors formulated as a hypothesis the statement of the best effectiveness of SST over the other therapeutical modalities, such as CB, supportive and behavioral therapies. Herbert *et al.* (2005) hypothesized that the modified program of group CBT enriched by SST would produce greater treatment effects than the standard group CBT protocol.

Apart from the case study, the samples of the studies varied between 13 and 65 adult patients, of both sexes, with ages varying between 18 and 57, with primary or secondary diagnosis of SAD, according to DSM-IV criteria, with or without comorbidities. The participants were recruited, in its majority, in the clinical environment. In the study by Stravynski *et al.* (2000), the sample came chiefly from the community, following descriptions of the treatment program in different means of communication. In Herbert *et al.* (2005), the participants were recruited exclusively in the community by means of announcements, newspapers articles, posters in bookshops, and cafés. Only the study by Bishop (2003) did not report the origin of the samples. Four other studies (Van Dam-Baggen & Kraaimaat, 2000a; Van Dam-Baggen & Kraaimaat, 2000b; Cottraux *et al.*, 2000; Stravynski *et al.*, 2000) shared as exclusion criteria the presence of indications of psychotic disorder and addiction to substances.

Still related to the criteria for including participants, a diversity of conditions, which are highlighted in the studies, was observed. Van Dam-Baggen and Kraaimaat (2000a) used a matching procedure of participants, who came from two psychiatric outpatient environments, for the two treatment conditions, in order to certify that both samples were relatively equivalent. In another study (Van Dam-Baggen & Kraaimaat, 2000b) including inpatients from a psychiatric clinic, the designation for the composition of the “reticent” and “non-reticent” samples had as a bases the scores in the *Frequency Scale of the Inventory of Interpersonal Situations* (IIS). In the studies by Cottraux *et al.* (2000), Stravynski *et al.* (2000) and Herbert *et al.* (2005), the participants were randomly allocated into the treatment groups. In the clinical case presented by Espada *et al.* (2002), the participant was a patient who spontaneously sought treatment. Bishop (2003) did not mention the selecting procedure of participants for the study. The participants identified in four other studies (Cottraux *et al.*, 2000; Stravynski *et al.*, 2000; Espada *et al.*, 2002; Herbert *et al.*, 2005) had in common the fact that they spontaneously sought treatment, and only in three studies the allocation into groups was random.

The studies used a different set of instruments and measures. The only instruments that repeated throughout the studies were *Symptom Checklist-90* (SCL-90) (Van Dam-Baggen & Kraaimaat, 2000a; 2000b; Stravynski *et al.*, 2000), *Fear Questionnaire* (FQ) (Cottraux *et al.*, 2000; Stravynski *et al.*, 2000; Herbert *et al.*, 2005), and *Beck Depression Inventory* (BDI) (Cottraux *et al.*, 2000; Espada *et al.*, 2002; Herbert *et al.*, 2005).

Table 3 presents a detailed characterization of the outlines adopted in the studies about the effectiveness of SST.

**Table 3.** Characterization of the outlines adopted in the studies of effectiveness of the SST

Outlines	Studies					
	1	2	3	4	5	6
Application: - group	+	+	+	+	+	-
- individual	-	-	-	-	-	+
Duration of sessions:	90 min	nr	120 min	120 min	120 min	50 min
NO of participants:	5 to 8	8 to 10	4 to 6	nr	4 to 6	1
Therapist: - one	+	+	-	+	+	+
- pair	-	-	+	-	-	-
- co-therapist	+	-	-	+	-	-
Techniques: - behavioral rehearsal	+	+	+	+	+	+
- modeling	+	+	+	+	+	+
- homework assignment	+	+	+	+	+	+
- feedback	-	-	+	+	+	+
- reinforcement	-	-	+	+	+	+
- self-monitoring	+	+	-	+	-	+
- bibliotherapy	+	+	+	-	-	-
- successive approximations	+	+	-	-	+	-
- instructions	-	-	-	+	+	+
- educational phase	-	-	-	-	+	+
- functional analysis	-	-	-	+	-	+
- imitative learning	-	-	-	+	-	+
- problem solving strategies	-	+	-	-	-	-
NO of sessions:	20	20	6	14	12	4
Follow-up:	3 m	-	6 and 12 m	6 and 12 m	3 m	12 m

1: van Dam-Baggen and Kraaimaat (2000a); 2: van Dam-Baggen and Kraaimaat (2000b); 3: Cottraux *et al.* (2000); 4: Stravynski *et al.* (2000); 5: Herbert *et al.* (2005); 6: Espada *et al.* (2002).  
m: months; (+): present in the study; (-): absent in the study; nr: no reference

As one can observe, SST was used in groups in five studies. In the multi-component intervention by Espada *et al.* (2002), and in the online system by Bishop (2003), SST was used individually. The predominance of the use of SST in groups, as opposed to individually, can be justified by the following advantages: (a) it saves time for the therapist; (b) it offers more diversity of behavior rehearsal with a larger number of individuals; (c) it allows for ready generalization of the gains and more quantity of effective feedback for the trained performances; (d) it provides experience with a wider range of problem-situations and more support to solve them; (e) it provides more multiple models, besides the ones offered by the therapist; and (f) it favors the learning of discrimination of the desired and undesired possible consequences for the emission of the new behaviors that are learnt.

The SST groups that are described were formed by four to ten participants, and in one of them, the number of participants that composed the treatment groups was not mentioned. As to the duration of sessions, they varied between 90 and 120 minutes. The total number of sessions varied between six and twenty. In the case study, the SST module included in the multi-component treatment took four sessions of fifty minutes.

The clinical interventions in Van Dam-Baggen and Kraaimaat (2000a; 2000b), Cottraux *et al.* (2000) and Stravynski *et al.* (2000) were carried out by experienced therapists in SST or CBT, counting on a co-therapist in two of these interventions. In the study by Herbert *et al.* (2005), the

therapists received weekly individual and group supervision for quality assurance, and to ensure adherence to the treatment manuals.

Regarding the studies by Van Dam-Baggen and Kraaimaat (2000a; 2000b) and Espada *et al.* (2002), the following social skills were included in the SST program for patients with generalized SAD: observing; listening; initiating, keeping, and finishing conversation; giving and receiving feedback; eye contact; volume of speech and intonation; making and refusing requests; receiving refusals; expressing opinions; making complaints; greeting; stating positive self-assertions; receiving and making criticism; expressing opinions; and standing up for one's rights. In the study by Espada *et al.* (2002), the educative phase involved teaching the patient about the performance styles of social passive, assertive, aggressive; about the social performance components; and the definition of socially skilled behavior. In Herbert *et al.* (2005), the educative component of SST included teaching the participants about the three expressive domains: (a) speech content, (b) paralinguistic characteristics of speech (volume and tone of voice, timing), and (c) non-verbal behavior (proximity, eye contact, facial expressions), using them in different social contexts. It was observed that assertiveness was explicitly present in five clinical interventions of SST (Van Dam-Baggen & Kraaimaat, 2000a; 2000b; Cottraux *et al.*, 2000; Espada *et al.*, 2002; Herbert *et al.*, 2005).

The techniques typically used in SST programs and common to all the clinical intervention studies were: behavioral rehearsal, modeling, and homework assignment. The feedback, positive reinforcement and self monitoring techniques were present in four studies and the use of bibliotherapy, successive approximation and instructions was present in three studies. The procedure of functional analysis was used in only two of the studies.

Homework assignment has been one of the resources to check generalization of the effects of SST programs (Del Prette & Del Prette, 2005). In analytical-conceptual terms, homework assignment functions as a tool to identify problems of stimulus control which may be hindering the effectiveness of the intervention over social functioning of individuals in their natural environment. Consequently, this effectiveness is found to be implicated in the social validity of the acquisitions predicted by the SST programs.

In all the interventions of SST used in clinical environment, evaluations were carried out before and after treatment. Follow-up evaluations were used in five of the studies, presenting a variability of follow-up plans amongst them.

A disadvantage of the fact that the majority of participants of the studies were recruited in the clinical environment is the possibility that this context represents the most serious cases of SAD, which, ultimately, would have implications as to generalization of the results. Corroborating this limitation, it was observed that the participants recruited in this context received, predominantly, the primary or secondary diagnosis of generalized SAD, with and without comorbidities.

Regarding the results that were obtained, the effectiveness of SST was proved by most of the studies, including the comparison with the other treatment modalities, such as CBT and supportive therapy, confirming the initial hypothesis. In the study by Stravynski *et al.* (2000), although SST had produced better results sooner, this tendency was leveled with behavioral therapy, and both treatments resulted in the same degree of improvement in the 12-month follow-up assessment. In the multi component intervention by Espada *et al.* (2002), the patient presented notable improvement in their social relationships, especially in conversations and social events. In the study by Bishop (2003), the participants with generalized SAD reported they perceived themselves more capable of understanding stories, but they considered that the online learning system did not make them feel any better, besides demonstrating a slightly negative attitude towards its functionality.

In methodological terms, the internal validity of SST could benefit greatly if it were contrasted with a convincing control condition (placebo), that is, a planned condition to resemble a therapy without being one. This supposition gains consistency when one considers that to spend a

period in a waiting list is not likely to be the best control for the effects of treatment, in addition to the lack of a precise definition of what constitutes the best control condition for psychosocial interventions.

In six of the studies, the effectiveness of both SST and the other therapeutical modalities was proved by the results of self-report measures. Only the studies by Stravynski *et al.* (2000) and the one by Espada *et al.* (2002) used clinical interviews to evaluate the effectiveness of the treatments that were offered, besides the self-report measures. Herbert *et al.* (2005) also used behavioral evaluations before and after the interventions, constituted of two interaction tasks in role-play and an impromptu speech.

However, a restraint must be made about the attested “effectiveness” of these studies. When one analyses the methodologies that were used, only the studies by Cottraux *et al.* (2000), Stravynski *et al.* (2000) and Herbert *et al.* (2005) can be characterized as effectiveness studies, since they adopted randomized intervention groups in the composition of their research outlines. The other studies (Van Dam-Baggen & Kraaimaat, 2000a; 2000b; Espada *et al.*, 2002) intended to test efficacy but they did not, and therefore are better characterized as efficiency studies, which do not require randomized allocation of the participants into the groups. Considering that the treatments of the study by Van Dam-Baggen and Kraaimaat (2000a) were carried out in two psychiatric environments in two different parts of The Netherlands, the randomized distribution was not possible, and thereby, a matching procedure of the participants into two treatment conditions was adopted.

Some considerations must be made regarding the results of the three studies carried out in the clinical contexts. In the study by Cottraux *et al.* (2000), any conclusion about the effectiveness of the phases of cognitive therapy, which occurred firstly, and SST would be inaccurate, although most of the changes were seen after the SST module. Supposedly, cognitive therapy paved the way for SST, since the patients were able to continue using cognitive techniques during the rest of the intervention. In this context, one can consider that a synergic action of the cognitive therapy and SST may have influenced the results. This can also have been present in the case study by Espada *et al.* (2002), since many cognitive and behavioral techniques preceded the SST module. Even though these are not cross-over clinical studies, an alternate use of the procedures to different samples (groups) would be desirable in order to guarantee the best methodological control of the proposed outlines, which would not avoid the problem of first intervention effects continuing throughout the period of the second phase. Additionally, in Herbert *et al.* (2005), the synergic action is very clear, since the SST component was fully integrated to the standard protocol of the group CBT, resulting in a joint therapeutical effect of these two treatment approaches.

Herbert *et al.* (2005) advocate that the explicit exclusion of any reference to the behavioral skills in the condition of only group CBT may have worked to weaken the treatment to some extent, when compared to the way it is normally given, in which the behavioral skills are sometimes approached even if it is in an informal and somewhat quick way. In contrast, the authors add that even in the modified protocol of group CBT, more time continued to be dedicated to cognitive restructuring than to SST, both in the stages of psychoeducation of the program and in each simulated exposure exercise, making it clear that there was not a strong or exclusive focus on SST in this condition.

In Stravynski *et al.* (2000), behavioral therapy was planned to adopt the format of SST, aiming at improving how the patient performed spontaneously the target behavior chosen, with the only restraint of not using certain techniques which are typical of training programs, such as modeling, behavioral rehearsal, and feedback. According to the description by the authors, there was convergence between behavioral therapy and SST in the following points: it was based on a strong interpersonal focus and aimed at teaching the patient to both create new social circumstances and to engage in all the social situations in a different way. These proposals in common suggest that the behavioral therapy proposed by the authors showed to be an interface of SST, without the use of all the techniques that are used in typical training programs.

The functionality of the online learning system proposed by Bishop (2003) presented some limitations and implications as for its use in actual social situations. Firstly, the system would have to be adapted to fulfill the needs of individuals with generalized SAD, since they have no problems to interpret the literal meanings of what is said to them in social situations, but because they do interpret comments in a negative way. Secondly, the practical use of this system would demand an additional cognitive processing of information from the individuals in order to participate in an actual social situation, besides making them lose visual contact with an interlocutor, which would amplify their symptoms of social impairment.

Based on the results of the studies, the applicability of SST in clinical context was verified as one of the best treatments of choice for psychiatric patients with primary or secondary diagnosis of generalized SAD.

Taking into account the descriptions and the results of the studies, it is possible to conclude that the best outline in order to test the effectiveness of SST in patient diagnosed with SAD would be one that included this therapeutical modality constituted the sole treatment approach, being used in groups, with random allocation of participants in the groups of training and for comparison, and also using contextualized interaction tasks based on previous evaluation of the resources and deficits of skills presented by the participants in different contexts. It seems that the outlines of SST with best results were those used in the studies by Van Dam-Baggen and Kraaimaat (2000a; 2000b), although they can not be characterized strictly as efficacy study.

Analyzing the results that attest the “effectiveness” of SST amongst the studies, it is possible to conclude that the reach of this therapeutical modality has as a limiting factor the inferential character of the scales in the evaluation of the acquisition of social skills and other therapeutical gains by the patients, leaving open some questions of ecological validity.

### FINAL COMMENTS

Examining the 17 studies grouped into two classes of proposed analysis, the absence was verified of a standard instrument or measure to evaluate the social skills that would provide more validity and reliability to the data that are collected, taking into account the diversity of instruments that were used with this objective. In the collection of articles that were analyzed, the necessity was observed of recognition of an instrument systematically studied as a “Gold Standard” in order to evaluate the social skills and/or social competences of individuals, which would favor the comparison among the studies.

It is considered that the excess of interpersonal anxiety and the difficulties in the processing, in cognitive-affective terms, as interpretative biases, negative self and meta perceptions, and self-focused attention of individuals with SAD may be implicated in the performance or fluency deficits presented by them, inhibiting, thus, the display of socially competent performances in social interactions, in case they do not present acquisition deficit. Del Prette and Del Prette (2001) define socially competent performance as the one which expresses an appropriate reading of the social environment, which correctly decodes the expected performances, valued and effective to the individual in his or her relationships with others, contributing to the maximization of gains and minimization of losses for oneself and for the ones with whom they interact.

In the article by Thompson and Rapee (2002), it seems that the term “social skills training” is used as a synonym to “add social skill to the repertoire of a person”. In this point, apparently, the authors do not consider that SST does not aim at solely adding new social skills to the behavioral repertoire of individuals that have deficits in this repertoire, but also to improve their social skill before specific demands of the interpersonal situations, as well as to promote the social competence before distinct audiences. Additionally, SST also comprehends the reduction of anxiety as an attainable objective, by means of appropriate and specific techniques for such, not only for individuals with SAD.

For those patients who already have relatively strong skills in their repertoire, for example, SST may facilitate the increase of their self-efficacy with respect to social situations, thus improving their skills to deal with anxiety and consequently decreasing social avoidance (Gaudiano & Herbert, 2003).

The data of the study by Christensen et al. (2003) evidenced that the negative metaperceptions of socially anxious individuals were mostly due to their own negative self-perceptions than to the negative perceptions of others, in consonance with the statement by Furmark (2000) that self-perception of individuals with social phobia generates negative impression of themselves, which, for them, reflects what others really notice and think about them. In agreement with this result, and with the arguments by Wells and Clark (1997), the results of the studies by Alden and Mellings (2004) showed that socially phobic individuals typically build a negative image of themselves from the perspective of an outer observer.

Future studies need to be carried out in order to verify more accurately the possible associations between social anxiety and academic performance, with better methodological control.

It was concluded that the prior characterization of the social skills repertoire of individuals in general is paramount, and especially of patients with SAD and individuals with high levels of social anxiety, in order to propose effective treatment programs that fulfill more directly and objectively their interpersonal demands.

The analysis of the reach of the results attesting the effectiveness of both SST and the other indicators of social skills that were evaluated evidenced the necessity of new studies with clinical and non-clinical samples, with random allocation of participants, with the proposition of contextualized interaction tasks, supported by ecological validity which grants generalization of the results obtained about the association between social skills and SAD, evidencing thus the functionality and the process by which anxiety interferes in the social performance of individuals.

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# Efficient Class-wide Remediation: Using Technology to Identify Idiosyncratic Math Facts for Additional Automaticity Drills

*John Parkhurst, Christopher H. Skinner, Jared Yaw, Brian Poncy, Westley Adcock and Elisa Luna*

## Abstract

A multiple baseline design was used to evaluate the effects of a modified Detect, Practice, and Repair (DPR) procedure on multiplication-fact fluency with 10 low-achieving 5<sup>th</sup>-grade students. Experimenters modified the DPR procedure using Microsoft<sup>®</sup> PowerPoint<sup>®</sup> slide shows to conduct the assessments and allow for more rapid self-evaluation in order to identify target facts. Next, each student completed the cover, copy, and compare (CCC) practice procedures only on the problems which he/she did not answer correctly within 3 s. Results suggest that the procedure enhanced multiplication fact fluency across all 10 students. However, increasing baseline data on the third list of problems hindered interpretation of effects. The discussion focuses on improving skill remediation by using efficient procedures for creating idiosyncratic curricula.

Keywords: Technology, Efficient Remediation, Idiosyncratic Target Behavior, Math-Fact Automaticity, Class-wide Remediation

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Researchers have found evidence that many students do not master basic mathematics skills and in 2009, for the first time in two decades, national U.S. math scores at a fourth-grade level did not improve (National Center for Educational Statistics, 2009). These findings support the need for the development and evaluation of science-derived basic math skills interventions (Maccini, Mulcahy, & Wilson, 2007). Haring and Eaton (1978) developed a multi-stage hierarchy of skill development. During the initial stage, acquisition, the focus is on enhancing response accuracy. Once a skill can be performed accurately the focus shifts to developing speed of accurate responding, also known as fluency or automaticity (Deno & Mirkin, 1977; Hasselbring, Goin, & Bransford, 1988).

Several theories may explain why students who are fluent or automatic with basic addition, subtraction, multiplication, and division facts are more likely to experience success acquiring and mastering more advanced mathematics objectives (Deno & Mirkin, 1977; Haring & Eaton, 1978; Johnson & Layng, 1992; McCallum, Skinner, Turner, & Saecker, 2006; Shapiro, 2004; Skiba, Magneusson, Marston, & Erickson, 1986; Skinner, 1998). Individuals have limited cognitive capacity and automatic responding is thought to require fewer cognitive resources, including working memory and attention. Because many complex mathematics objectives require students to perform basic computations, those who expend too much of their cognitive capacity performing basic operations may have insufficient capacity to apply toward acquiring complex mathematic skills (Gagne, 1983; LaBerge & Samuels, 1974; Skinner & Schock, 1995; Woodward, 2006). Students who can complete basic math computations problems with rapidity are likely to expend less time and effort on math activities and have less math anxiety (Billington, Skinner, & Cruchon, 2004; Cates & Rhymer, 2003). Consequently, those with greater basic-fact fluency are more likely to choose to engage in math activities, which further enhance skills (Skinner, 1998; Skinner, 2002; Skinner, Pappas, & Davis, 2005).

## Idiosyncratic Target Behaviors and Behavioral Consultation

Researchers have drawn an important distinction between fluency and automaticity (Skinner & Daly, in press). The term fluency reflects the ability to respond to a group of stimuli both quickly and accurately. Thus, a fluent typist can type 150 words correct per minute. However, when discussing mathematics researchers have used the term automaticity to describe a students' ability to respond to a

specific fact (e.g.,  $6 \times 7 = \underline{\quad}$ ) rapidly, accurately, and with minimal effort or cognitive resources (Hasselbring et al., 1987; 1988; Poncy, Skinner, & Jaspers, 2007; Poncy, Skinner, & O'Mara, 2006). Developing the ability to respond fluently to a class of basic math facts (e.g., single-digit multiplication facts) may be caused by becoming automatic with each specific fact in that class (Skinner & Daly, in press). Consequently, as students are developing fluency, it is likely that they will have developed automaticity with some math facts (e.g.,  $5 \times 5 = 25$ ), but not others (Poncy et al., 2006; Poncy et al., 2007).

Behavioral consultation has been used to remedy idiosyncratic academic skill deficits (e.g., Saecker, Skinner, Brown, & Roberts, 2009). When working with academic skill deficits, one of the first steps in behavioral consultation is to identify target behaviors in need of remediation (Shapiro, 2004). Skinner and Daly's (in press) conceptualization of automaticity versus fluency makes it apparent that each student is likely to have different math facts which require targeted remediation (i.e., in need of automaticity building). Additionally, within each student, as automaticity develops with some facts, the curricula should be altered so that the student is not wasting valuable instructional/learning time on facts that he/she has already developed to the point of automaticity (Cates et al., 2003; Nist & Joseph, 2008; Poncy et al., 2006; Skinner, 2008).

Because practice enhances speed of accurate responding, interventions that occasion higher rates of accurate responding are likely to cause greater increases in automaticity and/or fluency (Coddling, Chan-Iannetta, Palmer, & Lukito, 2009; Skinner, 1998; Skinner, Belfiore, Mace, Williams, & Johns, 1997; Skinner, Bamberg, Smith, & Powell, 1993; Skinner, Belfiore, & Watson, 1995; Skinner, Fletcher, & Hennington, 1996; Skinner & Shapiro, 1989). However, high rates of responding will only enhance skills when those responses are accurate (Skinner, 1998; 2010). When students are responding at high rates, immediate feedback can decrease the probability of students repeatedly practicing inaccurate responses (Skinner & Smith, 1992). Procedures are needed to reduce, as opposed to enhance time spent on mastered facts to allow student more time to practice facts which are not automated (Cates et al., 2003; Joseph & Nist, 2006; Nist & Joseph, 2008; Poncy et al., 2006; Skinner, 2008).

### **Detect, Practice, Repair**

Detect, Practice, Repair (DPR) is a multi-component, class-wide procedure that focuses on enhancing fluency by allowing students to practice those math facts that they have not developed to the point of automaticity (Poncy et al. 2006). During a detect phase, Poncy et al. used a metronome to pace a group of students through a series of math facts, with the metronome signaling 1.5 s intervals to respond to each fact. After this paced assessment, each student circled those problems that he/she did not answer and then applied the practice phase to those identified problems by performing the Cover, Copy, Compare (CCC) procedure. CCC is a self-paced practice procedure designed to occasion high rates of active, accurate, academic responding (Skinner, Belfiore et al., 1997; Skinner, McLaughlin, & Logan, 1997; Skinner, Turco, Beatty, & Rasavage, 1989). CCC takes the learner through 5 steps: (a) the student will review the target mathematic problem, (b) study the mathematic problem with the answer, (c) cover the problem and answer, (d) write the problem and answer, (e) uncover the original problem and answer and compare their response to the original printed problem and answer.

Poncy et al. (2006) first used DPR to increase subtraction-fact fluency in 14 low-performing 3<sup>rd</sup>-grade students who were receiving special education services. Poncy et al. found that the DPR procedure yielded increases of 3.2 digits correct per week, compared to the district-wide average of .5 digits correct improvement. A subsequent application of DPR enhanced division-fact fluency in middle school students (Axtell, McCallum, Bell, & Poncy, 2009).

## The Current Study

The current study was initiated by an elementary school principal and a 5-grade teacher who requested consultation designed to address math-fact deficits in a low performing class. The school had four 5th-grade math classes and this teacher taught the students who were experiencing the most problem developing math skills. Specifically, the teacher requested that the consultant develop and help implement an efficient procedure designed to enhance multiplication-fact fluency that could be applied class wide. The teacher indicated that some students had stronger multiplication skills than others, but many could not respond rapidly and accurately to all the basic multiplication facts. As DPR was designed for group application, but still allowed each student to practice only problems which each individual needed to practice, the consultant used previous DPR research (Poncy et al., 2006; Axtell et al., 2009) to guide intervention development. During the problem solving process, the consultant and educator also addressed several limitations associated with DPR.

The metronome-paced detect phase of DPR students allowed some students to work ahead or continue at their own pace, ignoring the metronome (Poncy et al., 2006). To address this concern the Microsoft® PowerPoint® program was used to present one problem every 3 s. Also, in the first study when students evaluate responses they did not consider accuracy; rather they practiced problems that they did not answer within the 1.5 s timeframe (Poncy et al., 2006). Axtell et al. (2009) addressed this by having students check their work using a printed answer board that had to be reconstructed for each trial. In the current study, immediately after students finished these paced trials, a PowerPoint® slide displayed the problems and correct answers in the same order that they were presented. This allowed each student to efficiently self-evaluate response accuracy.

## Methods

### Participants and Setting

The current consultation case was conducted in an urban school district in the Southeastern United States. All procedures were run within the participants regularly scheduled math classroom that contained a computer connected to a Smart Board used to project PowerPoint® slide shows. Over 90% of the students in this elementary school were eligible for free or reduced-cost meals. The 10 students (7 African American, 3 Caucasian) who participated made up the entire, intact math section. None of the students (4 female, 6 male) received special education services for mathematics. Based on Deno and Mirkin's (1977) criteria, baseline data showed that 2 students had mastered basic multiplication facts, 6 were at instructional level, and 4 were at a frustrational level. As the intervention was designed to allow students to only address facts in need of additional practice, the teacher decided that the two students who appeared to have mastered the basic facts should remain in the study.

### Materials

A personal computer with Microsoft® PowerPoint® software, a projector, and a stopwatch were used for this study. Three sets (sets A, B, and C) of 12, 1-digit by 1-digit (factors 2-9), multiplication problems were created for the current study. Poncy et al. (2006) and McCallum et al. (2006) used similar multiplication sets. Three 15-slide PowerPoint slide shows were constructed for each set of problems. Each slide show began with a title slide indicating the problem set (A, B, or C). This was followed by 12 numbered slides, each containing 1 of the 12 multiplication problems. The slide show was constructed so that each problem (slide) appeared for 3 s. The next slide contained the answer-key slide for the 12 previous problems. This slide contained the problems and answers in the same order in which they were just presented. The final slide contained an overview of how to perform the CCC procedure. The slide show was constructed so that the title slide appeared first and then the slide show could be started with

each of the next 12 slides appearing on a scheduled delay of 3 s. The answer-key slide (14th slide) remained displayed until the experimenter changed slides to the final (15th) slide, which provided an overview of CCC procedures.

Experimenters also constructed assessment and DRP sheets that were used for this study. For each set of problems the experimenter developed 9 assessment sheets. Each assessment sheet contained four columns, and each column contained the 12 problems from the set in random order. Experimenters also constructed DRP sheets. Each sheet contained 4 columns of 12 response prompts. In the first column were 12 numbered lines for students to write their answers during the detect phase. The next 3 columns contained 12 boxes for students to write problems and answers during the CCC phase (see Appendix).

### **General Procedures**

**Behavioral consultation.** During a problem identification interview the teacher indicated that all of his 10 students needed to develop automaticity with their multiplication facts. The consultant used baseline assessment probes to validate the problem. Although these probes showed that 2 students had mastered basic multiplication facts the teacher asked that they remain in the study. Next, the consultant reviewed the relevant literature and shared it with the teacher as they developed the remediation procedure. As it would have been impractical and poor educational practice to target all multiplication facts simultaneously (McCleary et al., in press), facts were divided into three sets and each set targeted in a staggered format. Consequently, the consultant applied a multiple baseline across behaviors (problem sets) design to evaluate the effects of the interventions.

### **Assessment procedures.**

Group administered assessment probes were used to validate the problem, gather baseline data, and evaluate intervention effects across the three sets of problems. During each assessment session, students digits correct per minute (DC/M) were assessed on each set of problems (Sets A, B, and C). During each assessment session students were given 30 s to complete as many problems as they could on each sheet. Across sessions the sets were assessed in random order. Also 3 different assessment sheets were constructed for each problem set and these sheets were applied in sequential order across sessions.

After students were seated, sheets were placed upside down on each student's desk. The group was instructed to work problems in order as rapidly and accurately as possible. Additionally, they were told to avoid spending too much time on any problem by skipping problems that they could not answer. After being notified, the experimenter started a stopwatch and after 30 s had elapsed the students were instructed to stop and assessment sheets were collected. Identical procedures were then applied to the next two probes. When the intervention phase began identical procedures were applied immediately after the group finished the detect and CCC procedures.

Assessments were scored using Deno and Mirkin's (1977) method for measuring DC/M. Specifically, a digit was scored as correct if the correct digit was written in the correct place. For example, consider the problem  $4 \times 3 = \underline{\quad}$ . A response of 14, 22, or 2 would be scored as 1 digit correct and a response of 12 would be scored as 2 digits correct. As students were given 30 s to complete problems, these data were converted to DC/M by multiplying digits correct by 2.

**Intervention procedures.** During the intervention phase, students worked at their assigned desk. After intervention sheets were distributed, students were told that math fact problems would appear on the screen and that they were to attempt to write the correct answer on their sheet before a new problem was displayed. Students were told to pay careful attention and work rapidly. The 12 problems were then

display for 3 s each. Immediately after the 36-s slide show was finished, the answer key was displayed which contained the problems and answers in the same order as the slide show.

The students were asked to evaluate their work, identifying the first five problems that they did not answer correctly. Next they wrote these problems and answers in the second column of their CCC sheet. Finally, the experimenter switched to the final slide which described CCC procedures and students completed the CCC procedure with the five inaccurate problems. Students were trained to perform the CCC procedure on the first session. Using a demonstration, the experimenter illustrated how to perform the CCC procedure. To begin the experimenter looked at the first problem and answer, covered it, and then wrote the problem and answer in the adjacent column. Next, the experimenter evaluated the response and when correct moved to the next problem and answer; but when incorrect the experimenter taught the students to repeat the CCC procedure again with the final column. After demonstrating and describing both accurate and inaccurate CCC procedures the students were instructed to complete the CCC procedure with their five problems. Throughout the experiment the consultant and teacher monitored the students as they performed the self-evaluation and CCC procedures and prompted them to correct procedural errors (e.g., peaking during CCC).

**Modifying the procedures.** During the last phase, when Set C problems were targeted, two students began to complete the 30-s probes by rapidly writing down random numbers, without regard for accuracy. Therefore, a loose rewards program (e.g., no clear criteria) was added. Specifically, before the DRP session targeting set C the students were told that they could earn mechanical pencils if they tried their best and improved their response accuracy and speed. All 10 students were given mechanical pencils on the two sessions, regardless of their DC/M scores.

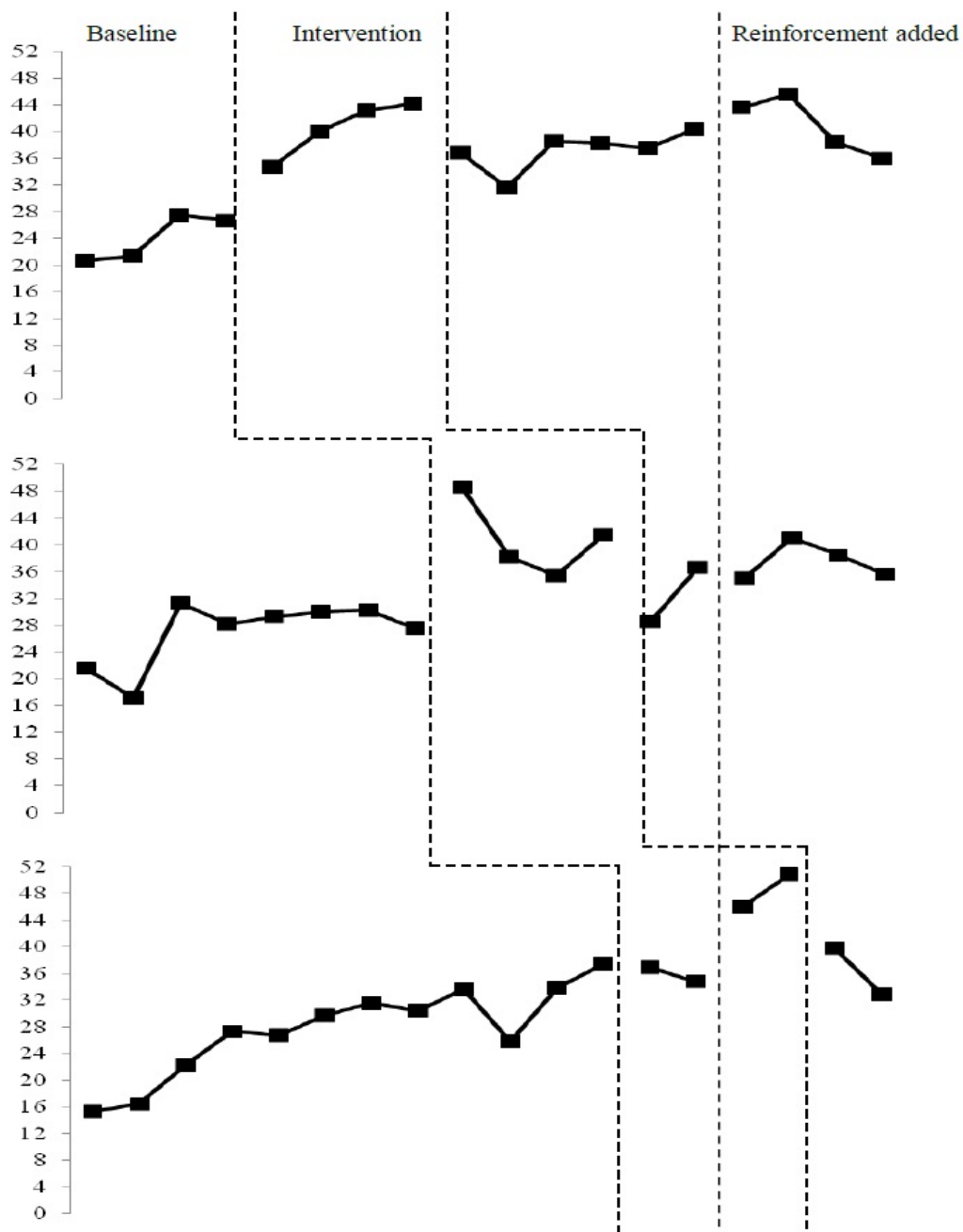
### **Interscorer Agreement**

All of the assessments were initially scored by the primary researcher. To obtain interscorer agreement an independent researcher, not linked to the consultation case, scored 12 sets (22%) of the assessment sheets. Interscorer agreement was calculated by dividing the number of actual agreements on digits correct by the number of possible agreements on digits correct and multiplying by 100. Interscorer agreement for the probes was 94.4%.

### **Results**

Figure 1 shows the class average DC/M scores across phases and sets of problems. Across all three problem sets the class showed an increasing baseline trend. For Sets A and B, increasing baseline trends stabilized at approximately 28 - 30 DC/M. Immediately after the intervention was applied to Sets A and B students showed an increase in DC/M. The immediate increase was largest for Set B, but a steadily increasing trend during the intervention phase on Set A problems also provided strong evidence of a treatment effect.

Figure 1 shows an increasing baseline trend in DC/M on Set C problems. This increasing baseline trend may have been caused by practice effects occasioned by the daily assessment or spillover effects (e.g., learning Set A and B problems enhance fluency with Set C problems, see McCleary et al., in press). Additionally, initial baseline performance was lowest on Set C; thus, regression to the mean may have influenced this trend. This increasing baseline trend hinders our ability to draw strong cause-and-effect conclusions and may have made it difficult to find an immediate increase after the intervention was applied to these problems.



**Fig. 1** Multiple Baseline Digits Correct Per Min.

As Set C problems were the last targeted, students may have lost interest in some aspects of the DPR procedure. In fact, within the first two Set C sessions, two students began writing down answers as rapidly as possible, without regard for accuracy during assessments. Consequently, after the second Set C session, researchers supplemented the procedures with a loosely applied reward program where all students were told that they could earn mechanical pencils contingent upon improvements on assessments (see McCleary et al., in press and/or Saecker et al., 2009). After this reward program was applied students performance increased.

Table 1 shows the class average and each students' mean DC/M across sets and phases along with letters indicating whether their fluency scores placed them at frustrational (F, 0 - 19 DC/M), instructional (I, 20 - 39 DC/M), or mastery (M, 40 or more DC/M) levels based on Deno and Mirkin's (1977) criteria. Across the three problem sets, students mean intervention scores were 13.2 - 21.2 DC/M higher than mean baseline scores. With respect to individual's average performance, with the exception of Student 5's performance on Set A, each showed increases from baseline to treatment phases across all problem sets.

Only two students (5 and 7) were considered to be at mastery level during baseline data collection. Across all three lists these students showed an average increase of 25.2 DC/M from baseline to interventions (range = -2.9 - 51.1). These results suggest that the intervention may have enhanced the students who already mastered basic facts. Two students' (1 and 2) average baseline scores ranged from 19 - 39 DC/M, placing them at Deno and Mirkin's (1977) instructional level. These students average improvement was 20.28 (range = 3.7 - 34.7). Baseline performance suggested that the other six students were at frustration level with basic multiplication facts. Table 1 shows that students 3, 4, 6, 8, 9, and 10 increased their average performance from baseline to intervention phase (M = 9.46, range 5.6 - 19.9) with all six students showing improvement across each of the six lists.

**Table 1. Digits correct**

Student	Set A		Set B		Set C		Total Change	
	DC/M	DC/M	DC/M	DC/M	DC/M	DC/M	DC/M	DC/M
	BL	INT	BL	INT	BL	INT	BL	INT
1	24.3 (I)	59 (M)	23.2 (I)	49.5 (M)	16.5 (F)	46 (M)	21.3 (I)	51.5 (M)
2	17.5 (F)	37 (I)	24.6 (I)	28.3 (I)	20 (I)	28 (I)	20.7 (I)	31.1 (I)
3	8.6 (F)	12 (F)	2.6 (F)	9 (F)	4 (F)	11 (F)	5 (F)	10.6 (F)
4	24 (I)	30 (I)	19.5 (I)	29.8 (I)	12.5 (F)	21 (I)	18.6 (F)	26.9 (I)
5	50 (M)	47.1 (M)	58 (M)	82 (M)	48 (M)	78.5 (M)	52 (M)	69.2 (M)
6	12.5 (F)	31.9 (I)	22.4 (I)	24.5 (I)	21.5 (I)	33 (I)	18.8 (I)	29.8 (I)
7	54 (M)	66 (M)	33.4 (I)	70 (M)	43.5 (M)	94.6 (M)	43.6 (M)	76.8 (M)
8	16 (F)	27 (I)	19 (F)	31.5 (I)	13.5 (F)	29 (I)	16.1 (F)	29.1 (I)
9	17.3 (F)	32 (I)	18.6 (F)	38 (I)	18 (F)	43.5 (M)	17.9 (F)	37.8 (I)
10	15.3 (F)	40 (I)	8.6 (F)	10 (F)	12.6 (F)	37.5 (I)	12.1 (F)	29.1 (I)
Mean	23.9 (I)	38.2 (I)	23 (I)	37.2 (I)	21 (I)	42.2 (M)	21 (I)	42.2 (M)

## Discussion

Previous researchers have found evidence that DPR can be used to enhance math-fact fluency in classrooms (Axtell et al., 2006; Poncy et al., 2006). In the current consultation case, we modified DRP procedures by incorporating technology (PowerPoint©) to enhance the quality and efficiency of the procedures. Although the increasing baseline trend on Set C problems prevents us from drawing strong cause-and-effect conclusions, the current results support the use of these procedures for building class-wide multiplication fluency, as all 10 students showed individual gains from their baseline averages to the intervention stage across sets A, B, and C.

We modified previous DPR procedures by using computer-based technology to assist with the detect phase, allowing each student to target idiosyncratic math facts during CCC. The PowerPoint© slide shows appeared to work well. Relative to metronome-paced worksheets, the PowerPoint© slide shows prevented students from working ahead (they could not see the next problem); although, they could continue working after a problem was removed from the screen. Additionally, the rapidly-paced (3 s per slide) program appeared to capture and maintain student attention. Unfortunately, the same cannot be said for the 30-s assessment procedures as at least two students eventually stopped trying to write the correct answers during some sessions. The data suggests that the consultant successfully addressed this problem by announcing and implemented rewards contingent upon quality work. Therefore, future researchers should determine if adding immediate feedback and/or reward components to these procedures enhances learning rates.

Another limitation of the current study was inconsistent effects across and within students. Although the sample size of students at each level (i.e., frustrational, instructional, and mastery levels) was small, the intervention appeared to be less effective for those at the instructional level. With respect to individuals, students 2 and 9 had similar mean DC/M during baseline; however, student 9 made much larger gains following the application of the intervention. Student 2's data provide a good example of within-subject treatment effect variability. Student 2 initially improved 19.5 DC/M on Set A, but his improvement was only 3.7 and 8 DC/M on Sets B and C respectively. Future researchers should attempt to identify factors that account for this within and across subject and group variability. Perhaps offering feedback and rewards may reduce this variability by eliciting more consistent effort from students and less variable effects within and across students

## Summary

When working with educators on academic skills, consultants are often asked to address deficits class wide or in group formats (Hawkins, in press). Since basic academic skills are often needed to learn and master more advanced skills, the goal should be to remedy these deficits as quickly as possible so that students can experience more success on current and future academic objectives (Skinner, 2008; 2010). When faced with groups of students (e.g., an entire class) in need of remedial service, specific targets often vary across students. Within students, remediation targets change as students develop their skills. The current paper describes a technology-based group procedure that allows educators to target idiosyncratic math facts in a class-wide format. Future applied research should continue to develop and evaluate group procedures that allow educators to efficiently remedy skill deficits by applying instructional time only to target behaviors in need of remediation (Cates et al., 2003; Poncy et al., 2006; Nist & Joseph, 2008; Skinner, 2008; 2010; Skinner & Schock, 1995).

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**Appendix: DRP Sheet**

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## **Therapist's directive and nondirective behavior: Analysis of their effects in a parent training group**

*Fabiane Ferraz Silveira, M.S., Alessandra Turini Bolsoni-Silva, Ph.D and Sonia Beatriz Meyer, Ph.D*

### Abstract

The study described the interaction between therapist and clients in a group intervention with two mothers and a grandmother. Five out of thirteen taped sessions were designated for analysis. Main results: a) therapist's categories that stood out: approval, recommendation, interpretation, information and information request; b) clients' categories that stood out: report, agreement, relation, and opposition, c) the probability for recommendation coupled with use of approval exceeded the probability of occurrence of other combinations. Possible explanations for the results were offered and new research questions were raised.

**Key words:** parent training; therapeutic interaction; therapist's and client's behavior categories.

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According to Meyer (2006) and Tourinho et al. (2007) the description of the effects of therapist and client's verbalizations' is a crucial condition in the process of identifying the factors that allow the effectiveness of the therapy. This contributes to mental health policies as well as improving services. In addition, it helps researchers and teachers to formulate not only new theories, but also new training for future therapists.

The literature that maps the therapist and client's behavior in an attempt to predict success and failure of the therapeutic process, gathers only a few studies regarding the category giving information; however, there is a variety of divergent positions when it comes to the categories orientation, interpretation and support. Keijsers, Schaap, Hoogduin and Lammers (1995) found that in a focal intervention with patients with panic disorder, the occurrence of theoretical information in the first session was negatively correlated with satisfactory results. Meyer (2009) systematized a database containing 495 therapy sessions of behavior-analytic psychotherapy with several therapists' categories, including giving information. She found that the average percentage of this category was 20% in the first session, declining to 6% up to 15% during the second to the forty-fifth session.

When orientation is provided, there are indicatives of an increase in client resistance (Patterson & Forgatch, 1985), and cooperation (Barbera & Waldron, 1994). Also there are indications of some discrete changes at the end of the intervention (Orlinsky, Grawe & Parks, 1994), as well as adverse effects pertinent only to the initial meetings with families (Harwood & Eyberg, 2004). These factors are equally shown.

In the famous 1985 study, Patterson and Forgatch observed an intervention with parents. They concluded that orientation and confrontation led to an increase in resistant behaviors. However, facilitation and support led to a decrease in such behaviors. Bischoff and Tracey (1995) define resistance as any behavior that indicates opposition to the therapist, the therapeutic process, or even to the session's agenda. According to Patterson and Chamberlain (1994) when clients are parents and have contact with the benefits achieved by the taught procedures, a decrease in resistance and increase in cooperation appears.

Barbera and Waldron (1994) examined pieces of tapes of second sessions with 12 families of juvenile offenders, finding that the category support represented the highest frequency (41%), followed by orientation (21%). Sequential analysis revealed that support resulted in cooperation for most clients,

and orientation on the other hand was not followed by resistance, but rather produced an increase in cooperation to half of the families. The authors' justification for this result lies in the fact that the therapist when orienting, addressed the whole family and not only one member, which was interpreted as beneficial by the clients.

Contrary to Barbera and Waldron's results (1994), the analysis of sections of second individual sessions with parents showed positive correlations between support and dropout, and questioning and dropout (Harwood & Eyberg, 2004). The authors observed a prevalence of closed questions rather than open questions in the group that dropped out of treatment. This suggests that a balance of open and closed questions during treatment is important. Although verbal support increased cooperation during the first session, they also concluded that verbal support can result in temporary effects or insufficient adherence.

Literature indicates that the use of interpretation and empathy predicts significant changes at the end of therapy (Orlinsky et al., 1994). However, there are still some diverging conclusions regarding dropout (Piper et al., 1998; Yano, Almeida & Meyer, 2008). Orlinsky et al. (1994) examined successful and unsuccessful individual interventions, observing that the categories interpretation and support/empathy occurred with greater frequency in interventions that obtained positive results. Piper et al. (1998) found a greater number (23%) of early interventions with a predominance of interpretation rather than support (6%). In the same direction, a recent study indicates that interpretation given in the first five sessions contribute to adherence of the client to the therapeutic process (Yano et al., 2008).

In Zamignani's (2007) study, a high frequency and duration of interpretation, recommendation, and approval were observed, with a gradual increase throughout the phases of therapy. The researcher's explanation for the increase of recommendation and interpretation at the intermediate stage correspond to therapists' behaviors expected at this stage of the therapeutic process: raising hypotheses and carrying out the intervention.

Meyer (2009) observed a gradual increase of the therapist's recommendations, reaching a value of 19% in the fourteenth session. After that moment, a decrease occurred reaching 14% at the end of first year and 7% at the end of the second year. As for the occurrence of interpretation, in the first sessions of behavior analytic therapy it was low and tended to increase, reaching almost 25% around the tenth session, and achieving stability in the twenty-fifth session.

According to Bischoff and Tracey (1995) the client's resistant behavior occurs when therapists use directive interventions, which is described as any verbalization that directs the session, or confronts the client, such as orientation and interpretation. Resistance is less probable to occur with nondirective interventions, which can be described as supportive verbalizations (Bischoff & Tracey, 1995).

According to Keijsers et al. (1995) the primary issue to be investigated is not the negative effects of therapist's directive behavior, but rather under what conditions, the therapist's behavior is accepted, and the therapist's advice is followed, by the client.

For Hill (2001) measures of frequency of therapist's behavior do not allow cause-effect conclusions. The author recommends that contextual aspects, including client's behavior should be added to the analysis. Similarly Tourinho et al. (2007) considers that the data produced from categorizations of participants behaviors can be analyzed in conjunction with other variables of the therapeutic process such as measures of results and information on previous sessions.

Sequential analysis is a methodological tool that allows the study of changes in therapeutic interaction (Lichtenberg & Heck, 1986). Sequential analysis can be used to examine client's verbalizations preceding and following a therapist's specific behavior and can reveal patterns of interactions (Harwood & Eyberg, 2004).

The purpose of this study was to describe interaction patterns between therapist and clients in a parent group intervention.

## Method

### Participants

Two mothers and a grandmother here denominated as P1, P2 and P3 and a female behavior-analytic therapist, with three years experience in parent training programs participated. P1 was a 31-year-old biological mother, married, housewife, with incomplete high school, and low average socioeconomic status. P2 was a 39-year-old biological mother, married, housewife, with incomplete high school and low average socioeconomic status. P3 was a 51-year-old grandmother, divorced, housewife, with incomplete high school, and low average socioeconomic status.

### Procedure

Fourteen group sessions of parent training were conducted. Theoretical references used during the intervention included Behavior Analysis and its derivatives, Social Skills Training (Del Prette & Del Prette, 1999), The Collaborative Model of Intervention (Webster-Stratton & Herbert, 1993), and Goldiamond's Constructional Approach Intervention (2002).

In order to describe the interaction patterns between therapist and clients the following steps were taken:

a) Five out of fourteen sessions were randomly selected (5, 6, 10, 13 and 14) for a total of ten hours of footage;

b) The client and therapist categories were analyzed using the software The Observer XT 7.0 and the Multidimensional Behavioral Coding System developed by Zamignani (2007). The therapist categories that were analyzed were the following: Information request (IRQ), Empathy (EMP), Information (INF), Reflection request (RRQ), Recommendation (REC), Interpretation (INT), Approval (APP), Discordance (DIS), and other. Each category had different subcategories of analysis. For example, the category Recommendation had the subcategories Advice, Model, Incentive, Structuring activity and Permission. The client categories that were analyzed were the following: Request (REQ), Report (REP), Improvement (IMP), Goal (GOA), Relation (REL), Agreement (AGR), Opposition (OPO), and others.

c) The Observer XT 7.0 executed the lag sequential analysis for the sessions 6, 10 and 13 taking the therapist behaviors Recommendation to group (REC G), Recommendation to P1 (REC P1) and Recommendation to P2 (REC P2) as the criterion codes. The therapist's behavior Recommendation to P3 was not included in the analysis due to its low frequency. To execute the lag analysis, Sackett, Holm, Crowley and Henkins (1979) proposed that any behavioral events can be viewed as a starting point or criterion code within the interaction. As reported by Lichtenberg and Heck (1986) "after initially computing the unconditional probability of occurrence of each of the events, the conditional probability of each possible event (including itself) is calculated as a function of the successive lags (steps) of each event from criterion" (p. 6). Four levels of analysis were carried out; "lag - 1", "lag + 1", "lag + 2" and "lag + 3". The categories that presented a higher difference between the conditional and unconditional probabilities were included in the results table. When the unconditional probability of an event was higher than the conditional probability, the event was not included.

**Results and Discussion**

The frequency and duration of therapist categories observed during the therapy sessions are shown in Figure 1; sequential analysis is shown in Table 1; and the percentage of each client category (per patient) is shown in Figures 2, 3 and 4.

Considering both measures of frequency and duration, there was a predominance of five out of eight examined categories (Figure 1). They are Approval, Information, Information request, Recommendation and Interpretation. The high percentage of Approval (37%) is supported in the literature (Borrego & Urquiza, 1998; Follete; Naugle & Linnerooth, 1996; Zamignani, 2007), which considers the social reinforcement provided by the therapist as the main factor responsible for changes. Other explanations are related to the adopted referential, the collaborative intervention approach (Webster-Stratton & Herbert, 1993) and the constructional approach (Goldiamond, 2002).

The high occurrence of Recommendation validates the results of other studies (Meyer, 2009; Zamignani, 2007) but contradicts the position of Orlinsky et al. (1994) who established associations between Recommendation and only discrete behavioral changes.

The introduction of the measure of duration revealed a significant presence of Interpretation, common to the results of other studies (Orlinsky et al., 1994; Zamignani, 2007).

The significant presence of Information can differ from the results of other studies, especially because the intervention contains a specific part of the session for therapist providing theoretical information to the clients.

Additional results demonstrate that the categories Recommendation, Information and Reflection request, were presented with a higher frequency when addressing the group as a whole; while, Approval, Information request, Interpretation, Empathy and Discordance occurred most frequently when addressing the clients individually.

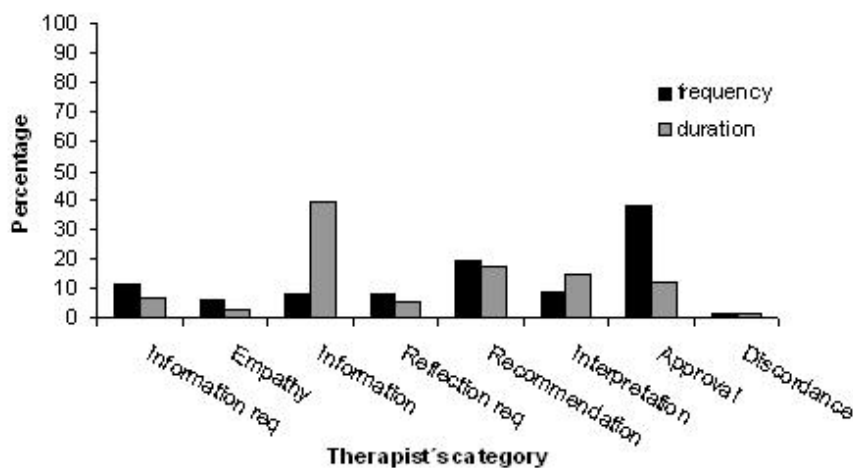


Figure 1. Frequency and duration of therapist category (percentage), compared to total therapist verbalizations observed in all sessions studied.

The results of Table 1 contain abbreviations, such as “T-APP-P1”. The first element represents an abbreviation of the participant who emitted the behavior. The second element is the behavior itself and the last element specifies the participant to which the behavior was directed. For instance, in “T-APP-P1” the therapist presented an approval to P1.

In Table 1, when looking at the criterion code REC G, it is observed that the therapist exhibited several Recommendations when addressing the group, mainly in session 13. It can be hypothesized that group recommendation produces weaker negative effects than individual recommendation.

Regarding the criterion code REC P1, changes can be observed during the intervention; the therapist's behavior changed gradually from using only Recommendation, to Recommendation with Approval and Reflection request. In the criterion REC P2, Recommendation was more likely to occur when preceded by Approval and Empathy, which have potential reinforcing effect. Regarding criterion code REC P3, the hypothesis is that the occurrence of therapist Approval between Recommendations could have contributed to client Agreement; this, in turn, contributed to new Interpretation and Recommendation by the therapist.

Sequential analysis was chosen based on the statements of Keijsers et al. (1995), who defend the importance of investigating under what condition directive interventions produce positive results. The results of the sequential analysis demonstrated some regularities in the interactions established, that is, the Recommendations provided by the therapist had a higher probability of being preceded by Approval and Empathy. Subsequent to Recommendation there are new Recommendations but alternated with Approval. Recommendation alternated with Approval seems to have the potential to minimize aversive effects of the therapist's Recommendations as shown in the literature (Bischoff & Tracey, 1994; Harwood & Eyberg, 2004; Orlinsky et al., 1994).

Table 1. Sequential analysis of sessions 6, 10 and 13 at levels lag-1, lag+1, lag+2 and lag+3. The criterion codes are the therapist behaviors: Recommendation to group (REC-G), Recommendation to P1 (REC-P1) and Recommendation to P2 (REC-P2). Client categories are shown in italics, and the unconditional probability is shown in parentheses.

Lag -1		Criterion code	Lag +1		Lag +2		Lag +3	
SESSION 6								
Category	CP	Criterion	Category	CP	Category	CP	Category	CP
T-INF-G	0,14 (0,07)	REC-G	T-REC-G	0,14 (0,10)	T-APP-P1	0,08 (0,09)	T-REC-G	0,17 (0,10)
T-APP-P2	0,21 (0,08)	REC-P2	<i>P2-AGR-T</i>	0,12 (0,07)	T-REC-P2	0,17 (0,08)	<i>P2-REP-T</i>	0,17 (0,03)
SESSION 10								
T-APP-P3	0,15 (0,19)	REC-G	T-REC-G	0,15 (0,08)	T-APP-P2	0,32 (0,11)	T-APP-P1	0,2 (0,14)
T-REC-P1	0,23 (0,02)	REC-P1	<i>P1-IMP-T</i>	0,15 (0,01)	<i>P1-REL-T</i>	0,15 (0,08)	T-APP-P1	0,15 (0,14)
T-APP-P3	0,36 (0,19)	REC-P2	<i>P3-AGR-T</i>	0,28 (0,21)	T-APP-P2	0,21 (0,11)	T-APP-P1	0,16 (0,14)
SESSION 13								
T-INF-G	0,16 (0,05)	REC-G	T-REC-G	0,15 (0,13)	T-REC-G	0,12 (0,13)	T-REC-G	0,12 (0,13)
T-APP-P1	0,26 (0,11)	REC-P1	T-RRQ-G	0,16 (0,04)	T-REC-P1	0,21 (0,03)	T-APP-P1	0,37 (0,11)
T-EMP-P2	0,07 (0,02)	REC-P2	T-RRQ-P2	0,14 (0,02)	T-APP-P2	0,21 (0,04)	T-REC-G	0,11 (0,13)

CP- conditional probability, INF-information, APP- approval, REC- recommendation, EMP-empathy, RRQ-reflection request, INT-interpretation. AGR-agreement, REP-report, IMP-improvement, REL-relation G-group, clients P1, P2 e P3.

Figure 2 shows that the predominant categories of P1 were: Report, Agreement and Relation, and that they were consistent in the measures of occurrence and duration. It is important to mention the significant presence of Relation and Agreement, in an intervention with a high occurrence of the directive categories Information, Interpretation and Recommendation. Such result is divergent to the studies that highlight the negative aspects of such therapist categories (Bischoff, & Tracey, 1995; Patterson &

Forgatch, 1985). The therapist's verbalizations directed to P1 were neither more frequent nor of longer duration compared to the other clients. Therefore it has been hypothesized that the therapist intervened most often with the clients who presented problems of greater severity. It is believed that clients whose cases are less severe and who have a larger repertoire of child-rearing practices can benefit from group interventions; the therapist does not need to address each client individually but rather can address the whole group.

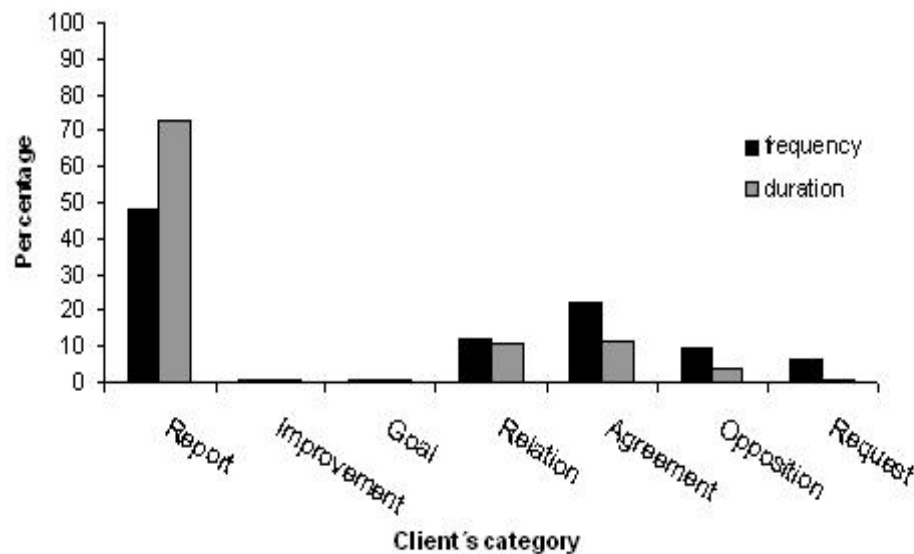


Figure 2. Frequency and duration of P1 client's category (percentage), compared to total P1 verbalizations observed in all sessions studied.

Similar to the other clients, P2 exhibited the categories Report, Agreement and Relation with greater frequency and duration; and unlike the other clients, P2 also exhibited Opposition with a great frequency and duration, as illustrated in Figure 3. The results from the sequential analysis (Table 1) demonstrated that the Recommendations to P2 were alternated with Approval, Empathy and Reflection request, which may have contributed to the presence of subsequent Agreement.

During the course of the intervention a topographic alteration was observed in P2's Oppositions: she no longer opposed the therapist with jokes and irony, but with direct criticism, which was considered a progress. This result can be related to the therapist's reactions: high frequency of Empathy and Approval, alternated with Recommendation, Interpretation and Reflection request; and the low occurrence of Discordance. The change in Opposition can also be related to P2's overall improvement described by her.

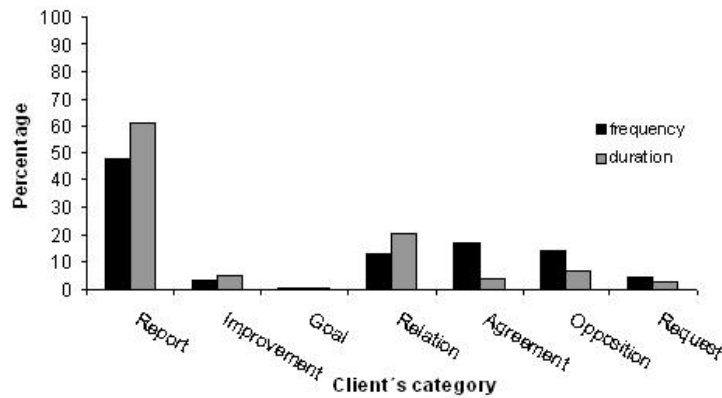


Figure 3. Frequency and duration of P2 client's category (percentage), compared to total P2 verbalizations observed in all sessions studied.

Considering both measures of frequency and duration, in Figure 4 appears a predominance of Report, Agreement and Relation, which are the same results obtained by P1. The therapist presented a high frequency of Approval, Interpretation and Information, as well as a low frequency of Recommendation when addressing P3.

The results of the sequential analysis (Table 1) indicate that Relation preceded Approval addressed to P3, and this Approval was subsequently followed by Agreement, Reflection request, Interpretation and, above all, more Approval.

Despite the good results achieved by P1, it is assumed that P3 was the client who benefited the most from the intervention since P1 already presented a wide repertoire of child-rearing practices prior to the intervention. Regarding P2, only some objectives were achieved, possibly due to the fact that the case was the most severe and the client presented a lack of behavioral variability. Even with the difficulties described in the pre-intervention evaluation, the participant P3 acquired the necessary repertoire possibly because of the conditions of the sessions, and the therapist's use of Approval, Information and Interpretation when addressing to her.

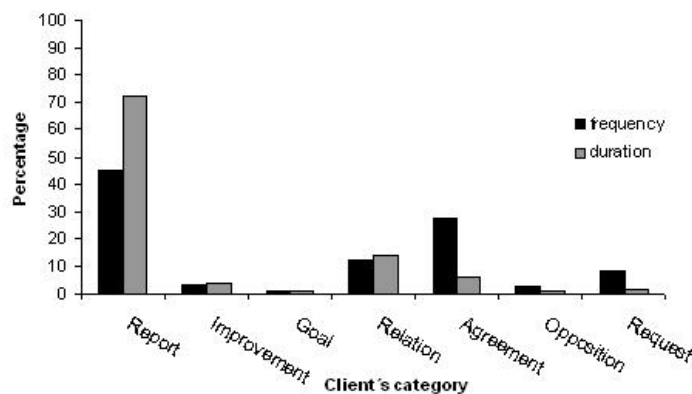


Figure 4. Frequency and duration of P3 client's category (percentage), compared to total P3 verbalizations observed in all sessions studied.

## Final Considerations

The results suggest that the therapist, when interacting with the clients in a collective way, presented Information and Reflection request with a higher frequency. However, when interacting with clients individually, the therapist prioritized the categories Approval, Interpretation, Information request, Empathy and Discordance. These results led to the conclusion that, in group interventions, when the therapist is requesting reflection, and using Interpretation and Recommendation, he should alternate with Empathy and Approval, in order to reduce the likelihood of adverse effects of the first categories.

In addition, it is believed that when dealing with clients who present repeated Opposition, the therapist may present a higher frequency of Empathy and a lower frequency of Discordance, as well as Interpretation and Recommendation, with Approval and Empathy. Therefore, the therapist should use these behaviors frequently in order to reduce Opposition.

Overall, this study brings to light the methodology that can be enhanced through further research: the use of videotaped sessions, utilization of behavioral coding system submitted to empirical tests; the analysis of all videotaped sessions; use of technological resources to collect and analyze data, as well as performance of sequential analysis that led to fine tuning the relations between the therapist and client behavior. This would not be possible solely through analysis of frequency and duration measures.

However, new research questions should be highlighted: the use of other axes of the behavioral coding system (Zamignani, 2007); group intervention analysis with participants presenting different characteristics and studies including other group intervention types.

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# The Use of Technology to Improve Staff Performance

*Kaori G. Nepo, M.Ed., BCBA*

## Abstract

The on-going staff training is one of critical components for the effective programming for adolescents and adults with autism, although it is often overlooked. The available technology can be useful to improve not only productivity and organization of our daily life, but also the work performance. The purpose of this study was to examine the effectiveness of technology on performance of instructors who are working with adolescents and adults with autism. The multiple baseline treatment design was used across instructors with the age between 26-34 who had been trained on basic knowledge and extensive application of ABA principles. The data were collected 3 to 5 times per week via Bluetooth® and self monitoring data collection system over 2 months. The results show that Bluetooth® technology can be utilized for data collection effectively, and the intervention package, including immediate feedback, self monitoring, delayed feedback with video clips and graphs significantly improved staff performance across all participants. However, the videotaping sessions and the presence of supervisor have affected staff performance and the videotaped sessions were used for positive feedback instead of corrective feedback as the author intended initially.

Keywords: Technology, staff performance, video feedback, self monitoring

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## Introduction

Staff performance is one of the critical components of the effective programming for learners with special needs (Jahr, 1998; Parsons, & Reid, 1995; Salmento & Bambara, 2000; Parsons, Reid, & Green, 1993; Baker, Foxx, & Albin, 1995; Schepis, Reid, Ownbey, & Parsons, 2001). Didactic trainings in forms of lectures and workshops are often used to teach staff knowledge and to improve staff performance. However, the didactic teaching does not always translate to the application of the clinical or educational interventions because "knowing" and "doing" are different repertoires. For example, knowing the difference of various prompting procedures does not make the instructor competent to implement prompting procedures effectively (Parsons & Reid, 1995; Jahr, 1998; Schepis, Ownbey, Parsons, & Reid, 2000; Smith, 1995; Plavnick, Ferreri, & Maupin, 2010; DiGennaro, Marrtens, & Kleinman, 2007)

In our verbal world, it is very natural to call learner's name or asking the learner, "What's next?" and staff may not think these as verbal prompts. However, students may develop prompt dependency within tasks or for transition. Just making faces or eye contact can be also a prompt for learners, but instructors may not realize they are even using those prompts while they are working with learners. Didactic teaching does not effectively address these issues.

On-site staff training, including the frequent on-site supervision and feedback, is proven to be effective in order to improve staff performance (Smith, 1995; Arco, 2008; Green, Rollyson, Passante, & Reid, 2002; Parsons, Reid, & Crow, 2003; Salmento & Bambara, 2000; Langeland, Johnson, & Mawhinney, 1998; Reid, Rotholz, Parsons, Morris, Braswell, Green, & Schell, 2003; Guercio, Dixon, Soldner, Shoemaker, Zlomke, Root, & Small, 2005). Despite the effectiveness of on-site training, there are some barriers to implement this type of training consistently and frequently. First, the on-site staff training including staff observation and providing feedback is time consuming, especially for community based programs since supervisors need to visit all training sites and they lose driving time between sites. Secondly, implementation of the on-site training is costly. It requires many supervisors to implement sufficient amount of training on-going basis and within reasonable amount of time period. Thirdly, the presence of supervisor can be intrusive to staff, learners, and the environment, especially in the community. In addition to these barriers to implement on-site training, reactivity of staff to the presence

of their supervisors could affect the assessment of staff performance (Brackett, Reid, & Green, 2007; Mowery, Miltenberger, & Weil, 2010). Without having accurate data on staff performance, the supervisors cannot provide appropriate training for staff. This will impact the quality of service provided to learners.

These barriers of providing on-site training can be minimized with utilization of available technology. The advancement of technology has made the various modes of environmental adaptations including many electronic devices available and accessible with significantly reduced cost. The implementation of those devices became easier due to the improved portability. Nepo (in press) and Satriale, Chance, and Nepo (2007) demonstrated that the Bluetooth<sup>®</sup> technology can be effectively utilized for interventions to teach learners with Autism. This concept can be also applied for the on-site staff training. In the present study, Bluetooth<sup>®</sup> technology was implemented to collect data and provide immediate feedback remotely thereby time and cost for driving will be saved and reactivity will be decreased.

Beside the on-site observation and feedback, the effective staff training package often include self-monitoring. Self-monitoring procedure consists of goal setting and recording own target behaviour has been proved to be effective to improve staff performance, especially when combined with other procedures (Petscher & Bailey, 2006; Richman, Riordan, Reiss, Pyles, & Baily, 1988; Baker, Fox, & Albin, 1995; Plavnick, Ferreri, & Maupin, 2010). The author incorporated the self-monitoring in this study not only to improve staff performance but also to monitor their awareness of own behaviours. The purpose of this study was to examine the effectiveness of the intervention package, including immediate feedback, self-monitoring, and delayed feedback with videotaped sessions and graphs, with utilization of commonly available technology on staff performance. A multiple baseline experimental design was used across participants and it was hypothesized that the intervention package incorporating technology will improve staff performance.

## Materials and Methods

### Methods

#### Materials

Bluetooth<sup>®</sup>: Motorola 807L, Verizon 06329N

Cell phone with Bluetooth<sup>®</sup> capabilities: LG 810, iPhone-3G with 8GB

#### Participants

Participants were Ricky, Eric, and George who worked at a community based program for adolescents and adults with autism as a direct care staff. Ricky was 31 years old male instructor who had experience working with adolescents with autism for over 5 years. He had participated in initial and on-going didactic training for the basic ABA strategies prior to the current study. Eric was 27 years old male instructor who held a teaching certificate but did not have previous work experience with adolescents with autism prior to the current position. He received the initial and on-going basic ABA training in forms of lectures and workshops. George was 34 years old male instructor who had experience working with adolescents with autism for over 5 years. He received initial and on-going didactic training for the basic ABA strategies prior to the study.

All participants agreed to participate in the study to improve their performance prior to the study.

However, the details of the study regarding the target behaviors were not disclosed until their intervention phases.

### **Settings**

The settings for this study were vocational sites for adolescents with autism, including local convenience store, hotel, and restaurant.

### **Target Behavior/Data Collection**

The number of unnecessary verbal prompts, including calling students' names when students needs to be prompted to keep working, asking students', "What's next?" while the goal is students to check their schedule and transition independently, and providing verbal directions between steps of tasks where the instructional plan indicates to use physical guidance to shape the sequence, were collected for 10 minutes via Bluetooth® and a remote cell phone 1-2 times per week.

### **IOA data**

IOA (Inter Observer Agreement) data were collected 31 % of the total sessions by a second instructor from the participants' school. The number of agreements was divided by the total number of sessions (the number of agreements plus the number of disagreement) and multiplied by 100. 100 % agreement on IOA was obtained.

### **Procedure**

A multiple baseline experimental design was used across participants to examine the effectiveness of the intervention package utilizing the commonly available technology, including self monitoring, immediate behavior specific feedback, delayed feedback with video and graphs on staff performance.

### **Baseline**

During the baseline, participants wore Bluetooth® and kept a cell phone with them (in their pockets or clipped to their hips). The number of verbal prompts was collected through the Bluetooth® remotely except the videotaped sessions. The verbal consent was attained prior to the study but participants were not provided information regarding their target behaviors.

### **Intervention**

Participants wore Bluetooth® and kept a cell phone in their pockets or clipped to their hips, and the number of verbal prompts was collected remotely via Bluetooth® technology. The participants were reminded of the target behaviors with examples prior to each session with adolescents with autism. During the session, the participants monitored the number of verbal prompts they used and the immediate feedback was provided during and immediately after the session from the supervisor via Bluetooth®. Videotaped sessions and graphs of their behaviors were used for feed back at the end of their day.

### **Results**

The number of verbal prompts was collected via Bluetooth® successfully and remotely. The immediate feedback via Bluetooth®, delayed feedback with graphs and video clips, and self monitoring significantly reduce the unnecessary verbal prompts for all participants during the sessions with adolescents with autism. Initially the videotaped sessions were planned to provide corrective feedback as well as positive feedback for the target behavior. However, reactivity of all participants to being videotaped and the presence of the supervisor were very high, and the number of verbal prompts was low across phases. Thus, the video clips of sessions were used mainly for positive feedback during the intervention. Nonetheless, all participants responded positively to the intervention package.

Ricky's verbal prompts were decreased from an average of 12.25 (8-15) times per 10 minutes to an average of 1.9 (0-10) per 10 minutes with implementation of the intervention package. For Eric, the number of verbal prompts was decreased from an average of 14.6 (9-17) times per 10 minutes to an

average of 1.22 (0-8) per 10 minutes after the intervention package was implemented. George’s verbal prompts were decreased from an average of 16.7 (9-23) times per 10 minutes to an average of 1.5 (0-12) per 10 minutes with implementation of the intervention.

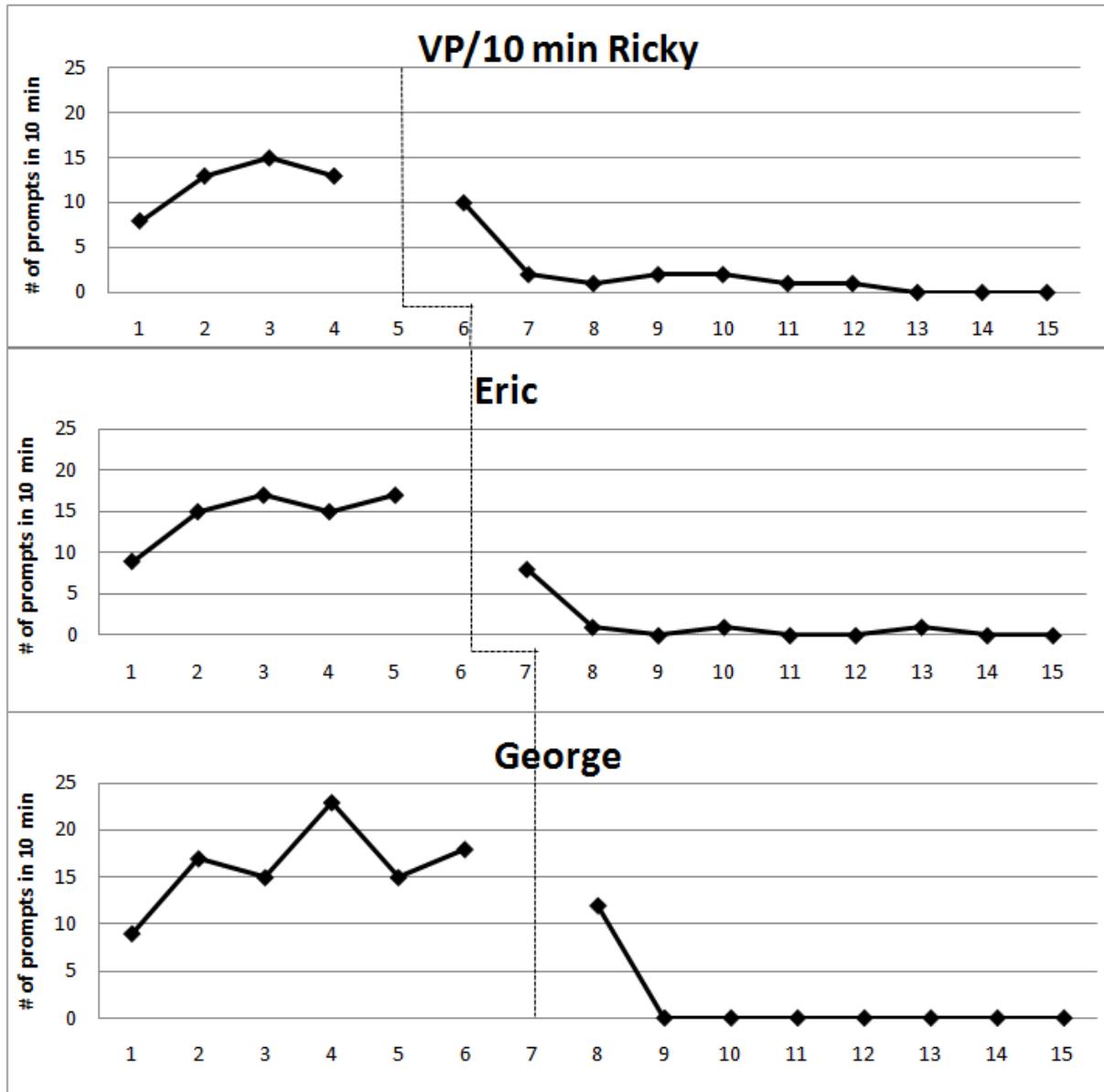


Figure 1. Number of Verbal prompts within 10 minutes.

### Discussion

The increasing number of research studies shows that the use of technology can support the effective ABA programming (Mechiling, Gast, & Scid, 2009; Goldsmith & LeBlanc, 2004; Stromer, Kimball, Kinney, & Taylor, 2006; Parsons & Mitchell, 2002; Delano, 2007; Goodwin, 2008; Mechling, & Cronin, 2006). The results of this study indicated that the commonly available technology can be utilized to collect data effectively and provide on-site staff training remotely. All participants responded to the current intervention package positively and the unnecessary verbal prompts were eliminated to teach skills to adolescents with autism. It is also important to note several advantages of utilizing Bluetooth®

within the intervention package here. First of all, reactivity to the presence of their supervisor was eliminated. Compared to videotaped sessions, all participants exhibited significantly more unnecessary verbal prompts during their baseline sessions with data collection via Bluetooth® which reflected their typical staff performance in absence of their supervisors. Thus, Bluetooth® supported to collect accurate data in order to provide proper training for staff performance (Brackett, Reid, & Green; 2007). Secondly, cost of maintain enough supervisors and driving, especially for community based programs or programs with multiple sites, was reduced. Thirdly, this data collection method made on-site staff training for supervisors easier to provide since the supervisors could collect data remotely from their office. Fourthly, by incorporating Bluetooth® technology, feedback was delivered immediately which was proved to be more effective than delayed feedback to improve staff performance (Daniels, 1989; Schepis, & Reid, 1994). In addition, intrusiveness to the environments, students, and staff were reduced since the supervisors were not physically present during the sessions. As we all agree, having extra person in the environments can be stigmatizing or at least not appropriate, especially in the community or in the inclusion classrooms. The Bluetooth technology® had made the implementation of the intervention possible without the presence of supervisor.

Despite of positive outcome of the current intervention package on staff performance, there are some limitations in this study need to be noted. Through Bluetooth® data collection, the possible use of other prompts such as gestures, facial expressions, or eye contacts, cannot be monitored even the staff may have used during sessions. Those prompts may require attention for further improvement of staff performance. All participants displayed high reactivity to being videotaped and the presence of the supervisor, thus the videotaped sessions were not used as corrective feedback tool as intended originally. Those video clips were used rather as positive feedback for the target behaviors. Self monitoring can be difficult at times, especially during dyads and triads instructions in the community on top of collecting data for learners' behaviors. The long term effects of the intervention also need to be investigated. The follow up data need to be collected continuously to examine the maintenance of their behaviors. The network connectivity can affect the reliability of data collections. For example, if there are too many dropped called during the session would affect the results. Additionally, there may be individual difference in the reactivity to the Bluetooth®, video feedback, immediate feedback, as well as visual inspection. Although all participants in the current study were motivated by feedback and their own progress, others may feel the intervention somewhat intrusive.

The replication studies across larger number of participants and settings are necessary to assess the effectiveness of the staff training utilizing the current technology. The further investigation on the components of this intervention, including self monitoring, immediate feedback, and video feedback, as well as the sequence of these components calls for the future research. The reaction to videotaping, wearing Bluetooth®, and data collection by others require additional analysis. In addition, the impact on the performance of the learners with autism by reducing the verbal prompts needs to be examined, since the ultimate goal of the staff performance improvement is providing the most effective treatment for consumers.

As the author demonstrated and supported by increasing body of research, technology can support the advancement of behavioural interventions (Mechiling, Gast, & Scid, 2009; Goldsmith & LeBlanc, 2004; Stromer, Kimball, Kinney, & Taylor, 2006; Parsons & Mitchell, 2002; Delano, 2007; Goodwin, 2008; Mechling, & Cronin, 2006). Along with rapid advancement of technology, the more devices or software become readily available to be utilized as a part of behavioural interventions. It is time for more researchers to uncover the ways to incorporate technology into the behavioural interventions.

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\*PAAL: Preparing Adolescents for Adult life

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# The Use of Biofeedback, CES, Brain Mapping and Neurofeedback with Youth who have Sexual Behavior Problems

*Robert E. Longo, LPC, NCC, BCIA-EEG*

## Abstract

This chapter will address the use of Biofeedback, Cranial Electrotherapy Stimulation (CES), QEEG Brain Mapping, and Neurofeedback with young people who have sexual behavior problems. Current knowledge in neuroscience, trauma, theory, rational, and case examples will be addressed. The chapter will review selected biofeedback and neurofeedback protocols and their use in treating conditions common to young people with sexual behavior problems. Implications for the future will be discussed.

Keywords: Biofeedback, neurofeedback, Cranial Electrotherapy Stimulation (CES), Brainmapping, quantitative electroencephalograph (qEEG )

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## Introduction

During the early part of this decade, an increasing number of researchers, practitioners, and clinicians, within the field of assessing and treating sexually abusive and sexually aggressive behavior, among others, have begun to address the impact of trauma on the brain, especially in young people with sexual behavior problems, Teicher (2007), Creeden, (2006), Bengis & Cunnigam (2006). This information and knowledge also has direct application to those young people who also have histories of abuse and/or neglect, Ziegler, (2005), Ogden, Minton, & Pain, (2006). In particular the professionals listed above and others have addressed the impact on youth with sexual behavior problems and those who have been sexually abused. This is important because many young people with sexual behavior problems have a history of abuse and neglect.

Teicher, (2008), notes that exposure to childhood abuse, particularly childhood sexual abuse, is a risk factor for development of impulse control disorders, and can lead to a cycle of violence and perpetration. Exposure to early stress can exert enduring effects on brain development that may underlie many of the consequences of exposure to sexual abuse. Research indicates there are negative effects of childhood sexual abuse on development of the hippocampus, corpus callosum, prefrontal cortex and visual cortex.

Martin Kafka, MD, Clinical Associate Professor of Psychiatry at Harvard Medical School notes, that the following are risk factors for sexual recidivism in adult males: negative mood states, mood disorder, ADHD combined subtype, PTSD, Conduct Disorder, and BiPolar Dysthymic Disorder. Kafka notes that 10-15% of males with anxiety and/or depression had sexual risk taking behaviors; and that “mood and anxiety disorders may be so common among sexual offenders, that these conditions and their associated effects are not distinctly identified as correlated with recidivism.”

## Trauma and Its Impact on the Brain

Trauma resulting from early childhood abuse and neglect impacts the brain in a variety of ways. The Training & Research Institute, Inc. in Albuquerque, NM (2004) notes that childhood physical, emotional, sexual abuse and neglect can cause antisocial behavior by over-excitation of the limbic system; the primitive midbrain region that regulates memory and emotion, and the prefrontal cortex; which is associated with judgment, consequential thinking, and moral reasoning. They note, for example: 1) The left hemisphere is responsible for regulation and oversight of logical responses to a situation; and control and mediation of emotional responses generated by the right hemisphere.

*The impact of childhood abuse or neglect results in diminished control of emotional response, resulting in poor or inappropriate reactions to emotional situations, angry outbursts, self-destructive or suicidal impulses, paranoia, psychosis, and a tendency to pursue intense ultimately unstable relationships.*

2) The prefrontal cortex is the internal editor of emotional states, consequential thinking, moral reasoning, and reactions to emotional crisis.

*The impact of childhood abuse or neglect results in increased potential for depression and delinquent and criminal behavior.*

3) The corpus collosum creates communication between the right and left hemispheres.

*The impact of childhood abuse or neglect results in a significantly smaller corpus collosum, causing nonintegrated, inappropriate responses to everyday situations.*

4) The temporal lobes regulate emotions and verbal memory.

*The impact of childhood abuse or neglect results in poor modulation of emotions, and an increased chance for temporal lobe epilepsy.*

5) The hippocampus (part of the limbic system) is responsible for the formulation and retrieval of verbal and emotional memories.

*The impact of childhood abuse or neglect results in lower performance on verbal memory tests, possible continued mental problems, and concerns during the adult years.*

6) The amygdale, (also part of the limbic system) creates emotional content for memories, mediating depression, irritability, and hostility/aggression, and governing reaction and responses to fear.

*The impact of childhood abuse or neglect results in a significantly smaller amygdala raising the risk for depression, irritability and hostility/aggression; and is also responsible for incorrect emotional “memories”, absence of fear conditioning, and an increased chance of psychopathic tendencies.*

7) The purpose of the cerebellar vermis is to modulate production and release of neurotransmitters, and has a significant number of receptor sites for stress related hormones.

*The impact of childhood abuse or neglect results in an increase in potential risk for psychiatric symptoms such as depression, psychosis, hyperactivity, and attention deficits, and in rare cases, psychotic symptoms are possible.*

For patients who suffer from trauma, depression, and other mental disorders, we now know that we can use cognitive behavioral therapy (CBT) and trauma focused cognitive behavioral therapy (TFCBT) to reduce or even eliminate the need for psychotropic medications (Begley, 2007). CBT can:

- a) mute over activity in the frontal cortex (while antidepressants often raise activity there),
- b) can raise activity in the limbic system, and
- c) “rewires” the brain to adopt new “thinking circuits”.

In other words, one’s own thoughts can virtually reshape one’s emotions by redirecting one’s own thought process, which in turns opens pathways for people to change their perceptions about themselves and others. This process is often referred to as “mindfulness” (Siegel, 2007; Kabat-Zinn 2005).

The brain is often negatively impacted when a person is traumatized. Trauma can result from a variety of experiences, which include, but are not limited to:

- a) actual physical injury to the head or traumatic brain injury (TBI),
- b) neglect, physical abuse, sexual abuse; and
- c) exposure to traumatic events such as the death of a sibling or parent, the killing of a family pet or farm animal, natural disasters, life-threatening experiences, among others.

The use of effective treatments however, helps the brain's response to trauma, and problematic thoughts, feelings, and behaviors that can be altered and changed from unhealthy responses to healthy ways of coping. When patients are diagnosed with PTSD, they are likely to have experienced terror and affect dysregulation (dissociation) immediately after the trauma (Siegel, 1999).

### **Biofeedback & Self Regulation**

When using trauma focused cognitive behavioral therapy, the treatment the goal is to first teach affect regulation, and then begin Narrative Therapy with a focus on internal states awareness.<sup>1</sup> Traumatized patients and patients who suffer from stress related disorders including insomnia, anxiety and depression can benefit from participation in peripheral biofeedback. Peripheral biofeedback may include learning self-regulation skills through the measurement and monitoring of breathing/respiration rate (RR), heart rate (HR), heart rate variance (HRV), skin conductivity level (SCL), and body temperature (thermofeedback).

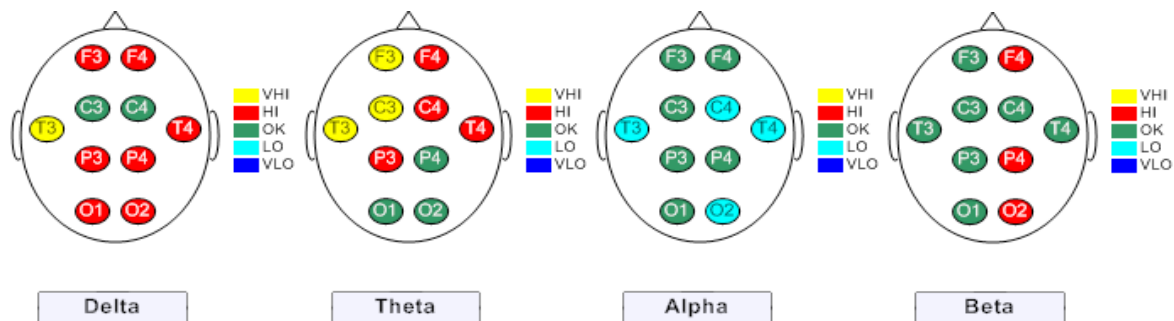
Self regulation is important in working with traumatized patients because as the patient works through the trauma and works towards creating a new narrative, retrieving such memories can create both a psychological and physiological response. These responses can result in the patient shutting down during the session and not making further progress, (Ogden, Minton, & Pain, 2006). The use of biofeedback, and self-regulation techniques assist the patient in coping with trauma and developing the skills that are necessary to remain in the "Window of Tolerance" (Ogden, Minton, & Pain, 2006).

Diagram #1 illustrates how peripheral biofeedback and cranial electrotherapy stimulation (CES) assisted a 15 year-old male patient who was diagnosed with ADHD and ODD ( in addition to sexual behavior problems), and quantitative electroencephalograph brain mapping (qEEG)<sup>2</sup> revealed the patient had ADHD, moderate depression, severe anxiety, and moderate learning disability.

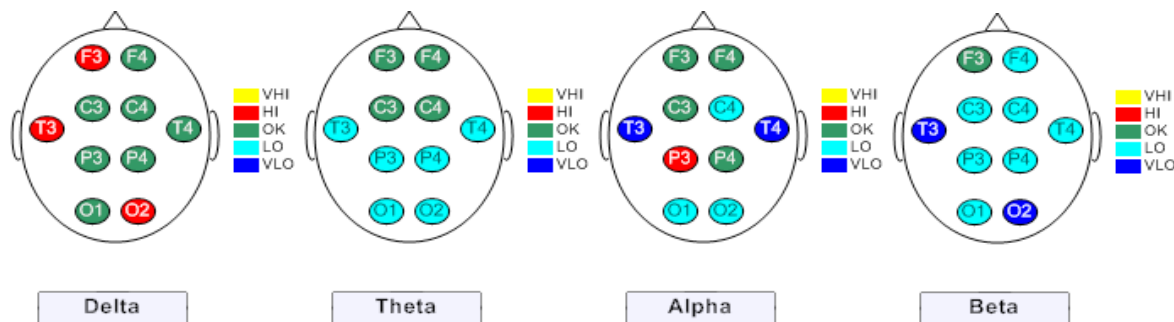
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<sup>1</sup> <http://tfcbt.musc.edu/>

<sup>2</sup> qEEG stands for quantitative electroencephalograph. Recorded from either 12 or 19-channels. The resulting EEG data are computer processed to provide a statistical analysis of brain electrical activity. In turn, these data are presented in various visual forms such as "brain maps" and other images which can show the ways in which different areas of the brain are functioning.



**05/09/08 Post-Treatment**



**Diagram #1: 2/4/08 Pre-Treatment**

*The above diagrams are from pre-post brain mapping on a 15 year old male with sexual behavior problems also diagnosed with ADHD and Oppositional Defiant Disorder (ODD). The patient participated in weekly biofeedback and CES sessions over a three month period. Of significance is the lowering of Delta and Theta brain wave magnitude.*

**Biofeedback, Cranial Electrotherapy Stimulation (CES), Brain Mapping & Neurofeedback**

**Treatment Benefits**

Biofeedback has been around for approximately 40 years, and in recent years has gone through a “renaissance” or resurgence. Many major hospitals and clinics, i.e., Harvard’s Brigham and Women’s Hospital and Duke University Medical Center now offer biofeedback to patients with a variety of physical and/or mental health concerns.<sup>3</sup>

Whether biofeedback actually teaches permanent skills remains unproven. However, the evidence and studies do suggest that therapy works to lower stress-related problems, including physical aches and

<sup>3</sup> The Benefits of Biofeedback. www.wilddivine.com newsletter 8/27/08.(Wild Divine newsletter@wilddivine.com.

pains. Evidence also indicates that biofeedback helps with non-stress related conditions as well. A newer technique, neurofeedback or EEG biofeedback, appears promising for restoring normal brain wave function that has been disrupted by TBI, PTSD, severe migraines, and other disorders.

There is even some evidence that biofeedback and neurofeedback (a subset of biofeedback) can work with attachment disordered children, and that underdiagnosis of a mood or developmental disorder can lead to ineffective treatment. Anxiety disorders, traumatic disorders, and physiological factors must also be taken into account. Many of these patients are misdiagnosed with ADHD instead of addressing what may very well be behavioral disorders.<sup>4</sup>

The use of biofeedback to impact heart rate variability (HRV) through the practice of controlled breathing is becoming more popular and has a growing body of research and clinical evidence to support its benefits. Striefel (2008) notes, “HRV serves as both a diagnostic marker of adaptability and health and as a treatment approach for a wide variety of client problems”.

The ethics of most, if not all mental health and physical health disciplines and those practitioners of biofeedback, are (and in most cases, state and/or federal regulations mandate as a patient’s right), that patients have the right to be free from pain and anxiety in the shortest amount of time and through the use of the least intrusive methods. Thus these issues must be addressed in the patient’s treatment plan.

More recently HRV has been used to reduce trauma-related symptoms, including depression in patients (Gevirtz, R. & Dalenberg, C. 2008). The Trauma Research Institute protocol for Post Traumatic Stress Disorder (PTSD) treatment includes psychoeducation, Cognitive Behavioral Therapy (CBT), Acceptance and Commitment Therapy (ACT), and HRV Biofeedback. Karavidas (2008) notes, “autonomic nervous system (ANS) dysfunction is thought to play a significant role in depression. Prior research indicates that individuals suffering from depression often show decreased vagal tone, increased heart rate, fatigue, sleep disturbance, and sympathetic arousal.” Karavidas (2008) states,

*“Biofeedback techniques are known to facilitate treatment for a wide variety of disorders with a psychosomatic component, including asthma, cardiovascular disorders, hypertension, cephalopathies, anxiety, and duodenal ulcers... Nevertheless, it remains unclear how the patient who has undergone training with such biofeedback techniques learns how to control his or her autonomic responses... Generally, the instructions given to such patients have been aimed at achieving a general state of relaxation in many cases by using progressive muscle relaxation... Some studies are now highlighting the importance of respiration in order to improve learning of biofeedback techniques.”*

### **What is Biofeedback?**

“Biofeedback is a non-invasive form of treatment. The therapist attaches sensors or electrodes to the body and these sensors provide a variety of readings--*feedback*--which is displayed on the equipment for the patient to see. The signals typically measure skin temperature, muscle tension and/or brainwave function. With this information, patients can learn to make changes so subtle that at first they cannot be consciously perceived. With practice, however, the new responses and behaviors can help to bring relief and improvement to a variety of disorders.”<sup>5</sup>

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<sup>4</sup> Alston, J.F. The complex issue of attachment disorders  
<http://www.psychiatrictimes.com/display/article/10168/54326> 8/26/08

<sup>5</sup> Definition adopted by BCIA, AAPB and ISNR May 18, 2008.

Peripheral biofeedback is a non-medical technique in which people learn to use their own body's signals to improve their health. Biofeedback training teaches how to consciously change and control the body's vital functions that are normally unconscious, such as breathing, heart rate, blood pressure, and temperature through information provided by electronic devices/sensors that take readings through a software program. The process of learning to control these body functions gives the patient moment by moment information about their physiological conditions, of which they are normally unaware.

Biofeedback has been shown to be effective with many stress related disorders and conditions that may be made worse under stress such as high blood pressure, muscle pain, migraine and tension headaches, and anxiety disorders, such as panic attacks, phobias, and obsessive-compulsive disorder. The biofeedback professional serves as a coach and the patient as the trainee. By teaching the patient the process of self-monitoring (becoming sensitive to and aware of one's stress patterns and symptoms), the patient develops skills for self-regulation (changing responses to decrease or eliminate discomfort and unpleasant sensations), which in turns results in the skill of self-regulation, providing the patient with a sense of self-control.

Patients are provided with the opportunity to learn basic biofeedback techniques through the use of biofeedback hardware and software, (i.e., the Wild Divine Project® Healing Rhythms®<sup>6</sup>). The *Healing Rhythms* software guides the patient through 15 biofeedback and relaxation steps. Patients place sensors on the fingers of one hand which measure HR and SCL; both of which increase when the patient is stressed or anxious, and decrease as he/she becomes more relaxed. Another probe placed on the *middle section* of the *middle finger* measures skin temperature; which increases as the patient becomes more relaxed and less anxious. When training down headaches and migraines, for example, the thermometer probe is placed on the *middle section* of the *middle finger* of the *hand on the opposite side of the head/body where the patient is experiencing headache pain*. Patients are expected to practice their breathing and relaxation techniques each day.

### How Biofeedback Works

Sensors are placed on the patient's fingers (an ear-clip sensor may also be used (i.e., with HeartMath), and the patient is then instructed to use relaxation, meditation, or visualization to bring about the desired response, whether it is muscle relaxation, lowered heart rate, slower breathes, or lower temperature. The biofeedback device reports progress by changes in the vital signs being monitored. Peripheral biofeedback includes physical responses:

Thermal - skin temperature (thermofeedback) measured on hand or foot

Sweat gland activity - electrical conductivity of the skin, galvanic skin response (SCL, SCR, GSR)

- Heart rate - with an electrocardiograph (ECG) (HR)
- Heart rate and blood pressure (heart rate variability (HRV)
- Brain-wave activity, with an electroencephalograph (EEG)
- Respiratory sinus arrhythmia is a noninvasive measure of vagal cardiac input, or RSA feedback (respiratory sinus arrhythmia feedback (RSA))<sup>7</sup>
- Respiration - respiratory function-breathing patterns and rate, breaths per minute (BPM)

<sup>6</sup> [www.wilddivineproject.com](http://www.wilddivineproject.com)

<sup>7</sup> RSA is the natural cycle of arrhythmia that occurs through the influence of breathing on the flow of sympathetic and vagus impulses to the sinoatrial node ([http://bio-medical.com/news\\_display.cfm?newsid=63](http://bio-medical.com/news_display.cfm?newsid=63))

- Muscular reactivity and tension, electromyography (EMG)

### Biofeedback Measures

Breathing rates, breaths per minute (BMR):

- Normal 12 BPM
- Range 4 (relaxed) -18 (tense/anxious) BPM
- Normal resting adult 10-18 BPM
- Anxiety 20 - 30 BPM
- Hyperventilation 57 BPM

**Thermofeedback Temperature:** The measure of body temperature via the finger in degrees Fahrenheit or Celsius.

- $95 + F/35 + C$  is very relaxed
- $90 - 94/32.2 - 34.3$  is calm / relaxed
- $80 - 90/26.6 - 32.2$  is nervous
- $75 - 80/23.8 - 26.6$  is tense / stressed
- $<75/23.8$  is very stressed and tense

### Skin Conductivity Level (SCL), Galvanic Skin Response (GSR) or Skin Resistance Level (SRL):

The measure of sweat and moisture in the fingers, the lower the measure the more calm and less anxious /stressed. Sweat glands are surrounded by blood vessels.

- Range: 2 – 100 microhms
- Stressed out: 20 microhms
- Relaxed baseline: 2 – 5 microhms

**Coherence (Coh):** Coherence is the interaction of the body's heart rate, SCL, and breathing which then registers in the brain as a relaxed state. To achieve good coherence the patient needs to have a Coh. of .80 or higher up to 1.00

**Heart Rate Variance (HRV):** During biofeedback when the heart rate becomes rested and even between beats; the body and mind are more relaxed and a smooth sinusoidal rhythm appears.

### Conditions Treated by Biofeedback

Peripheral biofeedback is particularly useful and can help with stress-related conditions where there is sympathetic or adrenal stress. It is also useful for conditions where there is inadequate control over muscle groups or muscle dysfunction. Conditions treated with biofeedback include but are not limited to:

- stress
- anxiety
- depression
- sleep disorders
- headaches
- asthma
- muscle injury
- pain relief
- insomnia
- TMJ
- high blood pressure
- digestive disorders
- attention deficit disorder
- irritable bowel syndrome
- hyperactivity.

### Cranial Electrotherapy Stimulation (CES)<sup>8</sup>

#### What is Cranial Electrotherapy Stimulation (CES)

Cranial Electrotherapy Stimulation (CES) involves the use of the Alpha Stim 100®, a small hand held device that delivers small electrical pulses, one milliampere (mA) or less, directly to the brain. Pulses are

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<sup>8</sup> <http://alpha-stim.com/default.htm>

used to promote relaxation, sleep, and relieve some psychological and emotional conditions like depression and anxiety. CES electro-technology causes production or reduction of certain neurochemicals in the brain. For example, levels of norepinephrine and dopamine, (that reflect relaxed mental and emotional states), can increase using CES technology, and biochemical compounds related to emotional stress can be seen to decrease. Cortisol is an important hormone (also known as the stress hormone) in the body, is secreted by the adrenal glands and involved in many functions including regulation of blood pressure. Cortisol is an important and helpful part of the body's response to stress. Higher and more prolonged levels of cortisol in the bloodstream (like those associated with chronic stress) have been shown to have negative effects. Cortisol is involved in the following functions and more:

- Proper glucose metabolism
- Immune function
- Insulin release for blood sugar maintenance
- Regulation of blood pressure
- Inflammatory response

Normally, it's present in the body at higher levels in the morning and at its lowest at night. Although stress isn't the only reason that cortisol is secreted into the bloodstream, it has been termed "the stress hormone" because it's also secreted in higher levels during the body's 'fight or flight' response to stress, and is responsible for several stress-related changes in the body. Small increases of cortisol have some positive effects:

- Heightened memory functions
- Lower sensitivity to pain
- A quick burst of energy for survival
- A burst of increased immunity
- Helps maintain homeostasis in the body

While cortisol is an important and helpful part of the body's response to stress, it's important that the body's relaxation response to be activated so the body's functions can return to normal following a stressful event. Unfortunately, in our current high-stress culture, the body's stress response is activated so often that the body doesn't always have a chance to return to normal, resulting in a state of chronic stress. Higher and more prolonged levels of cortisol in the bloodstream (like those associated with chronic stress) have been shown to have negative effects, such as:

- Impaired cognitive performance
- Blood sugar imbalances such as hyperglycemia
- Decreased bone density
- Lowered immunity and inflammatory responses in the body, slowed wound healing, and other health consequences
- Suppressed thyroid function
- Higher blood pressure
- Decrease in muscle tissue
- Increased abdominal fat, which is associated with a greater amount of health problems than fat deposited in other areas of the body. Some of the health problems associated with increased stomach fat are heart attacks, strokes, the development of, higher levels of "bad" cholesterol (LDL) and lower levels of "good" cholesterol (HDL), which can lead to other health problems.

To keep cortisol levels healthy and under control, the body's relaxation response should be activated after the fight or flight response occurs. Patients can learn to relax their body with various stress management techniques (i.e., biofeedback), and through making lifestyle changes in order to keep their bodies from reacting to stress in the first place.

### How does CES work?

The Alpha Stim 100®, has the proven ability to alter brain wave patterns through electronic stimulation. This stimulation is delivered through two small earclips (electrodes) attached to the ear lobes. The micro-current stimulation coaxes the brain into the desired state. Effectively, CES offers many benefits. All of these benefits are centered around the brain, which is in control of the rest of the body.<sup>10</sup> Figure #1 below illustrates how the Alpha Stim 100 CES current enters, stimulates and activates the brain.

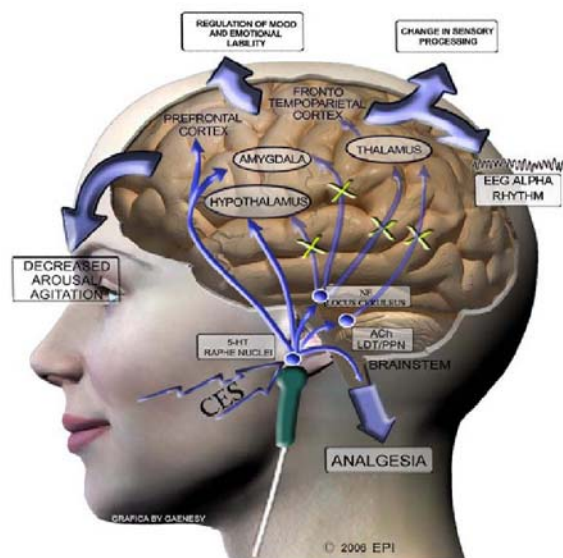


Figure #1

## Electroencephalography - Mini-Q qEEG

### Mini-Q qEEG

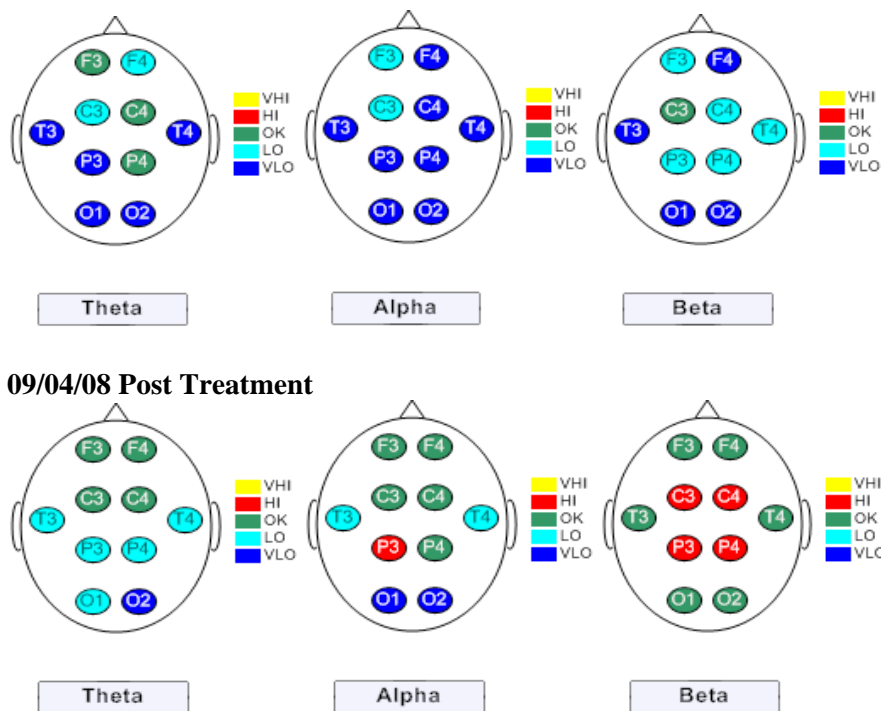
Electroencephalography (e-lec-tro-enceph-a-lo-graphy ~ EEG) is a neurological diagnostic procedure that records the changes in electrical potentials (brainwaves, Delta, Theta, Alpha & Beta) in various parts of the brain. The EEG is a recording of the electrical activity of the brain from the scalp. Quantitative Electroencephalography (qEEG) is the measurement, using digital technology, of electrical patterns at the surface of the scalp which primarily reflect cortical activity or "brainwaves". A multi-electrode recording of brain wave activity is recorded and converted into numbers by a computer. These numbers are then statistically analyzed and are converted into a color map of brain functioning. qEEG provides a method to take EEG recorded from a variety of locations and statistically analyze the data to provide topographical maps as illustrated in the diagrams below. This output can be used to assess clients and develop Neurofeedback protocols. Learning to process and read qEEG reports typically takes years of experience.<sup>11</sup>

<sup>10</sup> <http://www.alpha-stim.com/default.htm>

<sup>11</sup> <https://www.newmind-apps.com/>

## Neurofeedback

Zalaquett, C.P. & Bell, T. (2008) note that neurofeedback, unlike medicines, when done properly has no negative physical side effects and the training appears to produce permanent alterations in learning and behavior. Some studies have shown that neurofeedback is linked to improved I.Q. scores<sup>12</sup>, (see Diagram #2 below).



## Diagram #2 ~ 02/20/08 Pre-Treatment

Diagram #2 shows pre-post treatment mapping of a 51 year old female with a recent TBI, and who was suffering with depression, mild anxiety and learning disability. After 26 sessions of neurofeedback, the patient had reduced magnitude. Pre-post IQ testing revealed that the patient had an IQ increase of 12 points. Elevated Beta at C3 and C4 (Sensory & Motor Functions) reflect pain the patient has from a lower back injury. Elevated Beta at P3 and P4 likely indicate problem areas with self-boundaries, excessive thinking, vigilance personality, excessive self-concern, and victim mentality based upon the recent departure from an abusive relationship.

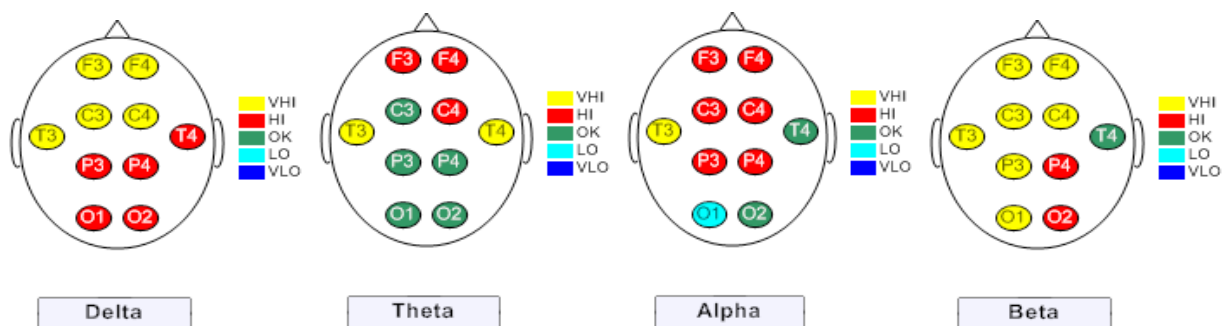
Neurofeedback, also called neuro-biofeedback or EEG biofeedback is a therapy technique that presents the patient with realtime feedback on brainwave activity, as measured by sensors on the scalp, typically in the form of a video display, and sound. When brain activity changes in the direction desired by the neurofeedback protocol, a positive "reward" feedback is given to the patient. Rewards/reinforcements can be as simple as a change in pitch of a tone or as complex as a certain type of movement of a character in a video game.

<sup>12</sup> <http://www.coedu.usf.edu/zalaquett/n/neurofeedback.htm> 8/26/08

The most common and well-documented use of neurofeedback is in the treatment of attention deficit hyperactivity disorder. Multiple studies have shown neurofeedback to be useful in the treatment of ADHD. Other areas where neurofeedback has been researched include treatment of substance abuse, anxiety, depression, epilepsy, Obsessive Compulsive Disorder (OCD), learning disabilities, Bipolar Disorder, Conduct Disorder, anger and rage, cognitive impairment, migraines, headaches, chronic pain, autism spectrum disorders, sleep dysregulation, post Traumatic Stress Disorder (PTSD), and Mild Traumatic Brain Injury (MTBI).

Below are pre-post measures of magnitude qEEG. In qEEG brain mapping, “the magnitude analysis system provides a reference database system that is tailored specifically for clinicians instead of researchers. Instead of using standard deviations, the maps provide simple output indicating whether EEG is high or low in the various dimensions of analysis. The cognitive output automatically flags areas of possible problems based on correlations between map output and MRI research. Emotional output information provides similar information based on MRI research and standard neurology texts as well as clinical experience. Clinicians can see at a glance the salient issues likely to be present due to the EEG distribution as well as being provided with an appropriate protocol option.”<sup>13</sup>

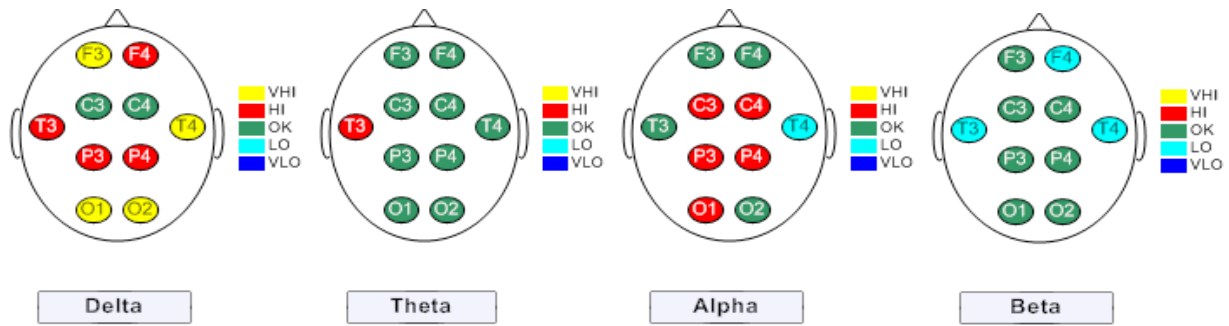
Magnitude is the most important reading, as it is the power of individual brain waves. “Magnitude is used instead of power because most neurofeedback practitioners work with magnitude. Professionals feel it is important that they be able to easily refer to their statistics and see what the actual microvolt value when an area is indicated as high on the map. Magnitude is merely the average amplitude over time. The magnitude values in brain maps are based on a statistical sample in addition to being cross validated with the major databases. The meaning of high or low magnitudes varies with location and distribution. Learning to interpret their meaning takes considerable experience.”<sup>14</sup>



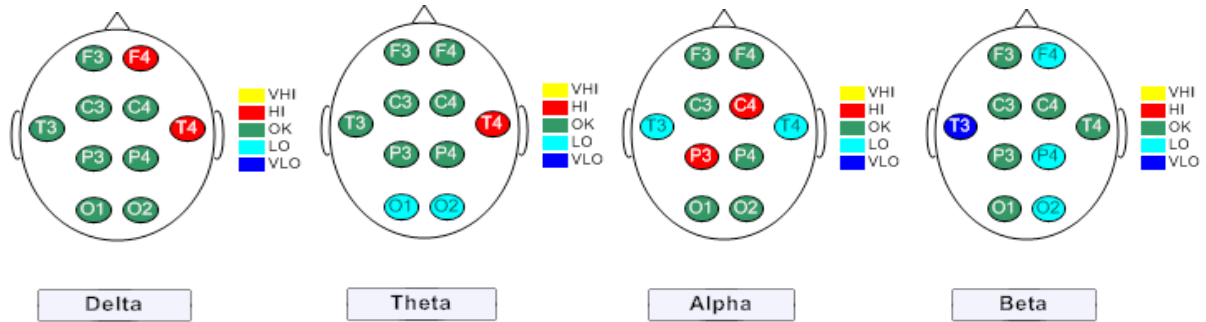
**Diagram #3 - 1/18/08 Pre-Treatment  
03/27/08 Partial completion of Biofeedback & CES**

<sup>13</sup> <https://www.newmind-apps.com/>

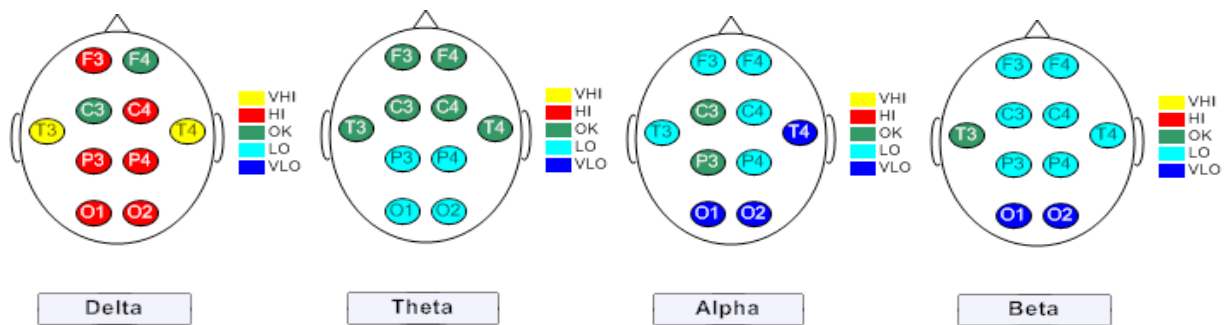
<sup>14</sup> <https://www.newmind-apps.com/>



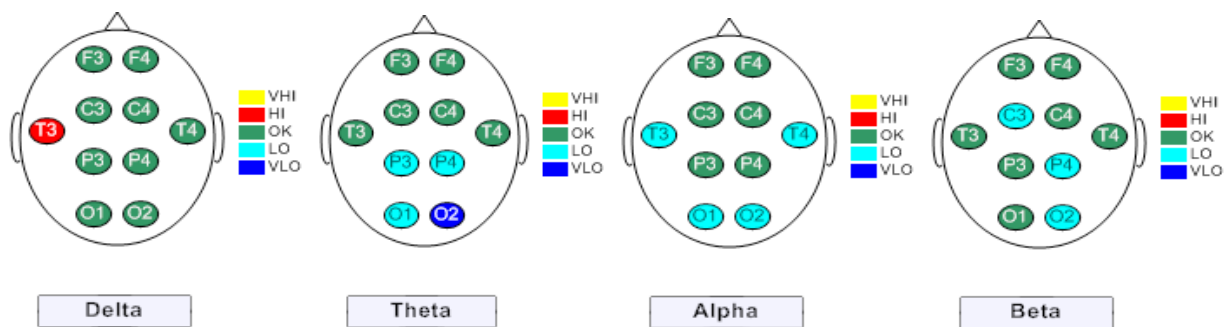
**10/10/08 Post-Treatment**



15 year old male with a history of sexually abusive behavior and an admitting diagnosis of ADHD, PTSD, ODD. Patient completed 15 sessions of biofeedback with CES and 20 sessions of Neurofeedback.



**11/14/2008 Post-Treatment**



**Diagram #4 Pre-Treatment 06/04/08**

*Diagram #4 shows pre-post treatment effects of a 16 year old male sexual abuser with an admitting diagnosis of PTSD and conduct disorder, after completing 15 sessions of biofeedback, CES, and 9 sessions of neurofeedback.*

## **Brain Waves**

### **Delta Waves**

Delta brainwaves are of the greatest amplitude and slowest frequency. They are typically irregular, and center around the range of 1.5 to 3 cycles per second. Deep dreamless sleep would take the patient down to the lowest frequency, typically, 2 to 3 cycles a second. These brainwaves occur during coma. Delta brainwaves are normally found in deep sleep and in "normal" infants, and young children. Unhealthy Delta brainwave patterns often reduce one's ability to focus and maintain attention. They indicate an abnormality in an awake adult.

### **Theta Waves**

Theta brainwaves are typically of greater amplitude than Delta and are slow frequency. This frequency range is normally between 4-7Hz, with a sinusoidal rhythm or/ square top. Theta waves are usually suggestive of creativity, spontaneity, and distraction/daydreaming. A person who begins to daydream is often in a Theta brainwave state.

### **Alpha Waves**

Alpha brainwaves are the second highest frequency brainwave category (in order of frequency - the highest frequency being Gamma waves), and typically occur in a pattern of 8-12 cycles per second. Alpha represents non-arousal. Alpha brainwaves are slower, and higher in amplitude. When an adult's eyes are closed, Alpha has the highest amplitude. Most of the recorded waves in a normal adult's EEG are the occipital Alpha waves, which are best obtained from the back of the head when the adult is resting quietly with the eyes closed but not asleep.

### **Beta Waves**

Beta brainwaves are present in normal waking consciousness. When the brain is aroused and actively engaged in normal mental activities, it generates Beta waves. Beta waves are of relatively low amplitude, and are the fastest of the five different brainwaves ranging from 13-30Hz. Healthy levels of Beta enable analytical problem solving, decision making and sound judgments, and are characteristics of a strongly engaged mind. Some neurotherapists have observed that SMR (LoBeta) brain wave frequencies (12-15 cycles per second) make individuals feel more present, and in the moment.

## **The Application of Biofeedback, CES, and Neurofeedback with Sexually Abusive Youth**

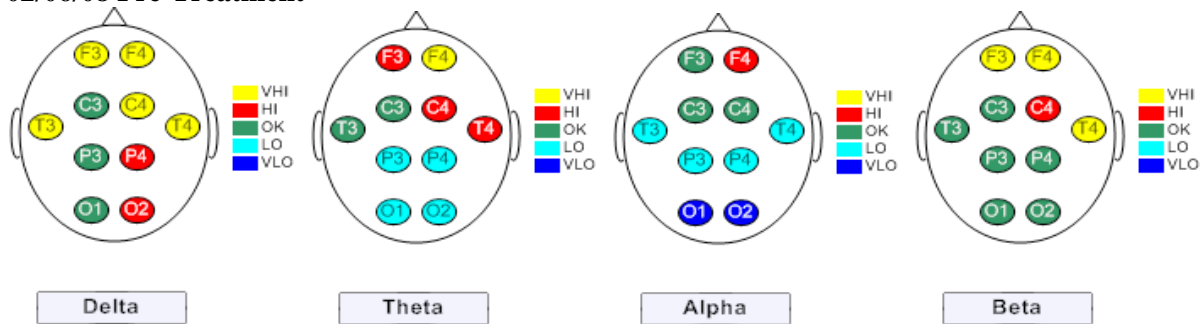
Working with young people who have sexual behavior problems is no different than working with other patients when the practitioner is considering the use of biofeedback, CES, qEEG brain mapping, and/or neurofeedback. The majority of patients coming into our stress reduction clinic and biofeedback lab are residential male adolescent patients between the ages of 11 and 17 who have sexual behavior problems. As noted above, most of these patients have attentional problems, learning disabilities, depression and/or anxiety.

To date our clinic has conducted over 110 brain mapping sessions on 85 patients of which 63 are adolescents and over 35 are young people with sexual behavior problems. Every brain map conducted on

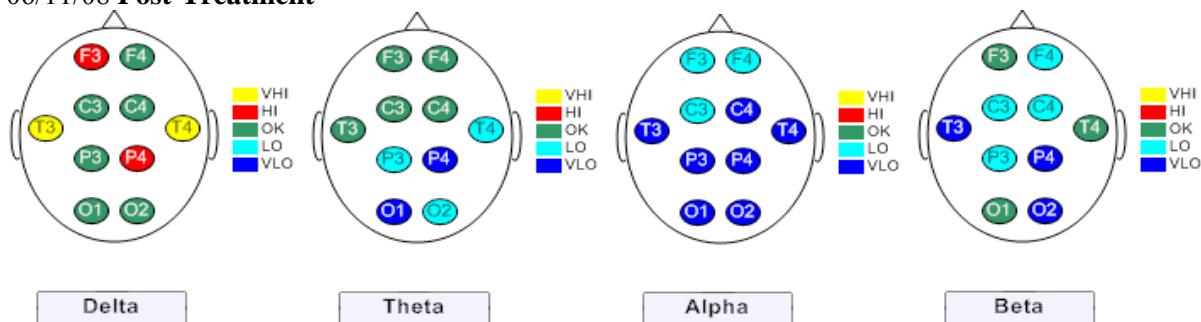
a young person with sexual behavior problems has revealed that the patient suffers from either depression, anxiety or both.

While biofeedback and neurofeedback hold much promise for working with this population, no one therapy, treatment or intervention can claim a perfect success rate. The case illustrations (Diagrams 5 & 6) below, demonstrate some of the differences between patients.

**02/06/08 Pre-Treatment**



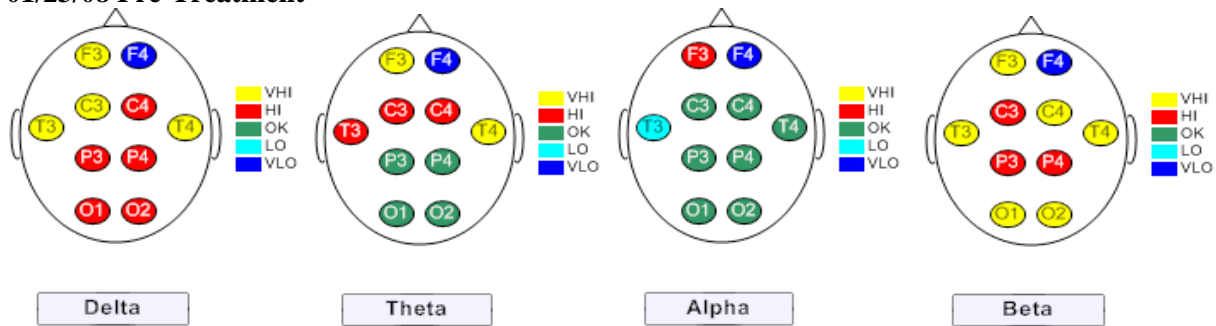
**06/11/08 Post-Treatment**



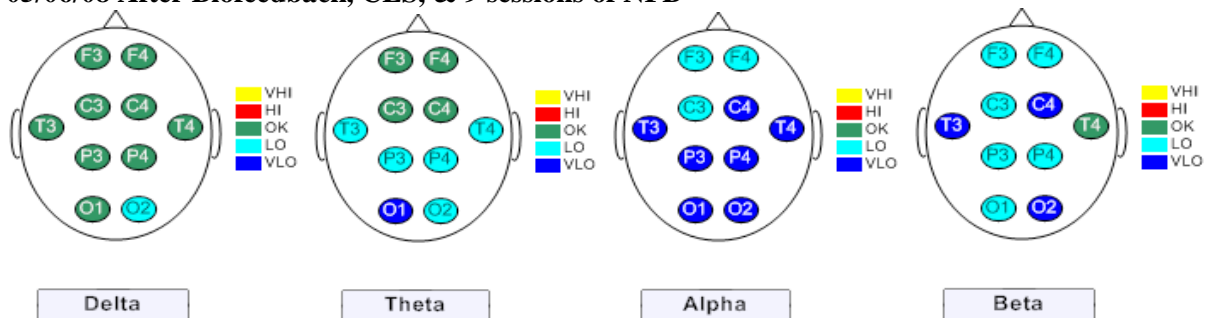
**Diagram #5**

Diagram #5 illustrates a pre-post treatment mapping on a 15 year old male with a history of sexually abusive behavior and an admitting diagnosis of ADHD, PTSD, ODD, and CD. At the onset of treatment and during the first several months, patient demonstrated non-compliant behavior and severe acting out behavior resulting in the need to place him in therapeutic holds. Towards the end of treatment the patient was engaged in intensive therapy dealing with family issues related to his being adopted. Patient completed 15 sessions of biofeedback and CES and approximately 12 sessions of neurofeedback.

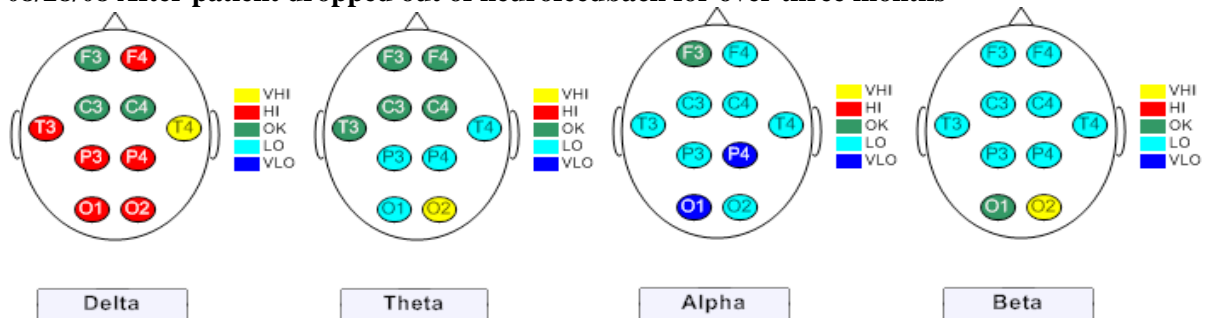
**01/23/08 Pre-Treatment**



**05/06/08 After Biofeedback, CES, & 9 sessions of NFB**



**08/28/08 After patient dropped out of neurofeedback for over three months**



**Diagram #6**

Diagram #6 illustrates a pre-post treatment mapping on a 15 year old male with a history of sexually abusive behavior and an admitting diagnosis of ADHD, and ODD. At the onset of treatment, during the first several months, and after dropping out of neurofeedback, the patient demonstrated non-compliant behavior and severe acting out behavior resulting in the need to place him in therapeutic holds. The patient dropped out of neurofeedback treatment at a time when the patient was engaged in intensive therapy dealing with family issues related to his being adopted. Patient completed 15 sessions of biofeedback and CES and 9 sessions of neurofeedback, prior to dropping out of neurofeedback. Patient's behavior continued to worsen and he requested to be reinstated in neurofeedback. The first brain map revealed that the patient had mild attentional problems, severe depression, and moderate anxiety. Follow-up mapping after biofeedback, CES and 9 sessions of neurofeedback revealed that he had no attentional problems, however his depression and anxiety remained the same at that time. The third mapping on 08/28/08 shows how the patient relapsed due to a variety of emotional problems that occurred prior to his request to re-enter treatment.

### **Implications for the Future**

The US Food and Drug Administration (FDA) notes that biofeedback is a standard relaxation “Therapy”. Biofeedback and neurofeedback are primarily operant conditioning, and reinforcement of a naturally occurring event. Patients can reinforce the desired brain activity with EEG biofeedback. When patients participate in neurofeedback, he/she often experiences significant change in 15-40 sessions; and the average change occurs in 20-25 sessions.

Neurotherapists and other mental health professions are turning to the above discussed treatments and therapies in increasing numbers. Some in psychiatry are suggesting that brain mapping is so important, that patients should not be prescribed psychotropic medications until a qEEG brain map has been conducted (Walker, 2008). While brain mapping cannot be considered as diagnostic at this time, those working in this field are increasingly hopeful that brain mapping diagnostics is not too far from being a reality. Given the benefits of biofeedback and the treatments discussed above, there is no good reason why these treatments should not be used with any youth who has emotional, cognitive and/or behavioral problems. Ethically, we will become more challenged by our disciplines and specialties if we do not turn to these methods of helping others.

### **Combining Therapies**

Combining therapies to assist patients in learning to relax and decrease stress related responses including anxiety and depression, can further facilitate recovery. For example, patients who received a combination of EMG biofeedback and CES showed greater improvement than those who underwent biofeedback alone.<sup>15</sup> Neurofeedback should generally not be done without other supportive therapies.

Generally, there are no contraindications for using any of the above treatments and therapies with adults, young people, and specifically young people with sexual behavior problems. There are benefits to combining CES and biofeedback and combining biofeedback with neurofeedback. Any of these treatments and therapies will enhance sex offense specific treatments as well as the use of CBT, TF CBT and other treatment modalities and therapies as described above.

### **Summary**

While this chapter has limits to the degree to which any of the above treatments and therapies can be described in detail, it serves as an overview and hopefully an impetus for professionals who treat young people with sexual behavior problems, to consider expanding their practice and services to include them.

Research has shown that the majority of young people who have sexual behavior problems do not differ significantly from those youth who become involved in the juvenile justice system and/or have other delinquent behaviors (Hunter, 2006), Chaffin, M. & Longo, R.E. (2004), Longo, R.E. (2003), Longo, R.E. and Calder, M.C. (2004), Prescott, D.S. & Longo, R.E. (2006). However, research does show that many of these young people do suffer from depression and anxiety, among other mental health concerns and problems. The use of biofeedback, CES, brain mapping and neurofeedback can further assist these patients in working toward healthier lifestyles and full recovery.

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<sup>15</sup> Biofeedback and electromedicine reduce the cycle of pain spasm pain in low back patients. Research abstracts <http://wwwbiof.com/onlinestore/alpha/zimmerman-spasm.asp> 8/26/08

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