

'Relax to Win' – Treating children with anxiety problems with a biofeedback video game

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Summary/ Abstract

One of the central components in the treatment of common childhood problems such as anxiety, phobia, and post-traumatic stress is relaxation training. Biofeedback has been developed as an effective means of teaching relaxation skills especially with adults. One of the challenges has been to develop biofeedback protocols that are intelligible and child-centred enough to engage children. In this article we describe the 'Relax to Win' biofeedback video game that has been developed by the MindGames team in Media Lab Europe. In particular, we describe how it has been adapted to be used clinically with children who suffer from anxiety problems in a child mental health setting. The application is illustrated with a case study at the end.

Background

Anxiety is the natural response to a stimulus or situation, which poses a threat to well-being, safety or security (Carr, 1999). This response encompasses cognitive, affective, physiological and behavioural aspects and a treatment approach should address all these (Herbert, 1994; Barrios and Hartman, 1998; Silverman and Kurtines, 1996).

From early childhood and into adolescence, children can experience a wide range of developmentally appropriate fears, which are usually transitory in nature (Hallam, 1994; Ollendick, King and Yule, 1994). But for some children who attend mental health services, persistent and debilitating anxiety is an ever present feature of their daily lives.

Epidemiology

Anderson (1994) in a review of major epidemiological studies concluded that the overall prevalence for anxiety disorders in children and adolescents is approximately 2.9%. Co-morbidity rates for anxiety disorders, with other disorders, such as conduct disorder and attention deficit hyperactivity disorder is also marked (Anderson, 1994).

The effect of persistently elevated levels of anxiety on children can result in impaired social functioning and self esteem. It can also disrupt family and peer relations and lead to school difficulties. Anxiety can also be a marker for childhood depression and the continuance of severe anxiety and phobias into adulthood (Hallam, 1994).

Treatment

To be effective, the treatment of anxiety disorders should address the cognitive, affective, behavioural and physiological elements of them. Relaxation training can be particularly effective in addressing the biophysiological component of anxiety. Relaxation training has three main objectives, which are to teach the client:

- 1) 1) to differentiate states of arousal/tension from a state of relaxation.

- 2) 2) to detect the early signs of becoming tense and to change behaviour before a spiral of arousal/tension has developed.
- 3) 3) to acquire techniques for facilitating relaxation and to learn to conduct daily activities with a lesser, but appropriate, degree of effort (Hallam, 1994;138).

Research has shown that relaxation training by altering the physiological arousal level can help children to manage their feelings of anxiety (Barber, 1984; Ost, 1987; Borysenko, 1988). Such an interventions as describe in this article can be practised with their parents, at home or in other settings, thus increasing the effectiveness of it.

Affective Feedback

Biofeedback is an established method of helping people achieve and maintain specific internal states. In simple terms biofeedback provides a person with a representation or picture of some aspect of their physiology that he/she may be ordinarily unaware of. For example, using a simple thermometer attached to a finger a computer could provide a pictorial graph of the blood flow to the tips of the fingers. By using the graph as feedback the person can learn how to increase the blood flow to their fingers (associated with relaxation). It is similar to a person learning to relax by becoming aware of the tension and sensations in their muscles, yet with biofeedback extra feedback information is provided via a biometric sensor and relayed pictorially on a screen. Biofeedback thus has a number of therapeutic uses in helping people learn how to achieve and control positive mental states such as concentration or relaxation and has been used with people with anxiety, depression and attention problems (Schwartz, M. S., 1995).

In the MindGames team, in Media Lab Europe we are interested in building on the concept of biofeedback to create the 'two-way' process of what we have called Affective Feedback. Interacting with the computer, the individual not only receives constructive feedback about his emotional state, but also the computer system receives feedback from the person and learns to alter the environment according to their emotional state. This is best illustrated by one of the Mindgames video games, BrainChild, which alters the auditory feedback it gives the individual depending on his level of relaxation. For example, if the person is responding to the relaxing music and words (as measured by biometric sensors) the computer will continue them, and if not the computer will change them. The long term research aim of the team is to create multi-sensory virtual environments that uniquely tailor themselves to the individual's emotional state and specific needs; essentially the computer learns to get a sense of how you are feeling and adapts accordingly!

In the short-term the MindGames team is working on enhancing traditional biofeedback in a number of concrete ways:

- 1) Using multi-modal approach to biometric sensing that incorporates muscle tension (EMG), brain waves (EEG) and heart rate (ECG), and that applies complex signal processing techniques in order to gain a comprehensive and meaningful measurement of the user's internal state.
- 2) Using a more compelling and enaging 3-D gaming environment that incorporates sound and image in providing better quality feedback to the user.

3) Using motivational context of a video game, whereby the natural reward of completing a game, motivates the user to complete the tasks and to learn the desired skills.

Relax to Win

Relax to Win is the first video game developed by the MindGames team that enhances biofeedback in the above ways. Essentially, it is a two-player competitive racing game in which the players win the race by learning to relax. The basic idea is simple: Each player takes control of a dragon - these characters have three cycles of movement - walk, run and fly; each being faster than the previous. As a player relaxes, their dragon moves through walk, then run and finally begins flying. If the player stresses out at any point, the dragon will move back down through the cycles. Therefore, the person who relaxes most wins the race. In the one player version of the game (which is the version used in the case study) the player competes against a 'ghost dragon' who represents his last best score. In this way the player can 'compete against himself' and thus learn how improve his level of relaxation over time.

Relaxation in the game is measured by placing electrodes on each player's middle and index fingers. As people become stressed they sweat more, affecting the electrical conductivity of the surface of their skin and this is picked up by the electrodes. This phenomenon is called the galvanic skin response (GSR) and is a well established measure of stress in biofeedback and is actually used in the lie detector test!

Relax to Win, attempts to enhance the biofeedback by placing it within the context of a compelling 3-DI video game which engages children's interest due to the quality of the feedback and the fact that it is racing game that they have to complete. Winning the race provides an motivating and effective reward for achieving a relaxed state. Competitive games are normally associated with tension and stress, so the player must learn how to override this tendency and learn not only how to relax, but how to relax in a tense environment.

Treatment Protocol

The treatment consists of five individual sessions with the child and his/her parent that includes the 'Relax to Win' game as a central component. With the help of a therapist, the children are taught various relaxation techniques and coping strategies and then invited to try them out as they compete in 'Relax to Win'. They are also taught how to generalize and apply the ideas to outside situations, such as in home and school situations, depending on where their anxiety affects them. Treatment is tailored to match each individual child's specific needs and goals. A sample session format is follows:

Session 1

- 1) Goal setting – agreeing with child and parent specific goals for therapy (e.g. learning to relax when faced by a specific fear)
- 2) Discussion of problem and how child normally copes
- 3) Playing 'Relax to Win'
- 4) Review with child what 'intuitive skills' used to relax during the game
- 5) Planning how to expand on these 'intuitive skills' when faced by fears

Subsequent Sessions

- 1) Review of progress
- 2) Introduce new coping / relaxation idea such as positive visualisation, relaxation using breathing etc.
- 3) Try out new idea, using 'Relax to Win' game
- 4) Planning how to apply ideas at home or in school when faced by stressful situations

Case Study

Jack is a twelve-year-old boy who experiences episodes of anxiety. In the past these have focused on worries regarding his health or his parent's health. He can also worry about current affairs items that he has seen or heard about. Jack who is doing well in school, and is popular does not experience these worries there. His mother and father are understanding and supportive around his worries and do their best to reassure him. Jack said that by talking to his parents about his worries that they can often reassure him.

Jack agreed to come for four sessions, using the Relax to Win game accompanied by his father to learn some relaxation techniques to help him manage his worries. Jack's goal in coming to these sessions was for him to be able to relax a bit more. He felt optimistic about achieving this. Jack's father's goal was for his son to be more confident. Jack's father sat in on all four sessions so he could be a support to Jack and help him with the ideas at home.

In the first session, information was given on how the body responds to feelings of anxiety. Jack said that he coped with any worries, by trying to think about something different or reading a book. These worries also occur at night time when he is in bed. Jack also said that he has sometimes taken deep breaths to help him relax. He was familiar with this technique from karate which he does with his father. Jack tried the game three times and was able to achieve progressive states of relaxation. He said that he was using taking deep breaths and sitting more comfortably in the chair to help him relax. He said that focusing on the game also helped him relax and this reminded him of how he concentrates on his reading, when he feels anxious. His father also tried the game and reinforced for his son how, taking a deep breath also helped him to relax. It was agreed that the next session would focus on learning a progressive relaxation exercise.

In the second session, Jack practiced a deep breathing exercise. His father also joined in the game and he described this technique as 'breathing out your worries'. Jack said that he was going to use this technique during the Relax to Win game. Each of the four trials achieved a similar or better score than the previous one, with the best score achieved on the final attempt. Jack said that this was because he was using the deep breathing technique better. He said that he knew it was working, because he felt more tired and relaxed now. The homework was to practice deep breathing at home.

In the third session, Jack stated how he had used the deep breathing technique at home and that one night he woke up in bed, feeling hot and stuffy and unable to breathe, as his nose was blocked. Jack said that he did the breathing exercise and felt more relaxed and

tired and went back to sleep. In this session, we focused on practising a different technique, namely visualisation to promote a relaxed state. The therapist played a tape of the sound of the sea, while reading a guided imagery script that described feeling happy and relaxed at the seashore. Jack and his father closed their eyes and engaged in deep breathing, while visualising the scene. At the end of the imagery, Jack said that he could imagine himself at the sea. In attempting the game Jack used his visualisation and deep breathing to achieve a more calm and relaxed state. He said that they both complemented each other. His scores for the first three attempts were similar. For the final attempt, Jack agreed to listen to the sound of the tape, while turning down the accompanying music of the Relax to Win game. He kept his eyes closed and engaged in the visualisation and deep breathing exercises. He achieved a much better score. Jack said that the two techniques of visualisation and deep breathing complemented each other, as using visualisation helped your thoughts to relax, while engaging in deep breathing helped your body to relax.

In the fourth and last session, Jack practiced using affirmations to promote feelings of relaxation. He wrote up several positive self-talk statements, such as 'I'm doing well', and 'I am feeling relaxed' and practiced saying them with meaning to himself. His father supported Jack, saying that he uses positive self-talk when he feels under pressure in work. When he had practised these affirmations, Jack used them while playing the Relax to Win game. At the end of four trials, in which he was able to become gradually more relaxed, he said that closing his eyes, while repeating an affirmation and doing the deep breathing exercise helped to feel more relaxed. He said the two techniques helped each other. Jack also felt that he would use the deep breathing exercise if he felt anxious and use the affirmations if he was worried about an exam, such as school entrance test he was shortly to do.

Conclusion

In this article we have described the use of the 'Relax to Win' biofeedback video game as part of a therapeutic protocol to help children with anxiety problems learn relaxation skills. The game has proved compelling and engaging to children, motivating them to become curious about how they relax and to try new skills out in order to 'win' the game. The game, however, only provides assistance and is not a replacement for a quality therapeutic process. It provides a useful 'prop' to help a therapist engage children and to structure a therapeutic protocol. The essential therapeutic element is not the game itself but the conversation about the game when the child identifies the skills they use to relax. One could speculate that in the case study above, it was this therapeutic conversation that made the vital difference as well as the support provided by the therapist and the father. In this way, the Relax to Win game could provide a useful technological aid to therapists.

Biography

Dr. John Sharry is a Director of the Brief Therapy Group, a Consultant Research Scientist at Media Lab Europe. He is co-author of the Parents Plus Programmes as well as three

psychotherapy books *Becoming a solution detective*, *Solution focused groupwork* and the forthcoming *Counselling children adolescents and families*.

Matt McDermott is a senior social worker and a qualified child psychotherapist at the Department of Child and Family Psychiatry, in the Mater Hospital. He has a special interest in...

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