

Dual Utilization of GSR Feedback with Virtual Reality Treatment to Reduce Fear of Flying

One of the major challenges faced by behaviorally oriented psychologists has been to match reduction of autonomic arousal with stimuli realistic enough for the phobic patient to respond as if it were a truly "dangerous" situation. Historically, patients have been asked to rely on their imaginations to visualize the anxiety producing scenario (Wolpe, 1958), e.g., being in an airplane or crowded elevator. The critical factor has always been the extent to which the patient viscerally responds to the imagined threat, not the amount of visual imagery that is produced. The frequently reported patient complaint of, "I have a lousy imagination," is not as damning as we once thought. Far more damaging is when physiological measures like heart rate (HR) or galvanic skin resistance (GSR) are unaffected by imagined phobic scenes. Either way, in vitro desensitization has been an awkward treatment to implement. Nonetheless, HR and GSR are considered excellent measures of how people viscerally respond to stressful situations. As everyone knows, rapid heartbeat and excessive sweating are sure signs of nervousness.

A second and more potent alternative, in vivo desensitization, is exposing the phobic patient to the actual stimuli, e.g., taking the patient on the Boston Shuttle from LaGuardia to Logan airport after teaching relaxation and breathing strategies. This can be quite expensive, time consuming, and not always practical. Furthermore, it can be dangerous if not handled properly.

As an example of what can happen to an otherwise rational person, a successful attorney reported the following scenario, which led to her referral and subsequent treatment here at Behavioral Associates. After years of avoiding travel by air, Ms. R finally succumbed to pressure from the senior partners at her law firm to fly to California to meet with an important prospective client. It had become clear to Ms. R. that her superiors were becoming impatient with her "unwillingness" to fly and she feared being passed over for a partner position. So she entered treatment for this problem with me, here at Behavioral Associates.

Fear of flying can be broken down into several categories. Some people are afraid of the landing and takeoff only, while others fear the "trapped in" feeling they experience when the plane has been cruising during mid-flight. Others dread the turbulence. Ms. R. began her panic attack somewhere over the middle of the country when she realized she could not actually "steer" the plane. She was watching two obese women eating their lunch several rows ahead of her and began to imagine danger. She quickly walked up the aisle and implored them to move, saying, "You ladies are really fat and I'm sure you're going to tip over the plane. I want one of you to get up and sit across the aisle so we are properly balanced!" When they refused, her anxiety escalated and she ran to the door of the jet and tried to open it. She was tackled and restrained by several passengers and flight attendants and was, for the most part, quite miserable (and embarrassed) for the rest of the flight to Los Angeles. She took the train home several days later and sought treatment here in New York.

A promising compromise for treating phobias is the marriage of computerized virtual reality and computerized biofeedback. Virtual reality therapy (VRT) is a breakthrough technique that allows patients to experience and actively interact with computer-generated graphics that mimic real life situations. Airplane phobics, for example, will put on a set of special glasses with headphones that generate the three dimensional experience of actually being in a plane, going down the runway, taking off, cruising through turbulence, and landing. The technology induces a sense of deep immersion into the virtual world that is similar to hypnosis; the sense of realism is enhanced because the program invites interaction with the virtual world during the "flight," e.g., modifying the angle of looking out the window, fastening the seat belt, reading a magazine, changing stations while listening to music on the radio, etc. The patient feels as if he is actually in a plane flying! This represents a significant advance in the field of exposure therapy because the therapist has full control of the environment.

I have been experimenting with an interesting strategy of combining GSR feedback with a virtual reality training model to help phobic patients deal with fear of flying. I have divided the treatment sessions into two distinct phases that appear to be effective in reducing anxiety reduction rapidly. The first phase involves simulated exposure to the plane taking off, with the virtual reality glasses on, "experiencing" flying, turbulence,

landing -- all the experiences of an actual flight. During this time, I am monitoring GSR activity (the patient gets no GSR feedback, since this is only a dependent variable). In this phase the patient sees and hears things that closely resemble actual flight. The virtual reality experience is considered successful to the extent that the patient becomes immersed or captivated. Patients report better "immersion" when I dim the lights, close the blinds, and place a darkened hood over their heads to reduce outside light. The self reported level of immersion is generally corroborated by the GSR data.

Phase 11 involves providing visual GSR feedback (no virtual reality glasses) while the patient receives only auditory exposure to the virtual reality software. The sounds of take-off, flying, turbulence, and landing all come blasting through the computer's speakers (engine noise on the software is quite compelling). Throughout this treatment stage, the patient engages in diaphragmatic breathing designed to produce respiratory sinus arrhythmia (RSA), a benign cardiac condition associated with deep relaxation. I use a five second in, five second out diaphragmatic breathing procedure to enhance generalization.

I rotate the order of the phases throughout the treatment cycle. Thus, the audio (jet engine noise) takes on greater meaning because it has been paired, via classical conditioning, with the visual exposure that the virtual reality experience delivers. Patients are quite intrigued when I show them graphs of their raw GSR data. Furthermore, seeing objective data increases credibility from the patient's point of view: they see and learn just how truly frightened they have become, leading to increased compliance with the treatment protocol. Also, it provides an objective method to assess progress from session to session.

It is my belief that the protocol succeeds because patients are finally able to both monitor and ultimately control their physiological responses as the interactive scenario unfolds before their eyes. We have never had this luxury before, and the combining of biofeedback and virtual reality gives us these tools. In vitro and in vivo desensitization have been merged and fortified by the potential to realistically interact with the phobic environment; as GSR feedback replaces the need for Subjective Units of Distress (SUD) scales, virtual reality replaces the need for patient visualization. However, virtual reality and biofeedback treatment are still not potent enough to stand alone and to significantly offset the typical phobic response. Fortunately, in combination, they appear to strengthen each other, completing a loop that finally allows meaningful feedback and authentic counter-conditioning. Technology marches on, resting on the shoulders of Wolpe's (1958) counter-conditioning technique.

Reference: Wolpe, Joseph. Psychotherapy by reciprocal inhibition. Stanford, Calif.: Stanford University Press, 1958.

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