

Experiential Cognitive Therapy for the Treatment of Panic Disorder With Agoraphobia: Definition of a Clinical Protocol

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INTRODUCTION

THROUGH THE DEVELOPMENT of epidemiologic studies we are able to say that 3.5% of the general population suffer from panic disorder¹ with serious personal and social repercussions, such as depression, substance abuse, and suicidal tendencies.² According to the DSM-IV,³ the essential feature of panic disorder (PD) is the occurrence of panic attacks. A panic attack is a sudden onset period of intense fear or discomfort associated with at least four symptoms that include: palpitations, breathlessness, dizziness, trembling, a feeling of choking, nausea, de-realization, chest pain, and paresthesias. The panic is characterized by a cluster of physical and cognitive symptoms, which occurs unexpectedly and recurrently, such as pervasive apprehension about panic attacks; persistent worry about future attacks; worry about the perceived physical, social, or mental consequences of attacks; or major changes in behavior in response to attacks.

PD is often associated with circumscribed phobic disorders such as specific phobias, social phobias, and especially with agoraphobia.^{4,5} Agoraphobia is described separately from PD in the DSM-IV to highlight the occurrence of agoraphobic avoidance in individuals with or without a history of panic disorder.³

Agoraphobia consists of a group of fears of

public places such as going outside, using public transportation, and being in public places (i.e., supermarkets, theaters, churches, football stadiums) that causes serious interference in daily life. Other fears may spring from this core phobia (such as going through tunnels, using lifts, and crossing bridges) as well as other internal fears, such as excessive worry about physical sensations (palpitations, vertigo, and dizziness) or an intense fear of panic attacks, including fear of social interaction. The results of these psychopathological symptoms are that the patient tends to avoid the feared situation and, from then on, this avoidance carries over into other situations. Indeed, avoidance of public places in order to reduce fear or panic became the main cause of incapacity in patients, who, in more serious cases, are confined to their homes.^{6,7}

The recognition of PD as a specific syndrome was introduced by Klein.^{8,9} He disclosed that patients with recurrent panic attacks responded to imipramine but not benzodiazepines, and vice versa for anxious patients without recurrent panic attacks. His studies were particularly influential in establishing PD as a separate diagnostic entity.

In the aetiopathology of PD, Barlow¹⁰ describes the initial panic attack as a misfiring of the "fear system" under stressful life circumstances in physiologically vulnerable individu-

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als. An isolated panic attack does not necessarily lead to the development of PD, as evidenced by the scientific literature.^{1,11} The individuals who develop PD have a physiological vulnerability, a sort of anxious apprehension conceptualized by Barlow as a set of danger-laden beliefs about the symptoms of panic and about the meaning of panic attacks. After the initial panic attack, the unrealistic interpretations persist because patients engage in cognitive and behavioral strategies that are intended to prevent the feared events from occurring. As the fears are unrealistic, the main effect of these strategies is to prevent patients from disconfirming their negative beliefs. Then, as in many anxiety disorders, the symptoms of anxiety are additional sources of perceived danger, and produce a series of vicious circles that further contribute to the maintenance of the disorders.^{10,12} The words of Clark¹³ clarify the aetiopathogenetic model of PD:

Individuals who experience recurrent panic attacks do so because they have a relatively enduring tendency to interpret certain bodily sensations in a catastrophic fashion. The sensations that are misinterpreted are mainly those involved in normal anxiety responses (e.g., palpitations, breathlessness, dizziness, paresthesias) but also include some other sensations. The catastrophic misinterpretation involves perceiving these sensations as much more dangerous than they really are and, in particular, interpreting the sensations as indicative of *immediately* impending physical or mental disaster—for example, perceiving a slight feeling of breathlessness as evidence of impending cessation of breathing and consequent death, perceiving palpitations as evidence of an impending heart attack, perceiving a pulsing sensation in the forehead as evidence of a brain haemorrhage, or perceiving a shaky feeling as evidence of impending loss of control and insanity. (Clark,¹³ p. 149)

TREATMENT OF PANIC DISORDER AND AGORAPHOBIA

Many studies demonstrate the effectiveness of a multicomponent cognitive-behavioral treatment strategy for PD with agorapho-

bia.¹⁴⁻¹⁷ Clark, Salkovskis, Barlow, and other colleagues^{6,7,10,13-15} have outlined the treatment for PD with agoraphobia. The traditional protocol involves a mixture of cognitive and behavioral techniques that are intended to help patients identify and modify their dysfunctional anxiety-related thoughts, beliefs, and behaviors. Emphasis is placed on reversing the maintaining factors identified in the cognitive and behavioral patterns. The treatment protocol includes exposure to the feared situation, interoceptive exposure, cognitive restructuring, breathing retraining, and applied relaxation. On an average, the duration of the protocol is 12–15 sessions. Readers interested in a more detailed description of CBT for panic disorder and agoraphobia can consult Salkovskis and Clark,¹⁸ Mathews, Gelder, and Johnston,¹⁹ and Barlow.¹⁰

VIRTUAL REALITY IN PSYCHOTHERAPY

In psychotherapy, the virtual cyberspace offers a series of powerful and valid applications for diagnosis and treatment. The qualities that make VR software reliable and particularly useful in the practice of assessment and rehabilitation of certain psychopathological dysfunctions emerge with extreme clarity from the specialist literature.^{20,21}

VR consists of a three-dimensional interface that puts the interacting subject in a condition of active exchange with a world re-created via the computer. The possibility of not limiting the paradigm of interaction in a unidirectional sense represents the strong point of the new technology: the user is not simply an external observer of pictures or one who passively experiences the reality created by the computer but, on the contrary, may actively modify the three-dimensional world in which he or she is acting in a condition of complete sensorial immersion.²¹ The nature of this exchange means that the subject feels actually present in this new context. The feeling of “actual presence” is perhaps the peculiar characteristic of this tool.^{22,23} and is made possible both by the realistic reproduction of the cybernetic environments and by the involvement of all the sensorimotor channels during interaction.

To describe in what way the development of science and technology may favour the butressing of the therapeutic effects associated with traditional strategies of care, we introduce two elements: the cost-benefit analysis in psychotherapy and the exposure technique.²³ One of the fundamental parameters in assessing the effectiveness of therapies is the ratio existing between the "cost" of administration of the therapeutic procedure and the resulting "benefits." Cost is the expenditure not only in terms of money and time, but also in terms of emotional involvement by the person to whom the therapy is directed. The benefits regard the effectiveness of the treatment (i.e., the achievement of the target set) in the shortest time possible.

Exposure therapy traditionally is carried out "in imagination" or "in vivo." In the first case, the subject is trained to produce the anxiety-provoking stimuli through mental images; in the second case, the subject actually experiences these stimuli in semi-structured situations. Both of these methods present advantages and limitations with regard to the cost-benefit ratio. In the first case, the prevalent difficulty is represented by teaching the subject to produce the images that regard experiences associated with anxiety: the majority of failures linked to this therapy are those subjects who present particular difficulties in visualizing scenes of real life. The cost of the application, however, is minimal because the therapy is administered in the physician's office, thus avoiding situations that might be embarrassing for the patient and safeguard the patient's privacy. In the second case, the difficulty lies in structuring experiences regarding the hierarchically ordered, anxiety-provoking stimuli in reality. The cost in terms of time, money, and emotions is high. At the same time, the advantage of contending with real contexts increases the likelihood of effectiveness of the *in vivo* procedure.²⁴

In this context, the need emerges to favor the possibilities of intervention on psychological dysfunctions by overcoming the limits that render the cost-benefit ratio disadvantageous. In this framework, virtual reality technology takes its place as an experience that is able to reduce the gap between imagination and reality.^{24,25}

The prevalent elements in cognitive-behavioral therapies are that of exposing the subject to the stimuli that produce the dysfunction and of generating responses that are antagonistic to the maladaptive ones.²⁶ VR facilitates both of these processes of treatment. Using VR software, it is possible to re-create, together with the subject undergoing treatment, a hierarchy of situations corresponding to reality, which the subject may experience in an authentic way thanks to the involvement of all sensorimotor channels.²⁷ The realistic reproduction of virtual environments enables the interacting individual to be immersed in a dimension of real presence. This makes it possible to limit the costs as compared to traditional procedures of treatment, as pointed out above, and to consolidate the effectiveness of the treatment thanks to the possibility of re-creating a three-dimensional world within the walls of the clinical office.^{23,24}

EXPERIENTIAL-COGNITIVE THERAPY PROTOCOL: A MULTICOMPONENT APPROACH

The preliminary treatment protocol for Panic Disorder and Agoraphobia, named Experiential-Cognitive Therapy (ECT), was developed at the Applied Technology for Neuro-Psychology Laboratory of the Istituto Auxologico Italiano, Verbania, Italy, in cooperation with the Psychology Department of the Catholic University of Milan, Italy.²⁸ The actual version included the efforts of researchers from the Center for Advanced Multimedia Psychotherapy, California School of Professional Psychology, San Diego, CA, USA, and from the Seoul Paik Hospital, Inje University, Seoul, Korea.

The goal of ECT is to decondition fear reactions, to modify misinterpretational cognitions related to panic symptoms, and to reduce anxiety symptoms. This is possible in an average of seven sessions of treatment plus an assessment phase and booster sessions, through the integration of virtual experience and traditional techniques of CBT. We decided to employ the techniques included in the cognitive-behavioral approach because they showed high levels of efficacy. Through virtual environ-

ments, we can gradually expose the patient to a feared situation. Virtual reality allows us to re-create a real experiential world in our clinical office. The patient faces the feared stimuli in a context that is nearer to reality than imagination.²⁸

VR design and implementation

For ECT, we developed the Virtual Environments for Panic Disorder (VEPD) virtual reality system. VEPD was developed using a Thunder 600/C virtual reality system by Virtual Engineering of Milano, Italy. The Thunder 600/C is a Pentium III-based immersive VR system (600mhz, 64 mega RAM, graphic engine: Matrox G400 Dual Head, 32Mb WRam) including an HMD subsystem and a two-button joystick-type motion input device.

The display system. The Sony Glasstron PLM-A55 HMD provided the visual display. The HMD displays 800 lines of 255 pixels to each eye and uses LCD technology (two active matrix 7" color LCDs). An InterSense InterTrax 30 tracker provided head tracking. The tracker can sense azimuth, elevation, and roll with a sensitivity of 360 degrees per second. The response latency is 38 ms \pm 2 ms.

In this research we did not use a stereoscopic display. Previous researchers regard stereoscopy as important because it provides the user with good cues of depth.²⁹ However, the refresh rate of graphics decrease by 50% for the need of two different images for each eye. Consequently, we decided against implementing a stereoscopic display. To compensate for the lack of binocular cues, we included perspective cues (light and shade, relative size, textural gradient, interposition, and motion parallax) in the virtual environment.³⁰

Motion input system. The data glove-type motion input device is very common in virtual environments for its capability of sensing many degrees of freedom simultaneously. However, the operator is also frequently confused by the difficulty in correctly using it, especially when there is a time delay contained in the feedback loop).

To provide an easy way of moving in VEPD,

we used an infrared two-button joystick-type input device: the operator moves forward by pressing the upper button the operator moves backward by pressing the lower button. The direction of the movement is given by the rotation of the operator's head.

The virtual environment. VEPD is a 4-zone (see Fig. 1) virtual environment developed using the Superscape VRT 5.6 toolkit. The four zones reproduce different potentially fearful situations—an elevator, a supermarket, a subway ride, and a large square. In each zone, the characteristics of the anxiety-related experience are defined by the therapist through a setup menu. In particular, the therapist can define the length of the virtual experience, its end, and the number of virtual subjects (from none to a crowd) to be included in the zone.

- *Zone 1:* In this zone, the subject has to enter an elevator. The subject becomes acquainted with the appropriate control device, the head mounted display, and the recognition of collisions, in the elevator.
- *Zone 2:* This zone shows a supermarket in which the patient can shop. The subject can pick up objects and pay for them at the cash register.
- *Zone 3:* This zone reproduces a subway ride. The subject is located in a train that moves between different stations.
- *Zone 4:* The last zone is a large square in which a medieval church, different buildings, and a pub are located.

The clinical protocol

Subjects. Subjects will be consecutive patients seeking treatment in one of the institutions involved in the study who meet with DSM-IV criteria for PDs and agoraphobia for a minimum of 6 months as determined by an independent clinician on clinical interview. Individuals will be excluded if they are acutely suicidal, medically ill, or pregnant, have abused alcohol or drugs within the last year, or have evidence of cardiac conduction disease. Before starting the trial, the nature of the treatment will be explained to the patients and their written informed consent will be obtained.



FIG. 1. The different zones included in VEPD.

The selected subjects will be randomly divided into three groups: the ECT group that will experience the ECT treatment; the CBT group that will experience the traditional Cognitive Behavioral approach, and a no-med group. A wait-list control group matched to the other three will also be used.

Assessment. Subjects will be assessed by independent assessment clinicians who will not be involved in the direct clinical care of any subject. They will be MA-level chartered psychologists or PhD-level chartered psychotherapists. For the clinical interview, they will use a semistructured interview with the aim of identifying relevant DSM-IV diagnostic criteria in the subjects. All subjects will be assessed at pre-treatment, upon completion of the clinical trial, and after 1-month, 3-month, 6-month, 12-month, and 24-month follow-up periods. The following psychometric tests will be administered at each assessment point:

1. **BDI-II**—The Beck Depression Inventory-II (Beck, Ward, Mendelson, Mock, & Erbaugh³¹) contains 21 items that address behavioral, physical, cognitive, and affective components of depression. Each item has four choices that are scored from 0 to 3 in terms of severity.
2. **STAI**—The State-Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs³²) measures a person's situational (or state) anxiety, as well as the amount of anxiety a person generally feels most of the time (trait). The two scales contain 20 items each, which may be scored 1 (not at all) to 4 (very much so). Trait anxiety has a reliability of .81 and state of .40, with internal consistency of between .83 and .92.
3. **ACQ**—The Agoraphobic Cognitions Questionnaire (Chambless, Caputo, Bright, & Gallagher³³) consist of 15 items and evaluates cognitive changes such as the so-called *fear of fear*. The patients have to indicate with

what frequency they have negative thoughts when they are anxious, such as "I'm going to die," "I'm going to go crazy."

4. **FQ**—The Fear Questionnaire (Marks & Mathews³⁴) consists of a subscale of agoraphobia that has five items and is limited to the evaluation of motor behavior.

During the assessment the following measures will also be used: (a) subjective measurements (self reports, diaries) and (b) subjective Units of Distress (SUDs) during exposure to virtual environments. In particular SUDs will be taken at baseline, after 10 minutes and after 20 minutes. (scale is from 0 = no anxiety to 100 = maximum anxiety).

Session 1

- Description of the etiologic model according to the cognitive-behavioral approach.
- Programmation of cognitive-experiential treatment.
- Introduction to virtual environments.
- Graded exposure to virtual environments.

The first goal of session 1 is to discuss with our patient the etiologic model of PD and Agoraphobia and to describe the program of experiential-cognitive therapy. The description is necessary to obtain an active role of the patient in the therapy. Then we introduce our patient to virtual reality through the use of the HMD and joystick.

The innovative principle of ECT is to integrate cognitive and behavioral techniques with the experiential possibilities offered by virtual reality. Then, the next step of the first session is to structure the Graded Exposure procedure to virtual environments.

In imagination and *in vivo* exposure to the feared stimuli are the most effective psychological treatments available to confront avoidance behaviors in phobic disorders.³⁵ The objectives of the therapy are things that the patient fears or avoids, which create difficulty in daily life. The tasks are the concrete steps needed to reach each one of these objectives. We have developed a virtual reality software with virtual environments, reproducing a square, a supermarket, an underground sub-

way station, and an elevator, which allows the patient to face feared stimuli, providing graded exposure therapy.

The second step is to show the patient the role of avoidance as the main source of agoraphobic and panic behaviors. The therapist underlines the importance of regular exposure to feared situations and structures a self-exposure schedule with the patient. *In vivo* graded self-exposure as homework, initially with the co-therapist (when it is possible), is very important to empower the efficacy of the therapy.³⁶ This step can be more easily approached by graded exposure to virtual reality and produce important advantages for the patient: reducing the number of sessions, reducing dependency on the therapist, and helping to maintain therapeutic achievements.

According to Barlow³⁷ and Clark,¹³ exposure mainly affects avoidance, but also has a significant effect on panic symptoms and cognitive distortions. In PD, the graded exposure treatment has much wider effects and leads to improvements in fear during exposure, avoidance, physiological arousal, and catastrophic thoughts.

The long-term follow-up studies show that the improvements tend to increase with the introduction of self-exposure.³⁶ This technique stimulates the patients toward adopting a main role and attributing the success to their own efforts.

Session 2

- Breathing retraining and relaxation.
- Graded exposure to virtual environments.
- Introduction and scheduling of *in vivo* self-exposure.
- Homework: *in vivo* self-exposure with co-therapist.

Before pursuing graded exposure work, we teach breathing retraining and relaxation. A consistent percentage of panickers describe hyperventilatory symptoms as being very similar to their panic attack symptoms.³⁸ This observation stimulated the idea that hyperventilation may play an important causal role in panic attacks. In this conception, panic attacks are viewed as stress-induced respiratory changes

that provoke fear because they are perceived as frightful and augment fear elicited by other panic stimuli. Many researchers have examined the efficacy of breathing retraining that consist of training in slow and diaphragmatic breathing.³⁹

Clark and Salkovskis¹⁴ reported a larger scale study in which the panickers received two weekly sessions of breathing retraining and cognitive restructuring training. After the treatment, panic attacks were reduced markedly in that brief period of time and especially in subjects who were not significantly agoraphobic.

The goal of this step is to teach the patient a technique to control panic symptoms during exposure therapy in virtual reality and during self-exposure. The breathing exercises can be administered through the following schedule⁴⁰:

1. Stop what you are doing and sit down or, at least, concentrate on the following instructions.
2. Hold your breath without taking any deep breaths and count to 10.
3. When you get to 10, exhale and keep saying the word "calm down" in a soothing way.
4. Breathe in and out in cycles of 10-seconds (5 for inhalation and 5 for exhalation), saying the word "calm down" each time you exhale. As such, there will be 6 breathing cycles a minute.
5. At the end of each minute (after 6 breathing cycles), hold your breath again for 10 seconds. As you continue, resume the 10-second breathing cycles.
6. Continue breathing in this way until all symptoms of involuntary hyperventilation have disappeared.

Session 3

- Homework review.
- Graded exposure to virtual environments.
- Cognitive restructuring.
- Homework: in vivo self-exposure with co-therapist.

Each session starts with a review of the homework to verify the difficulties that have

emerged during self-exposure and to reinforce the patient for the tasks that have been carried out. After the graded exposure procedure, session three is based on cognitive restructuring.⁴¹ In PD, cognitive treatment focuses upon correcting misappraisal of bodily sensations as threatening. The cognitive strategies reduce attentional vigilance for symptoms of arousal, level of chronic arousal, and anticipation of the recurrence of panic.

Cognitive treatment starts by reviewing a recent panic attack with the patient and identifying the main negative thoughts associated with the panic sensations. Once the patient and the therapist agree that the panic attacks involve an interaction between bodily sensations and negative thoughts about the sensations, a variety of procedures are used to help patients challenge their misinterpretations of the symptoms.

Many patients interpret the unexpected nature of their panic attacks as an indication that they are suffering from some physical abnormality. In these cases, information and psycho-education about the nature of anxiety can be helpful, especially if it is tailored to patients' idiosyncratic concerns. One of the most useful cognitive procedures involves helping patients to understand the significance of past events that are inconsistent with their negative beliefs.

The techniques are introduced by explaining that errors in thinking occur naturally during heightened anxiety, thus preparing the client to gain an objective self-awareness and expectation that their thinking is distorted. One prevalent type of error in cognitions is overestimation. The panickers are inclined to jump to negative conclusions and treat negative events as probable when in fact they are unlikely to occur. The procedure for countering overestimation errors is to question the evidence for probability judgments. The general format is to treat thoughts as hypotheses or guesses rather than facts and to examine the evidence for predictions, while considering alternative, more realistic predictions.

Another type of cognitive error is misinterpreting events as catastrophic. Decatastrophizing means to realize that the occurrences are not as "catastrophic" as stated, which is achieved by considering how negative events

are managed versus how “bad” they are. This is best done in a Socratic style so that clients examine the content of their statements and reach alternatives.

The cognitive strategies are conducted in conjunction with the behavioral technique of graded exposure in virtual reality. The steps for cognitive restructuring are⁴¹:

1. Introducing the cognitive model of PD and Agoraphobia.
2. Individuation of NATs (negative automatic thoughts) by means of an interview and DTR (dysfunctional thought record).
3. Classification and role attribution of dysfunctional thought individuated.
4. Verbal reattribution procedures (according to Clark or Wells’ model).
5. Behavioral reattribution procedures.

Session 4

- Homework review.
- Graded exposure to virtual environments using relaxation.
- Cognitive restructuring.
- Homework: *in vivo* self-exposure with co-therapist.

The schedule of session four is the same as session three. The first part is dedicated to graded exposure. The second part is dedicated to the careful inquiry of cognitive distortions and their modification.

Session 5

- Homework review.
- Interoceptive exposure.
- Graded exposure to virtual environments using relaxation.
- Homework: *in vivo* self-exposure.

The key feature of session five is Interoceptive Exposure.^{10,37} The theoretical basis for interoceptive exposure is one of fear extinction, given the conceptualization of panic attacks as “conditioned” alarm reactions to particular bodily cues. Because PD is considered a “phobia of internal bodily cues” according to the cognitive model, the purpose is to modify associations between specific bodily sensations and panic reactions.

According to the cognitive-behavioral models of Clark⁴² and Barlow,³⁷ the most important therapeutic focus consists, in the first place, of inducing panic-like sensations by means of voluntary hyperventilation, cardiovascular exercise or spinning in a chair. The second most important focus is in demonstrating mistaken beliefs about the catastrophic results of such symptoms by Socratic methods and other techniques used in cognitive therapy. The third most important focus is in encouraging the patient to follow through with planned behaviors to test their previous beliefs along with reinforcing more realistic thought systems related to the symptoms.

This technique can be used also during exposure to the virtual environments. After the induction of panic-like sensations, the patient can use breathing retraining and relaxation to control symptoms.

The controlled study and follow-up of cognitive-behavioral treatments for PD demonstrates the effectiveness of interoceptive exposure procedures in the short-term and long-term. The essential steps of interoceptive exposure are: (a) Ask patient to hyperventilate for 1 minute to induce panic-like sensations; (b) Demonstrate mistaken beliefs about the catastrophic results of panic sensation; and (c) Repeat the exercise after a few minutes for the patient to obtain a desensitization to internal bodily cues.

Session 6

- Homework review.
- Cognitive restructuring
- Graded exposure to virtual environments using relaxation.

The session consists of cognitive restructuring and graded exposure with breathing exercises to strengthen the results.

Session 7

- Homework review.
- Cognitive restructuring.
- Prevention relapse.
- Booster sessions schedule.

After cognitive restructuring, prevention of relapse is an important step in the last session.

In this session, we have to schedule the homework of self-exposure, the Booster sessions, and to reinforce the patient for the tasks that have been carried out and for the future tasks.

Booster sessions

- Follow-up after 1 month, 3 months, and 6 months
- Review and reinforcement of patient's tasks
- Management and prevention of future relapse

The number of booster sessions can be scheduled according to the results of the patients. In our experience, three sessions after 1, 3, and 6 months is an appropriate number to complete therapy. The objective of booster sessions is to verify the difficulties that have emerged and to reinforce the patient for the tasks that have been carried out. During this phase, it is possible to repeat some steps of the therapeutic techniques to improve or to stabilize the results of treatment.

CONCLUSION

The possibilities offered in this framework by virtual technology are numerous and all extremely advantageous. The administration, guided by the therapist, of scenes in VR that favor the induction of a relaxation response have shown extremely positive results. This is primarily due to the intrinsic effects of the VR tool. The feeling of actual presence offered by the realistic reproduction of cybernetic environments and the involvement of all the sensorimotor channels enables the subject undergoing treatment to "live" the virtual experience in a more vivid and realistic manner than could be attained through imagination.²³

VR constitutes a highly flexible tool that makes it possible to program an enormous variety of procedures of intervention on psychological distress. The possibility of structuring a large amount of controlled stimuli and, at the same time, of monitoring the possible responses generated by the user of the program offers a considerable increase in the likelihood

of therapeutic effectiveness, as compared to traditional procedures.

This innovative tool produces a change with respect to the traditional relationship between client and therapist. The new configuration of this relationship is based on the awareness of being more skilled in the difficult operations in recovery of past experiences through the memory and in foreseeing future experiences through the imagination. The therapist who knows this valid tool and knows that it can be used as an advantage in therapeutic practice feels more powerful and capable of intervening in a more incisive manner on the course of the distress of his client. At the same time, the subject undergoing treatment perceives the advantage of being able to re-create and use a real experiential world within the walls of the clinical office of his or her own therapist.^{24,28}

VR-assisted therapy, therefore, offers a strong impulse to the development of new possibilities of prevention and care of psychological health. Through VR it is possible to reduce serious and careful experimentation. And it will be possible to enjoy the numerous advantages offered by immersive VR and by technological development.

REFERENCES

1. Kessler, R.C., McGonagle, K.A., Zhao, S., Nelson, C.B., Hughes, M., Eshleman, S., Wittchen, H.U., & Kendler, K.S. (1994). Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States. *Archives of General Psychiatry* 51:8-19.
2. Markowitz, J.S., Weissman, M.M., Ouellette, R., Lish, J.D., & Klerman, G.L. (1989). Quality of life in panic disorder. *Archives of General Psychiatry* 46:984-992.
3. APA. (1994). *Diagnostic and statistical manual of mental disorders*, 4th edition (DSM-IV). Washington, DC: Author.
4. Goisman, R.M., Warshaw, M.G., Peterson, L.G., Rogers, M.P., Cuneo, P., Hunt, M.F., Tomlin-Albanese, J.M., Kazim, A., Gollan, J.K., Epstein-Kaye, T., Reich, J.H., & Keller, M.B. (1994). Panic, agoraphobia, and panic disorder with agoraphobia: Data from a multi-center anxiety disorders study. *Journal of Nervous and Mental Disease* 182(2):72-79.
5. Sanderson, W.S., Di Nardo, P.A., Rapee, R.M., & Barlow, D.H. (1990). Syndrome co morbidity in patients diagnosed with a DSM-III-Revised anxiety disorder. *Journal of Abnormal Psychology* 99:308-312.
6. Barlow, D.H., & Mavissakalian, M. (1981). Directions

- in the assessment and treatment of phobia: The next decade. In Mavissakallan, M., & Barlow, D.H. (eds.) *Phobia: Psychological and pharmacological treatment*. New York: Guilford Press.
7. Chambless, D.L., & Goldstein, A.J. (1983). *Agoraphobia: Multiple perspectives on theory and treatment*. New York: Wiley.
 8. Klein, D.F. (1964). Delineation of two-drug responsive anxiety syndromes. *Psychopharmacologia* 5:397-408.
 9. Klein, D.F. (1967). Importance of psychiatric diagnosis in prediction of clinical drug effects. *Archives of General Psychiatry* 16:118-126.
 10. Barlow, D.H. (1988). *Anxiety and its disorders: The nature and treatment of anxiety and panic*. New York: Guilford Press.
 11. Telch, M.J., Lucas, J.A., & Nelson, P. (1989). Non-clinical panic in college students: An investigation of prevalence and symptomatology. *Journal of Abnormal Psychology* 98:300-306.
 12. Barlow, D.H., & Craske, M.G. (1994). *Mastery of your anxiety and panic II*. San Antonio, TX: Harcourt Brace & Co.
 13. Clark, D.M., Salkovskis, P., Gelder, M., Koehler, C., Martin, M., Anastasiades, P., Hackmann, A., Middleton, H., & Jeavons, A. (1988). Tests of a cognitive theory of panic. In Hand I., & Wittchen, H. (eds.) *Panic and phobias II*. Berlin: Springer-Verlag.
 14. Clark, D., Salkovskis, P., & Chalkley, A. (1985). Respiratory control as a treatment for panic attacks. *Journal of Behavior Therapy and Experimental Psychiatry* 16:23-30.
 15. Clark, D.M., Salkovskis, P., Hackmann, A., Middleton, H., Anastasiades, P., & Gelder, M. (1994). A comparison of cognitive therapy, applied relaxation, and imipramine in the treatment of panic disorder. *British Journal of Clinical Psychology* 164:759-769.
 16. Gitlin, B., Martin, M., Shear, K., Frances, A., Ball, G., & Josephson, S. (1985). Behavior therapy for panic disorder. *Journal of Nervous and Mental Disease* 173:742-743.
 17. Shear, M.K., Ball, G., Fitzpatrick, M., Josephson, S., Klosko, J., & Francis, A. (1991). Cognitive-behavioral therapy for panic: An open study. *Journal of Nervous and Mental Disease* 179:467-471.
 18. Saikovskis, P., Clark, D., & Hackmann, A. (1991). Treatment of panic attacks using cognitive therapy without exposure or breaching retraining. *Behaviour Research and Therapy* 29:161-166.
 19. Mathews, A.M., Gelder, M.G., & Johnston, D.W. (1981). *Agoraphobia. Nature and treatment*. New York: Guilford Press.
 20. Glantz, K., Durlach, N.I., Barnett, R.C., & Aviles, W.A. (1997). Virtual reality (VR) and psychotherapy. Opportunities and challenges. *Presence* 6:87-105.
 21. Riva, G. (1997). Virtual reality as assessment tool in psychology. In Riva G, (ed.) *Virtual reality in neuropsychophysiology: Cognitive, clinical and methodological issues in assessment and rehabilitation*. Amsterdam: IOS Press, pp. 95-112.
 22. Riva, G., & Galimberti, C. (1997). The psychology of cyberspace: A socio-cognitive framework to computer mediated communication. *New Ideas in Psychology* 15:141-158.
 23. Vincelli, F., & Molinari, E. (1998). Virtual reality and imaginative techniques in clinical psychology. In Riva, G., Wiederhold, B.K., & Molinari, E. (eds.) *Virtual environments in clinical psychology and neuroscience*. Amsterdam: IOS Press.
 24. Vincelli, F. (1999). From imagination to virtual reality: The future of Clinical Psychology. *CyberPsychology & Behavior* 2(3):241-248.
 25. North, M.M., North, S.M., & Coble, J.R. (1997). Virtual reality therapy for fear of flying. *American Journal of Psychiatry* 154:130.
 26. Rothbaum, B.O., Hodges, L., & Kooper, R. (1997). Virtual reality exposure therapy. *J Psychother Pract Res* 6:219-226.
 27. North, M.M., North, S.M., & Coble, J.R. (1996). Effectiveness of virtual environment desensitization in the treatment of agoraphobia. *Presence* 5:127-132.
 28. Vincelli, F., Riva, G. (2000). Experiential cognitive therapy for the treatment of panic disorders with agoraphobia. *MMVR 2000, Medicine Meets Virtual Reality Conference*. January 27-30.
 29. Barham, P.T., McAllister, D.F. (1991). A comparison of stereoscopic cursors for the interactive manipulation of B-splines. Presented at Stereoscopic Display and Applications II.
 30. Dolocek, Q.E. (1994). Computer-generated stereoscopic displays, *John Hopkins APL Technical Digest*, 15:137-142.
 31. Beck, A.T., Ward, C.H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry* 4:561-571.
 32. Spielberger, C.D., Gorsuch, R.L., Lushene, R., Vagg, P.R., & Jacobs, G.A. (1983). *Manual for the Stait. Trait Anxiety Inventory*. Palo Alto, CA: Consulting Psychology Press.
 33. Chambless, D.L., Caputo, G.S., Bright, P., & Gallagher, R. (1984). Assessment of fear of fear on agoraphobics. The Bodily Sensation Questionnaire and the Agoraphobic Cognitions Questionnaire. *Journal of Consulting and Clinical Psychology* 52:1090-1097.
 34. Marks, I.M., & Mathews, A.M. (1979). Brief standard self-rating for phobic patients. *Behavior Research and Therapy* 17:263-267.
 35. Marshall, W.L., & Segal, Z. (1988). Behavior therapy. In Last, C.G., & M. Hersen, M. (eds.) *Handbook of anxiety disorders*. New York: Pergamon Press, pp. 338-361.
 36. Marks, I.M. (1987). *Fears, phobias, and rituals*. New York: Oxford University Press.
 37. Barlow, D.H., Craske, M.G., Cerny, J.A., & Klosko, J.S. (1989). Behavioral treatment of panic disorder. *Behavior Therapy*, 20:261-282.
 38. Holt, P., & Andrews, G. (1989). Hyperventilation and anxiety in panic disorder, agoraphobia, and generalized anxiety disorder. *Behaviour Research and Therapy* 27:453.
 39. Ley, R. (1991). The efficacy of breathing retraining and the centrality of hyperventilation in panic disorder: A

- reinterpretation of experimental findings. *Behavior Research and Therapy*, 29:301–304.
40. Echeburua, E., & Corral, P. (1995). Agorafobia. In Caballo, V.E., G. Buela-Casal, G., and Carrobes, J.A. (eds.) *Manual de psicopatología y trastornos psiquiátricos*, Vol. 1. Madrid: Siglo XXI.
41. Wells, A. (1997). *Cognitive therapy of anxiety disorders. A practice manual and conceptual guide*. New York: John Wiley & Sons.
42. Clark, D.M. (1989). Anxiety states. Panic and generalized anxiety. In Hawton, K., Salkovskis, P.M., Kirk, J., & Clark, D.M. (eds.) *Cognitive behaviour therapy for*

Psychiatric problems. A practical guide. Oxford: Oxford Medical Publications.

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