

# The Application of Virtual Reality in Panic Disorder & Agoraphobia

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## Background

The origins of VR

The Ultimate Display

"The screen is a window through which one sees a virtual world. The challenge is to make that world look real, act real, sound real, feel real." (Sutherland, 1965)

The challenge means offering Presence simulation to users as an interface metaphor to a synthesized world.

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## Background

•In November 1992, one of co-researchers in a virtual reality experiment called "flying carpet" experienced symptoms like phobia. (North & North 1994)

•In 1993, while protecting the discovery as the intellectual property of Clark Atlanta University(CAU), CAU discovery was shared with GVD Center of Georgia Institute of Technology and the Psychiatric Division of the U.S. Army.

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## Exposure Therapy

Must expose the patient to the object/situation they fear

‡ In vivo

‡ Numerous studies have shown that VRE therapy "works"

‡ Virtual Reality Exposure

‡ How effective is VRE compared to standard exposure?

‡ Imaginal

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## Applying VR in Mental Health

### Acrophobia Experiment

- 1<sup>st</sup> case 10 college students with fear of heights, random assignment to VRT, individual, 8 sessions, significant differences compared with waiting list (Williford et al. 1993; Williford & North 1995; Rothbaum et al. 1995).
- 2<sup>nd</sup> case A subject with acrophobic situations, 8 sessions, successful result (North & North 1996).
- 3<sup>rd</sup> case: 60-old married man, 40 years of agoraphobic history, Height phobia simulator, 6 sessions, successful (Choi et al. 2001)

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## Applying VR in Mental Health

### Fear of Flying Experiments

- 1<sup>st</sup> case: 32-old married woman researcher, navigation software, 8 sessions (each last 30 minutes) successful (North & North 1994)
- 2<sup>nd</sup> case: 42-old married man researcher, navigation software (helicopter), 5 sessions, successful (North et al. 1996, 1997)
- present: many material and good outcomes, effectiveness is maintained on Twelve-month follow-up (Rothbaum et al. 2002)

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***Applying VR in Mental Health***

panic disorders and agoraphobia Experiment(1)

- Both CBT and ExCT(Experiential Cognitive Therapy) could significantly reduce the number of panic attacks, the level of depression and both state and trait anxiety. However, ExCT (8 sessions) procured these results using 33% fewer sessions than CBT(12 sessions). This datum suggests that ECT could be better than CBT in relation to the "cost of administration," justifying the added use of VR equipment in the treatment of panic disorders with agoraphobia (Vincelli F 2003).

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***Applying VR in Mental Health***

Panic disorders and agoraphobia Experiment(2)

- 20 subjects (4 sessions of ExCT group) showed similar improvements in every screening tools with 20 subjects (12 sessions of PCP). (Choi, 2003)

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***Applying VR in Mental Health***

panic disorders and agoraphobia Experiment(3)

- 30 subjects(VRT group) showed more decreased average SUD ratings steadily across sessions than 30 controls(no therapy).
- Comparison of a CBT program including VR for the exposure component with a standard CBT including in vivo exposure and with a waiting list control..... VR for the treatment of panic disorders and agoraphobia is effective (Botella C et al.2004)

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## What is the Underlying Mechanism?

Many opinions

- Exposure technique via visual and auditory senses
- Neurophysiological information processing theory
- Accelerated integrative information processing paradigm
- Only Assistant tool helping to psychotherapy?

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## 가상현실 정신치료 센터 (1)

- 1998 인제대 신경정신과 최영익 교수팀과 한양대학교 의용공학과 교실과 공동 작업 시작.
- 2000 “가상현실을 이용한 정신치료” 기술로 국가 지정 연구소(NRL) 지정됨.
- 2002년 (주) 마인드텍 설립
- 운전 시뮬레이터, 앰비블레이터 시뮬레이터, 고소공포증 시뮬레이터, 발포 시뮬레이터를 개발하여 치료에 사용 중이고, 비행 시뮬레이터, 지하철 시뮬레이터 개발 중.

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## 가상현실 정신치료 센터 (2)

- 총 20편의 VRT 관련 논문을 발표(SCI급 저널 12편 포함)
- “가상현실 기술을 이용한 정신치료 방법 및 시스템”이라는 제목으로 국내 특허와 국제 특허를 출원
- 2001 이탈리아의 Giuseppe Riva, 미국의 Brenda Wiederhold와 공동으로 광장공포증을 동반한 공황장애 환자의 치료에 VR을 적용하여 치료 기간을 단축시키고 효과를 증대 시키는 연구 진행중

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## The Short-term Treatment of Acrophobia with Virtual Reality Therapy(VRT) : A Case Report

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13

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### Results (1)

Questionnaire	Pre-treatment	Post-treatment
1. Anxiety Sensitivity Index	0.56	0.13
2. Agoraphobic Cognition Questionnaire	1.64	1.29
3. Body Sensation Questionnaire	1.59	1.53
4. Fear Questionnaire	2.87	1.47
5. Acrophobia Questionnaire	3.20	1.85
6. Attitudes Towards Heights Questionnaire	71.67	10.00

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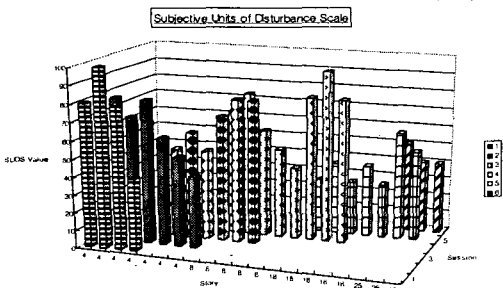
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### Results (6)




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**EXPERIENTIAL COGNITIVE THERAPY  
FOR THE TREATMENT OF PANIC  
DISORDERS WITH AGORAPHOBIA:  
DEFINITION OF A CLINICAL PROTOCOL**

**F. Vincelli<sup>1,2</sup>, M.S.; Y.H. Choi<sup>3</sup>, M.D.; E. Molinari<sup>2</sup>,  
Ph.D.; B. Wiederhold<sup>4</sup>, Ph.D.; G. Riva<sup>1,2</sup>, Ph.D.**

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<sup>3</sup>Seoul Paik Hospital, Inje University, Seoul, South Korea

<sup>4</sup>Center for Advanced Multimedia Psychotherapy, CSPP Research and Service Foundation, San Diego, California

16

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**The Development and the Effects  
of Experiential Cognitive Therapy  
for the Treatment of Panic  
Disorder with Agoraphobia**

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**Table 1. Demographic data**

variable	ExCT	PCP	
age (yr)	35.97 (7.54)	36.65 (9.19)	
sex (M/F)	11 / 9	9 / 11	
education (yr)	15.11 ( 1.99)	14.60 ( 2.06)	
onset (mon)	30.40 ( 8.91)	31.95 ( 8.22)	
duration (mon)	62.50 (46.68)	57.20 (65.02)	
occupation	housewife	8	3
	student	1	0
	mental labor	7	6
	physical labor	0	1
	own business	2	3
	expert	0	4
	jobless	1	2
	ect.	1	1

18

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## Virtual Airplane



- ⌘ Subject wears Head-mounted Display
  - Position Tracker
  - Covers Entire Field of View
  - Hears only audio from earphones (including therapist).
- ⌘ Simulates
  - Sitting in plane on runway, engine on/off
  - Taxi
  - Takeoff
  - Flight in good weather
  - Flight in bad weather
  - Landing
- ⌘ Sits in Thunderseat

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Table 2. Improvement after ExCT

	Pre-ExCT	Post-ExCT	t-test
STAI-S	65.11 ( 8.32)	36.89 (18.22)	5.34***
STAI-T	61.82 ( 7.76)	48.24 ( 5.95)	5.71***
ASI	31.47 (10.68)	19.16 (11.52)	3.94**
BDI	20.68 ( 9.21)	11.16 ( 8.31)	4.66***
PBQ	156.61 (36.68)	106.78 (37.45)	4.79***
ACQ	37.56 (13.99)	27.89 ( 9.75)	3.10**
BSQ	52.37 (14.78)	38.26 (11.67)	4.43***
FEAR	58.10 (30.67)	35.00 (23.73)	2.24**

\*\* p < .01. \*\*\* p < .001

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Table 3. Improvement after PCP

	Pre-PCP	Post-PCP	t-test
STAI-S	61.42 (11.04)	42.42 ( 8.66)	6.37***
STAI-T	61.84 (10.12)	46.37 (10.81)	5.77***
ASI	36.85 (10.81)	15.65 (11.38)	6.40***
BDI	24.80 (11.09)	10.25 ( 8.08)	5.78***
PBQ	159.79 (21.93)	90.79 (29.41)	9.55***
ACQ	38.50 (11.39)	22.35 ( 6.86)	5.12***
BSQ	55.95 (18.44)	34.63 ( 7.83)	5.38***
FEAR	53.47 (21.15)	23.05 (14.76)	5.49***

\*\*\* p < .001

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## Safety Issues (2)

### Aftereffects

**원인:**

이는 사용자가 가상 환경에서의 감각/운동 요구에 적응하려고 하다가 가상 환경에서 벗어나서 현실에 재적응하는 과정에서 일어나는 지연 현상과 연관된 분일지 때문에 일어나는 것으로 생각된다.

**증상:**

운동 장애, 자세 조절의 변화, 지각-운동 장애, 틱래쉬-백, 몽롱함, 피로감 그리고 일반적으로 저하된 각성 상태 등

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