Inducing, changing, training and investigating moods and emotions via Virtual Reality

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VR and Clinical Psychology

- VR has shown to be a useful tool for the treatment of the psychological disorders (mainly anxiety disorders)

- Initially VR has been oriented to facilitate the exposure technique.

- More than 100 studies have shown the effectiveness of VR treatments compared with no treatment, standard treatments, and “in vivo” exposure.

- But VR has more potentialities in Clinical Psychology

- In several studies we have proved that VR could be an efficacious MIP, being able to induce different moods in users (sadness, joy, anxiety, and relaxation) (Baños et al., 2004, 2006, 2008, 2012).
What is a MIP?

• *Set of procedures that try to induce emotional changes in experimental subjects, in a controlled way, manipulating several variables in the lab.*

- Specific and transitory mood
- Non-natural situation
- Analogue of natural
- Broad utility
Why are MIPs useful?

- Research on emotions
- Uses in psychological treatments (p.e., relaxation)
- To promote wellbeing
• Results from **Positive Psychology** studies have shown that **positive emotions** not only induce people to feel good, but also promote people being more creative, integrative and flexible, open to information, more resilient, etc.

• Fredickson have found that positive emotions increase psychological resilience and are related to a broadened pattern of thinking, broadening the possible responses range, and undoing the cardiovascular repercussions of negative emotions. (Fredickson, 2003; Fredickson & Levenson, 1998; Fredickson & Joiner, 2002)

• These studies have studied the effects of positive emotions using mood induction procedures (MIP).
Types of MIPs

- Velten Self-statements
- Music
- Auto-biographical recall
- Films
- Hypnotic suggestion
- Drugs
- Imaginary

- Facial Expressions
- Social Feedback and Performance feedback
- Empathy
- Threatening
- Gifts
- Combination of 2 or +
MIPs: Some problems

- **EFICACY / SUCCESS RATE**
  - Variable (15%-100%)
  - Depend on mood: as a whole, negative better

- **INTENSITY OF INDUCED MOOD**
  - Most problematic issue: effects duration

- **RANGE OF INDUCED MOODS**
  - Some of them only useful for 1 mood
  - Only hypnosis is useful for all moods, but problems with its applicability
MIPs: Could VR be useful?

- Increasing ecological validity
  - Controlled induction in a “real” environment
- Inducing a broad range of moods
- Not only inducing, but also changing induced mood: potential uses for therapy.
OBJECTIVES OF THIS PRESENTATION

– To present several VR-MIPs developed by our team

– To summarize some studies testing the efficacy of VR-MIPs to induce, change, and training moods
EMMA Parks

The context is a Park in a city

• It contains 5 VEs: sadness, joy, anxiety, relaxation and neutral.
• Protocols are completely self-applied.
• Multimedia elements
  – music,
  – narratives,
  – Velten self-statements (Velten, 1968)
  – Pictures (selected from International Affective Picture System IAPS, Lang, Bradley, & Cuthbert, 1995),
  – movies,
  – autobiographical recalls.
VR- Mood Induction Procedure (VR-MIP)

Virtual Environment

1. Neutral environment that changes progressively depending on the mood state to be evoked in the user.
2. The virtual experience starts with a narrative, users listen to a short story according to the emotional condition.
3. Then, they are asked to go to the centre of the park, where there is a banstand.
4. In five of the sides of the stand, a statement of the Velten technique appears in a disordered manner and they have to order it.
5. For each sentence, users have to represent a picture out of four options (from International Affective Picture System (IAPS) Lang, et al, 2001)
6. After that, users are asked to go to the cinema to watch a short film. (Joy: “Singing under rain”; Relax: “Out of Africa”)
PEOPLE LIKE ME
LIFE SEEMS SAD AND MEANINGLESS TO ME
Participants are asked to tell aloud a personal event in their life related to emotional information given in the virtual walk.
OBJECTIVE

• To present 3 studies
  – 1: efficacy of VR-MIP to induce moods in general population.
  – 2: efficacy of VR-MIP to change a negative mood experimentally induced.
  – 3: efficacy of VR-MIP to induce joy in population with depressive symptomatology, using repeatedly MIPs in several sessions.
ESTUDY 1

Objective
• Test the efficacy to induce several moods (sadness, joy, anxiety, relax)

Participants
- 210 Volunteers (University students) :
  - UV
  - UPV
  - UJI
- Age: 18-45 (X= 23,84, SD= 4,86)
- Gender: 36,4% men; 63,6% women
Mood Measurement

• **Visual Analogic Scale (VAS):**
  – A 7 points Likert Scale
  – to rate how you feel the following emotions:
    • Sadness
    • Joy
    • Anxiety
    • Relaxation

Not feeling the emotion at all           Feeling the emotion extremely
Mean ratings

Sad group: VAS scores
Mean ratings

Joy group: VAS scores

- Joy
- Sadness
- Anxiety
- Relax

before
after
Mean ratings

Anxiety group: VAS scores
Mean ratings

Relax group: Before and after VAS scores mean ratings

![Graph showing mean ratings for Joy, Sadness, Anxiety, and Relax before and after relaxation](image)
Mean ratings

Neutral group: Before and after VAS scores mean ratings
STUDY 2

Objective
– to test the efficacy of a VR-MIP to change an induce negative mood into an induce positive mood.

Participants
– 135 volunteers from 3 universities (UV, UPV, UJI)
MOOD MEASUREMENTS

- VISUAL ANOLOGUE SCALES (VAS)
  pre- post- induction (0-10)
  - Happiness
  - Sadness
  - Anxiety
  - Relax

- PANAS (Positive and Negative Affect Scale)
  (Watson, Clark & Tellegen, 1988). pre- post- induction
PROCEDURE

- Reception and general instructions
- VR Training
- Pre-Assessment
- MIP-VR
- Post-Assessment
- Break (30 minutes)
- Pre-Assessment
- MIP-VR
-- Post-Assessment

Only “Sad group”
RESULTS

1st & 2nd INDUCTION COMPARISONS
SAD-HAPPY GROUP. VAS SCORES

1-pre 1-post 2-pre 2-post

[Graph showing VAS scores for happy, sad, anxious, and relax conditions before and after induction.]
RESULTS

1st & 2nd INDUCTION COMPARISONS
SAD-HAPPY GROUP. PANAS SCORES

- POSITIVE
- NEGATIVE
STUDY 3

Objective

• To test the influence of repeated positive mood inductions on life satisfaction in people with subclinical levels of anxiety and depression.

Participants

• 312 university volunteers were screened using BDI and STAI-T.
  • *Beck Depression Inventory* (BDI).
  • *State Trait Anxiety Inventory* (STAI) used only the Trait Subscale
• Participants with BDI scores $\geq 14$ were included in the joy induction
• Participants scoring STAI-T $\geq 24$ (for man percentile 70) or STAI-T $\geq 30$ (for woman percentile 70) were included in the relax induction.
• Finally, 15 university volunteers have been included in the experiment.
• Measures: Pre and Post MIP:
  – *Beck Depression Inventory* (BDI).
  – *State Trait Anxiety Inventory* (STAI)
• *Positive Affect and Negative Affect Schedule* (PANAS): is a list of 10 positive moods and 10 negative moods
• *Satisfaction With Life Scale* (SWLS). 5-item instrument designed to measure global life satisfaction.
• *Life Orientation Test* (LOT). 6 items to assess generalized optimism (3 items) versus pessimism (3 items)
• *State Cheerfulness Inventory* (STCI-18). 18 items too assess cheerfulness, seriousness, and bad mood states.
• *Visual analogue scales* (VAS) 0 to 10-point Likert Scales to assess sadness, joy, anxiety, and relaxation
• **Procedure**

  - P’s were volunteers University students.
  - All P’s completed the STAI-T and BDI at University classes.
  - P’s scoring above the subclinical STAI or BDI scores were invited to participate in an experiment.
  - P’s scoring high in BDI scores were assigned to the joy-induction, and P’s scoring high in STAI were assigned to the relax-induction.
  - P’s were tested individually.
  - P’s were told that the experiment implies coming to the laboratory for a period of 30-40 minutes during 3 sessions separated by 2-3 days.
• **Procedure**

  • Experimental session begun with P` s completing the pre-induction emotion and well being measures.
  • Then, a brief training session with an experimenter (only 1s session)
  • P` s were left alone in the room, and the virtual session started.
  • MIP took about 20 minutes aprox.
  • Finally, P` s completed the emotion and well being questions.
  • The same procedure was followed 2 more times during a period of 7-9 days.
RESULTS
BDI pre-post along sessions

![Diagram showing pre-post BDI scores for sessions S1, S2, and S3. The scores decrease from pre to post for each session.]

0 2 4 6 8 10 12 14 16 18
PRE POST PRE POST PRE POST
RESULTS

STAI pre-post along sessions
RESULTS
PANAS pre-post along sessions

PANAS - NEGATIVE

PANAS - POSITIVE

PRE POST PRE POST PRE POST

S1 S2 S3

JOY RELAX

PRE POST PRE POST PRE POST

S1 S2 S3

JOY RELAX
RESULTS

VAS pre-post along sessions

VAS - HAPPY

VAS - RELAX

VAS - SAD

VAS - ANXIETY
RESULTS
Satisfaction With Life (SWL) pre-post along sessions

![Graph showing the Satisfaction With Life (SWL) pre-post along sessions for three sessions S1, S2, and S3. The graph compares ALEGRE and RELAX groups with data points plotted for each session's pre and post values.]
RESULTS
Life Orientation Test (LOT) pre-post along sessions

LOT-R

S1 S2 S3

PRE POST PRE POST PRE POST

ALEGRE RELAX
RESULTS
State Cheerfulness Inventory (STCI) pre-post along sessions

STCI - HAPPINESS

STCI - BAD TEMPER

STCI - SERIOUSNESS

JOY-H

JOY-Bs

RELAH-Bs

JOY-S

RELAH-S
CONCLUSIONS

- MIP-VR is an efficacious procedure to induce different moods
- MIP-VR: is able to CHANGE the induced mood
- 2nd time even better, but...
- MIP- VR: is able to induce moods in people without psychological problems

• The consecutive MIPs keep anxiety reduction and improve joy mood along sessions in people with subclinical scores

• Thus, and according to Fredickson and others, the mood induction allows to increase the participants’ satisfaction and a happy and optimistic state, as well as to decrease their bad temper.
2 Virtual environments to induce positive mood: Relaxation and Joy

Therapeutic benefits

“Going to a relaxing place”
“Going to a joyful place”

They allow to induce positive mood states (relax, joy)

The individual can learn useful techniques to reduce negative emotional mood states (relaxation, mindfulness…)
Virtual Reality Environment
How have we used MIPs? By the moment...

• Pain reduction in fibromyalgia
• Improving mood in elderly
• Improving mood in cancer inpatients
• Improving mood in adjustment disorders
• Improving moods in people in deprivation situations (“Mars 500”)
• ...
EARTH (Emotional Activities Related To Health using VR)

What is E.A.R.T.H.?

• A system with self-applied modules focused on positive mood induction, and psychological well-being and resilience.

• EARTH includes 3 self-applied modules:
  – Park of Wellbeing
  – Wellbeing through nature
  – The book of life
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