Design and Evaluation of a Virtual Environment for the Treatment of Anger

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Overview

1. Anger and Treatment
2. Design
3. Experiment
4. Conclusions and final remarks
1.

Anger and Treatment
• Anger disorder is not recognised by Diagnostic and Statistical Manual of mental disorders (DSM-IV-TR)

• Anger is observed in various other disorders

• Treatment for maladaptive anger are: cognitive behavioural therapy, exposure, psychodynamic, psycho-educational, relaxation-based, skill-based, stress inoculation, and multicomponent
Phases in Stress Inoculation Training (SIT)

1. Conceptual educational phase
2. Skill acquisition and skill consolidation phase
3. Application and follow-through phase

Patient rehearse their skills in vivo or vitro
Problems with vivo
• difficult to control
• difficult to organise

Potential solution exposure in virtual reality, as has been done for fear of flying, fear of heights, or social phobia
Collaboration with De Fjord, a Dutch mental health clinic for adolescents

Both in and outdoor patients
Design
### Mental Health Computing Research Model (Brinkman, 2011)

<table>
<thead>
<tr>
<th>Technology element</th>
<th>Technology Intervention</th>
<th>Clinical effect</th>
<th>Field use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus on effect of technology components that affect the interactions with a user</td>
<td>Focus on establishing usable technological health intervention</td>
<td>Focus on efficacy of treatment with technology intervention</td>
<td>Focus on daily practice on technology intervention</td>
</tr>
<tr>
<td>Methods include, for example, lab studies, often with non-patients</td>
<td>Methods include both design activities and, for example, usability studies, often with non-patients, but also with therapists</td>
<td>Methods include case studies and randomized controlled trials with patients</td>
<td>Methods include field observations, or surveys among patients and/or therapists</td>
</tr>
<tr>
<td>Strong involvement of technology-oriented researchers</td>
<td>Often multidisciplinary team</td>
<td>Strong involvement of mental health researchers</td>
<td>Involvement of clinicians</td>
</tr>
</tbody>
</table>
Situated Cognitive Engineering

(Neerincx and Lindenberg, 2008)

Phase 1:
WDS Analysis

Phase 2:
Requirements baseline

Phase 3:
Refining and validating

Diagram:
- Operational demands
- Human Factors Knowledge
- Envisioned Technology
- Core Functions
- Claims
- Scenarios (movieclips)
- Requirements baseline
- Review
- Comments
- Refine
- Prototype
- Evaluate
The Vision
Use Scenarios Analysis

(A) Self training, afterwards reflection

(B) Therapist controlled session

(C) Group sessions
Core functions

**Therapist controlled avatar response**

- Multiple social scenes
- Arousal enhancing environmental stressors
- Recording behaviour and emotional state
- Support for reflection

- Pre-scripted Dialogues
- Avatar takes initiative
- Therapist selects next sentence the avatar will speak
- Avatar response
  1. Sub-assertive (passive) reaction
  2. Assertive reaction
  3. Aggressive reaction

<assertive reaction> “Good afternoon sir, could I have a look into your bag please?”

<aggressive reaction> “Hey you! Give me your bag”
Core functions

Therapist controlled avatar response

Multiple social scenes

Arousal enhancing environmental stressors

Recording behaviour and emotional state

Support for reflection

Scenes in Clothes Shop
1. Neutral scene
2. Changing a bought item
3. Argument with other customers about the last item
4. Suspect of stealing
Core functions

Therapist controlled avatar response

Multiple social scenes

Arousal enhancing environmental stressors

Recording behaviour and emotional state

Support for reflection

Directed at copying resources

1. Volume and type of background music
   - Rock
   - Hip-hop
   - Heavy-metal
   - Classical music

2. Lighting in shop
   - Normal very bright
   - Flashing
Core functions

- Therapist controlled avatar response
- Multiple social scenes
- Arousal enhancing environmental stressors

Recording behaviour and emotional state

Support for reflection

Record behaviour avatar (indirect recording patient by mirroring strategy)

Affectbutton -> Pleasure, Arousal, Dominance state patient
Core functions

Therapist controlled avatar response

Multiple social scenes

Arousal enhancing environmental stressors

Recording behaviour and emotional state

Support for reflection
3. Experiment
Research Questions

Patient side:
Can the stressors in the virtual environment evoke stress?

<table>
<thead>
<tr>
<th>Exposure stressors (IV)</th>
<th>(DV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive</td>
<td>Stress</td>
</tr>
<tr>
<td>Aggressive</td>
<td></td>
</tr>
<tr>
<td>Aggressive &amp; environmental stressors</td>
<td></td>
</tr>
</tbody>
</table>

Therapist side:
How usable is the system for a therapist?
Methods

Participants
• 18 non-patients, 14 males, 4 females, 17-24 years
• Two patients of De Fjord clinic

Measures (patient side)
• Galvanic Skin Response (GSR)
• Simulation Sickness Questionnaire (SSQ)
• Igroup Presence Questionnaire (IPQ)
• Self-Assessment Manikin (SAM)
• Affectbutton
• Dialogue Experience Questionnaire (DEQ)

Procedures
1. SAM, SSQ
2. VR Exposure Neutral
3. VR Exposure
   • Passive dialogue
   • Aggressive dialogue
   • Aggressive dialogue + additional environmental stressors
     • SAM, IPQ, DEQ
4. SSQ

Measures (therapist side)
• Component-based usability questionnaire (CBUT)
Patient side

Some results

- (SSQ) Sign. less reported Simulation Sickness after experiment than before experiment (?)
- (IPQ) no sign. effect for exposure conditions was found on presence level
- (DEQ) no sign. overall effect for exposure conditions was found on dialogue experience
- (DEQ-Reality) sign. effect for exposure conditions on reality dimension of dialogue experience.
Avatar response

Exposure conditions

- Passive
- Assertive
- Aggressive

- non-patients
- patient A
- patient B
Therapist side

Ease of use

User interface components

Norm value
4.

Conclusions and Final Remarks
Conclusions

• The system allows individuals to engage in potential aggressive dialogues with increased their physiological arousal and evoked more aggressive replies.

• Results of the 2 patients also seem to point in this direction

• Various therapist user interface components seem easy to use
Future work

• How can this system be used effectively in anger treatment?

• More dialogues and also more physical setting

• Reduce therapist workload by using automated free speech interaction (ter Heijden and Brinkman, 2011)

• More (additional) environmental stressors, e.g. avatars with emotional expression such as facial expression and body posture
Thank you for your attention!!

Literature
