Presence, Immersion and Cybersickness Assessment through a Test Anxiety Virtual Environment

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INTRODUCTION
I'm gonna need a bigger brain.
I’m gonna need a HMD
METHOD
Sample

- Non-clinical sample
- 46 undergraduate students
- 12 men (M = 22.5; SD = 2.96 years)
- 34 women (M = 23.21; SD = 5.61 years).
Immersion, presence and cybersickness:

• The Immersive Tendencies Questionnaire – ITQ-F (Bouchard, Robillard & Renaud, 2002);

• The Presence Questionnaire – PQ-F (Bouchard et al., 2002);

• The Simulator Sickness Questionnaire SSQ-F (Robillard et al., 2003).
Test anxiety:
• Reactions to Tests Questionnaire – RT (Sarason, 1984).

Anxiety:
• State and Trait Anxiety Inventory – STAI-Y (Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983).

GSR and BPM:
• AcqKnowledge from Biopac Systems
Set-up
Exercício de Avaliação

Responda às questões abaixo, assinalando apenas uma das opções.
O teste é constituído por 20 questões. Para mudar de página
pressão a seta no fundo da página.

1. Que peças artísticas compõem uma pinacoteca?
   A. Quadros
   B. Partituras musicais

2. O que significa o nome do jornal russo “Pravda”?
   A. Povo
   B. Veridade
   C. Liberdade

3. Qual o único número primo que é par?
   A. 0
   B. 2
   C. 3
RESULTS & DISCUSSION
Comparative average and standard deviation scores for Presence, Immersion and Cybersickness.

**Studies Clinical Samples**

- **Presence**
  - $M = 102.70(9.70)$

- **Immersion**
  - $M = 88.10(11.30)$

- **Cybersickness**
  - $M = 26.10(17.70)$

**This Study**

- **Presence**
  - $M = 76.20(14.36)$

- **Immersion**
  - $M = 67.05(13.16)$

- **Cybersickness**
  - $M = 32.43(10.42)$

**Studies Non Clinical Samples**

- **Presence**
  - $M = 93.70(11.12)$

- **Immersion**
  - $M = 57.70(11.00)$

- **Cybersickness**
  - $M = 16.70(17.00)$
Differences between gender for Test, Trait and State Anxiety.

**Male**
- Test Anxiety: $M=2.00(0.42)$
- Trait Anxiety: $M=33.50(8.51)$
- State Anxiety: $M=33.16(8.31)$

**Female**
- Test Anxiety: $M=2.03(0.56)$
- Trait Anxiety: $M=39.41(8.51)$
- State Anxiety: $M=33.47(10.11)$
Differences between gender for Presence, Immersion and Cybersickness.

**Male**

Presence
M=84.50(15.65)

Immersion
M=67.45(15.61)

Cybersickness
M=28.18(6.64)

**Female**

Presence
M=72.75(12.50)

Immersion
M=66.90(12.50)

Cybersickness
M=33.84(11.13)

p < .05

p < .001
Differences between gender for Test Anxiety, Presence, Immersion, Cybersickness and Psychophysiological activation.

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
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<tbody>
<tr>
<td>Test Anxiety</td>
<td></td>
</tr>
<tr>
<td>Irrelevant Thinking (M=2.60(0.82))</td>
<td>Irrelevant Thinking (M=1.64(0.63))</td>
</tr>
<tr>
<td>Tension (M=1.95(0.58))</td>
<td>Tension (M=2.38(0.70))</td>
</tr>
<tr>
<td>p &lt; .01</td>
<td>p &lt; .01</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>Presence</td>
<td></td>
</tr>
<tr>
<td>Realism (M=32.16(7.03))</td>
<td>Realism (M=26.34(6.48))</td>
</tr>
<tr>
<td>Affordance to act (M=18.66(4.77))</td>
<td>Affordance to act (M=14.83(3.60))</td>
</tr>
<tr>
<td>Self assessment performance (M=18.83(3.54))</td>
<td>Self assessment performance (M=8.20(2.48))</td>
</tr>
<tr>
<td>p &lt; .05</td>
<td>p &lt; .05</td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td>Immersion</td>
<td></td>
</tr>
<tr>
<td>Emotions (M=11.09(3.36))</td>
<td>Emotions (M=15.36(4.37))</td>
</tr>
<tr>
<td>Games (M=10.27(3.72))</td>
<td>Games (M=7.06(2.57))</td>
</tr>
<tr>
<td>p &lt; .05</td>
<td>p &lt; .05</td>
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<tr>
<td>Physiology</td>
<td></td>
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<tr>
<td>BPM (M=72.39(9.90))</td>
<td>BPM (M=83.87(11.00))</td>
</tr>
<tr>
<td>p &lt; .01</td>
<td>p &lt; .01</td>
</tr>
</tbody>
</table>
Effect of Computer Experience groups in Psychophysiological activation.

None

BPM
M=91.10(0.00)

Basic

BPM
M=87.55(7.91)

Intermediate

BPM
M=76.43(12.48)

Specialist

BPM
M=71.58(8.67)

p < .01
Effect of Playing Computer Games on Virtual Reality variables.

- **Presence**
  - Never: $M=71.21(13.23)$
  - Occasionally: $M=74.47(18.49)$
  - Frequently: $M=84.09(13.69)$
  - Everytime: $M=85.00(0.00)$

- **Immersion**
  - Never: $M=58.46(10.61)$
  - Occasionally: $M=69.41(11.67)$
  - Frequently: $M=75.00(13.40)$
  - Everytime: $M=68.00(0.00)$

- **Cybersickness**
  - Never: $M=35.13(10.92)$
  - Occasionally: $M=31.41(11.04)$
  - Frequently: $M=31.27(8.95)$
  - Everytime: $M=22.00(0.00)$

$p < .01$
FINAL CONSIDERATIONS
Hardcore players

Man

Women

PC Exp.

No PC Exp.

No Play

Hardcore players

Immersion & presence:

Physiology:
FUTURE WORK
• Clinical populations
• Assess the relevance of playing videogames
• Understand better the causes of cybersickness
Effect of Playing Computer Games in Immersion.

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Occasionally</th>
<th>Frequently</th>
<th>Every time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus</td>
<td>M=22.56(3.32)</td>
<td>M=25.35(3.89)</td>
<td>M=26.09(4.70)</td>
<td>M=24.00(0.00)</td>
</tr>
<tr>
<td>Involvement</td>
<td>M=17.82(4.61)</td>
<td>M=21.12(4.62)</td>
<td>M=22.55(5.07)</td>
<td>M=22.00(0.00)</td>
</tr>
<tr>
<td>Emotions</td>
<td>M=12.77(3.80)</td>
<td>M=15.41(4.43)</td>
<td>M=15.09(5.50)</td>
<td>M=13.00(0.00)</td>
</tr>
<tr>
<td>Games</td>
<td>M=6.00(2.37)</td>
<td>M=7.52(2.50)</td>
<td>M=11.27(2.78)</td>
<td>M=10.00(0.00)</td>
</tr>
</tbody>
</table>

p < .001