Perceived realism has a significant impact on presence

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Context

- Several authors have examined factors that are related to a stronger feeling of presence.
  - Field of view *(Lin et al., 2002; Prothero et al., 1995)*
  - Stereoscopy *(Ijsselsteijn et al., 2001)*
  - Sound / spatialized sound *(Hendrix & Barfield, 1996)*
  - Tactile augmentation *(Hoffman et al., 1996, 1998)*

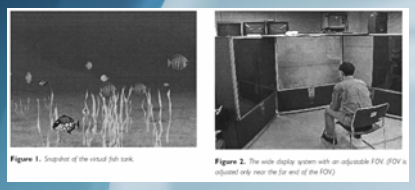
Pictorial realism, delay, interactivity.

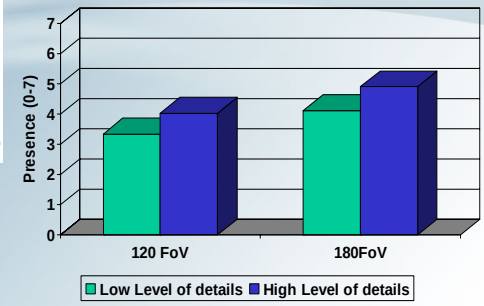
Welch et al., (1996).

- Two studies with CRT projectors and poor quality VE (by current standards). Driving simulation. University students. Repeated immersions in different experimental conditions
- Study 1 (S1):
  - Interactivity (driver/high or passenger/low)
  - Realism (low = black sky, black background, no oncoming cars, etc.)
- Study 2 (S2):
  - Delay in visual feedback (normal/200ms or 1.5 sec)
  - Realism
- There were significant differences for all three variables.
- When asked what was more important, participants chose Interactivity over Realism (S1) and Delay over Realism (S2).

FoV versus level of details

(Shim & Kim, 2004).





ANOVA

FoV:	F=6.89, $p < .01$
Lev of Det:	F=25.58, $p < .001$
FoV x LoD:	F=1.68, ns.

FoV seems more important than LoD.

N = 23 engineering students
In fact, 2 additional conditions at 150 Fov.
Presence measure with one-item question.

Anxiety and image quality

Zimmons, 2004 (Ph.D. dissertation, in preparation)

Text -/ light +

Text +/ light -

Text -/ light -

Grid

Heart rate

ANOVA N = 42 :

- Time: $p < .001$ Group: $p < .05$ Gr X T : ns

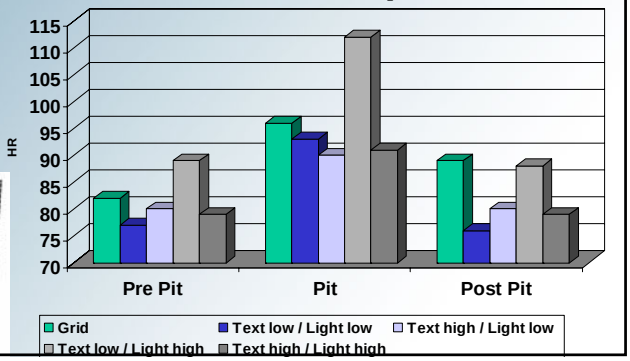
Contrasts :

- Pre vs PIT : $p < .001$ PIT vs post : $p < .001$

Condition 3 vs others : All $p < .001$

Grid vs the others: All ns.

Presence : « SUS » at post: ns Effect size = .05



Aim

- Every study focused on the objective properties of the virtual environment that can increase realism.
- We wanted to focus on perceived realism. We therefore experimentally manipulate perceived realism.
- Out hypothesis was that presence would increase when subjects were lead to believe that the virtual environment represented a physical (“real”) environment.

Participants

- 37 participants aged between 18 et 62 (M=33.1; sd = 15.0)
  - 11 participants were diagnosed as suffering from rodent phobia (rats / mice).
  - 26 were “diagnosed” as not suffering from rodent phobia
- Gender: 78.4 % female
- Randomly assigned to :
  - The experimental condition
    - Participants were falsely lead to believe they will be immersed in live in 3D, in real time, in a real room with a real mouse in a cage.
  - The control condition
    - Participants were told the immersion will take place in a VR environment that is a replica of a real room.

Procedures

Step 1 : Pre-screening, SCID, informed consent

↓

Step 2 : General assessment
(Phobia severity, ITQ, SSQ-pre)

↓

Step 3: Preliminary immersion

(an initial immersion in a neutral / irrelevant VE
to learn how to navigate and what is presence)

VR environment for the neutral / irrelevant immersion



Procedures

Step 1 : Pre-screening, SCID, informed consent

Step 2 : General assessment
(Phobia severity, ITQ, SSQ-pre)

Step 3: Preliminary immersion

(an initial immersion in a neutral / irrelevant VE
to learn how to navigate and what is presence)

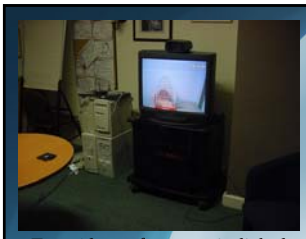
Step 4: A brief measure of presence

Step 5: Experimental manipulation

Control: watching a video of a mouse in a cage

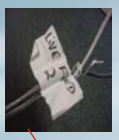
Experimental: discussing in videoconference with an assistant who is showing a mouse in a cage. The videoconference and VR systems are linked

Set up

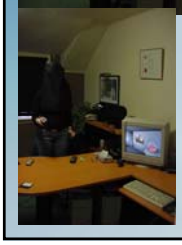


Two videoconference units linked at 384 kbps/sec

The live mouse



IBM Pentium IV™, *ATI* de 128 MB, Cy-*Visor HMD, Intertrax*²



The HMD was covered with a 30 cm by 40 cm black cloth

Many computers falsely linked to the videoconference unit to create the illusion that the VR environment is a live feed from the videoconference system.

VR environment for the experimental immersion

For the experimental immersion, this environment was a replica of the room seen in videoconference and on the video

Procedures

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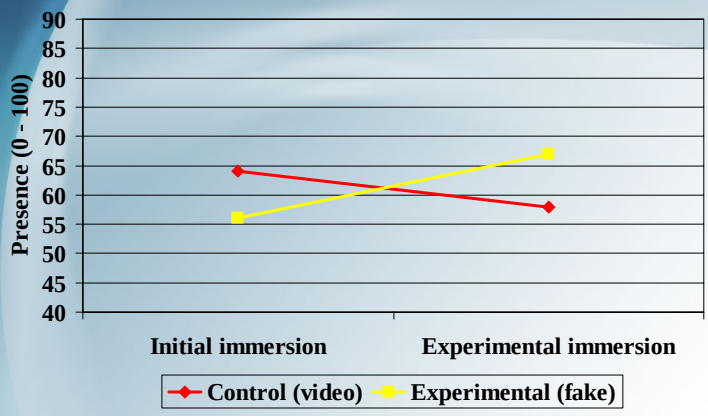
Step 6 : A VR Immersion in the same environment

Step 7 : Post immersion measures
Presence, SSQ

Manipulation check

- 82% of the participants in the experimental (fake) condition believed they were actually « in » the physical room through the VR system.
- The mouse was rated as realistic by 81% of the participants in the experimental (fake) condition and by 77% of the participants in the control condition (video) (Chi-square ns).

Result on the brief measure of presence



Within effect : $F(1, 26) = .58$, ns
Between effect : $F(1, 26) = .0$, ns
Interaction Within X Between : $F(1, 26) = 6.82$, $p < .025$

Results on other measures

	Control (video)		Experimental (fake)		
	Initial	Experi-mental	Initial	Experi-mental	*F* Interaction
Presence Q. (W&S)	90.67 (10.19)	96.67 (15.60)	76.60 (12.13)	80.80 (14.41)	.1
SSQ	12.05 (10.07)	14.34 (15.78)	12.32 (10.97)	16.50 (15.37)	.01
Cybersickness (0-100)	9.06 (11.61)	11.56 (18.79)	21.67 (20.73)	13.40 (12.92)	2.99

Conclusion

- These results show that perceived realism has a significant impact on presence.
- To suspend disbelief we are not limited to physical and objective qualities of the immersion in VR.
- It has been shown that emotions felt during the immersion, as well as the narrative provided before the immersion can play a significant role. Perceived realism may be another element we can manipulate.
- It is necessary to compare perceived realism and objective realism, and to reproduce this experiment with different VR scenarios.