Narrative vs Environment: the role of media content in emotional induction

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Background

Communication literature distinguishes between media form - physical, objective properties of a display medium - and media content - the overall theme, narrative or story depicted via a display system (IJsselsteijn, W., De Ridder, H., Hamberg, R., Bouwhuis, D., & Freeman, J., 1998).

It is well known that the affective dimension is an important part of user experience in interactive media (Baños *et al.*, 2004; Baños *et al.*, 2005; Hudlicka, 2003; Lisetti *et al.*, 2003; Rettie, 2005).

For this reason, many authors are exploring how to design the different parts of the interactive experience to induce relevant emotions and improve the level of involvement (Fogg, 2003; Freeman, 2003; Kamada *et al.*, 2005; Light, 2004; Picard, 1997; Spagnolli & Gamberini, 2005).

We are interested to investigate the role of media content to induce relevant emotions in interactive experience.

The research question

Which are the effects of media content dimensions - narrative and environmental features - on emotional induction?

To achieve this goal, we manipulated simultaneously the background narrative and the affective features of the virtual environment and verified the effects on user's affective response.

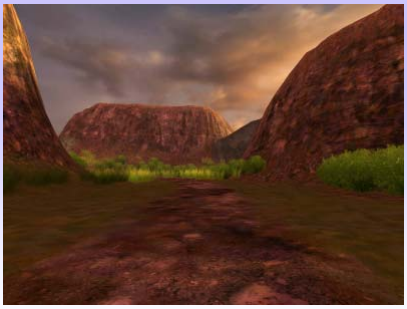
Hypotheses:

1. There is a significant difference in the emotional state of the participant depending on the narrative condition used
2. There is a significant difference in the emotional state of the participant depending on the affective features of the virtual environment
3. The sense of presence perceived from the participant is correlated with the emotional state modification during the virtual experience

The Virtual Environments (VEs)

← Island

Canyon →



Experimental design

We manipulated the VR experience using a mixed 2x2 experimental design

- two different virtual environments (island and canyon)- distinguished by the affective features
- two different narrative backgrounds (positive and negative)

and 2 repeated measures

- pre Virtual experience
- post Virtual experience

The dependent variables tested were:

- the emotional state (through self reports and physiological parameters)
- the sense of presence

Participants

The sample included 80 females University students with age ranging from 20 to 26 years (M=23+/-1.4), randomly assigned to the four conditions.

	Positive narrative	Negative narrative
Canyon	20	20
Island	20	20

Measures

- State Anxiety Inventory (STAI) (Spielberger, Gorsuch, Lushene, Vagg & Jacobs, 1983);
- Visual Analogue Scale (VAS) (Watson et al., 1988);
- Positive and Negative Affect Scale (PANAS) (Watson, Clark, & Tellegen, 1988b);
- ITC-Sense of Presence Inventory (ITC-SOPI) (Lessiter, Freeman, Keogh & Davidoff, 2001);
- Physiological parameters: Heart rate and amplitude (HR, HA), Galvanic Skin Response (GSR), Respiration rate (RR)

Materials and instruments

Hardware

- Portable Computer fujitsu siemens AMILO processor Pentium 4
- Wireless joystick (Logitech Wingman Cordless Rumblepad Gamepad)
- Head-Mounted Display Sony Glastron PLM S-700
- Head-Tracker: Intersense Intertrax2
- "Procomp Infinity full" system, for the measurement of physiological indexes

Virtual Environment

The Island and Canyon VEs have been developed using a powerful 3d engine, Cryengine: a Pc engine based on a script system which combines textures in different ways to create realistic environments and to produce visual effects.

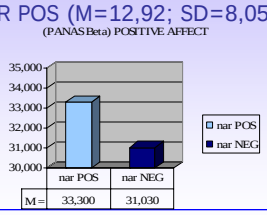
Procedure

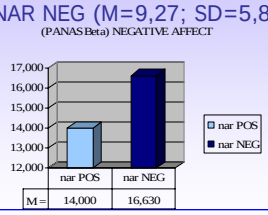
- Measurement of the physiological parameters (BASELINE)
- Filling of the questionnaires for the emotional state assessment (Pre-experiment);
- Virtual Training session
- Listening to the narrative voice (positive or negative) that introduced the participants to the virtual experience session
- Virtual Reality session (island or canyon);
- Measurement of the physiological parameters (Post-experiment)
- Filling of the questionnaires for the emotional state and the sense of presence assessment (Post-experiment);

Results 1/3

Effect of the narrative condition used on emotional modification
BETWEEN SUBJECTS ANALYSIS :

- The positive affect (from PANAS Scale) is significant higher in positive narrative than in negative: [U = 616,500; p<.05; NAR POS (M=33,30; SD=6,49) > NAR NEG (M=31,03; SD=5,93)].
- The negative affect (from PANAS Scale) is significant higher in negative narrative than in positive narrative: [U = 527,500; p<.005; NAR POS (M=14,00; SD=4,14) < NAR NEG (M=16,63; SD=4,83)].
- The HR amplitude is significant lower in Negative narrative than in Positive Narrative [U = 557,000; p<.05; NAR POS (M=12,92; SD=8,05) > NAR NEG (M=9,27; SD=5,87)].





Results 1/3

Effect of the narrative condition used on emotional modification
WITHIN SUBJECTS ANALYSIS :

In positive narrative condition:

- the negative affect (from PANAS) is significant higher in T1 than in T2 [Z = -3,230; p<.000; T1 (M=14,38; SD=4,37) < T2 (M=12,35; SD=3,56)].
- the anxiety level (from VAS Scale) is significant higher in T1 than in T2 [Z = -3,543; p<.005; T1 (M=2,33; SD=1,31) < T2 (M=1,60; SD=0,96)].
- the anxiety level (from STAI) is significant higher in T1 than in T2 [Z = -1,657; p<.05; T1 (M=36,38; SD=9,31) < T2 (M=34,15; SD=6,68)].

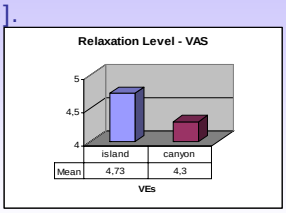
In negative narrative condition:

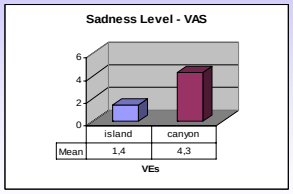
- The positive affect (from PANAS) is significant higher in T2 than in T1 [Z = -2,456; p<.01; T1 (M=28,00; SD=6,23) < T2 (M=29,73; SD=6,76)].
- The anxiety level (from VAS Scale) is significant higher in T1 than in T2 [Z = -2,086; p<.05; T1 (M=2,13; SD=1,16) < T2 (M=1,70; SD=1,16)].

Results 2/3

Effect of the affective features of the VEs on emotional modification BETWEEN SUBJECTS ANALYSIS:

- The relaxation level (from VAS scale) is significant higher in Island than in Canyon: [U = 633,000; p<.05; ISLAND (M=4,73; SD=1,04) > CANYON (M=4,30; SD=1,10)].
- The sadness level (from VAS scale) is significant lower in Island than in Canyon: [U = 642,000; p<.05; ISLAND (M=1,40; SD=0,74) > CANYON (M=4,30; SD=1,09)].





Results 2/3

Effect of the affective features of the VEs on emotional modification WITHIN SUBJECTS ANALYSIS :

In the Island:

- The negative affect (from PANAS) is significant higher in T1 than in T2: [Z = -2,729; p<.01; T1 (M=15,15; SD=3,89) < T2 (M=13,08; SD=3,76)].
- The anxiety level (from VAS Scale) is significant higher in T1 than in T2: [Z = -3,332; p<.000; T1 (M=2,45; SD=1,24) < T2 (M=1,65; SD=1,00)].
- The anxiety level (from STAI) is significant higher in T1 than in T2: [Z = -2,000; p<.05; T1 (M=36,75; SD=8,73) < T2 (M=34,68; SD=7,84)].

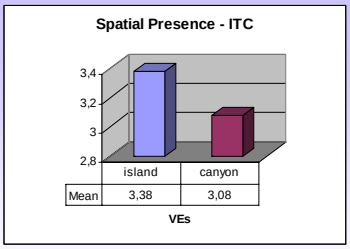
In the Canyon:

- The negative affect (from PANAS) is significant higher in T1 than in T2: [Z = -2,006; p<.05; T1 (M=13,00; SD=3,27) < T2 (M=12,25; SD=3,31)].
- The anxiety level (from VAS Scale) is significant higher in T1 than in T2: [Z = -2,211; p<.05; T1 (M=2,00; SD=1,20) < T2 (M=1,65; SD=1,10)].

Results 3/3

Effect of media content on the sense of presence in the virtual experience

The spatial presence is significant higher in Island than in Canyon [U = 487,000; p<.005; ISLAND (M=3,38; SD=0,51) > CANYON (M=3,08; SD=0,36)].



Results 3/3

Correlations between
the sense of presence and the emotional modification

- There is a positive correlation between the Engagement scale - of ITC-SOPI - and the positive affect - of PANAS - (rho= .471; p<.001);
- There is a negative correlation between the Negative effect - of ITC-SOPI - and positive affect - of PANAS - (rho= -.277; p<.01).
- There is a positive correlation between the Negative effect - of ITC-SOPI - and negative affect - of PANAS - (rho= .430; p<.001).

Summary of results

Main effects:

- Narrative on emotions:

• the positive narrative had a significant effect on positive emotions and vice versa;

• both narrative conditions showed a decrease of negative emotions;

- Environmental features on emotions:

• the experience of the island induced an higher level of relax and a lower level of sadness than the one of the canyon;

• the emotional change achieved was similar in the Positive Narrative and in the Island on one side, and in Negative Narrative and in the Canyon on the other side;

- Environmental features on presence:

• the experience of the island induced an higher sense of presence than the one of the canyon;

Correlations:

- There are several significant correlations between the dimension of the sense of presence (from ITC-SOPI) and emotional dimensions (from PANAS)

Conclusion

Results showed a reciprocal influence of affect and cognition in living the virtual experience. In particular:

- it seems that we can induce affective responses by matching affective expectation, showing in a direct way a stimulus with emotional connotation.

- it appears possible to induce affective responses by defining specific priorities and interpretations, using a narrative instrument.

This result may be critical for the future development of applicative virtual environments because shifts the attention of the developer of both features: the background narrative and the affective features of virtual environment.

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