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## The Influence of Media Content and Media Form in Sense of Presence: A Preliminary Study

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### Abstract

*The sense of presence is a fundamental concept used to analyse how to create a deep sense of engagement between subject and the virtual environment the subject is in. The sense of presence perception is closely related with human emotions and cognition. The aim of this project is to verify if sense of presence may be influenced by media contents (audio/video contents) more than by media form (different screen size).*

### 1. Introduction

The sense of presence is a fundamental concept used to analyse how to create a deep sense of engagement between subject and the virtual environment. Barfiel, Zeltzer, Sheridan and Slater [1] define Presence as the “participant’s sense of being there” in the virtual environment. The concept of sense of presence is used to analyse the engagement level of the participant in a specific task: the higher the sense of presence perceived during an activity, the higher the subject’s engagement during this activity [2].

Slater and Wilbur [3] analysed the sense of presence as a fundamental characteristic of a virtual environment: a virtual context may induce in the user a high sense of presence only if the images proposed are a faithful presentation of a real situation. This perspective is not been confirmed by Sastry and Boyd [4]: according to these authors, the sense of presence is related to the interaction between the user and the environment. To induce a sense of presence it is important for a person to have the opportunity to chose, to move objects presented in the context. The better a medium is able to support the subject’s actions, the higher the sense of presence and the perception of lack of mediation will be: it is important for technology to be “invisible to user” [2] so the participant can focus his/her attention only on the task rather than on the medium.

Ijsselsteijn, de Ridder, Freeman and Avons [6] propose two general categories that can determine a user’s sense of presence: media characteristics and user characteristics.

Media characteristics can be divided into two components: “media form” and “media content”.

“Media form” refers to physical and objective properties of the display of the medium; “media content” includes themes and narratives presented via the medium.

In this study this classification mentioned above will be used to manipulate the independent variables related to the media features.

Freeman, Avons, Pearson, Ijsselsteijn analysed presence as a three dimensional structure:

- Sense of Physical Space: the participant’s sense of being situated in a contiguous spatial environment;
- Ecological Validity: the participant’s sense of the belief and realism of the content;
- Engagement: participant’s sense of interest and engagement in relation with the content of the mediated environment.

The “media form” concept is related to the Sense of Physical Space. The “media content” concept is related to sense of Engagement. This set of conditions create the Ecological Validity concept.

Emotion, behaviour and cognition have an important effect on the sense of presence.

According to Huang and Alessi [7], emotions are an essential part of how people experience the word.

Emotions play an important role in the subjective judgments people. In a virtual environment it is possible to measure the user’s emotional and physiological changes.

If the virtual environment is able to induce a deep sensation “of being there”, this environment is also able to elicit emotions.

This way people could learn how to cope with emotions using particular and different virtual environments. In this study the role of emotion is central, and the emotion concept is based on Appraisal emotion theory [8]. According to Scherer, emotions rise after that the individual evaluate the situation: each event assumes a peculiar meaning that influences the emotional state of the individual.

Appraisal theory [8, 9, 10] postulates that each different emotion is the result of a sequence and evaluation of stimuli that involve emotional and subjective responses. Gross [12] confirms that event evaluation triggers in the subject different behaviours, emotional and physiological subjective responses.

By changing the emotional manifestation, the final responses to the stimuli may be changed.

This theory is named Process Model of Emotion Regulation [12].

Gross and Levenson [11] tested the effectiveness of clip video in the emotion induction process and validated 10 film clips. This research demonstrated that using short clip videos (from 30 seconds to 2,30 minutes), presented on a pc screen, it is possible to modify the emotional state of the subject, eliciting specific discrete emotional states (e.g. Amusement, Sadness, Fear, Disgust), rather than a diffuse state of positive or negative activation.

In this study the same videos are presented through different media to check if there are some differences in sense of presence and also in emotion induction process.

The aim of this work is to check if sense of presence and emotion induction process can be influenced through multimedia (audio/video) contents and using different media form.

Another aim is to evaluate the relationship between the media content and the media form when inducing a sense of presence.

The hypothesis are:

- media content influences the emotion induction process;
- media form doesn't influence the emotions induction process;
- media form doesn't influence the sense of presence;
- media content influences the sense of presence.

This study has a mixed design (3x4). The first independent

variable refers to the media form and is measured between subjects on three levels: mobile phone (MP), pc desktop (PD) and Head-Mounted Display (HMD). The second independent variable refers to media content: 4 video clips with a focus on a specific emotion: amusement (When Harry met

Sally), sadness (The Lion King), fear (The Silence of the Lamb) and neutral (Alaska's Wild Denali) videos (Gross & Levenson, 1995) It is measured with repeated measures analysis. It is a within subjects analysis. The dependent variables are: induction of sense of presence and emotional state.

The sample, in this preliminary study, includes

40 subjects, college students aged between 20-30 years old (20

females and 20 males). The sample has been randomized for "media" condition. Each participant watched 4 clips using three different media (MP, PD, HMD).

Each participant answered the following questionnaire:

Before the experience (before watching the video, T0):

- Vas (*Visual Analogue Scale*, [11]).

After the experience (after watching the video, T1):

- Vas (*Visual Analogue Scale*, [11]);
- Ucl-Sus [13];

## 2. Results

The first hypothesis was confirmed: media content influences emotion induction process. For each videos, in Vas Questionnaire [11] from T0 to T1, Repeated Measure Anova results point out a significant emotional change, coherent with each video. For amusement, video results show a significant increase of happiness level ( $p < .001$ ,  $F_{(3,601; 259)} 82.998$ ); for fear video, results show a significant increase of anxiety level ( $p < .001$ ,  $F_{(4,207; 155,649)} 34.798$ ); for neutral video, results show a significant decrease of happiness level ( $p < .001$ ,  $F_{(3,971; 252)} 56.358$ ); for sadness video, results show a significant increase of sadness level ( $p < .001$ ,  $F_{(2,892; 252)} 40.959$ ).

The second hypothesis was also confirmed: media form doesn't influence the emotions induction process. Repeated Measure Anova results in Vas questionnaire show no significant interaction between emotion induction and media form.

The third hypothesis was been partially confirmed: media form doesn't influence the sense of presence in non interactive environments.

In order to analyse the sense of presence Ucl-Sus questionnaire [13] was used.

Results show no significant differences in the perceived sense of presence for amusement, fear and neutral videos among media form conditions (MP, PC, HMD).

The sadness video results show a significant higher sense of presence for HMD condition ( $p < .05$ ,  $F_{(4,74)} 2.739$ ).

The last hypothesis is also confirmed: media content influence the sense of presence.

Oneway Anova results show significant differences among media content for sense of presence induction ( $p < .001$ ,  $F_{(3,159)} 28.003$ ).

In particular, results show a significantly lower sense of presence for neutral video

compared to other ones (post hoc analysis  $p < .001$ ). Moreover results show a significantly lower sense of presence for sadness video compared to amusement video ( $p < .05$ ).

## Conclusions

These results suggest that media content are significantly more effective than media form for the emotion induction process.



Moreover results suggest the relevance of media content to induce an higher sense of presence compare to media form in non interactive environments.

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