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A RELAXING JOURNEY: THE USE OF MOBILE PHONES FOR WELL-BEING IMPROVEMENT

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Abstract

The new generation of mobile phones has many additional features -as PDA (Personal Digital Assistant), camera and media player- that make it a potentially powerful tool for cyber-psychology. The aim of this project is to test this potential by analysing the effectiveness of mobile narratives to improve relaxation and reduce anxiety in a sample of commuters.

Mobile narratives, narrated video experienced on mobile phones, are used in this study to perform relaxation exercises aiming at introducing emotional changes in participants, to improve their well-being in everyday life stress situations (Green M. C., Brock T.C., Kaufman G., 2004). The narratives guide the subjects during the exploration of four different areas of a tropical island, proposing different relaxation techniques based both on the “Progressive Muscular Relaxation” protocol (Jacobson, 1938) and the “Authogenic Training” protocol (Schultz, 1977).

The project sample is composed of 120 commuters: college students aged between 20-25 years old (60 female and 60 male), recruited on the Varese-Milano local train (70 minute trip). Specifically, the sample has been randomly assigned to four different conditions: Vnar group: who experienced the mobile narrative on a mobile phone during their daily train trip; Nnar group: who experienced video contents only (the beach of a virtual tropical island) on a mobile phone during their daily train trip; Mp3 group: who experienced only the audio contents (the relaxation exercises only) on an mp3 player during their daily train trip; Ctrl group: a no intervention condition. Each participant was administered State, Trait and Presence questionnaires before and after the experience. In the Vnar condition results show a significant anxiety level decrease ($p < .001$) assessed by Stai State questionnaire. No significant differences were found in other conditions. In Vnar condition results show a significant relaxation increase ($p < .001$) assessed by Vas questionnaire. No significant differences were found in other conditions.

Introduction

The new generation of mobile phones has many additional features—such as PDA (Personal Digital Assistant), camera and media player—that explain their success: now it is possible to write text (SMS, Short Message System), to send images (MMS, Multimedia Messaging System), to watch television, and to listen to music. Before the advent of this new technology, Computer Mediated Communication (CMC) was exclusively a verbal communication, but now it is enriched with new contents through effective sensory integration (e.g. audio-video contents) that give mobile communication

an emotive value and allows stimulation, in a global way, three of the four senses: hearing, sight, touch. These innovations make the mobile phone a potential powerful tool for cyber-psychology. The aim of this project is to investigate the efficacy of the mobile phone as a positive emotion induction instrument. In this context “emotion” corresponds to phenomena that suddenly arise and involve the whole person (Legrenzi, 1997). The relationship between an event and the individual interest for the event itself generates an emotion. Each emotion is linked to a particular situation, defined as an emotional antecedent, which activates the subject and modifies his reaction (Lazarus, 1966). From this point of view it is important to use a specific narrative to increase the interaction and the emotional elicitation in a subject inside a virtual context. In this particular case the subjects’ emotional answers will be analysed with reference to the presentation of video content on the mobile phone, presented with a specific mobile narrative, created to induce a relaxed sensation in a commuter sample. Narrative, in this sense, is used as a fundamental vehicle for emotion induction (Harvey, 1998) because it allows the subject to improve interaction with the surrounding environment.

In order to create a feeling of engagement in a particular virtual environment, Freeman (2003) studied Emotioneering techniques (32 categories). Emotioneering refers to a large body of narrative techniques that can create in the participant a deep sense of presence in the game or in other interactive experiences. Barfiel, Zeltzer, Sheridan and Slater (1995) define Presence as the “participant’s sense of being there” in the virtual environment. Specifically, Lombard & Ditton (1997) analysed the sense of presence as a “perceptual illusion of non-mediation”: through sense of presence, the participant forgets that his environment perception is mediated by new technologies. This concept is fundamental in order to create a deep sense of engagement between the subject and the virtual environment proposed.

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 will be during this activity (Riva, 2004). Usability is the fundamental characteristic that a medium must have to be able to activate a higher sense of presence in the user (Norman, 2004). This concept is related to the importance of technology to be “invisible to user” (Riva, 2004), in order to give to the participant the possibility to concentrate only on the task required rather than on the media used. Sense of presence and narrative are two related concepts: one of the instruments to increase sense of presence in a participant is to use a good narrative (Riva, 2004).

Starting from this remark, mobile narrative has been used in the protocol of this study. Mobile narratives, narrated video experienced on mobile phones, are used in this study to perform relaxation exercises aiming at introducing emotional changes in the participant, improving well-being in stressful situations in everyday life (Green M. C., Brock T.C. & Kaufman G., 2004). The narratives guide the subjects during the exploration of four different areas of a tropical island proposing different relaxation techniques based both on the “Progressive Muscular Relaxation” protocol (Jacobson, 1938) and the “Authogenic Training” protocol (Schultz, 1977).

The aim of this research is to check if a narrative experience, associated with video content, can influence emotional subject state. This research is the second part of a pilot study (Preziosa, Grassi, Villani, et al, 2005) aimed at analysing the efficacy of mobile narratives implemented on mobile phone to induce a state of relaxation. Authors have decided to replicate this study by adding an Mp3 condition, an audio only content condition, for better understanding the efficacy and the importance of mobile narrative compared with the video only content.

In particular, authors want to investigate if mobile narratives that guide subjects in a mediated experience, related to video content presented on mobile phone, could induce emotional changes in a subject. Specifically, authors want to study if a mobile narrative could bring a significant anxiety decrease and improve a deeper sensation of relaxation in the user. Besides, researchers want to understand if mobile narrative induces a higher sense of presence during video presentation. For this reason, anxiety level, relaxation level and sense of presence will also be measured in a condition lacking narrative content.

Methods

Experimental design

This study has a mixed design (4x2). The first independent variable refers to experimental intervention and is measured between subjects on four levels: video and audio content (Vnar); only video content (Nnar); only audio content (Mp3); control group (Ctrl). The second independent variable refers to time as unit of measure (pre and post intervention) with repeated measures analysis. It is a within subjects analysis.

In this study four conditions were compared: Vnar (mobile narrative condition): video content of a virtual island associated with audio content; Nnar: video content of a virtual island; MP3: audio content; Ctrl: no intervention group.

Dependent variables:

- Emotional state dimension;
- Emotional trait dimension;
- Sense of presence.

Sample

The sample is composed of 120 subjects (60 female and 60 male), university commuter students, aged between 20-25 ($M= 23,27, \pm 1,38$). The sample has been randomly divided into four conditions: Vnar, Nnar; mp3 and Ctrl group; each group is composed of 30 subjects. No difference among groups was found before the intervention.

Protocol

The experimental protocol aims to increase a relaxed sensation in a commuter sample during their daily train trip. Procedure is organized in four sessions performed during two consecutive days, each one lasting 10 minutes. In Vnar and Nnar conditions video contents present four different parts of a virtual island, two daytime scenes and two night-time scenes, a wave's sound in background is associated to those experiences. In Vnar condition video contents are associated with audio contents: a narrative guide subject

during the island exploration and the fulfilment of the relaxation exercises. In Mp3 condition subject tests only the audio contents. Consecutive video sceneries, in both Vnar and Nnar conditions, are presented along with audio content. Audio contents are the same as in Mp3 condition. Ctrl group had only to complete the questionnaire battery without being administered any intervention.





Session 1: beach 1, daytime scenery.

The subject, at the end of a short island exploration, is invited to sit down on a deck chair on the shore. In front of him is a relaxing landscape: ocean waves, a beautiful sunshine and a few seagulls flying in the sky. Audio content guides the subject in some relaxation exercises: breath control exercises, following wave movements, and arm relaxation exercises where the subject has to move his shoulders slowly.

Session 2: cloud, nighttime. Subject is invited to sit down on a deck chair to watch a big cloud in the sky, which slowly expands and narrows itself. Subject is invited to do breath exercise following the cloud's slow movement. Relaxation exercises concern the lower body parts; the subject has to concentrate his attention on his legs. He has to slowly swing his weight from foot tip to heel and vice versa.

Session 3: waterfall, daytime scenery.

The waterfall is surrounded by a ridge of mountains. At the end of the waterfall a small river flows to the sea. A few leaves float slowly on the river. Those leaves represent the subject's worries of the day. The subject is invited to perform some breath control exercises and neck relaxation exercises, following the voice narrative.

Session 4: beach 2, nighttime scenery.

After a short island exploration, the subject is invited to sit down on a deck chair in front of the sea. Waves arrive slowly on the shore, and a light breeze moves palms. The subject is invited to do breath exercises following wave movement. Subject also has to draw little circles in the sand with his foot for sweetly stimulating his legs.

Narrative during these four experiences is based on Progressive Muscular Relaxation, Jacobson's protocol (1938), and on Autogenic Training, Schultz's protocol (1969). At the end of each session subjects had to complete a questionnaire battery to measure their anxiety, relaxation and presence level.

Material

- 1 4 Motorola A925, display 208x320: mobile phones with UMTS technology. Headphones were used;
- 2 4 videos representing a virtual island. Videos are associated with a specific narrative and to a musical background that reproduces sea waves;
- 3 6 Mp3 to support the audio condition. Headphones were used.

Measures

Three different kinds of questionnaires are used in this study: State questionnaires, trait questionnaires and presence questionnaires. The questionnaires are submitted on paper.

State Questionnaires:

- 1 STAI (State-Trait Anxiety Inventory, Spielberger, Gorsuch & Lushene, 1970). This questionnaire aims to measure state anxiety level with 20 items;
- 2 PANAS (Positive Affect Negative Affect Scale, Watson, Clark & Tellegen, 1988) This questionnaire is composed of 20 adjectives. Subject has to decide, referring to a likert 5 point scale, how a particular adjective describes him;
- 3 VAS (Visual Analogue Scale, Gross & Levenson, 1995). This questionnaire is composed by 8 adjectives that describe subject's emotion.

Presence Questionnaires:

- 1 UCL-SUS (Slater, Usoh & Steed, 1994) The aim of this questionnaire is to analyse subject's sense of presence perceived in relation to the mediated experience. The questionnaire is composed of 3 items.
- 2 ITC-SOPI (Lessiter, Freeman, Keogh & Davidoff, 2001) This questionnaire is composed of 44 items, divided into 4 scales: Spatial presence, Engagement, Ecological Validity, Negative Effects. The aim of this questionnaire is to measure sense of presence in a mediated environment.

Trait Questionnaires:

- 1 COPE (Coping Orientation to Problems Experience, Sica, Novara, Dorz & Sanavio 1997) The aim of this questionnaire is to analyse different coping skills. This questionnaire is composed of 60 items, divided into five scales: social support, positive attitude, avoidance strategies, problem advice, religion.
- 2 Generalized Self-Efficacy scale, Schwarzer & Jerusalem, 1995) The aim of this questionnaire is to measure self efficacy subject level. It is composed of 10 items.
- 3 STAI Y, in the trait version. This questionnaire is composed of 20 items.

Procedure

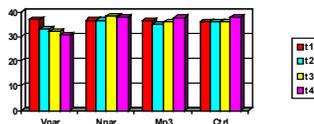
Vnar and Nnar conditions follow the same procedure. The difference among the three groups is in the kind of intervention they are submitted to: in Vnar group subjects are invited to watch mobile narratives on a mobile phone; in Nnar group subjects are invited to watch only the video contents on the mobile phone; in Mp3 group subjects are invited to listen to only the audio contents through Mp3.

On the first day of the experiment, during a morning train trip, the subject has to complete baseline questionnaires: Stai State, Vas, PANAS, Stai Trait, Cope, and Self Efficacy. At the end of the submission he has to experience the mediated experience during his train trip. During the evening train trip, the subject has to watch the second mediated experience and then submit a new questionnaire battery: Stai State, Vas, PANAS, UCL-Sus, ITC-Sopi. During the second and last day of the experiment on the train, the participant has to submit another questionnaire battery: Stai State, Vas, Panas; and then he has to experience the third mediated experience. During his evening train trip the user has to submit the fourth and last mediated experience and then to complete the following questionnaires: Stai State, Vas, PANAS, UCL-Sus, ITC-Sopi, Stay Trait, Cope, Self efficacy.

Procedure for the Mp3 condition is the same as in Vnar and Nnar conditions, but in the questionnaires submitted there aren't Presence questionnaires: UCL-Sus and ITC-Sopi questionnaires. During the morning train trip on the first day of the experiment and during the evening train trip on the second and last day of the experiment, participants of the Ctrl group have to submit the following questionnaires: Stai State, Vas, PANAS, Stai Trait, Cope, Self efficacy. Ctrl group had only to complete the questionnaire battery without being administered any intervention. The sample has always taken the same train for the duration of the experiment, the train they usually take to go to university.

Results

At first, data have been analyzed for normality and distribution control, kurtosis and skewness control and the absence of significant differences between groups before the intervention. At first repeated measures ANOVA have been made to analyze time influence between the beginning and the end of the intervention. Afterwards a between subjects analyses has been made to understand the possible differences between groups. The "State" dependent variables showed a significant variance in time. Repeated measures Anova results, in Stai State questionnaire, show significant differences in time ($F_{(3,114)} = 4,646$, $p < .05$) and in time x condition ($F_{(3, 348)} = 6,194$, $p < .005$) referring to anxiety level. Means were compared in graphic n.1 and in table 1.



Graphic n. 1 Stai state questionnaire

Time	Cond	Mean	Std. Deviation
T1	1	37,10	6,47
	2	36,77	9,07
	3	36,13	7,04
	4	36,63	8,36
T2	1	33,37	4,91
	2	36,93	8,60
	3	36,13	6,78
	4	35,20	7,73
T3	1	32,20	6,18
	2	38,37	10,36
	3	36,13	7,04
	4	36,20	10,35
T4	1	30,63	4,61
	2	37,87	8,97
	3	37,93	7,30
	4	37,70	13,20

(tab. 1)

Contrast analysis shows a significant difference in the interaction Time x Condition, assessed by Stai State questionnaire (table 2).

Time	Mean Square	F	Sig.
Level 1 vs 4	458,431	14,261	.000
Level 2 vs 4	162,697	5,793	.001
Level 3 vs 4	78,142	3,238	.025

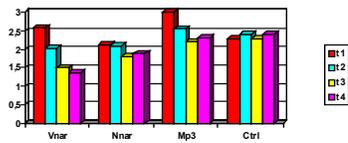
(tab. 2)

Means results demonstrate that Vnar condition shows a significant anxiety level decrease in time, assessed by Stai State Questionnaire. This anxiety decrease is not significant in Nnar, Mp3 and Ctrl conditions. In these conditions mean shows an anxiety level increase in the time.

Looking at these results is possible to argue that the audio and video contents, proposed on the mobile phone, are effective to reduce the anxiety level in a commuter sample.

A significant anxiety decrease in Vnar condition is confirmed also by VAS Questionnaire analyses. For the “anxiety” item in the Vnar condition, an anxiety level decrease is confirmed. Repeated measure Anova results show a significant decrease of anxiety level in “anxiety” item ($F_{(3, 348)} = 12,904$; $p < .001$). Means were compared in graphic n.2 and in table 3.

Graphic n. 2 Vas questionnaire item « anxiety »



Time	Cond	Mean	Std. Deviation
T1	1	2,60	1,04
	2	2,13	1,28
	3	3,00	1,46
	4	2,27	1,17
T2	1	2,03	1,07
	2	2,10	1,21
	3	2,57	1,17
	4	2,40	1,19
T3	1	1,50	,82
	2	1,83	1,02
	3	2,20	1,10
	4	2,27	1,17
T4	1	1,37	,76
	2	1,90	1,18
	3	2,30	1,26
	4	2,40	1,19

(tab. 3)

Contrast analysis, as illustrated in table number 4, shows the efficacy of the intervention as a great decrease in anxiety level, specifically between the first and the third time.

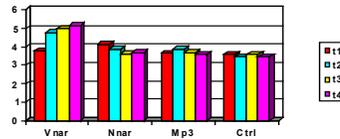
Time	Mean Square	F	Sig.
Level 1 vs 4	31,008	31,973	.000
Level 2 vs 4	9,633	11,481	.001
Level 3 vs 4	,208	,176	,676

(tab. 4)

Besides, results show a significant anxiety level decrease in Nnar and Mp3 conditions, but with lower values compared to Vnar condition.

Relaxing variable, assessed by Vas Questionnaire in “Relax” item, shows a significant difference in time x conditions ($F_{(9,348)} = 6,949$, $p < .001$). Means are shown in table number 5 and in graphic number 3.

Time	Cond	Mean	Std. Deviation
T1	1	3,80	1,03
	2	4,13	1,25
	3	3,67	1,09
	4	3,60	1,38
T2	1	4,73	1,14
	2	3,87	1,17
	3	3,90	1,21
	4	3,47	1,25
T3	1	4,97	1,16
	2	3,63	1,45
	3	3,70	1,47
	4	3,60	1,38
T4	1	5,17	1,32
	2	3,70	1,09
	3	3,60	1,52
	4	3,47	1,25



Graphic n. 3 Vas questionnaire item «relax »

(tab. 5)

In Vnar condition there is a significant relaxation level increase from the beginning to the end of the intervention. In the other conditions there isn't a significant change. These results are confirmed by the contrast analysis of time x conditions interaction (table number 6).

Time	Mean Square	F	Sig.
Level 1 vs 4	19,433	10,079	.000
Level 2 vs 4	3,053	4,930	.003
Level 3 vs 4	,719	,714	.545

(tab. 6)

Presence questionnaire, UCL-Sus and ITC-Sopi questionnaires were administered in Vnar and Nnar conditions. Sus questionnaire results show a significant difference in sense of presence between t2, answers gotten during the baseline presence questionnaires, and t4, answers at the end of the intervention ($F_{(1.58)} = 6,938$, $p < .05$). Means were compared in table number 7. In Vnar condition results show a significantly higher value for sense of presence from the beginning to the end of the intervention, as shown in contrast analysis in table number 8.

Time	Cond	Mean	Std. Deviation
T2	1	3,97	1,30
	2	2,47	1,11
T4	1	4,33	1,12
	2	2,43	1,45

(tab 7)

Time	Mean Square	F	Sig.
Level 2 vs 4	1,667	6,938	.011

(tab 8)

Questionnaire results show significant differences in the anxiety level in the interaction between time and conditions ($F_{(3,116)} = 5,072$, $p < .05$). As means and contrast analysis illustrate (table number 9 and 10) at the end of the treatment Vnar condition shows a significant anxiety level decrease compared to other conditions. These results are not confirmed in the other conditions. In particular in Nnar and Mp3 conditions results show a little anxiety level increase.

Stai Trait

Time	Cond	Mean	Std. Deviation
T1	1	39,27	8,65
	2	41,33	12,25
	3	41,20	10,83
	4	38,57	8,28
T4	1	36,33	9,58
	2	42,20	11,95
	3	41,63	11,59
	4	38,30	7,65

(tab. 9)

Time	Mean Square	F	Sig.
Level 2 vs 4	1,667	6,938	.011

(tab 10)

Self efficacy Questionnaire shows significant differences in self efficacy state among the conditions ($F_{(3,116)} = 10,404$, $p < .01$). As means and contrast analysis illustrate (table number 11 and 12) at the end of the treatment Vnar condition shows a significant increase of self-efficacy state. Results do not confirm this positive change in the other conditions.

Time	Cond	Mean	Std. Deviation
T1	1	29,57	3,78
	2	28,63	3,91
	3	29,03	2,71
	4	28,93	2,99
T4	1	31,10	3,67
	2	28,67	4,12
	3	28,80	2,94
	4	29,30	2,83

(tab. 11)

Time	Mean Square	F	Sig.
Level 1 vs 4	18,186	10,404	.000

(tab. 12)

Coping results show a significant difference among conditions for Social Support variable ($F_{(3,116)} = 3,790$, $p < .05$). Specifically, as means and contrast analysis shows (table number 13 and 14), there is a significant increase in Vnar condition for Social Support, compared to other conditions.

Time	Cond	Mean	Std. Deviation
T1	1	31,17	6,64
	2	31,13	8,59
	3	30,67	8,08
	4	31,60	7,72
T4	1	33,00	6,81
	2	30,77	8,24
	3	30,87	8,37
	4	32,20	7,93

(tab. 13)

Time	Mean Square	F	Sig.
Level 1 vs 4	18,186	10,404	.000

(tab 14)

Discussion

The aim of this study was to investigate if a mobile narrative is able to induce positive emotions in a commuter sample. Specifically authors wanted to check if mobile narrative is able to induce a deep relaxation sensation and a significant anxiety sensation decrease. At first, authors compared differences found in questionnaire results among the four session intervention between conditions (Vnar, Nnar, Mp3 and Ctrl; within subjects analysis); then they compared differences among conditions (between subjects analysis). Within subjects analysis shows significant differences in time intervention assessed by State questionnaire, specifically in Stai State questionnaire and Vas questionnaire analysis. Stai State questionnaire results show a significant anxiety level decrease in the Vnar condition, not found in the other conditions. Results assessed by Vas questionnaire, for the item “anxiety”, show a significant anxiety level decrease for all the experimental conditions (Vnar, Nnar and Mp3), but the higher result is found in Vnar condition. At the end of treatment, in the Ctrl group, results show an increase of anxiety level. Besides, data show the efficacy of mobile narrative (Vnar condition) for positive emotion induction compared to only audio content (Mp3), only video content (Nnar) and Ctrl condition. In fact data show a higher efficacy in time intervention in Vnar condition for relaxation variable, assessed by the Vas questionnaire. In the other experimental conditions, results do not show a significant relaxation sensation decrease. These results underline the efficacy of mobile narrative (audio content associated with video content) in emotion induction, in particular in relaxation induction. Audio contents presented to subjects of Vnar and Mp3 conditions were based on two different relaxation techniques:

the “Progressive Muscular Relaxation” protocol (Jacobson, 1938) and the “Authogenic Training” protocol (Schultz, 1977). The aim of audio contents was to induce in users a feeling of relaxation and to create in them a deep sense of presence in the environment proposed. In fact Sus questionnaire results show in the Vnar condition a significantly higher value for sense of presence between t2, answers gotten during the baseline presence questionnaire, and t4, the answer at the end of the treatment; results not found in Nnar condition (only audio content group). Besides, the ITS-Sopi questionnaire, for Spatial Presence variable, shows a significant difference between t2 and t4 in the Vnar condition. In the Nnar condition there weren’t significant differences in time intervention. Finally Self-efficacy questionnaire results showed a significant self-efficacy increase only in Vnar condition. In the end, analysing these results, it is possible to confirm the efficacy of mobile narrative, supported on the mobile phone, to induce a positive emotional state in users, to improve their well being in stressful situations in everyday life and to create a deep sense of presence in the environment proposed.

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