

# **The EMMA Project: Engaging Media for Mental Health Applications**

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## **Summary**

So far, scientific literature has paid attention to the cognitive and environmental determinants of presence, trying to offer a definition and assessment measures that could seize such an elusive concept. However, the emotional determinants of presence have received less attention. Not too much effort has been dedicated to study the relationships between emotions and presence. However, emotional responses could play a key role in generating and enhancing presence, specially for some Virtual Reality (VR) applications, such as mental health field (both for promotion and treatment goals). The main goal of EMMA project –an European Community funded research project (IST-2001-39192)- is to study the relationships between presence and emotions. In particular, after analyzing the possible emotional impact of high compelling synthetic experiences characterized by an high level of presence, the EMMA project wants to develop “mood devices” able to induce different forms of mood enhancement on both clinical and non clinical samples. This research will help to understand better the

development of some psychopathological phenomena and the development of “new correcting experiences and learnings” to cope those psychopathological experiences. Furthermore, EMMA project will pretend the development of innovative tools to be used with three different real users: (i) users of (real world) mental health services, such as treatment for anxiety disorders, depression, and so on (ii) users with acute restricted mobility (e.g. designed experiences for hospital inpatients), and (iii) mood enhancement for general population (relaxation environments through TV or VR).

## **1 Introduction**

Presence, the sense of "being there", is a complex experience. There is consensus that it is formed through an interplay of raw sensory data and various cognitive processes. However, there are still a number of unresolved issues such as the structure of presence, an accepted explanatory model of presence, measuring presence, contributions of determinants of presence, effects of presence, impact of individual differences and social consequences of presence technologies (Ijsselsteijn et al., 2001).

So far, scientific literature has paid attention to the cognitive and environmental determinants of presence, trying to offer a definition and assessment measures that could seize such an elusive concept. However, the emotional determinants of presence have received less attention. Not too much effort has been dedicated to study the relationships between emotions and presence. However, emotional responses could play a key role in generating and enhancing presence, specially for some VR applications, such as mental health field (both for promotion and treatment goals).

Emotions affect behaviours and cognitions, and they have an important impact on presence. Users “feel” presence. And as presence is unstable, emotions are also continuously changing. If we are able to understand better presence and emotional reactions to VE, we will be able to design more effective “virtual” experiences. Especially in clinical psychology field, but not only, we need to know how to generate and optimise the emotional impact that the virtual experiences have from a therapeutic point of view.

## 1.1 Theoretical issues

Over the last 100 years clinical psychology and psychopathology have advanced notably and different useful metaphors have been stated for the understanding of human being (e.g. the Freud's metaphor on hydraulic systems; the computer metaphor in the information processing developments, etc.). These metaphors had an important heuristic value. At this moment, VR permits us to state a new metaphor. This one starts from the classic notion of "living organism that uses tools", that is, the use of tools modifies the environment, and in turn, such a modification has an effect on the human being. From this perspective, the psychological subject can be considered as a very complex open system in which not only the cognitive components are central, but also the "wise emotions" (Campbell, 1978). This open system is intimately interacting with the "participative universe" (Prigogine & Stengers, 1979), and it is in a continuous process of change. This open system contributes actively to the construction of its own experience. In fact, the observer's participation produces what is called "tangible reality", the Universe (Wheeler, 1979). Tart (1990) already pointed out that our "reality" is virtual. We live inside machines which simulate the world, "our machine to know the world", using the Konrad Lorenz's terminology (Lorenz, 1977). Our perceptions are constructions, "simulations of the world processes" that allow us to do things. Moreover, VR allows a new way of interaction with the information. As it occurred with the microscope and the telescope, more information is available with this "new sense" for both researchers and users. In short, VR has a notable potential to stimulate the scientific knowledge since it serves as a model of understanding the human mind; it may provide important keys to understand its anomalies and, from those keys, we can establish solving strategies.

At present, there are some assumptions that have a notable heuristic value, but they are quite elusive, like the conceptualization of *self* established by William James (1890). This author distinguished between *I* and *ME* as two central components of the self. *I* represents the self as "expert/knowledgeable" (the part that organizes and interprets continuously the experience) and *Me* represents the self as "known". James also pointed out the gradual transition between *Me* and *Mine* (everything the individual can consider of one's own: his/her body and ideas, his/her family, house, friends, political party,, ...). This aspect allows the consideration of a basic trait of the self, its *extension*. Therefore, the *self* is not an entity blocked and closed to the world, but it is part of the environment

and the environment is part of the *self* (Hermans, 1996). The aspect of *process* has to do with the historical nature of the human experience and implies to take into account space and time. The individual lives in a concrete time and space, and from them he/she can be orientated towards the past and future and towards the surrounding world. *Organizational* means that the person is not only orientated towards different parts of his/her temporal and space location, but also he/she connects or organizes those parts into a story or self-narrative. *Valuation* has to do with any unit of meaning in which the events of a self-narrative are organized.

Up to now, the different VR applications have insisted on the convenience of “simulating the reality in the most accurate way possible”, but it is the moment to take a step forward and to start the design of “other realities” that represent our deepest fears, illusions, fantasies, ... New realities that user consider very “real” and they feel present in them. New realities that lead us to new processes/stages of evolutionary development. In those realities both users and “the others” could be present (or a part, sketch or trace of them). It is possible to imagine multiple dynamic positions of the *self*, along the development process. The self may move from each of those different positions and also may establish communication and interaction among them. They can be contemplated as characters that adopt an own life inside a story, the self of any position can correspond to other real or imaginary self (protecting father, imaginary friend, loving mother, etc.). From this perspective, the self is understood as a social self in the sense of Bruner (1990), that is, it is a *distributed* self. What is stated is that “I” am not only “here”, but also “there” and may act as if “I” were the other.

## **1.2 Treatment strategies**

During the last century, excellent progress has taken place in the field of psychological treatments. At this moment, “empirically validated” treatments are available (Task Force on Promotion and Dissemination of Psychological Procedures, 1995). The cognitive model has mostly contributed to the development of these treatments. However, this approach has been unable to bring under control all of the changing human processes. These insufficiencies are somehow based on the theoretical limitations. There are some discrepancies between the lineal rationale of the cognitive theories and the complexity of the therapy. Furthermore, it is difficult to change certain groups of believes, and it is also the fact that the central role of the emotions is not taken

into account (Guidano, 1990). In this context, Miller (1956) pointed out that cognitivists were victims of their own success, they abandoned the construction of a metaphor of the meaning and turned to a human mind model based on computer . One of the challenges in cognitive psychology is to bring again the meaning as a central subject in psychological research (Goncalvez, Alves, Soares and Duarte, 1996). In Gonçálvez et al. opinion, in order to understand the basic processes and central problems involved in an adequate psychological functioning it is necessary to understand how we create, structure and change meanings. That is, our personal identity, the coherent narrative of our lives has the meaning as a central organizer principle.

The FET Proactive Initiative 2002 call on Presence Research Activities, which includes EMMA (Engaging Media for Mental Health Applications, IST-2001-39192) as one of its projects, pretends to develop novel media that convey the sense of “being there” and expects to obtain a theory of presence thanks to interdisciplinary research.

## **2 Project objectives**

There are two strategic objectives in the EMMA project.

The first one will be to investigate how **presence** mediates or generates **affective and emotional responses**, how emotional responses can be manipulated to control the extent and nature of presence, and how to use presence and emotions effectively in clinical settings. Emotions affect behaviors and cognitions, and they have an important impact on presence. Users “feel” presence.

The second objective will be to design, develop and test different mediated environments, from more traditional to more emerging, and new technologies that generate and enhance presence and emotions.

### **2.1 Social/well-being issues**

The word "depression" or “anxiety” refers to distressful and uncomfortable moods. They are often used to describe moods that all of us experience from time to time. But these emotions can also be symptoms of true clinical-medical disorders. Periods of depression and anxiety are quite common and secondary to the other medical or psychiatric illnesses, and some individuals experience lengthy, often repeated or chronic

episodes of these emotions for no apparent reason when they are otherwise physically well. These people are said to suffer from a mood disorder, where altered moods are central or "primary" and are accompanied by other symptoms, such as disturbances of sleep, weight changes, lack of energy, exaggerated worry and tension, low self-esteem, and so on. As mental disorders, both anxiety and depression are considered the most common mental illness, and significant and costly problems. They are important public health problems, due to its high prevalence, its comorbidity with other disorders, and its important negative consequences on the sufferers' quality of life. Epidemiological studies throughout the world (DSM-IV, 1994) indicate that the life time risk for Major Depression ranges from 10% to 25% for women and 5% to 10% for men, and the prevalence rates appear to be unrelated to ethnicity, education, income, or marital status. In the case of anxiety, several studies have also shown high prevalence rates (for instance, 13% for social phobia prevalence, 10% for panic attacks). Furthermore, Adjustment Disorders, characterized by clinically significant emotional or behavioral symptoms in response to an identifiable psychosocial stressors, are very common, and epidemiological figures vary widely as a function of the population studied and the assessment methods used (DSM-IV, 1994).

For the treatment of mood disturbances antidepressant agents are usually used. These include the serotonin reuptake inhibitors or other agents such as venlafaxine (effexor) and bupropion (wellbutrin). However, this pharmacological treatment is not easily tolerated by a significant proportion of patients. Different cognitive and interpersonal therapies and counseling are also used to reduce distress within relationships, to cope with losses and to overcome work-related challenges. Unfortunately, these therapies require long treatment time and a strong involvement of the patient. For these difficulties millions of Europeans are actually untreated for mood disturbances that cause enormous suffering and hardship.

EMMA project's main goal is the investigation of the use of engaging media for the development of non-addictive, mood-stabilizing experiences. In particular, after analyzing the possible emotional impact of high compelling synthetic experiences characterized by an high level of presence, EMMA pretends to develop "mood devices" able to induce mood enhancement on both clinical and non clinical samples. The "mood

devices” will provide innovative ways of coping with distressful emotions, that will be better than existing approaches, for different users:

- (i) Users who suffer from psychological problems (affective disorders, anxiety disorder, adjustment disorders).
- (ii) Users with acute restricted mobility (the emotional mediated experiences that bedridden patients could have by means of mood devices may help relieving their anxieties, reducing their pain, and encouraging them in their fight against diseases).
- (iii) General population (relaxation environments through TV or VR; presence-enhanced synthetic environments for entertainment, etc.).

## 2.2 Technical issues

In order to produce emotional experiences, EMMA project needs to create innovative applications offering multi-sensorial access and to analyze their influence on the level of presence of different users. To do this, several technological tools will be used. The definition of the tools to be used will be analyzed during the project. Anyway, there are some technological tools that will be addressed due to their possibilities for generating emotional responses. These are:

- Virtual agents: To allow the incorporation, in a simple and fast way, of virtual agents in software applications for different hardware platforms. Those virtual agents will be able to talk and gesticulate according to the user’s interaction with them in order to generate several emotional responses.
- Tele-immersion – To design and develop a low/medium cost tele-immersion system to be used as a new paradigm for computer enabled interaction between patient and therapist. Tele-immersion can be a very effective way of generating emotions on users as it enables to present realistic avatars in natural interfaces. Also to investigate the effects that different configurations can have on the sense of presence in order to optimize both SW and HW tools.
- Augmented reality – To develop several augmented reality (AR) visualization paradigms and to analyze their influence on the level of presence of the users.

The AR tools to be used will be based in the use of low cost HW configurations. AR constitutes a very natural interface for presenting different data (objects, avatars, VE) mixed with real data, and so a good technological candidate for generating emotions and presence on users.

- Handheld devices – To develop SW solutions on new mobile computing platforms with wireless capabilities in order to facilitate access for everyone in everywhere situation. The hardware platforms will be centered in PDA, 3G cellular phones and tablet PC using new outstanding natural interfaces like handwriting capabilities, `digital ink`, speech recognition and calligraphic interfaces.

### **3 Focus on presence**

EMMA pretends to achieve a more complete understanding of presence and reactions to mediated experiences. This will help us in creating more effective experiences for emotional learning, that could be useful in many different contexts.

Three distinct types of presence will be studied: You are there, the world is here, and we are together. Regarding subjective presence, some applications could need users BEING there, and BEING NOT here (in the “real” world), but in other ones users could be there and here. Equally, some applications need the virtual world being there, or it may be a mixed in between real and virtual or holographic worlds. The purpose is to create “significant life experiences” that ARE there and thus users can test that reality, and change it. It is like Alice in Wonderland: you can go through the mirror and see the other side of reality, and after that, you can come back. Specifically, EMMA will focus on narratives of abandon, loses, reject, acceptance, collaboration, minusvaloration, fear, and so on. These mediated experiences will be able to induce emotions such as sadness, anxiety, anger, joy, hope, etc., and users will learn to cope with these emotions and feelings. A goal is to create a VR laboratory where “emotionally loaded” scenarios will be designed. Related to that, one purpose is to create a “LIVING BOOK” that would constitute digital shared environments, accessible across a range of media (from fully immersive rooms or environments to textual diary entries), allowing users to build a history of their emotional experiences, but also to live present emotional experiences and even generate new future experiences. Finally, EMMA will also focus on the

therapist presence. Users could be always accompanied by a person who trust on, under therapist protection. So it is easier for them to venture to change the world (and change themselves). And not only when users are “in” the virtual environment, but also when they are in the real world, even generating therapist presence using some aspects of therapist (voice, instructions, etc.).

The project is focused not only on generating and enhancing presence, but also on measuring it. The purpose is to measure the “arrival” experience (being in the VE) and the “departure” experience (not being in the physical environment). As the sense of presence is unstable (a moment-by-moment feeling), it would be necessary to design and develop new instruments to measure sense of presence.

## 4 Innovation

The result of the EMMA project will allow innovative advances in central aspects for mental health field: new theoretical developments, new research paradigms, and new treatment strategies.

**a) Theoretical advances:** Although the effectiveness and the utility of the VR (Virtual Reality) applications for the health field have been demonstrated, it is still needed an appropriate theoretical framework that guides the research and allows a larger progress in the future. EMMA project will help us to undertake that framework.

EMMA also will allow to seize the process of extension of the self, and the “narrative” and “dialogal” conception of the self, defined by Hermans as an *organized process of valuation*.

**b) A new research framework:** EMMA aims at carrying out basic scientific research on presence and reality judgments. Researching on presence and reality judgments may shed some light to discover how we attach reality to our perceptions, cognitions, interactions etc., and especially what go astray in the same metacognitive processes of psychotic individuals. This may allow us to distinguish between psychosis and neurosis, or in a more traditional way, between “craziness” and “normality”. Being able to count in psychopathology with a normative theory about reality judgment would help us identify which are the specific execution deficits that have those who suffer from certain problems. For example, it could help us understand basic psychopathological processes as delusions

and hallucinations: How does a person with a delusion collect and interpret the information and how does he or she use the evidence to support or disregard his or her beliefs? How are irrational beliefs created in sane human beings? On the other hand, from a practical point of view, the understanding of what aspects are altered, and in which way they are altered, could suggest innovative interventions to be used in therapy.

Another innovation is to use VR as a “new realistic laboratory” (Baños, Botella & Perpiña, 1999) where to study behaviors, emotions, thoughts, basic psychopathological processes, individual differences etc.. and emotions. This “realistic lab” will allow to do research with a high degree of validity. It is classic the dilemma between the different types of validity. It seems that we usually sacrifice something regarding the internal or external validity: As a greater control is needed, it seems necessary to turn to the “artificiality” and/or “simplicity” of the lab. The “virtual laboratory” could help overcoming this dilemma creating significant contexts, with high external and ecologic validity, in which certain questions can be tested with a high degree of control and accuracy.

**c) New treatment strategies:** The purpose of EMMA project is to design and test VR strategies that structure effectively the treatment procedures stated by these theoretical approaches. If the narratives are the essential processes of the construction of meaning, it is possible to make hypothesis about the different idiosyncratic ways to construct the meaning corresponding to different prototypic narratives. In other words, as EMMA project proposes, by means of “mood devices” it will be possible to construct “new vital narratives” with high emotional impact which provide concrete central meanings. This prototypic experiences can be used to activate, correct, structure, and restructure previous life experiences that serve as structural frameworks from which it could be possible the categorization of cognitive processes for future experiences. It is not only to change the observable behavior, nor change the central cognitive contents that influence the individual functioning, but going beyond, trying to open the door that allows to modify cognitive processes and structures, and activate and modify basic emotional patterns.

## 5 Conclusions

With the EMMA project, it is expected to achieve a better understanding of presence construct, paying special attention to the study of the relationships between emotions and presence, by means of an interdisciplinary approach.

At the end of the project, it will be possible to understand better the development of some psychopathological phenomena and to develop “new correcting experiences and learning” to cope those psychopathological experiences, with tools that offer richer sense of presence. Since mood disorders are the most common psychological problem in the general population, it will be possible to reach a higher number of persons suffering from psychological problems.

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