

RAVE-08 Abstract

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Design of an affective vocabulary for the eXperience Induction Machine

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Abstract

The versatility of synthetic media environments may open up new ways of non-verbal affective communication. Indeed, it appears a theoretical possibility to synthetically generate optimal stimulation for any individual dependent on their current preferences and state not unlike the Holodeck proposed in *Star Trek*. In order to achieve this level of personalization however, we do need to understand the relationship between multi-modal content and a user's experience. This study uses a unique paradigm to assess the validity of an affective vocabulary using synthetic audio-visual content. The environment used is a mixed-reality human accessible space called eXperience Induction Machine (XIM) [1]. XIM is a general-purpose immersive infrastructure equipped with a wide range of sensors and effectors that supports a broad study of human-artifact interaction. Such an installation can either be seen as a pure input/output device, it can constitute an autonomous, sentient entity or provide a gateway to virtual environments. The design and scientific framework of XIM proceeds from an earlier large-scale installation called "Ada - the intelligent space", an installation for the Swiss national exhibition Expo.02 that has been visited by over 560.000 people over a period of 6 months [2].

In the pilot study reported here we assess the relationship between multi-modal content and affective responses. 12 participants were exposed to different explicitly parameterized audio-visual stimulus combinations using XIM's surround video projection system, light emitting floor tiles and multi-channel sound system. Verbal user responses were collected together with the electrocardiogram (ECG) and electrodermal activity (EDA). The architecture of the system was designed to allow the future deployment of on-line machine learning algorithms for the automatic detection of the most effective stimulus combinations. Verbal responses showed that floor generated visual and music stimulations were rated as significantly arousing while wall projected visual stimuli seemed to have no such effect. The physiological responses showed a high degree of correlation between specific stimulation parameters and the user's physiological state, but these correlations showed a high individual variability. Thus, these results are consistent with our previous observations that synthetic multi-modal content can modulate a visitors' emotional state in an immersive room like XIM [3].

This study provides the first evidence that an immersive space such as XIM can be used to systematically manipulate the affective state of a visitor. We continue investigating how different parameters of synthetic audio, visual and audio-visual content can be mapped to affective physiological responses. The next step is to employ different learning algorithms to let the system find the optimal combination of parameters for inducing a desired affective state. Although audio-visual parameters used in the first studies are abstract and relatively context-free, this knowledge will provide us with a better understanding of how various sensory cues may implicitly affect users in highly immersive multi-sensory environments. As a part of forthcoming experiments, we envision the comparison between the effects produced by stimuli in a pure virtual setup, realized either in a CAVE or via a head-mounted display, with data from the immersive XIM environment. In addition, we will generalize this paradigm towards more complex multi-modal interactive narrative structures.

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References

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