

Quality of Immersive Experience in Storytelling: A Framework

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Abstract—In this paper we discussed concepts of immersion and engagement in storytelling, arguing that immersion is one of the predominant quality measures in determining the multimedia experience of a story. We further discussed the measurability of immersion from the perspectives of human factors, system factors and design factors. Finally we postulate a holistic framework for measuring immersion in storytelling, in an aim to contextualize immersive experience which is otherwise difficult to evaluate.

Keywords—Quality of Experience; Immersive Experience; Storytelling

I. INTRODUCTION

Among the many experiences of enjoying storytelling, immersion is one of the most salient. Being immersed in a story world means that one or more features of the story are engaging to the extent that you are mentally absorbed into that virtual environment. In this sense immersion is a major quality that determines the success of the story and highlights the experience of storytelling. In addition, despite the transient nature of experience, immersion is a measureable, at least to some extent, quality that could be contextualized by psychological, physiological or neurological means.

II. CONCEPTS OF IMMERSION AND ENGAGEMENT IN STORYTELLING

Recent technological advances, particularly in the areas of Virtual Reality and Augmented Reality, have allowed the notions of immersion and engagement to take center stage in designing and navigating interactive narrative or storytelling, and accentuated the role of immersion as one of the predominant quality measures in determining the multimedia experience of a story.

According to the definition of Carr [1], immersion can refer to a quality of experience at both the perceptual and the psychological level. Perceptually, immersion means the degree to which a user's senses are monopolized by the technology or experience; Psychologically, being immersed means being "mentally absorbed" by a virtual environment. In the SCI-model, Ermi and Mayra [2] categorize immersion into three aspects: the sensory, the challenge-based and the imaginative immersion. Further afield, Calleja [3] proposes a

"player involvement model" which describes immersion in several dimensions, particularly: kinesthetic, spatial, narrative, shared, affective (emotional), and ludic involvements. Lazzaro [4] suggests that the degree of immersion in a virtual environment depends on four primary factors, i.e., feelings of challenge, escapism, excitement and social factors.

Immersion, as hereby thus defined, is the moments when users are mentally attentive and absorbed into the story world to the extent that they are losing their self-awareness and unconscious of their physical surroundings. In a word, being immersed means that we are mentally preoccupied by that story experience with a sense of realness and a sense of presence (being there), the very duality embedded in the definition of "immersive experience". With this definition, we aim to tangibly describe and measure immersive experience in storytelling, which is otherwise difficult to sense, capture, interpret and interact with in a concrete manner due to its ephemeral nature. Our goal is to contextualize, externalize, or materialize immersive experience in the process of users interacting with digital artifacts such as storytelling and social TV scenarios.

III. THE MEASUREABILITY OF IMMERSION IN STORYTELLING

Immersion is potentially influenced by many experiential and environmental factors, for instance, the size of the touch-screen, the effect of the challenge and the player's expertise, realism and behavior, one's perception of time, graphical fidelity and task fidelity, affective attention, ambient panorama, shared and collaborative environment, user interface design (e.g. 3D stereo and vibrotactile feedback), etc. One of the methods for measuring immersion is to find out whether a user's psychological, physiological or neurological states are mapped with the structure of the story.

A lot of studies are inspired by the seminal efforts of Schachter and Singer [5], Fossati [6], Russell [7], Dolan [8] and Coull [9], who have established links between i) physiological arousal and emotional states; ii) the neural correlates of emotional processing; iii) the psychological construction of emotion; iv) emotion, cognition and behavior; v) the neural correlates of arousal. All these among others

have established a coherent eco-system of inter-related concepts and their measurements in physiology, emotion (affect), cognition, neuropsychology, and behavior. These provide hints on how we could leverage measureable parameters such as physiological, neuropsychological and behavioral data to infer the emotional and cognitive states of an immersive experience.

Previous studies have developed a series of experiential qualities in storytelling which could serve as metrics for measuring quality of immersive experience. Roth et al. explicitly propose a conceptual framework of five dimensions of experiential qualities in interactive digital storytelling, which are: curious, suspense, aesthetic pleasantness, self-enhancement, and optimal task engagement ('flow') [10]. Klimmt et al. go into even greater details in outlining the experiential qualities in digital storytelling, where there are 13 aspects involved: usability of system, correspondence with system performance and own expectations, presence, character believability, effectance, autonomy, curiosity, suspense, flow, aesthetic pleasantness, enjoyment, emotional state, and role adoption / identification [11].

IV. QUALITY OF IMMERSIVE EXPERIENCE IN STORYTELLING: A FRAMEWORK

Based on the above discussions, we postulate a framework for measuring quality of immersive experience in storytelling (See Figure 1). Three types of data are fed into the analytical system: human factor factors, system factors, and design factors. Human factor data include the physiological, neuropsychological and behavioral measurements, which could then infer the cognitive and emotional processing of the participants. System factor data suggest the user's optimal requirements of the system, which may include, but are not limited to, haptic feedback, graphical fidelity, screen size, and most important of all, quality of service. These system configurations could lead to the degree of delight or annoyance of the end users, i.e., Quality of Experience related to immersion. The human factor data and system factor data could be directly measured in subjective or objective Quality of Experience testing following existing measurement paradigms. Design factors are storytelling tactics including narrative, interactivity, spatiality, challenge, and many others as discussed above. These data could be obtained through qualitative research methods, such as ethnographic study, interviews, subjective report, questionnaires, etc. Finally, all three aspects constitute an operable framework for measuring quality of immersive experience in storytelling.

This framework aims at providing an entry point into the measurability of immersion in storytelling. Future empirical studies will be followed to validate this framework by measuring immersion from the point of views of human factors, system factors and design factors. As a lucky coincidence, this framework also reinforces previous models of Quality of Experience evaluated from the human, technology and contextual perspectives.

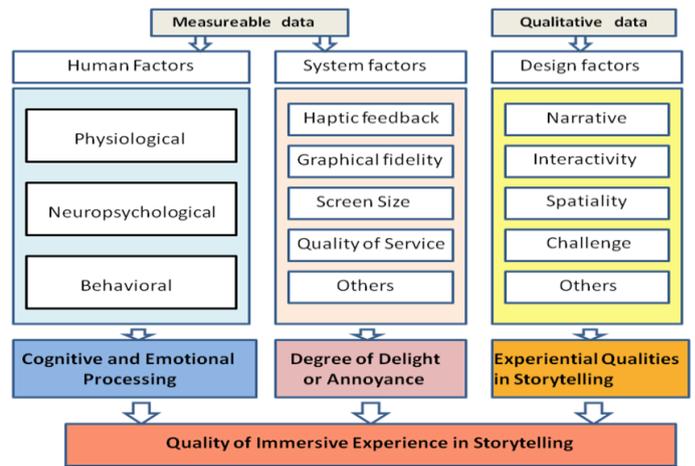


Figure 1: Framework of Quality of Immersive Experience in Storytelling

V. CONCLUSION

In this paper, we develop a framework for measuring quality of immersive experience in storytelling. This framework aims at providing concrete and viable means for the measurement of immersion which is previously only conceptually or unsystematically discussed. This is where our contribution lies.

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