# Assessment of fun in interactive systems: A survey

Luiz Carlos Vieira, Flávio Soares Corrêa da Silva *

*Laboratory of Interactivity and Digital Entertainment Technology, University of São Paulo, Rua do Matão, 1010 – Cidade Universitária, 05508-090 São Paulo, Brazil[1]*

## Abstract

Fun is fundamental in life, since it fosters interaction and learning. But the design of fun is not trivial since it is subjective: it depends upon context, preferences and the history of users. That is why assessment is an important issue in the design process. Traditional assessment methods involve observation and inquiring of users while interacting, while more recent methods involve data collection and physiological measurements. This article presents a survey on the existing methods for the assessment of fun from its constituent elements – attention, flow, immersion and emotion.

© 2016 Published by Elsevier B.V.

## 1. Introduction

The pleasure and excitement experienced when playing games or doing other enjoyable activities is known as *fun*. Fun is an important element of life because it satisfies curiosity and fosters learning (Malone, 1980), and consequently it is something that designers want to imbue their artefacts with. It is an obvious requirement for games – otherwise people would not want to play them – but it is also important for ''serious'' items, including commercial and scientific software systems. The satisfaction obtained by using or doing something, that has been searched for by Human-Computer Interaction (HCI) researchers in terms of utility and absence of discomfort, is also considered to include other non-utilitarian components of the *user experience* related to appeal, preference and emo-

tions (Brown, 2010, chap. 5; Hassenzahl, 2005), all aspects of fun (Chen, 2007). Current deployment technologies (e.g. on-line mobile markets) make it easy to have access to many similar products, particularly software systems. In cases where the users have many options to choose from, the use is discretionary, or involves sustained activity, then ease of use is not enough and designers must stimulate users to *want to* use their artefacts by making them fun (Carroll, 2004).

However, fun is difficult to design because it is an experience comprised of emotions. Human emotions result from pre-conscious events and conscious judgement of events, and are complementary to reason in the decision process by making memory of past experiences relevant, reinforcing intentions and preparing the body for action (Scherer, 2005). People interpret experiences with different levels of emotional details depending upon context of use, past experiences, preferences and expectations, and this causes the experience-related emotions to be ephemeral or hard to guarantee as a result of the interaction with an artefact (Chen, 2007; Hassenzahl, 2004). The fleeting character of fun is evident in video games. Even though

---

they are software systems, there are no functional requirements to solve real problems. Instead, they are supposed to elicit pleasurable emotions[2] in a very similar fashion to other media.

Hence a game designer, like any other designer, uses heuristics to fulfil "situational needs", such as challenges, social interaction and aesthetic preferences, in order to increase the odds that the resulting experiences are pleasurable beyond the fulfilment of pragmatic aspects (Hassenzahl, 2005). And since the emotional experience is much more subjective than the satisfaction aspects of usefulness or safety, only the observation or inquiring of people using it can help identify obscure elements of the design and provide opportunities to incorporate good unexpected events discovered by users themselves (Schell, 2008). Therefore, the practise of testing is fundamental to help improving the chances of an artefact being fun to wider audiences in different contexts.

This paper presents a survey of the existing methods for assessing the fun aspects of the experiences people have while using interactive systems, like games. To do so, it starts by briefly describing what those aspects are, and then explores the methods used to help evaluating them.

## 2. Aspects of the fun experience

It is hard to define *fun* in a few sentences. The main reason is that fun intersects different concepts such as enjoyment, amusement, pleasure and satisfaction. Pleasure, enjoyment and fun are particularly close, as can be observed in their semantics. While pleasure is "enjoyment, happiness or satisfaction", enjoyment is "the feeling of pleasure caused by doing or experiencing something", and fun is "pleasure, enjoyment or entertainment".[3]

Although those definitions seem very similar, there are important distinctions that humans intuitively understand because they have experienced such feelings many times in their lives. Humans know they had fun when they have experienced an intense, fleeting and desirable moment in which they enjoyed doing an activity and completely forgot about time and problems. Aspects that have been described as contributing to that feeling include attention, interactivity, conscious and unconscious control, engagement, and even style of narrative (Preece, Rogers, & Sharp, 2002). But it all starts with *interaction*.

### 2.1. Interaction, attention and flow

Interaction is a phenomenon of mutual influence that is important for existence because it allows for perceiving, reasoning and acting upon changes in the world, and hence

dealing with uncertainty (Dubberly, Pangaro, & Haque, 2009). As an *exploratory behaviour*, interaction builds relational properties that indicate the proper way to manipulate objects (based on physical affordances and socio-cultural constraints) (Norman, 2002) and to relate with other agents, fostering complex group behaviours like competition, cooperation and coordination (Dubberly et al., 2009).

Humans interact among themselves through both verbal and non-verbal communications. Verbal communication is the type of interaction that involves the use of *words*, either in a spoken, written or even signed form. On the other hand, non-verbal communication is the type of interaction that relies on body language to convey information. Non-verbal communication involves gestures, posture, facial expressions, eye contact, vocal cues, and even dressing or the use of space, among other forms, and it is by far the most used type of interaction employed among humans (Smith, 2004, chap. 2). They are driven by both conscious and unconscious behaviours, and thus are related to cognition and emotion. Facial expressions, for example, have been consistently related to both cognitive load and expression of emotions (Bettadapura, 2012; Levialdi, Malizia, Onorati, Sangineto, & Sebe, 2007).

Either way the motivation to interact comes from evolution, which made the human brain a system very interested in novelty. The human limited attention is constantly trying to focus on the perceptions captured from the senses that are more in accordance with internal intentions. This continuous process leads to the improvement of the *self* – a sum of all memories, actions, desires, pleasure and pain experienced so far – in the sense that what becomes known is "chunked" into bits of information that are handled by the autonomous nervous system (Csikszentmihalyi, 1991).

The intentional focusing of attention requires effort, what is known as the spending of psychic energy, and the condition in which the information on the senses threatens one's goals is known as psychic entropy (Csikszentmihalyi, 1991). The opposed condition to this entropy, when the focus of attention is effortless, is called the *optimum experience* (or *flow*) and it is said to be the moment in which a person experiences enjoyment at the most (Csikszentmihalyi, 1991). This is due to the feeling of being in control (in the flow), facing challenges that are difficult and unattained, and yet feasible.

Thus enjoyable activities usually have meaningful challenges and compatible skills, as well as the ability for total concentration, spontaneity of actions, clear information on goals, feedback of actions, strong sense of control, reduced self-awareness and reduced perception of time passage (Csikszentmihalyi, 1991).

### 2.2. Immersion

But fun is not only about performance, it is also further studied in games as the composition of challenge with two

---

[2] emotions that are perceived as pleasurable in the context of an activity despite the likeness (positive or negative) generally attributed to them (e.g. fear when playing/watching a horror game/film).

[3] definitions taken from the Cambridge and the Merriam-Webster online dictionaries.