Ouch! How Embodied Damage Indicators in First-Person Shooting Games Impact Gaming Experience

James E. Young, Ibrahim Shahin, and Masayuki Nakane

Department of Computer Science, University of Manitoba, Canada
young@cs.umanitoba.ca, {i.j.shahin,msyknakane}@gmail.com

Abstract. In this paper we present results from an exploratory study on first-person shooting game damage indicators, comparing a *red flash*, a *paper doll*, and an *x-ray* mechanism, observing impact on gaming experience.

1 Introduction and Related Work

In first-person shooting games players interact with virtual worlds through multiple modalities (first-person graphics, spatial sound, movement) from the perspective of a virtual character, with the aim of enabling the player to experience the game as the character. While creating a first-person gaming experience it is not entirely feasible to cause pain to a player when the character receives an injury, and so games attempt to replicate aspects of getting an injury without actually causing pain. In this paper we explore how damage indication methods impact players emotional and cognitive experience of gameplay, rather than other metrics such as task efficiency (e.g., best score) – an approach termed "affective ludology" [8]. From this perspective, building player immersion and a sense of presence in the virtual world (i.e., total immersion [2]) is an integral part of a successful gaming experience. In this work, we compare three different damage indication methods in terms of how they impact gaming experience – this extended abstract is only a summary of the work [10].

Damage indicators are integral to many video games and have a long history, ranging from using abstract health-point systems (such as in ID Software's Doom franchise), toward more modern and more-realistic methods such as hindering character senses (vision and audio, as with Activision's Call of Duty) or movement (as in Ion Storm's Deus Ex). Some games add additional information including from which direction an injury came from (e.g., behind) using, for example, a simple arrow (as in 343 Industry's Halo 4). We found very little work in the research community on different first-person shooter damage indication methods.

Evaluation of a person's affective state, and correlating it with measures of immersion and enjoyment, are still active research problems with various facets ranging from qualitative analysis of written questionnaires and interviews [3], applying heuristics [4], administering subjective questionnaires [1], or using a whole range of biometric and psychometric assessment methods [9]. We draw from this work and apply some of these methods in our study.

2 Damage Indicators

We investigated three damage indicators, a *red flash*, *paper doll*, and *X-ray*: the red flash indicator tints the player's screen red upon injury (Fig. 1, left); the paper doll indicator places a cut-out character silhouette at the top-left of the screen, flashing the screen background and associated body part red upon injury (Fig. 1, middle); the novel X-ray indicator overlays X-ray images of the injuries in semi-transparent red, indicating injury to either head, torso, an arm, or legs (Fig. 1, right, and Fig. 2). In all cases the opacity of the tint or flash is proportional to the severity of the injury. Thus, the three indicators form points on a range from less immersive design (red flash), more immersive intention due to providing first-person information (paper doll), and yet more immersive design due to the nature of presentation (X-ray).

Fig. 1. We compared the three indicators: a *red flash* (left) indicating an injury was incurred, a *paper doll* (middle) with red flash providing further information on where the character was injured (in the right arm), and an *X-ray* (right) showing that the character was hit in the left arm.

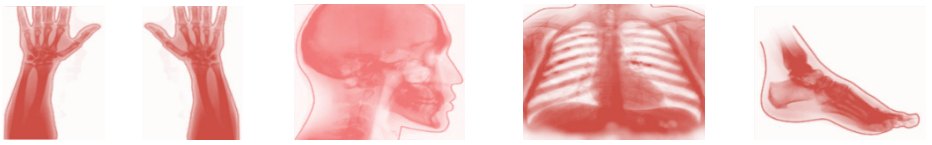

Fig. 2. The X-ray films used to show injury – left and right hands, head, torso, and foot

3 Study

We implemented a first-person shooting game using Epic Games' Unreal 3 first-person engine on a desktop PC. The game used a standard PC control scheme (WASD keys and a mouse), and a percentage-based health system.

We recruited 14 participants (explicitly with experience with PC first-person shooting games and the WASD+mouse scheme) from our local university population (age 18-32, M=25.0, 13 male, 1 female). After an informed consent and demographics questionnaire, participants played a sample level with no damage indicator to ensure that they were familiar with the controls and game scheme. Participants played three different levels using the three different damage indicators, with the order counterbalanced across participants. After each level the post-condition questionnaire was administered, and we ended the experiment with a post-test questionnaire.

The post-condition questionnaire asked the participant to rate "*how you felt* when your character took damage" and "how you think *your character felt* when taking damage," using the standard Self-Assessment Manikin [7] instrument. We administered the Game Experience Questionnaire [6] and further asked how "tough" they felt the character was and how "strong were the enemies," and finally asked them to rank how much they liked the particular damage indicator. This was followed by open-ended written questions regarding general comments and how each indicator impacted the perception of character damage, the enjoyability of the game, and the player-character relationship.

4 Results

We performed qualitative analysis on written feedback from the questionnaires, via cycles of open and axial coding, with our results presented in the themes below.

Injury Information was Appreciated. Most participants commented that the injury information was useful, and that it also added to the game experience. Such comments were evenly split between the X-ray and paper doll conditions.

Realism. There was an overall theme of participants talking about the indicators in terms of realism and how this made them feel. This was particularly common with the X-ray indicator. Discussion of realism was often observed when participants were asked to compare one indicator to the others. In particular, all participants who preferred the red flash discussed it in terms of realism, that the red flash was most realistic. Some noted that, rather than being a good thing, increased realism hindered their game play experience, and that their choice of damage indicator may depend on their relationship with the character as one participant preferred unrealistic damage indicators for not wanting to care about the main character.

Dialog with the Character. We analyzed participant response to the question of "what would your character have to say to you" in terms of comments that described injuries to the character, as an indication of how much the player was thinking of the character's health and wellbeing. We found that 3 participants discussed in such terms for red flash, 1 for paper doll, and 6 for X-ray. In all cases, participants only gave such feedback for one indicator, and said more generic things for others.

Lack of Paper Doll Salience. There was a great deal of complaint on the visibility of the paper doll. Some did not even use it. Many of those who used it reported that the location was too in the periphery, and this impacted game play and immersion. Some suggested to change the location of the paper doll or to have it blink when damaged.

X-Ray Occlusions. Even though the X-ray indicator was translucent, many people complained that it was visually obstructive, especially when the character was hit in several places at the same time and when the templates overlapped, and that this impacted how they can play the game. Many provided suggestions for how to improve the indicator such as making it less flashy and colorful, or making it smaller. Some participants recommended a hybrid indicator of the paper doll and the X-ray.

Quantitative Results We found no significant effects on affective response (SAM), or the Game Experience Questionnaire. We did find that the damage indicator had an effect on how strong participants perceived the enemies in the given trial (Friedman's ANOVA, $\chi^2(2)=6.067$, $p=0.048$, mean ranks: red flash=2.32, X-ray=2.04, and paper doll=1.64), although post-hoc tests did not reveal further effects, this suggests that enemies were perceived as being weaker for paper doll than for red flash, with the X-ray perhaps somewhere in the middle. Post-test preference responses were: 3.5 participants for paper doll, 4 for red flash, and 6.5 for the X-ray (0.5 for a tie).

5 Discussion and Recommendations

Participants reported the additional injury information provided by the X-ray and paper doll indicators was useful and caused them to think more about their characters, and their reports strongly suggest that this information, and how it was presented, contributed to their immersion. They also explicitly related the indicator to the "feeling" of receiving an injury, and for both indicators, talked a great deal more about character injuries than they did with the red flash. Finally, this finding correlates with how participants found enemies to be stronger with the red flash and weaker with the others, suggesting how the immersion can relate to quality of play or even perception of such. One surprising result was that immersion may actually hinder gaming experience, rather than improve enjoyability (as in [2]): some participants found the interaction to be too real in the X-ray case, which made them feel bad for their character and guilty, and some found the pain-type immersion to be demotivating.

The results of our new X-ray indicator were encouraging. There were many signs of immersion: participants used affective language, talked about feeling the pain, and talked more about their character's injuries in comparison to the red flash. In addition, a majority share rated the X-ray as their favorite, there was a great deal of positive feedback, and participants wrote more about the X-ray indicator than the others. Participants who did not like the indicator primarily cited the obstruction of vision, noting it made them? feel mechanically hindered instead of being injured. This is an important point to note, as the obstruction was a deliberate design decision intended to simulate the loss of senses when in pain. This tells us that designing the obstruction of senses has to be tactfully done to fit well within the game.

From our analysis and results we propose the following recommendations:

Damage indicators have a strong impact on gameplay and Immersion. Small damage indicator design changes can have a large impact on player experience and immersion, so consider this aspect of game design carefully.

Immersion has many dimensions. Increasing immersion in ways that clash with the game design may have negative experience effects, as X-ray may be too realistic.

Players can reasonably discuss aspects of immersion. Participants were clear and insightful about their experiences of immersion and gameplay, supporting self-report as a useful means for future studies.

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