Investigating Narrative in Mobile Games for Seniors

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ABSTRACT
Narratives are an intimate part of our lives. Based on behavioral research suggesting that older adults tend to process text better at discourse level, this study investigates the impact of narrative structure on the enjoyment level of older game players. Two variations of a casual memory mobile game were built, one with a narrative and the other one without. Nineteen senior citizens, differentiated according to their play orientation, play-tested the games. Results show that embedding narratives in mobile games enhances the play experience of older adults, irrespective of their play style. This may have implications both for game developers and for seniors' acceptance of casual games.

Author Keywords
Narrative structure, Elderly, Enjoyment, Mobile games.

ACM Classification Keywords
H.1.m. Information systems **[Models and Principles]**: Miscellaneous.

General Terms: Design, Experimentation

INTRODUCTION
A few portable games for seniors, like *Brain Age*, have met with popular success, but games on the mobile phone for older adults remain relatively understudied. With the rapid adoption of mobile phones as personal items by the aging baby-boomer generation [15], the elderly is potentially a promising niche audience for mobile game developers.

Digital games can benefit seniors in terms of entertainment and relaxation, socialization, mental challenges and physical fitness [10]. But to design games that older players will actually enjoy playing, we must understand how each individual component of a game impacts seniors' play experiences. This study addresses the issue by investigating the role of narrative structure in mobile games for the elderly. As "fundamentally storytellers and storylisteners…who think, perceive, feel, and act on the basis of stories" [12], people's natural affinity with narrative presents it as a familiar element that could potentially help seniors to better enjoy mobile games.

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UNDERSTANDING NARRATIVES
Narratives represent an important dramatic element that serves to give context to the formal elements of a game [8]. They are often defined as "the representation of a series or sequence of events" [23]. In this study, we shall use the term 'narrative' to subsume story, plot and character.

Narratives structure our lives, experiences and even identity [4, 22]. Behavioral research has shown that older readers tend to rely more on "discourse-level structures and knowledge-based processes" to make sense of text [17]. Processing text at the discourse-level, as opposed to the textbase-level [19], entails "constructing coherent macrostructures…to understand the situation given by the text" [13]. In other words, older readers are more prone to build a mental situation model of the content based on information from prior knowledge to enable comprehension. This corresponds to how understanding narrative structures requires the audience to build and remember "an integrated and coherent mental model" of the overall plot elements [18].

Mental capabilities, like working memory, declines with age, but older adults are able to exploit their life experiences [12] in the form of narratives. According to Busselle and Bilandzic's [5] model of narrative comprehension and engagement, comprehending a narrative likely facilitates emotional engagement. Thus, we posit that seniors make better sense of, and so enjoy more, games with narrative structure than flat or non-structured games.

PLAY STYLES
Senior mobile phone users are not a homogeneous group. Despite the general tendency of older adults to process text at discourse-level, different players will experience games with narrative structures differently. Yee's taxonomy of individual player's motivations [24] can help us to differentiate among users. His motivational framework is based on Bartle's scheme [1] that classifies players into achievers, explorers, socialisers and killers. Through empirical testing, Williams, Yee & Caplan [23] eliminated the 'explorers' type and added the 'immersionist' category, fixing three main components of player motivations: Achievement, Social and Immersion. For this study, we focus on single-player games which do not involve the social component.

Achievers are mainly interested in acting or doing things in the game. For them, "the point of playing is to master the

game" [1]. Yee's player motivation model [26] expands the focus of achievers from simply points or score accumulation to include advancement (desire to be powerful), mechanics (interest in game rules for performance optimization) and competition (desire for challenge). Conversely, immersionists pay more attention to aspects like discovery (finding the unknown), role-playing (creating a persona), customization (interest in character personalization) and escapism (desire to escape from real world).

PRELIMINARY STUDY

To better understand what kinds of narratives especially appeal to the target population, we conducted a preliminary study with seven seniors, via oral administration of questionnaires asking about their demographics, social relationships, use of media and mobile phone, gaming experience, familiar contexts, interests and passions. It was found that most of them had one recurring wish or concern: the happiness and well-being of their closest relatives. Also, their most frequented outing contexts included coffeeshops (food courts), shopping centres, and religious places. A simple narrative was then formed. We employ the three-act restorative structure, frequently used as a high level framing tool in games. The structure specifies the establishment of a conflict in the first act, followed by a second act which elaborates on the consequences of the conflict, and finally the resolution of the conflict is played out in the final act [16]. In the narrative used for our study, a grandparent would like to grant all the Christmas wishes of the family members but loses the wish list on the way to the shopping centre. The player, as the grandparent, is required to resolve the narrative arc by trying to recall items in the wish list.

MOBILE GAMES FOR SENIORS

Figure 1 shows the screen shots of two memory game versions that we developed, presenting the 'Game problem' and the 'Results' screens respectively. The choice of memory games was motivated by the strong preference of seniors to play games for "cognitive exercise" or "mental workouts" [21]. The gameplay in both games is identical: the player has to select an object that has been seen earlier out of a list of choices. Hence, both games focus on short-term memorization tasks, which can help the senior to improve or maintain the proper functioning of their working and iconic memory. The difference is that the 'narrative version' (on left) has an embedded storyline, while the 'non-narrative version' contains only the basic premise of a card game.

Figure 1. Screenshots of the narrative version (left) and non-narrative version (right) of the mobile games

Comparability of Mobile Games

The two games were given the same database of items to remember and the duration of a typical play-through of both game versions was also measured to be roughly equal. A pilot study with six participants was carried out to ensure that the games were similar in terms of usability. We applied the 'lessons learned' from the usability test to improve the games used in the actual study (e.g., with menu selection, wording, icon recognition, screen readability).

QUESTIONNAIRE DEVELOPMENT

Measuring Player Enjoyment

Player enjoyment has previously been equated with Csikszentmihalyi's concept of flow [6, 24]. Although we concede that "game enjoyment represents a broader set of experiences besides flow" [19], enjoyment is too expansive to capture accurately and we found no comprehensive game enjoyment model. Brockmyer & al's [3] Game Engagement Questionnaire (GEQ) was considered, but while this study focuses on measuring *enjoyment*, the GEQ looks at *engagement*, which encapsulates multiple other concepts such as immersion, presence and dissociation.

Sweetser & Wyeth developed a model of game design heuristics, called GameFlow, based on the eight elements of flow (i.e. concentration, challenge, player skills, control, clear goals, feedback, immersion, and social interaction) [24]. The model, validated as a viable concept [24], was subsequently reformatted into a set of scales (the EGameFlow) to assess players' enjoyment of e-learning games [8]. This study adapted the EGameFlow to fit our two games: items related to the social interaction and knowledge improvement dimensions were not considered, as no social, multiplayer or knowledge transmission aspects are involved in our games. The questionnaire was tested in the pilot study, and items which lowered the reliability index ($\alpha > 0.7$) of the scale were removed (Table 1).

Table 1. Player enjoyment scale used in the study

I enjoyed playing this game.
Generally, I can remain concentrated in the game.
I was burdened with tasks that seem unrelated to the game.
Overall, game goals were presented clearly.
I received feedback on how well I was doing in the game.
I received immediate feedback on my actions in the game.
The difficulty of challenges in the game increased as my skills improved.
The game provided new challenges with an appropriate pacing.
I felt a sense of control over the game.
While playing, I always knew what the next step to follow was.
I temporarily forget worries about everyday life while playing the game.
I experienced an altered sense of time while playing the game.
I felt emotionally involved in the game

Assessing player styles

Scale items to determine player styles were created based on the components and descriptions of Yee's taxonomy of player motivations [26] (e.g., "When I play a game, I want to be immersed in a fantasy world"). Care was taken to eliminate aspects irrelevant for our mobile games (e.g. competition, customization) and to tailor the language of the questionnaire to the capabilities of seniors (Table 2).

Table 2. Scale used to determine player style

I want to be immersed in a fantasy world.
I want to be able to explore a world.
I want to try out different characters and roles.
I want to be part of a story.
I want to escape from the real world.
I want to get a high score.
I want to win the game.
I want to get as many rewards as possible.
I want to feel powerful.
I want to know precisely how the game works.

As Yee cautioned, we do not refer to the two factors of achiever and immersionist as impermeable categorization boxes for players [26]. However, most players do tend to have a "primary style, and will only switch to other styles as a deliberate or subconscious means to advance their main interest" [1]. In our study therefore, a player has a score for each of achievement and immersion. The relative score on each allows us to understand the player's tendency, thus our use of the term 'player style' instead of 'player type'. Similarly, even though Bartle's and Yee's classifications were developed based on online games, we believe that player styles or tendencies apply across game genres and will be equally relevant for mobile games.

METHODOLOGY

Study design

The study followed a 2×2 mixed design, with game version as the within-subjects factor and player style as the between-subjects factor. Player enjoyment was the only dependent variable. Seven male and 12 female seniors, aged from 55 to 82, were recruited from an elderly volunteer centre, where the study was conducted. All of them had similar level of education (secondary school), and all but 3 were retired. All participants have owned a mobile phone for at least 1 year and on average use it 1 to 3 times per day. To control for order effect, participants were randomly assigned to one of two groups, each of which played the two games versions in differing orders.

Procedures

To fix a common baseline of familiarity with the gameplay and the controls of the mobile phone used (Nokia N96), all participants were guided through a simple application (with no game elements) at the start of the study. The application allowed subjects to get used to the following before the actual game-playing sessions: scrolling through a list, pressing the centre button to continue, remembering items and selecting the correct ones, and understanding the icons used (e.g. green ticks, red crosses) (Figure 2). Also, all participants filled in an enjoyment questionnaire immediately after having played each game. The game-playing sessions were limited to 10 minutes or when the subject failed to pass a level for four times in a row, whichever was sooner.

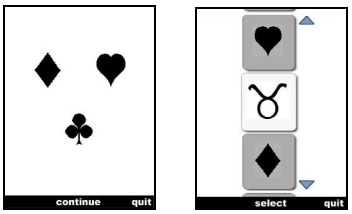

Figure 2. Screenshots of the simple application

DATA ANALYSIS AND RESULTS

Subjects were designated as having the primary play style of either an achiever or an immersionist based on their aggregated score on the corresponding items of the two dimensions in the player style scale. Reliability statistics performed on player enjoyment for each game version (α =.793, α =.754; $\alpha > .7$) and player style (α =.831, $\alpha > .7$) scales demonstrated that they were internally consistent.

A 2×2 (Game version×Player style) mixed-model ANOVA revealed that the main effect for player style was not significant. Thus, there was no overall difference in the enjoyment scores of achievers (M = 5.354) compared to immersionists (M= 4.885). However, a significant main effect for game version was obtained, $F(1, 17) = 6.028$, $p < .05$ ($\eta^2 = .262$). Enjoyment values for the narrative version of the mobile game (M = 5.293) were significantly higher than for the non-narrative version of the game (M = 4.946).

Furthermore, a significant Game version×Player style effect was found, $F(1, 17) = 10.578$, $p < .01$ ($\eta^2 = .384$). The cell means indicated that despite a large difference in player enjoyment scores for immersionists between the narrative (M = 5.288) and non-narrative versions (M = 4.481), enjoyment scores of achievers for the narrative game (M = 5.297) were similar to their scores on the non-narrative version (M = 5.410). The narrative game version had roughly equal enjoyment scores for both immersionists (M = 5.288) and achievers (M = 5.297), but the non-narrative game version saw much difference in enjoyment scores between immersionists (M = 4.481) and achievers (M = 5.410). Figure 3 illustrates the interaction effects.

DISCUSSION AND IMPLICATIONS

Kumar [13] advocated that metastructural devices like narratives and story development can help to enhance the experience of casual games for the mainstream audience, "answering the player's question (of) 'Why am I doing this?' which wasn't being answered by abstract match-3 games". Prior literature in behavioral psychology suggests that such narrative structures have the potential to heighten the enjoyment of games even more for older players.

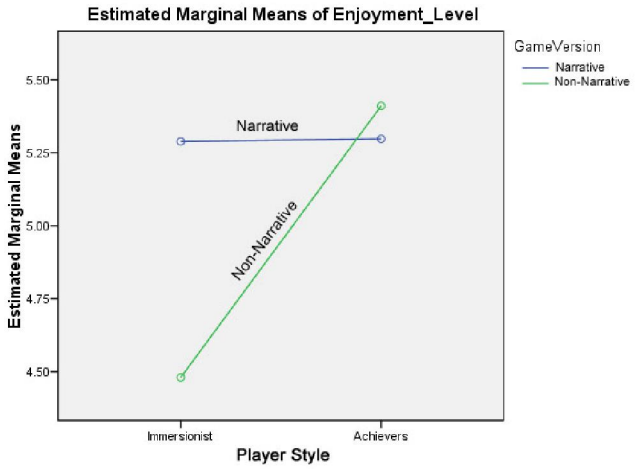

Figure 3. Interaction Effects of Game version x Player Style

The aim of this study was thus to investigate how narrative impacts seniors' play experiences. Results revealed that enjoyment of the narratively structured game was similar across the elderly group, independent of play style. However, immersionist-oriented senior players significantly enjoyed less the non-narrative game version than the achiever-oriented. This implies that mobile casual games with narrative structures can potentially capture a greater portion of the elderly audience as compared to flat or purely abstract games, making our findings a useful heuristic in game design. Moreover, increased enjoyment may enhance the senior's motivation to engage more with games, an entertainment activity shown to potentially benefit their well-being cognitively and emotionally [2, 9].

Although written and filmic narratives have been well studied with seniors, little has been done in the game medium. Our work thus adds to the literature on game design, narrative gerontology, technology acceptance, marketing, and behavioral science. Further research can extend the study to other cultures for further validation of the results, and add in a social component to the games to investigate the effects of the third play style not explored here.

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