Deconstructing 'Gamified' Task-Management Applications

Dennis L. Kappen
Gamer Lab
University of Ontario Institute
of Technology
2000 Simcoe St. N, Oshawa,ON
dennis.kappen@humber.ca

Jens Johannsmeier
Universität Osnabrück
Neuer Graben 27
49074 Osnabrück, Germany
jjohannsmeie@uos.de

Lennart E. Nacke
Gamer Lab
University of Ontario Institute
of Technology
2000 Simcoe St. N, Oshawa,ON
Lennart.nacke@acm.org

ABSTRACT

Many tasks—and the societal need to attend events as part of our office culture—have an overwhelming effect on our management capacity. Using gamification to make task and chore management more exciting could allow people to be more productive while they are engaged and focused on their tasks. There is currently a lack of studies on the usefulness of gamified task-management applications. We address this by taking a look at two memory-aid applications with task-based gamification: Task Hammer (TH) and Epic Win (EW). Among our findings is that TH was easier to learn to use while EW was more satisfying and motivating. Participants who felt good about an apps' reward system were also more satisfied with its use. Conventional task managers are, however, preferred for speed and efficiency. Based on our interviews, it seems that gamified task managers are not more useful than classical ones. However, there is a relation between how participants perceive game elements and how useful they find it for task management.

Author Keywords
Gamification, player experience, gameplay; interaction design; usability; human factors

ACM Classification Keywords
K.8.0 [Personal Computing]: General – Games

INTRODUCTION
With the economical struggle in recent years, companies are anxious to increase the productivity of their employees. This is especially important for many routine tasks that need to be completed, but that do not tend to be intrinsically motivating. Gamification promises to be the answer to this problem since some companies have developed applications around routine tasks and chores that are hard to manage without reminders or to-do lists. However, it is currently unclear how useful these applications exactly are and what gamification of task-management is more motivating. If these apps are indeed more effective than using post-it notes, calendars, diaries or organizers to keep track of peo-

ple's activities, they should be milestones of successful gamification. Given how ubiquitous mobile technologies, such as smart phones, have become, reminding oneself has become more automated and integrating reminders and tasks in game-like systems and communities seems like a natural fit. Hence, we wanted to study the usefulness and game aspects of two recent task-management gamification applications: Task Hammer and Epic Win. We were especially interested in how "players" respond to the gamification in these task management apps.

Related Work
Many industry sectors such as business, healthcare, education and accounting have begun to use game design elements [2]. Based on self-determination theory (SDT) [7], intrinsic and extrinsic motivations are key influencers for people to engage in activities including games. Ryan et al. [8] infer that as motivation to play games, 'players themselves find games gratifying and pleasurable'. This indicates that gamification of task-management applications must contain game attributes, which are inherently interesting and enjoyable and lead to a separable outcome [7].

Gamification by management imposition [5] looked at the improvement of affective experiences of employees in their work place. Social motivations of gamification indicated users to be keen on identifying reciprocal benefits [3] in using a gamified application. However, usefulness of gamification applications remains an underexplored area.

A STUDY OF GAMIFIED TASK-MANAGEMENT

Gamified Task Management Apps
To explore gamification in task management applications, we investigated two memory-aid task-manager apps.

Task Hammer (TH) is an Android-based application developed in 2012, which uses game elements as a motivational tool to influence player behaviour. TH turns completing tasks into a role-playing game (see Figure 1 left). In TH each task is a challenge. They gain points for remembering to complete the tasks on time. The app has alarms for remembering tasks and a limited selection of avatars. It allows players to set specific player attributes, such as strength, vitality, intelligence, perseverance, charisma to specific tasks.

Epic Win (EW, see Figure 1 right) is an iOS gamification app. The core of the app is a to-do list, which serves as a

notepad while incorporating a role-playing spin similar to TH. The app focuses on quests of achieving tasks, while giving players the opportunity to develop a character on a multi-level game platform, gain virtual money and develop skills of their character.

Task Hammer   *Epic Win*

Figure 1. Screenshots of the gamified task management applications TaskHammer (left; http://www.mdjsoftware.com/task-hammer) and EpicWin (right; http://www.rexbox.co.uk/epicwin/index.html.).

The premise of the game is that "our lives are full of quests". The main player challenge is to input daily tasks as quests to be carried out. The process of remembering to do the quests (i.e., the chores) earns players rewards. As each player completes a task from the to-do list, they move forward on the quest map. Players can choose their own avatars and the personality of the avatar changes with the aim to give the player a higher aspired personality.

Method
For evaluating gamification effectiveness, we investigated attributes of player experience in TH and EW by comparing player experience characteristics defined by a modified version of the USE questionnaire [4] (we added questions for intrinsic and extrinsic motivation, amotivation and comparing the game task-manager apps with conventional task-management tools) consisting of 60 questions in total. Responses to the questionnaire items were indicated using a 7-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (7). We compared responses of players to using TH and EW as a gamification application instead of using their standard task manager (MS Outlook calendar, Google Calendar or a simple diary).

Participants and Procedure
To explore the nature of user experience of players, voluntary participants downloaded the apps for Android or iPhone. They were instructed to use the task-manager application for four days, after which they participated in a survey and interview session. The aim of the interview session was to obtain a better perspective on the challenges, frustrations and fun experienced by the participants in using these apps. Of the fourteen (N=14) people who were interested in participation, seven had iPhones and seven had Android phones. Among this sample population, we had eight female and six male participants playing either application. The age range of the participant sample was 19 to 44 (M=29.14, SD= 6.71). Before partaking in the study, participants were informed of the procedure and signed an informed consent form. The task required each participant

to go about their normal duties of adding tasks into the app of their choice (TH or EW), participating in a survey and reporting back on their user experiences through a diary log and an interview. Participants had varying degrees of expertise in playing digital games; they were familiar with apps used on a Smartphone device. Two participants had no digital gaming experience.

Interview Protocol
The fourteen participants who took part in the survey were interviewed to evaluate player motivation, frustrations and experience. The interview questionnaire contained 16 questions, categorized into user experience, frustrations in using the app, motivations to playing the app, reward system, levels of achievement, the importance of game elements, and the engagement aspects in the specific apps they had played. Participants were asked to elaborate on their user experience in playing the app of their choice.

Results
Results from Questionnaire Data
The questionnaire had sections on 1) demographics; 2) gaming background; 3) usefulness; 4) ease of use; 5) ease of learning; 6) satisfaction; 7) motivation (intrinsic); 8) motivation (extrinsic); 9) amotivation; and 10) comparison between existing task-management apps being used and the gamified application. For each of the sections 3-10, we averaged the results of the corresponding questions and carried out one-sample Wilcoxon signed-rank tests to test whether the participants' (pooled across both apps) responses in each of the categories were significantly different from the neutral category (4). This should allow us to identify any of the apps' aspects about which the participants had strong feelings one way or the other. We also investigated whether there were any significant differences between responses of the two groups using different apps via Wilcoxon rank-sum tests. For both tests, we used a normal approximation with continuity correction due to ties in the data, so the z-statistic is reported for significant tests. The correlation coefficient *r* is reported as an effect size for both tests [6]. We adopt Cohen's suggestions that a value of 0.10 denotes a small effect, 0.30 a medium one and 0.50 a large one [1]. Figure 3 shows box-whisker diagrams of the averaged results for the eight categories separately for the two groups.

Demographics. Most participants had several years of gaming experience (M=14.57, SD=6.77) and played digital video games for about an hour every day on average (M=1.28, SD=1.06). Of the participants, 50% used Google Calendar and 35.71% used Microsoft Outlook to manage their tasks and workflow activities in a day, with the remaining two participants using the web app *Trello* or a diary, respectively.

Central tendencies. Our results show that participants found the apps easy to use (Mdn = 5.14, z = -2.83, p < 0.01, r = 0.76). This did not differ significantly between the two groups, p > 0.05. Similarly, the responses indicate that the apps' usage is also easy to learn (Mdn = 6, z = -3.08, p < 0.01, r = 0.83). This held significantly more strongly for TH

(Mdn = 6.75) than for EW (Mdn = 5.5), z = -2.31, p < 0.05, r = 0.61. Responses in the comparison category indicate that participants preferred their conventional task managers (Mdn = 5.4) for their speed and efficiency, z = -3.03, p < 0.01, r = 0.81. This effect is comparable between the two groups (TH: Mdn = 5.4; EW: Mdn = 5.6), p > 0.05. All other categories not explicitly mentioned here did not reach significant results in any of the two tests.
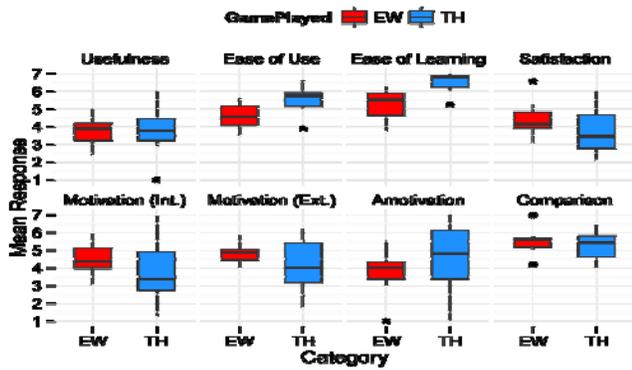

Figure 2. Box-whisker diagrams showing the distribution of averages of the two groups for each of the eight categories of the modified USE questionnaire. Whiskers indicate 1.5*IQR.

Correlations between categories. We were also interested in how participants' answers in the different categories related to one another. Namely, we wanted to find out whether the participants' intrinsic motivation correlated with their judgement of the apps' usefulness. To this end, we computed Kendall's tau as a correlation coefficient, resulting in τ = 0.48 for the categories "Motivation (intrinsic)" and "Usefulness". This correlation is significant with z = 2.32, p < 0.05, showing that participants' perception of the task managers' usefulness was related to how motivated they were to use the game app. Furthermore, we found a significant correlation between the averaged responses to the categories "Motivation (extrinsic)" and "Satisfaction", τ = 0.51, with z = 2.48, p < 0.05. This result indicates that participants who felt good about the apps' reward system were also more satisfied with its use. Another notable correlation was found between the categories "Motivation (intrinsic)" and "Comparison" (τ = -0.45, z = 2.16, p < 0.05). This implies that, whether participants preferred their standard task manager was related to whether they felt motivated by the game elements of the apps.

Results from Players Interviews
Each participant was interviewed to analyze their perspectives and experiences. The notes from the interview sheets were reviewed and some of the participants' comments are recorded below.

Actions. Many participants indicated that they were at first intrigued by the concept of playing a task management app for points. They were willing to try out the gameplay elements of the apps of their choice. A few participants were critical about the apps inability to communicate the basic story of the game. P6 (EW): *"I felt I understood the concept*

but the application could have done a better job in helping me understand [...] the game quicker". P1 (TH): *"I felt that the premise of the game was not clear in the beginning, and, I had to play and figure things out on the fly".*

Challenges. The participants evaluated the challenges of the game. Two of the participants were non-gamers and were curious to try out the app. However, their response to the "challenge" aspect of the game was quite critical. P3 (TH): *"This game did not have [...] challenge [...]; however I liked the reminders and the set up [...]".* P2 (TH): *"I felt [...] challenge was very basic [...]; I liked [...] the points received to do daily chores and set priorities for activities".*

Achievements. We enquired about the game-defined goals in using TH and EW. Interestingly, there were some participants who felt a sense of achievement while playing the app. One participant mentioned a sense of accomplishment: P1(TH): *"Yes. I even checked off tasks while grocery shopping because I wanted to feel that sense of accomplishment, especially on days when I didn't feel so motivated."* P3 (TH): *"Even if there are no points, I feel a sense of achievement when I am done with the task. I wouldn't mind the point system"* Hence the achievement attribute was intrinsically motivated for a few participants. On the other hand, the 'game experience' portion of the game design elements encouraged motivated play among users.

Fun. We looked at specific activities that the participants' termed as "fun" from an enjoyment and pleasurable experience perspective. "Fun" had different meaning for many participants. As examples of a few comments from participants we present the following quotes: P6(EW): "*Most fun for me was to [...] see myself being represented on this map, it got me going forward on a journey[...]."* P1(TH*): "The fanfare that occurs when completing a task is fun, and definitely makes doing something like cleaning the bathroom feel more rewarding."* P4 (TH): *"At the beginning, the app is fun [...] after that I guess that the fun just decreases."* P12 (EW*): "Fun not so much, but I did have a sense of accomplishment and "enjoyability" when I completed quests, and gained rewards*. From this we inferred that fun on certain occasions was linked to the representations of game elements, character transformation in the app, animation and sound effects and the element of surprise.

Game Design Process. After their initial challenges with the game interface, most of the participants were happy with the app. One interesting comment was from P14 (EW): *"I don't know how much of a social aspect there is to the app, other than broadcasting your activities on [...] Facebook or Twitter, which I don't really want to do."* Lack of customizability and minimal options of female avatars were also comments posted by a few participants. Additionally, lack of the element of surprise was another characteristic that made the game experience less enjoyable. Another major challenge was the inability of the apps to synchronize with existing task management apps, so that the players would not have to re-enter their tasks from the beginning.

Motivation (Intrinsic). A few of the participants informed us that they had no choice about not being intrinsically motivated about getting their chores done on time. Most participants had a sense of accomplishment in the act of being able to strike down tasks as completed.

Motivation (Extrinsic). Many participants questioned the rationale behind the allocation of the points. The reward system though exciting at the onset of the game was insufficient to sustain the excitement level in the game. More than the points accumulated, one participant mentioned visual stimuli (or a better aesthetic representation) provided a greater motivation to continue playing the game:P6(EW): *"...the rewards motivated me to a certain extent only, however I was more excited to see my character move on the map."*

DISCUSSION
The results of the survey can be briefly summarized as follows: Gamified task managers like TH or EW do not seem inherently more useful than classical ones, although this was to be expected, the primary effect of gamification should be to add motivation and satisfaction to the activity [8]. However, this does not seem to be the case with the two apps we tested: Participants' answers indicate that they did not feel strongly motivated (neither extrinsically nor intrinsically) nor did they feel particularly satisfied while using the apps. While the results also imply that participants did not feel aversion towards the gamified task managers (as seen in the neutral responses to the "Amotivation" category), the results of the "Comparison" category suggest that most of them preferred their standard task managers for everyday use. For example, most subjects found their standard task manager simpler to use, which somewhat negates the significant results of the "Ease of learning" category.

The questionnaire did not reveal many clear differences between the two task management apps studied. Although the results do suggest a tendency that TH is easier to (learn to) use while EW is more satisfying and motivating, the only category that reached a significant result was "Ease of learning".

Correlating the scores for the different categories revealed a few notable results. For instance, the significant positive correlations between intrinsic motivation and usefulness and extrinsic motivation and satisfaction imply that there is a relation between how participants perceive the game elements of the apps and how useful they find it for task management or how satisfied they were with the overall product, respectively.

CONCLUSION AND FUTURE WORK
Many versions of task-management applications other than TH and EW do exist. Our choice of these applications were focused toward understanding the value of game design elements superimposed over the attributes of usability such as usefulness, ease of use, ease of learning, satisfaction and motivation. The key comparators in this study from the survey questionnaire and interviews allowed us to understand the experiences of the users of these task management applications from the vantage point of the user.

Many participants indicated that just the addition of extrinsic motivational elements in the form of point and badges would not excite them to continue being immersed in a gamification application. We understand that our sample size was low; however the depth of results from questionnaire and interviews together provided us with valuable insights into the motivational design aspects essential for task-management gamification. We aim to continue and expand the study over a wider population to determine the efficacy of the design of task-management applications. Gamified business applications will not be used pervasively because of the presence of game design elements, but because of motivational user experience design, which drives the application to being a pleasurable experience.

REFERENCES
1. Cohen, J. *Statistical power analysis for the Behavioral Sciences*. Academic Press, New York, 1988.

2. Deterding, S., Dixon, D., Khaled, R., and Nacke, L.E. From Game Design Elements to Gamefulness : Defining " Gamification ."*MindTrek'11, September 28-30, 2011, Tampere, Finland.*, (2011), 9–15.

3. Koivisto, J. Social Motivations to Use Gamification: An Empirical Study of Gamifying Exercise. *Proc of 21st ECIS '13*, (2013), Pre–print.

4. Lund, A.M. Measuring usability with the USE questionnaire. *STC Usability SIG Newsletter 8*, 2 (2001).

5. Mollick, E. and Rothbard, N. Mandatory Fun : Gamification and the Impact of Games at Work. (2013), 1–51.

6. Rosenthal, R. *Meta-analytic Procedures for Social Research*. Sage, Newbury Park, CA, 1991.

7. Ryan, R.M. and Deci, E.L. Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary educational psychology 25*, 1 (2000), 54–67.

8. Ryan, R.M., Rigby, C.S., and Przybylski, A. The Motivational Pull of Video Games: A Self-Determination Theory Approach. *Motivation and Emotion 30*, 4 (2006), 344–360.