Time's Up: Studying Leaderboards For Engaging Punctual Behaviour

João P. Costa, Rina R. Wehbe, James Robb, Lennart E. Nacke
Laboratory for Games And Media Entertainment Research (GAMER Lab)
University of Ontario Institute of Technology
2000 Simcoe Street N, Oshawa, ON, Canada, L1H7K4
firstname.lastname@uoit.ca

ABSTRACT
In the workplace, an individual's punctuality will not only have an effect on how a person is viewed by colleagues, but will also reverberate on their productivity. Being late for a meeting can be disruptive to the working team, costing everyone time and causing the individual to miss valuable information. Little has been done to improve the punctuality of working teams. Therefore, we were interested in studying the effectiveness of leaderboards, a common gamification technique, for improving punctuality of participants to regular work meetings. Leaderboards were comprised of data collected by monitoring the arrival times of the participants, which influenced their scores in the leaderboards. We found that leaderboards themselves did not promote punctuality of every participant, but gave rise to various gameful social comparisons. These gameful social comparisons that emerged among participants when using leaderboards for our meetings were reported to be the cause of their punctuality improvements.

Author Keywords
Gamification; Punctuality; Leaderboards; Workplace; Games

ACM Classification Keywords
K.8.0 Personal Computing – General: Games; J.4 [Computer Applications]: Sociology, Psychology – *Social and Behavioral Sciences*.

INTRODUCTION
Work meetings are a crucial way of sharing information about projects and other pressing subjects. Moreover, to be punctual to these meetings is an important matter for the smooth flow of a meeting. Delays of meeting start times because of the absence of an individual can cause productivity interruptions to an entire team. Some industry approaches toward gamification have been promoting leaderboards to motivate employee behaviour and to motivate people to attend to tasks that they might consider boring. We wanted to better understand the role of leaderboards in promoting and improving punctual behaviours, so we studied the punctuality of the members of an academic research laboratory. Leaderboards are nothing more than a list of participants in a competition that are ordered according to a variable, such as highest to the lowest scores. They are known to stimulate and promote competitiveness and are also recognized as an effective way of gauging who is better at what the competition stands for [3]. However, in their essence, leaderboards need to feel fair to all participants in order to correctly encourage all those involved in the activity being gauged. Leaderboards were used to motivate the members of a laboratory to become more punctual. At the same time, we observed their particular behaviours and reactions to their rankings and those of their colleagues, among others. Several studies have implemented a playful or gamified approach to work tasks with the aim to, for example, improve participation and collaboration [8], promote learning [6], make mundane tasks more exciting [9] or increase productivity [12,15]. Although, based on previous research [10,12], gamification can sometimes work not *for* its designed purpose, but *against it*, if it is not implemented correctly. There is a danger in decreasing the performance and interest of participants in their tasks, because they will perceive the activity solely as *mandatory fun* imposed by their managers [12] (opposed to the feeling of playing a game where task burden is not immediately perceivable).

Our research further reinforces this notion of mandatory fun, since the results of our study show that the majority of the participants were not engaged by the leaderboards and exhibited an even more untimely behaviour, demonstrating a lack of interest in keeping their punctuality. However, our study shows that the leaderboards did improve the punctuality of some participants, allowing social comparisons. In this specific case, we are discussing the various observed behaviours in our study. We will show that for most of these participants, it was important to be ahead of their colleagues, or even their supervisors, thus highlighting the emerging competitiveness that leaderboards inject in the activities while promoting positive personal social behaviours like comparison as well.

Gamification '13, October 2 – 4, 2013, Stratford, ON, Canada.

RELATED WORK

Motivating workers to accomplish tedious tasks by overlaying game mechanics is not a novel concept [7] and has been studied and documented in the late 1950s in Donald Roy's "Banana Time" experiment [15]. Roy documented several ways on how to entice workers to be more interested or motivated to perform tedious tasks by integrating games and game-like activities at the workplace.

In a factory setting [2], managers could exert better control over workers. After gamifying tasks, managers observed that workers had gained greater interest in the interaction with fellow colleagues instead of being concerned with the managerial underlying technicalities like performance improvement, which could be the original intention of the playful task. A necessary distinction has to be made between doing tasks *"as work"* and *"at work"* [13]. The drive, will and energy to accomplish tasks in these two different contexts is influenced by intrinsic and extrinsic motivation defined as Ryan et al.'s Self-Determination Theory [4,16]. Moreover, what influences an individual's motivation to do something *"as work"* rather than *"at work"* is the existence or absence of consent to the gamified task, which can be seen as a *mandatory fun* activity [12]. The higher the degree of consent to the task, the more likely the employees will be to perform it (as long as they see it as a fair task for everyone and as long as it has been made clear for all participants). It is this same feeling of consent and meaning that is generally most difficult to cross and that separates the User Experience Hierarchy of Needs [1] into two tiers which divide the pyramid into extrinsic or intrinsic reward. If the gamification of tasks at work fail to feel meaningful and to be pleasurable to employees [12], then they are failing to be intrinsically motivating.

Various artefacts can be used to gamify an activity including or not limited to badges and tokens, experience levels, leaderboards. Leaderboards [5] consist of a list of participants, ordered by the highest to the lowest scores, and can be viewed in different ways such as all-time standings, weekly or daily rankings. They are known to stimulate and promote competitiveness and engagement between the players participating in naturally competitive activities, while gauging the competence of the participant [3]. In a study conducted by Mollick and Rothbard [12], leaderboards were used to understand the degree of motivation that these might imprint in employees when performing tedious and cumbersome activities at work. Their attempt to turn work into a more meaningful and pleasurable activity by applying a basketball gamification layer over the work tasks made the whole experience more playful in a competitive sales environment when it was consented to by the participants, demonstrating that gamification is a resourceful tool when done right to increase engagement in tasks and to push productivity.

Furthermore, research in games at work indicates that, when comparing a gamified task to a non-gamified counterpart [12], participants exhibit a greater positive affect towards work if they are engaged in *game-like* activity. When considering the general workplace activities, particularly the ones that are tedious, McGonigal [11] points out that gamifying such tasks is indeed a good way to stimulate and promote positive reactions towards tasks that would otherwise have been associated with negative affect, and no propensity or inclination to be completed by anyone.

On the contrary, further research also indicates that gamification yields results only when properly executed [10]. In that study, badges are used to gamify a trading service, in which the results point out that badges themselves did not present much value to the users, exhibiting a lack of interest due to an already present extrinsic reward, selling ones belongings. Such is corroborated by Deci and Ryan as well as by Przybylsky's work, in a sense that the greater the extrinsic motivations are present, the weaker the intrinsic motivation will be triggered [4,14,17]. This denotes the difficulty that exists in reaching the upper tiers of the Hierarchy of Needs as they are attained through feelings such as *competence, autonomy* and *relatedness* as described by the Cognitive Evaluation Theory (CET) also researched by Deci et al.s's work [4].

METHODOLOGY

To further explore the effects of leaderboards on the punctuality of the participants, we adopted a one-group post-test design, where the arrival times to meetings of laboratory members were recorded for nine meetings (i.e., two weeks). For the purpose the study, participants were asked to meet daily and report on the item they were presently working on. At the conclusion of the study all participants were invited to complete an exit survey to better understand their experience. The contents of each meeting had the purpose to ensure individuals were on track, focusing on and giving updates on the daily activities to coworkers. Issues or blockers were also to be reported to give place for collaboration. We introduced a time recording application that was available on site for all workers to use on each meeting. Every participant was reminded via email to use the application before the start of the meeting.

Procedure

Participants were walked through the study after informed consent was obtained. On every meeting, the Android tablet was passed along among the present attendees, and was then laid on a visible location for late attendees to use upon arrival. The application exhibited a toggle button per participant with their names on them, read from a main comma-separated values (CSV) file. The action of toggling such button represents the arrival of an attendee to the meeting, making the application register the time at which the button was tapped. The application also allowed to un-toggle a button in case someone tapped another person's name by mistake. The participants were also informed that the tablet was going to be made available to all five minutes before the settled time of the meeting, in a common space in the

laboratory and left unattended until the meetings were finished. The maximum time allowed for a meeting was thirty minutes and the Android application was adapted for this duration. After a meeting has passed, the application itself did not allow any more registrations of attendees, blocking any possible toggle-button interactions. Additionally, it calculated the scores of the participants based on how well they performed in terms of punctuality, using the score scheme outlined in the previous section.

Upon concluding a meeting, the data file was parsed by an R script, so we could construct the leaderboard bar chart, based off the score information of every participant, as well as a line chart exhibiting the mean average punctuality of the laboratory, so that global progress was made visible to all participants. These graphics were then placed online on a specific page in the wiki page of the laboratory. The page was kept up to date after each meeting. This was repeated through the nine meetings and the participants were notified via email that the leaderboards would be posted online on a dedicated page, to which a link was provided.

At the end of the study, each participant was asked to complete an online survey which focused on two principal topics: (i) the perceived usefulness of the leaderboard competition from their point of view and (ii) the perceived social pressure in relation to the competition and in relation to other participants. Both these two topics were surveyed using Likert-scale questions with a value range from 1 (Disagree) to 7 (Agree) or 1 (Not Relevant) to 7 (Extremely Relevant). By perceived usefulness we mean how effective a participant believes that the leaderboards were in regards to improving or deterring the punctuality of oneself and of others, as well as the sense of clarity in displaying this same progress in timely behaviours. As social pressure, we understand the participants' feelings in recognizing change in social behaviours (whether in themselves or in other participants).

Participants

The data were collected from 28 participants. These participants are of the Laboratory of Games And Media Entertainment Research (GAMERLab), of which 21.43% are female. The age of our study population ranged from 19 to 44 (*M = 25.31, SD = 7.69*), being composed of researchers, graduate and undergraduate students, staff and faculty.

The participants exhibited a random behaviour in regards to punctuality to the meeting prior to this study, where the majority of the participants were late, although not by a great amount of time. The constant tardiness was frequently pointed out by the responsible faculty members of the laboratory. However, some members were always timely.

Scoring System

The leaderboards were constructed based on scores calculated using the time deviation of the participant from the set meeting time. The participants used the leaderboard system for two weeks. The system assigned a higher score to participants that were early. Penalties were taken if the participant arrived later than the set meeting time, or if he did not attend to the meeting at all.

Being timely, however, grants a higher number of points to those who arrive slightly earlier than the meeting time.

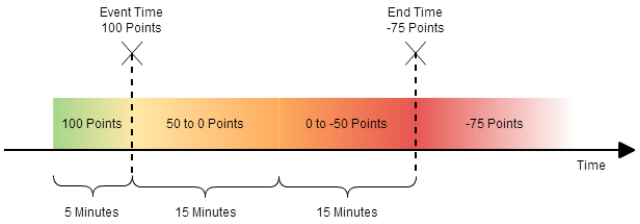

Figure 1. The scoring scheme employed in our study.

Figure 1 shows how scoring was used based on the participants arrival times. Punctuality scores were also derived based on the individual participant's punctuality over the course of the study. Both these data, the scores and times of the participants, were saved for later processing.

The leaderboards that we constructed based on the punctuality and scores of the attendees were made available on the online wiki of the laboratory, so every participant could see their ranking. This and their progression throughout the meetings were visualized as bar charts.

Materials

An Android application was developed to (i) register the arrival time of participants to the meetings, to (ii) compute their scores and to (iii) store this information in comma-separated values files for later statistical processing. This application was executed on a Samsung Galaxy Tab 10.1 tablet, running the Android 4.0 Operating System.

RESULTS

Some of our results were visible throughout the progression of the study, since we displayed the group progression after meetings. It is visible in Figure 2 that, as a whole, the punctuality of the laboratory's members improved slightly over time. Nonetheless, it would be wrong to assume that the participants were punctual, since the mean average arrival time to the meetings was about eighteen minutes (*M = 18.29, SD = 0.62*), which is far from desirable.

The punctuality to meetings measure improves greatly when accounting only for the arrival times of the present attendees (while discarding the no-showers, participants who were on leave of absence either partially or for the entire duration of the study, as seen in Figure 3). This represents a punctuality improvement of about 97%, improving the mean average punctuality to half a minute late (*M = 0.53, SD = 0.93*). However, upon conducting a Friedman's ANOVA on this data, since a clear normal distribution was not present, the arrival times seemed to not change significantly over the two weeks being measured, when not accounting for the no-showers and for the worst day in regards to punctuality ($X^2(8)=14.09, p>0.05$).

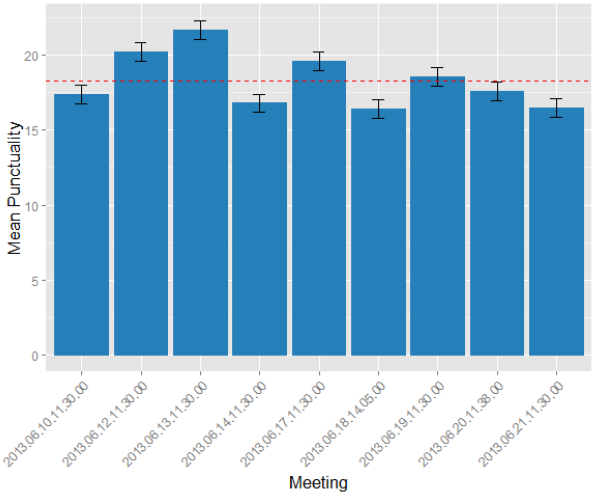

Figure 2. Overall Mean Punctuality of all participants. The mean is represented by the dashed line (*M=18.30, SD=1.85*).

Other alternatives were considered such as comparing punctuality of the first and last days or comparing the average punctuality of the first week and the second week but these alternatives were also deemed not significant.

We found two separate groups in this view of our data: Group 1, which is comprised of participants that are trying to get to the meetings on time, and Group 2, which has participants that exhibit a less punctual behaviour, increasing the mean arrival time of the whole laboratory. A closer look at the distributions of punctuality of the meetings allows us to better understand this phenomenon.

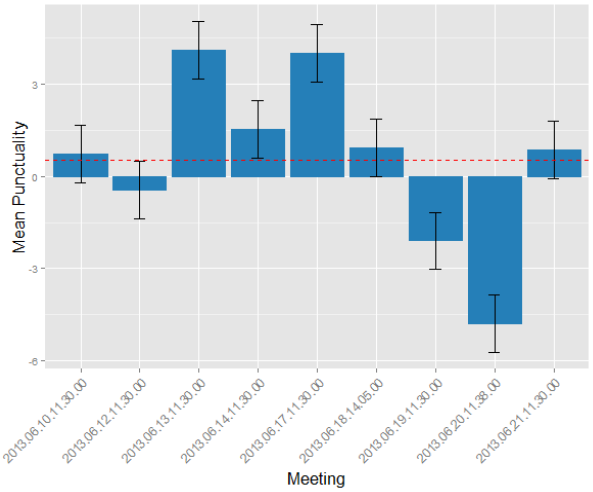

Figure 3. Mean Punctuality per meeting. The mean is represented by the dashed line (*M=0.52, SD=2.79*).

By looking at the results shown in Figure 4 (left), it is visible that, in the first meeting, some participants were on time, and that a few other participants arrived almost five minutes into the meeting (*M = 0.72, SD = 2.05*). In the second meeting, there is a slight improvement of punctuality in the overall population (*M = -0.44, SD = 2.4*). However, we can already see the two groups with different punctuality times. Looking at the third meeting, despite the less apparent bipartition of the participants, the punctuality is widely spread throughout the distribution, where the bulk of the participants arrived after four minutes already into the meeting (*M = 4.11, SD = 4.16*), dampening the punctuality.

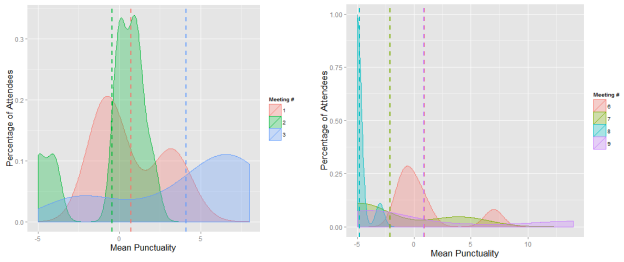

Figure 4. Punctuality distribution of the first three meetings (left) and the last meetings (right). The average arrival times

This division of participants in two groups where there seems to be a punctuality gap is also visible if we look into the last meetings of the study (Figure 4, right). The mean punctuality of the group improved since the average mean punctuality of every successive meeting has shifted to values below or closer to zero (*Meeting #6: M = 0.92, SD = 2.94; Meeting #7: M = -2.1, SD = 4.28; Meeting #8: M = -4.8, SD = 0.63; Meeting #9: M = 0.85, SD = 7.89*), as opposed to the values below zero of the initial meetings.

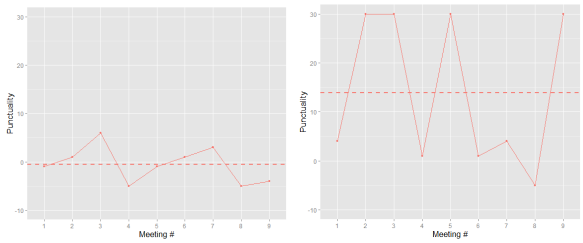

Figure 5. A punctual participant (left) (*M=-0.56, SD=3.74*) and an untimely participant (right) (*M=13.89, SD= 15.5*) over the course of 9 meetings. The means are represented by the dashed lines.

Notwithstanding, a bipartition of the group is still observable, particularly in meeting #6 (a group of participants attends to the meeting on time and a smaller group attends late). It is also visible that in some meetings (meetings #7 and #9), the distribution of attendance is spread.

From the time data gathered, the punctuality times of a participant belonging to Group 1 (shown in Figure 5, left) has a mean arrival time around zero minutes late (*M = -0.55, SD = 1.25*). However, a participant from Group 2 (see Figure 5, right) has arrival times oscillating from either showing to the meeting with a relative delay or not showing at all or too late (*M = 13.88, SD = 5.17*).

Survey Data

The study concluded with an exit survey. 14 out of 28 participants participated leaving an overall rate of return 50%. When asked about whether they have attended to all the meetings of the study, 64% of the participants answered *No*. Of those who have not always been present, 29% answered that they have attended to at least half the meetings. Among

all the participants, about 64% of the them communicated that they had, at some point, missed two or more meetings in a row, where the most prevalent justifications where either work, long commute times or vacation.

When the participants were asked about what motivates them to attend the meetings, 43% of the population answered to keep track of the progress and to see the progress of others and discuss ideas mainly motivates them. 36% of the participants answered that attending these meetings is something that is expected of them, and that fact alone motivates them enough. When asked the opposite question, *"What does not motivate you to go to the laboratory meetings?"* the answers were sparse. A few, 21% of the participants replied that the meetings take too much time and that they become a distraction. Others, (14%) replied that the main source of discouragement to attend the meetings was the fact that they were daily, and that might make them a little purposeless, especially when they imply stopping their current work to attend the gathering. In an equal proportion, 14% stated that the commute is the major hindrance that deters them to be motivated to attend the meetings.

As final general questions, the participants were asked whether they were motivated for the meetings and whether they found the meetings relevant. A few, 29% of the participants answered with a 5 on the scale about their initial motivation, with all the results evenly spread on the lower statement (*M=3.92, SD=1.26*) which shows some slight initial motivation. When asked about the relevance of the meetings, the majority thinks the meetings are not relevant (*M = 2.6, SD = 1.14*).

Perceived usefulness of the leaderboard competition

There is no agreement in whether the leaderboards informed participants of their punctuality: 21% of the total population thinks that the leaderboards did not clearly inform them, 21% of the population assume a neutral position, and 21% of the population agree to the statement, demonstrating that they felt the leaderboards informed them of their punctuality (*M=3.83, SD=2.33*). Nevertheless, 29% of the participants believe that the leaderboards did not express their progression of punctuality at all. Almost one third of the studied population (29%) thinks that the leaderboards did not make them improve their punctuality, while 14% completely agree that the leaderboards improved their punctuality. 21% of the population assume a neutral opinion (4 in the Likert-scale) in regards to feeling punctuality improvements thanks to the leaderboards (*M=3.5, SD=2.28*). 43% of the surveyed participants think that the leaderboards did not make the punctuality of others improve or worsen (*M=3.85, SD=1.85*).

43% of participants felt that although the gamification of the meeting offered value but felt that adding a reward or incentive to the leaderboards will make the points assigned more meaningful. One participant shared that: "I suppose the brief meetings feel like they have no purpose. They're over so quickly that what everyone has shared leaves my memory. [...] There's not enough incentive to come to work for these brief meetings. For some people, it's 1 minute of meeting for an hour of transit. Offering greater incentives to employees could improve the overall attendance." Despite these opinions, a peculiar result was obtained through the survey as the majority of the participants said that the leaderboards informed them of the punctuality improvement of others (*M=4.5, SD=2.32*).

Perceived social pressure of the leaderboard competition

The leaderboard scores of the participants did not feel to be a reason to brag about since 36% of the population disagreed when asked *"The leaderboard scores enabled me to brag about my punctuality"*. 14 % of the population completely agreed that the leaderboards gave them a chance to brag. When asked if they felt embarrassed about their punctuality score, almost half of the population (43%) replied that they were not embarrassed at all, where 7% felt a slight embarrassment. Additionally, when asked whether they felt engaged in the meetings because of the leaderboard competition, 43% disagreed with the statement, whereas only 21% said that they felt engaged (*MD=2.67, SD=1.97*).

Thoughts and opinions

When asked about the whole experience of the leaderboards and the punctuality being monitored, 36% stated that they had never seen the leaderboards, either because they were (a) not visible enough, (b) unaware of its existence or (c) because they could not access the online website where they were displayed since they had forgotten their access passwords. Only a small number of participants (7%) mentioned that having a leaderboards competition was fun. One of these participants also mentioned he was competitive by nature and that the leaderboards made him feel bad whenever he had to miss a meeting since he risked losing his standing in the leaderboard.

When asked to express their feelings as to whether this competition was useful, one particular participant stated that he found that it gave more purpose and content to the meetings, while definitely being useful in terms of providing motivation to be on time. Nevertheless, another particular answer stated that the participant felt the competition was not really useful for him, but he felt it was useful for some of the less seasoned members of the laboratory, particularly the undergraduate students. Another participant stated that the competition might have been useful for people who take pride in their attendance and who concern themselves with what others think of them. Only 7% of the participants replied to the question by stating that they felt that the competition was not useful.

For the participants who found the competition to be useful, when asked about possible improvements, opinions divide. 29% of the participants mention that extrinsic rewards could be an incentive to increase the meeting's punctuality, although one participant mentions that meetings should not be viewed as a competition since presence or absence greatly depends on parallel work that the attendees might have.

Increasing the presence and exposure to the leaderboards are suggestions made by 21% of the participants. Other suggestions worthy of mentioning include changing the scoring system or e-mailing participants with information on their progress for future reference.

The final question of the survey asked for further comments and thoughts on the leaderboard study. One of the participants clearly stated that *"Strangely, it was interesting to note that I was comparing my position with others."* as his major take away from the study. Other two participants expressed that, should the study have provided more intrinsic or extrinsic rewards, in accordance to the standings in the leaderboard, the competition would have felt more engaging, lessening the hassle of commuting or breaking one's work focus for attending the meeting. 21% of the population said that if the meetings were not on a daily basis, the competition would have felt better if gatherings had been more intercalated. It is worthy to also mention that one participant said that he had perceived that the study was about assiduity and not punctuality, something which influenced his attendance times.

One last remark about the scores that constitutes our results is that the participant who finished in first place was part of the laboratory's staff, while both second and third places belonged to graduate students.

DISCUSSION

Our analysis of the punctuality behaviours of the participants and their responses to the survey showed several main results that suggest the presence of these main themes:

Interest

Groups in our study were divided based on meeting attendance, which can be seen in the distributions of mean punctuality to the meetings. There is one group which thrives for being punctual, where the mean arrival times are similar to those of the participants displayed in Figure 5 (left) and another group with arrival times seemingly random like the ones displayed in Figure 5 (right).

This second group seems to be larger than the first one since most of the population said they had to miss more than two meetings in a row at some point, due to the schedule of the meeting coinciding with other work or meetings, long commute times that make a participant unable to attend the meeting or due to being away on vacation, something that explains the low kurtosis observable on some distributions of the arrival times of the participants. Despite having a punctual group, who were the initial timely participants prior to this study, and who reported to have become more timely thanks to the leaderboards, the rest of the participants kept undermining the group's global punctuality, group which was comprised of the initial late participants.

It then seems clear that most of the population, the second group that we found, seems to be lacking interest for attending the meetings in the first place, noticeably not only because meetings clash with other activities the participants might have, but also because they think these meetings take too much time in their daily schedule. The main reason of interest for attending the meetings seemed to be to keep track of work progress. Therefore, meetings did not seem to offer enticing, playful or pleasurable content to the participants to promote a higher degree of interest in attending them, and to, consequently, become timely.

Participants expressed the need to for incentives to attach meaning to the leaderboard positions. This is in line with research from Mollick et. al [12] stating that leaderboards alone dampened the levels of interest and engagement and consent of the population. Therefore adding rewards will encourage those who felt numbers alone are meaningless to fully participate. From our gathered data we can also assume that leaderboards seem to promote separation of smaller groups, instead of bringing everyone closer together in a larger group that competes as a whole. They can amplify opinions or behaviours in themselves, for better or for worse.

Hindrance

Many participants mention that daily meetings are too many meetings. To some, commuting from far only to attend the meetings on time or to stop what they were doing in order to be timely, and to get a good score, made the meeting feel more like a problem rather than a good thing. This is why we consider that adding leaderboards to daily meetings amplified thoughts of hindrance. One of the main reasons for this feeling seems to be that they are too frequent. Moreover, participants mentioned that meetings take a long time for its content, and that makes their remaining daily activities drag for longer because of the adaptation time to regain focus, which might happen often if the gatherings are scheduled on a daily basis, often overlapping with other projects' deadlines.

Despite the negative affect shown in relation to the frequency of the meetings, there is one participant that expresses that leaderboards added an extra layer of purpose to the gatherings, while another participant states that the meetings felt more useful for some of the undergraduate students attending the meeting.

It is curious to note that, despite the general feeling of hindrance, there was only one answer from one participant stating he had felt bad about not attending a meeting because it would lower his punctuality score. According to the suggestions of the participants, it then seems that, as stated before, if the meetings had a greater time span in between them, as opposed to being daily, they would have been perceived as less of a hassle, and would not conflict as often with other scheduled appointments. Perhaps by having less frequent meetings, the participants would have not felt as much pressure from the presence of the leaderboards due to a smaller exposure to the competition

Task Purpose

We have already discussed that meetings were perceived as having less interest when the punctuality is assessed with leaderboards. This is due to the uneasiness that participants felt when being monitored for something that did not entirely depend on their behaviour. They might have gotten stuck on traffic, they might have had an important meeting with another research group, or they might have been under pressure for a deadline that was really closing in. This view is corroborated by some participants where they show that they felt bad when having to miss a meeting because of external factors, afraid of losing their current standing in the leaderboards. This opinion is understandable, but when you consider those who did not report having these problems with conflicts of work schedules, the sense of purposelessness is still present, since only one participant mentioned that the inclusion of leaderboards added more purpose and content to the meeting.

As a solution, some of these participants suggest that having awards and rewards might increase the sense of purpose of the gatherings. What this tells us is that leaderboards, without further aspects attached to them like awards and rewards, are actually a determent to purpose, because they lead participants to think that there will effectively be a prize in the end, despite never having been told so. We believe what lacked in the case of our study was a tangible set of awards to which the participants could resort to, as a mean of identifying their progress, as a mean of motivating them further than just a score standing, and to make the meetings more purposeful. From the gathered results, the absence of a prize, not just as a physical token, is what most possibly made the meetings lose additional purpose in the eyes of the participants.

Behaviours

As we did our study, we were able to observe to distinct behaviours. The first behaviour we registered from the data is the interest in personal comparison. Some participants declared they felt engaged in comparing their own standing with those of others. This is behaviour akin to the competitive nature promoted by the leaderboards. Participants often asked whether they were ahead of a particular person. What is more striking is that, when asked whether they felt that the leaderboards displayed punctuality improvements of themselves and of others, the majority of the participants disagreed. What we can reap from this is that the leaderboards themselves did not entice and stimulate the punctuality improvement, but rather being ahead of a person such as a project colleague or supervisor was what drove the motivation to improve.

The second observed behaviour was the sense of improvement. It seems the leaderboards failed to express the punctuality improvement of the whole group, but have still enabled some degree of evaluation of personal standing on a social level because they facilitated the comparison to a smaller group of people, as opposed to comparing one's punctuality to the general picture. Additionally, participants did not feel that their own punctuality has improved thanks to exposure to leaderboards, but some did feel that this exposure made the punctuality of others improve. This contradictory observation is in line with what we mentioned before, and what participants answered in the survey, about comparing their punctuality scores between themselves.

It seems that the main driving factor of the sense of improvement was not the presence of a global leaderboard, but more the social interaction that it leveraged between a participant and those who stood close to his score. We conclude that leaderboards seem to narrow the perspective of a participant, seeming to forget about himself in the global picture and focusing more in his standing in relation to others when assessing the punctuality to the meetings in disregard of his overall progress.

Appeal

We also noted a particular behaviour throughout the duration of the study. Some of the participants, particularly those who finished in the first five standings, exhibited an observable amount of engagement in being punctual because, at the time the tablet was placed available for tapping, five minutes prior to the start of the meeting, these participants were already lining up or on the lookout for the device. More importantly perhaps, is that some of them exhibited this behaviour even before the five minute period, demonstrating a high degree of interest in using the application itself. Another curious behaviour was noted, where, often, participants that had just checked in during the five minute period scrolled on the application to check whether someone had arrived before them or not, most typically graduate students checking in on their corresponding supervisors.

Although the participants said that they felt the competition was rather purposeless, some strong enjoyment was found in taking part in the daily ritual of entering the room and tapping your name before some colleagues or professors.

LIMITATIONS AND FUTURE WORK

This study could benefit from using a control group to create a between-subjects design approach on later iterations. Additionally, collecting data for a longer time period would allow us to paint a more accurate picture of the participants, since the meetings could be more intercalated, conflicting less with their schedules. Future studies should also include a trial period to allow participants to adjust to meeting times and meeting protocol before data collection, as well as the possibility for excused absences. With such changes or improvements, it might be possible to get better statistical results beyond the empirical observations and comments we were able to extrapolate from the participants.

Our study did not apply any penalty or negative impact to those who were not punctual, other than the loss of score. This might have made it more difficult to motivate untimely participants. Thus, in the future, either changing the content

of the meetings or providing a reward is advised. However, changing it to something more captivating and pleasurable might make the participants who still miss some meetings due to work or commute feel worse. By doing so, an attempt can be made to understand whether losing the standing on the leaderboard or missing a pleasurable social interaction has a greater negative impact on the attendees and on their punctuality. By adding the suggested awards to the meetings, it will also be possible to look at which leaderboards or awards make participants feel worse when being untimely.

CONCLUSION

Leaderboards introduce a competitive layer to the punctuality of meetings, which can be seen as an additional concern for missing a meeting. Nevertheless, if there is no real end to the means (i.e., no palpable award for those who finish in good standing in the leaderboards), the purpose of the meetings is lost, increasing the feeling that the meetings become a nuisance or hindrance. Leaderboards seem to potentiate and magnify the interest levels that attendees have in meetings, associating more positive affect to those who already had interest in participating and lessening interest and increasing negative affect of those who were already prone to not attending meetings.

Our study showed that leaderboards do give way to positive social behaviours like social comparisons, which were of great importance to the majority of the participants, in particular to assess their improvement or standing in comparison to those who were of their interest, as opposed to assessing themselves in the global panorama of punctuality.

In conclusion, our study shows the possibility of gamifying meetings to improve the punctuality of the work group. This can help individuals project a better self-image, keep on task and increase their productivity.

ACKNOWLEDGMENTS

We thank all the participants involved in this study, belonging to the GAMERLab and University of Ontario Institute of Technology. We would also like to thank all staff, who provided helpful comments on previous versions of this document

REFERENCES

1. Anderson, S.P. *Seductive interaction design: creating playful, fun, and effective user experiences*. New Riders, 2011.
2. Burawoy, M. *Manufacturing consent: Changes in the labor process under monopoly capitalism*. University of Chicago Press, 1982.
3. Crumlish, C. and Malone, E. *Designing Social Interfaces: Principles, Patterns, and Practices for Improving the User Experience*. O'Reilly, 2009.
4. Deci, E.L. and Ryan, R.M. Self-determination theory. *Handbook of theories of social psychology 1*, (2011), 416–433.
5. Deterding, S. and Dixon, D. From Game Design Elements to Gamefulness : Defining " Gamification ."(2011).
6. Domínguez, A. et. al. Gamifying learning experiences: Practical implications and outcomes. *Computers and Education 63*, (2013), 380–392.
7. Edery, D. and Mollick, E. *Changing the game: how video games are transforming the future of business*. Ft Press, 2009.
8. Fernandes, J. et. al. iThink: A game-based approach towards improving collaboration and participation in requirement elicitation. *Proc. VS-Games'12*, (2012).
9. Flatla, D.R., Gutwin, C., Nacke, L.E., Bateman, S., and Mandryk, R.L. Calibration games: making calibration tasks enjoyable by adding motivating game elements. *Proceedings of the 24th annual ACM symposium on User interface software and technology*, ACM Press (2011), 403–412.
10. Hamari, J. Transforming homo economicus into homo ludens: A field experiment on gamification in a utilitarian peer-to-peer trading service. *Electronic Commerce Research and Applications*, 0 (2013).
11. McGonigal, J. *Reality Is Broken: Why Games Make Us Better and How They Can Change The World*. Penguin books, 2011.
12. Mollick, E. and Rothbard, N. Mandatory Fun : Gamification and the Impact of Games at Work. 22 (2012), 1–51.
13. Pratt, M.G. and Ashforth, B.E. Fostering meaningfulness in working and at work. *Positive organizational scholarship: Foundations of a new discipline*, (2003), 309–327.
14. Przybylski, A.K., Rigby, C.S., and Ryan, R.M. A motivational model of video game engagement. *Review of General Psychology 14*, 2 (2010), 154–166.
15. Roy, D.F. "Banana Time": Job Satisfaction and Informal Interaction. *Human organization 18*, 4 (1959), 158–168.
16. Ryan, R. and Deci, E. Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary educational psychology 25*, 1 (2000), 54–67.
17. 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.