ManDown - Gamification

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***Abstract*— People drinking irresponsibly may cause a lot of harm and many hospitals have to admit alcohol intoxicated individuals every day [1]. ManDown is a social mobile app that helps users drink responsibly by monitoring their intoxication levels. Part of the monitoring is done using games as the interface. Games are also used to make the app entertaining in the long term by letting users play together.**

I. Introduction

ManDown is an application that will help people who drink alcohol to do it responsibly. By taking and processing user specific data through machine learning, the application will let users know how much intoxicated by alcohol they are at any given moment. Thus, they will know when they should stop drinking not to get drunk. The app will help them drink safely and responsibly and have fun without worrying about waking up the following morning in a hospital. For the application to be successful it has to get users to provide the necessary data without them thinking that the app is intruding too much into their daily lives. The app must be interesting and addictive enough to get users to use it regularly and not only occasionally. It is only in the long term that the effects of the app will truly make a difference for the user's health. The app will gather data both passively and actively. The active data capture will require the user to interact with the app, which makes it trickier since this will depend on the current mood, availability and other factors surrounding the user.

II. Active Data Capture

To detect how intoxicated a person is at any given moment, the app should be able to measure the person's reaction time and loss of motor control and make an approximation of his/her intoxication level.

1) Reaction time: The way most doctors measure reaction time is by using a ruler[2]. The doctor grabs the ruler vertically by the top end while the patient keeps his hand on the bottom of the ruler, at 0 cm. The doctor releases the ruler, at a random moment, without alerting the patient. The patient has to catch the ruler as fast as possible. Reading the measure at the grabbed area of the ruler is a good estimate of the reaction time of the patient. With a smart phone, such scenario could be simulated using touch input and measuring the reaction time directly in seconds instead of gravity and distance.
2) Loss of motor control: measuring loss of motor control is slightly more complicated. It may be obvious at first glance whether someone has little control over his/her balance for example, but the problem is quantifying that loss of motor control. There are a few tests that can be used to measure loss of control, one of them, the string test. This test requires the intoxicated individual to walk on a straight line, while making sure that at each step the heel of one foot touches the toes of the other foot. The straight line can be indicated by a string or a floor painting. Motor control is measured taking into account total distance walked without departing from the string (or paint) and time spent in walking that distance.

Using a smart-phone app that simulates going to the doctor does not seem to be the definition of fun. There are clearly better and more interesting ways of getting data from the user base, using similar methods but changing the scenario to something more entertaining. Unfortunately, something entertaining for one person may not be entertaining to another. This is why it is important to focus on a specific demographic.

III. Targeted Demographic

ManDown is a smart application that will help people drink responsibly. The user interface of the application should be designed taking into account a clearly defined targeted demographic. The combination of colors, images, size and shape of buttons, and even the physical interaction with the application may work better for a given demographic than for another. Research shows that young adults are more susceptible to get admitted to hospital because of high intoxication levels [3] [4]. In 2013 smart-phone owners became more numerous than desktop owners on a global scale and today there are more than two billion smart-phone users worldwide [5], many of them young adults. In the UK, young adults are the largest users of smart-phones, with those from age 16 to 35, also known as millenials, monopolizing over half of the smart-phone ownership. [6]. These young adults, many of whom like to drink socially, are therefore the target demographic for ManDown. Making ManDown appealing to these young adults, who may risk to get intoxicated by alcohol, requires to study their behaviour, preferences and tastes.

IV. Millennials

Simon Sinek, motivational speaker and marketing consultant[7], was recently interviewed on Inside Quest about his thoughts regarding millennials in the workplace [8]. The interview soon became "viral" and has been a source of controversy because of his description of millennials as being self-absorbed, narcissistic, unfocused and entitled, and his attributing these characteristics to four factors having

an influence on their behaviour, namely: failed parenting strategies, the role of social media, impatience, and a non-encouraging corporate environment.

His comments regarding the role of social media and impatience are relevant to this research. He stresses the fact that Facebook, Twitter, Instagram and other social media act as some sort of drug. When you get a message or you see someone likes your image, this generates dopamine, the same chemical that makes people feel good when they smoke, when they drink or when they gamble. It is highly addictive [9]. When experiencing stress these young adults instead of turning to their friends or families, they will rather turn to their devices, alcohol and social media, where they will find temporary relief. Hopefully they will turn to ManDown, which can help them on the long term, compared to other apps.

Regarding impatience, Sinek states that millennials expect instant gratification, either when they want to buy something (on Amazon it arrives the next day) or when they wish to watch a movie (stream it online) or even when they want to find a girlfriend/boyfriend (simply use Tinder). They are used to get almost everything instantaneously, except job satisfaction and deep meaningful relationships. Again, instant gratification also releases dopamine and some apps take advantage of that, such as, for example the Candy Crush Saga: every time a combo is produced an instant congratulating text appears with fat colourful animations and sound.

This analysis provides some elements that may be useful to consider when developing ManDown. An app having millennials as its targeted demographic and designed to do active data capture should do it in short periods and providing instant gratification, competition and rewards. Moreover, it should promote social interaction. ManDown could incite millennials to drink in groups rather than alone. The best way to do so is by developing and designing small intuitive and fun video games that require face to face interaction.

V. Gamification

Gamification is to make an application that should serve a purpose other than playing games and give it video game like attributes, such as high-scores and rewards badges, to keep users interested and entertained. In the case of ManDown having a fun application is not enough. The application must be entertaining for long periods of use so that the machine learning can have enough data to adapt its model to a specific user. ManDown goes even further than just adding "game like" elements. It offers actual games to retrieve data from users.

A. Short and Long term engagement

ManDown is a social drinking app that does not condone drinking. It rather helps users to drink responsibly and safely. The best way to make sure that people use the app while drinking is by adding drinking games. But having only drinking games would go against the principle of ManDown. That is why along with active data capture and drinking games, ManDown also offers social non-drinking games or a mix of any of these types of games. Variety of games is key for this app's success.

B. Games for Active Data Capture

Games are used to provide an engaging method to retrieve active user input. Two games are being developed and more may come in the future:

- Whack-a-Beer: Inspired by Whack-a-mole, this game requires the player to tap beers coming out of ice buckets, while avoiding tapping on bombs or empty glasses. There are also cocktails that give extra points. The player has three lives, which can be lost either by tapping empty glasses or by not tapping a beer glass. The game is over once the player loses all lives or taps a bomb. The game gets gradually harder as time passes by accelerating the glasses' movements. The player can compete with friends by comparing high-scores.
  Each time the player taps a glass his/her reaction time (the instant the item appears compared to the instance it was tapped) is stored on the device with a label describing which item was tapped and when. At the end of the game all the reaction times that were collected are used by the Machine learning part of the application, with the scores and labels, to estimate the intoxication level of the player.

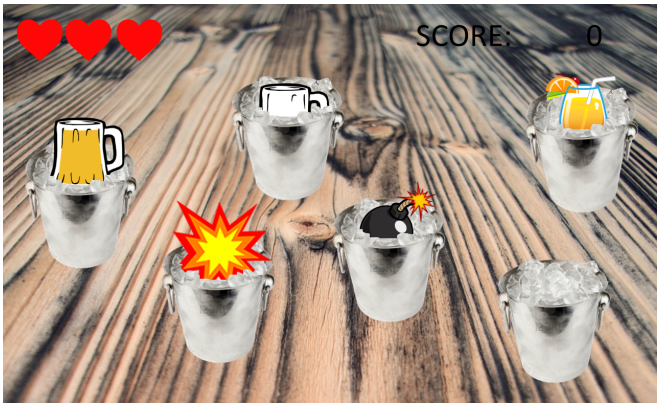

Fig. 1. Whack-a-Beer Interface design

- Tightrope Waiter: Using the movement detection developed by the data collection team, this game requires the player to balance a virtual drink on a virtual plateau using his/her smart phone while walking on a straight line in real life. The player starts with a positive score which decreases every frame by the distance from the drink to the center of the plateau. If the drink falls off the plateau it is game over and the player is advised to stop drinking for a while. The distance that has to be traveled (five meters) will be captured using GPS tracking.
  After walking a certain distance the application should be able to estimate the current intoxication level of the player by taking the total traveled time, and the distance

from the drink to the center of the plateau at any given moment.

- Drink Tour: If time permits, a multi-player game will be developed for ManDown. This game will be for 2 to 6 players and will be designed to capture reaction time. The point of the game is to attack your enemies while protecting yourself. Similar to the solo games, the theme is drinking in a pub. A conveyor belt brings drinks to your table. The player can drag and drop the "bad drink item" (the bomb and the empty glass) on to the conveyor belt going to the enemies table. As the game goes on the conveyor belt accelerates. Players lose one life each time an empty glass reaches their table. After losing three lives or once a bomb reaches their table, they lose the game. The game ends when only one player is standing alive. The players must not just remove "bad items" from their conveyor belts but also take the "good drinks" (beers and cocktails) to their table before an enemy steals them.
  This game should create a lot of fun scenarios, while hopefully not destroying friendships. Compared to other party games, this one has the job to retrieve multiple samples of player reaction times. In this game the reaction time is computed from the moment the drink appears on screen to the moment it has been clicked to drag, not the moment it is dropped on a friends conveyor belt or the players table.

These games are fun because they are challenging, but after a while they can become quite repetitive. One of the main reasons why young adults drink is to socialize. And the best way to socialize while drinking is to play drinking games.

C. Drinking Games

To make sure users do not forget to use this app when drinking with their friends, drinking games are added. This would also help the user base expand as some of these games would require every player to download the app. As users play with their friends and these friends play with other friends the app would exponentially grow in numbers of users. Also a good point to make is that if all players use their own phones ManDown could track how much each of them is drinking.

- Ring of Fire: A simple drinking game where, turn by turn, each player picks a card from a face down deck. Each card has an effect such as "you drink", "make friend 'A' drink" or "everyone drinks". Other cards with none drinking effects exist. The game ends once five "Ring" cards have been picked up. The player who has picked up the fifth and last "Ring" card must finish his/her drink.
  This game requires each player to have a separate phone. All players will see the same interface except for a personalized drink meter and message that will remind each player separately that it is his/her turn to pick a card and press next when finished.
- Cards : A simple deck of 52 cards, four suits of 13 cards. This game should be flexible enough so that players can play with their own rules. Each player can see his/her own hand and the cards on the "table".

At some point the app will advise users to slow down on their drinking. ManDown would then propose social games as fun non-drinking alternatives.

D. Social Games

Social games are meant to push the players to play together in the real world. They are simple, with no device interaction except to start and end the game. They simply give support using text and lets the players do the rest.

- Who am I? : Also known as the Forehead detective or the post-it game, this game requires each player to guess what is the name he/she has been given. The names given are celebrities (fictional or non fictional). Each player takes turns asking questions, about who they are, that have to be answered with yes or no. With enough information the players can make guesses who they are. The first to find out wins and the game restarts.
  Playing with ManDown, each player's device will show the names of the other players, each one next to a celebrity name. His/her own celebrity name would not be shown and should be guessed.
- Mime it : This game only requires one phone and simply suggests things that the user should mime. Friends will have to guess what the person is miming. That person can then pass around the phone. If the others have the app installed on their phones they could simply use their own phones.

These games will be simple to implement and will make the app much more focused on social activities. ManDown does not only propose face-to-face interaction with friends. High-scores and rewards are great ways to compete with friends even when they are not in the same room.

E. Rewards

A user progression system will be implemented, which awards badges to users based on how often they use the app. The badges rank users based on the frequency of check-ins and offer titles such as 'Newbie', progressing towards badges such as 'Liquid Lunch' and 'Brew Master'. This system increases the amount of direct user input as it would incentivise users to compete with each other among their social group within the app [10]. The app would also offer badges for playing the available games for a number of times or by scoring more than a certain point limit.

VI. Implementation

ManDown is currently being developped using Android Studio and will be available for any Android device with version 4.4 (KitKat) or over. The reason why KitKat was chosen, and not a lower version, is because smart-watch compatibility is only available from that version onwards. The reason why a higher version, with a better API supply, was not chosen is because of current user distribution.

Over 80% of the user distribution is using KitKat or newer Android versions [11]. Since all Android versions are retro-compatible, users with an Android with the latest version (7.1) can use an app developed for Android 4.4. The more people can use ManDown the faster it will expand.

Pixel density, also known as dot per inch (dpi), and screen resolution compatibility have also been taken into account. Android devices come in all shapes and sizes. It would be very unpleasant for users to see only part of the graphical user interface (GUI) because their phone is too small. Developing the app specifically for each resolution and dpi is not an option. That is why android proposes to use Density-independent Pixels (dp) [12]. Dp can be computed if the number of pixel (px) is known for one dpi: dp = px * (160/dpi). It is important to test the implementation on multiple screens. This can be done using the Android Studio Virtual Device Manager (VDM). The VDM can create a virtual device of any size with any dpi, which is great when the development team does not have many devices available.

Some of the games require real-time multi-player interactions. Android supplies an API, which manages network connections and provides players with options to create and join rooms [13]. When a room has been 'filled' the game can start and each device communicates with each other using messages, through both reliable and unreliable messaging. Reliable messaging takes more time but makes sure the receiver has heard the message. Unreliable is used for time sensitive information. It is fast but the sender does not check whether the receiver has heard the message. Therefore, it is important to deal with special cases where the receiver does not hear the message. For ManDown a mix of both these messaging options will be used depending on the game.

A. Progress

Whack-a-beer, the game that captures reaction time, was the first one to be developed. The reason why this game was the first, is because it made it possible to collect data from real users right away for the machine learning team to play with. Its simplicity made it a great game to test the development tools and API available for android 4.4 and getting used to programming and testing games with Android Studio. It also helped getting used to programming taking the screen size, resolution and dpi into account.

B. Future implementation

Following the logic of making data capture games first, the next game that will be developed is Tightrope Waiter as it collects a different type of data: the loss of motor control. Once completed, the data capture team will be able to ask real users to try out ManDown to get data while the UI/game team will work on the social aspect of the app. At least one of the drinking and social game will be implemented during that time. The ManDown team will then decide which other game or UI element will be given priority.

VII. Conclusion

ManDown is using gamification to capture data to estimate alcohol intoxication levels, all while making the players interact with each other for drinking and non-drinking games. This will entice young adults to drink responsibly and safely while having fun with friends. The user base should grow exponentially thanks to the multi-player games and its great compatibility with more than 80% of Android devices.

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