

# NEW YORK INSTITUTE OF TECHNOLOGY

Reinvent the Future.

Theory of Video Games:  
What makes a game addictive?  
*Final Report*

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## **Abstract:**

We have decided to research the psychology of video game addiction. We will be breaking down how current mobile games have lured people into spending so much money on their game, and what aspects keep their attention. The research will consist of how visual, auditory, and mental stimulations can help with our goal of understanding this addiction. With all this in mind, we want to use our findings to create a prototype game that can produce the most amount of revenue, with the least amount of work.

## **Why Mobile Gaming?**

Regardless of the platforms used, gaming has been one of the most successful and most popular pastimes all over the world. “In 2020, the U.S. video game industry grew 27% to \$56.9 billion in revenue, says NPD Group, surpassing movies and music combined.”[10] Gaming has been a source of entertainment since the 1950s. However, the gaming industry has boomed out to be one of the most successful and most profitable entertainment industries since the invention of mobile technology.

“The mobile game industry is one of the highest performing industries globally in 2020. With a massive turnout of \$77.2B in the just concluded year, there is no sign of slowing down in 2021.”[8] The recent surge of free games on mobile devices have dominated the gaming industry by making up to “80% of the total digital gaming revenue in 2018”[9].

## **Most Popular Gaming Devices:**

The smartphone is the most popular gaming device according to Gamers in the United States in a 2021 Statista Study. Other endless runner games are also solely played on Smartphones. Games like Temple Run released in 2011 and its sequel Temple Run 2 which was released in 2013 all are popular endless runner games. Smartphones are an easy medium for gamers as

## **Technologies in use:**

- Unity

Our team has decided to use Unity for building our prototype game. Since Unity is free to use the game development engine, it is accessible by the whole team. It's well known in the gaming environment for its versatility in building games for high-end studios and small start-ups. The added factor is that Unity has a whole store called "Unity Asset Store", in which we can find

free material to use for our game. This saves us time and effort because no one has to spend hours modeling and coloring items in the game.

Building every aspect of the game in Unity will be very straightforward because of its heavy documentation. Unity also provides the service to integrate ads into our game. Providing each user with an “ads” key that can then be used to display ads with specific functionality. This is another money-saving aspect because no one has to buy some licenses to display ads on the game.

- C#

We are using C# to program our game and its functionality because it is Unity's main programming language. Unity has hundreds of libraries custom-built using C# and it beats out using Java. Since only Mohammad has experience with this language, everyone took some time learning and understanding how it is used in Unity. C# is also heavily documented, so any questions that we came across had an answer.

- GitHub Desktop

We are using GitHub Desktop as our cloud sharing tool. This will allow us to sync all our programming and unity files with one another. Allowing everyone to work on different parts of the prototype at once without waiting for each other. The files are always saved on the actual GitHub website allowing quick access if anything was not working on the Desktop application.

- Discord

Our main form of communication is through Discord. Free to use and on all devices, we can discuss our findings, research, activities, and problems in one space. We are also able to set up meeting times and make sure everyone is on track to finish specific tasks.

- Google Drive

Google Drive is being used to store our work. We hold a backup of the live github file there every week just in case. We also use it to share documents, presentations, and other research related tasks there. Extremely fast and reliable, we all share a file and use it as our headquarters for all file related tasks.

- When2Meet

This is an online tool that our team is using to organize meeting times. We simply choose which dates and times we want to open for a meeting. Then share the invite link for everyone to select what days and times they are available to meet. When2Meet then shows you when everyone is available and from there we have weekly meetings at least twice.

### **Dopamine / loop of Compulsion:**

In our findings of what makes a video game addictive, there are many aspects that have an impact or influence in making a game addictive. One example of this would be video games taking advantage of our Dopamine and a loop of compulsion. According to an article [6], “Dopamine, a neurotransmitter in our brain that helps regulate our pleasure and reward centers, is behind a lot of what we do.” and a compulsion loop is a cycle of activities that can be continued by the user in order to continue the activity. The article summarizes the loop of compulsion in 4 steps:

1. The player gets a task to complete and the promise of a reward at the end (motivation)
2. The player is given a clear pathway to completing the task (an achievable challenge)
3. The player completes the task and gets the reward (dopamine hit!)
4. The player gets another task, formula repeats

Dopamine can be addictive and a loop of compulsion would enhance this addiction. It would be one of the major factors that makes video games addictive as many video games give players a task to do and reward them upon completion of this task. We can use this reference and see that in endless runners they follow a loop of compulsion in making their game addictive.

### **Just one more run:**

In the previous article, it explains what Dopamine is and how video games can create a loop of compulsion. With this as a reference, we can use this to find what makes an endless runner addictive. In one of our research, we discovered that a major goal in an endless runner development is the creation of a “Just one more run” aspect according to an article [2]. “Just one more run” is a factor in which an endless runner keeps players motivated to keep playing their game over and over again until eventually they stop. A major principle of an endless runner is that it has no end or goal to achieve. If players have no end and no goal to achieve, game developers will have to create a way within the game to keep players playing and there are many methods we can keep users to play.

A method that follows the previous article [6] example (loop of compulsion) would be a mission board. A mission board gives players tasks to do in the game and they would be rewarded for completing those tasks. The tasks can come in many different forms but a very common task found in almost every endless runner is a daily mission which can motivate a player to come back and play the game on a daily basis. This follows the four steps of creating a loop of compulsion, a task to complete (mission board), a pathway of completing the task (motivates the player to play the endless runner to get those task finish), a reward system (the players reward upon completion of the task), and finally a daily reset or new mission everyday.

### Examples Breakdown:

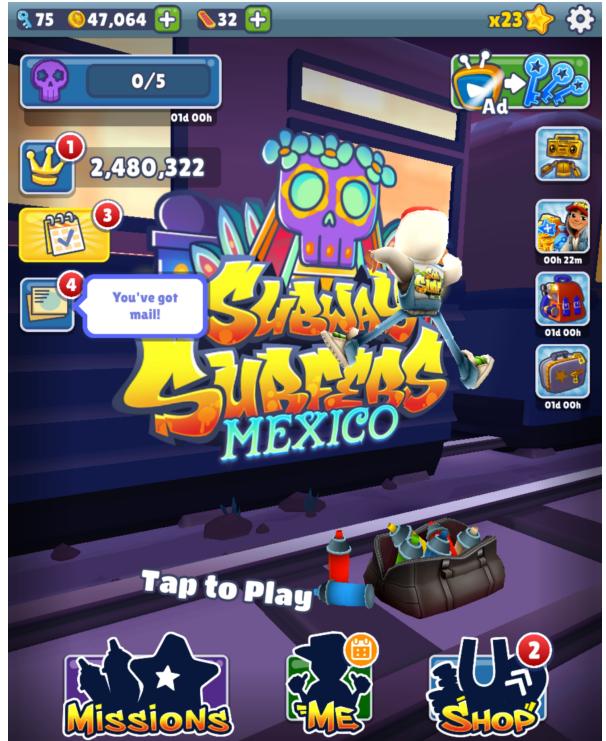
#### Subway Surfers

One of the most popular endless runners is a game called Subway Surfers. According to an article [4] as it has over a billion downloads worldwide with millions of active users across the globe. The article quoted “We've always taken the approach that this is fair free-to-play. There are no paywalls. We give access to all the content.” The game is completely free to play, and while in-game purchases are available they are not required for players to progress in the game. But as we show next, the game promotes these payment aspects heavily to their audience.



To our **left**, is a screenshot of what subway surfers looked like in 2011. As you can see the homepage of the game is very simple and easy to understand. They have all the basic components of a homepage like a shop, missions (Progression system), settings, and a title that just says how to start playing the game. Such a simple design has been altered so heavily due to the market shift which we will see in the following image.

To our **right** we can see the modern day home page of Subway Surfers. As you can visually tell, a lot has changed. We see so many new UI changes and one of the most key aspects is the right hand side. We have 5 separate items that tell the user to either watch an ad for rewards or buy something with real world money. Compared to the original view of the game, we can see that most aspects of the screen ask the user to spend money in some form. The collectables have a little “+” next to them that easily takes the user to the shop where they can do “one-tap” purchases with real money.



### Jetpack Joyride:

Another popular endless runner would be a game called Jetpack Joyride. The initial release of Jetpack Joyride was September 1, 2011. The game is at least ten years old with reportedly 14 millions of downloads since 2012 according to [12]. To gain over ten millions of downloads after a year of its initial release shows the popularity of the game and just recently, there was a sequel of the game, Jetpack Joyride 2. Currently, Jetpack Joyride 2 is in a soft-launch phase in 3 countries, Australia, New Zealand, and Canada.

On our right, this is the up to date Jetpack Joyride menu. Similar to Subway Surfers, it's common to see a mission or daily task for the game. Jetpacks, costumes, and vehicles are all cosmetic that can change the looks of their characters in the game. Finally, a leaderboard at the bottom left and the player's "Best Run".



Jetpack joyride is also free to play with the option of purchasing in-game cosmetics, currently, the game has a crossover with the movie “ghostbusters”. This event gave players the option of buying cosmetics related to “ghostbusters”, some options like buying the characters from the ghostbusters movie or even a ghost character to play as in jetpack joyride. There’s also the option of buying and changing the theme or background of the game into the ghostbusters theme. We find this method of having a crossover with other games or even movies popular because it’s an event and if people like this event, they would be more likely to spend money on these events.

### Temple run:

Temple run is another popular game in the endless runners genre, The game was initially released on August 4, 2011. According to an article back in 2012 [13], The game’s popularity can be seen as “over 40 million downloads since it’s initial release in august” and at least 13 million played once a day. 2 years later, the sequel of the game was released and according to an article [14], “The project went smoothly and Temple Run 2 launched successfully in January 2013, getting 6 millions downloads in it’s first day and 20 million in just four days” shows the popularity of temple run during the two year of release.

On our right, this is the start screen of the game “Temple Run”. We can see that Temple run is similar to Jetpack joyride / Subway surfers, The “objectives” give players a goal to reach in the game with “stats” to keep a record of their runs in the game. They put “Store” to purchase in-game cosmetics and settings to change options. The game is a little bit different from other games where the developer has an option of showing players more games developed from them.



## **Gameplay:**

Subway surfers are very popular and it has many reasons why it's popular. The game has a basic mechanic, swiping to control your character movement. You can swipe up to jump, swipe down to slide, swipe left to go left, swipe right to go right, and double tapping the screen to equip a board where players can save themselves in the case they mess up and keep the run going. In a player's endless run, there will be obstacles that would block and hinder the players and the player would have to avoid these obstacles as they continue their run and accumulate points.

The game has coins where players can pick up and spend on an in-game shop. Besides coins, the players can also pick up in-game items in their runs to change their gameplay a bit, an example of this would be a coin magnet which can pick up coins near the character for a period of time. Since coins can be spent in an in-game shop, they can buy cosmetics or items that can enhance their gameplay and motivate them to keep playing to reward themselves with an in-game item or cosmetic.

Similar to subway surfers, Temple run follows the same model for it's gameplay. The basic mechanic of swiping to control their characters, double tapping the screen to save themselves from dying and keep the run going. Basic obstacles that require the players to jump over or slide underneath and collectable power ups that can change their gameplay a bit.

## **Motivation:**

One of the core aspects in Subway surfers that makes players play on a daily basis is a mission board, the mission board holds daily tasks and sometimes it holds events where players can do for rewards. The events are around for a limited amount of time and players can be motivated to play for a while in order to receive a reward for the time spent on the game. There's also many achievement tasks where players can get rewarded from their total gameplay and since all these tasks are optionals, players can do them if they want for the rewards or even do them unconsciously as they are playing the game.

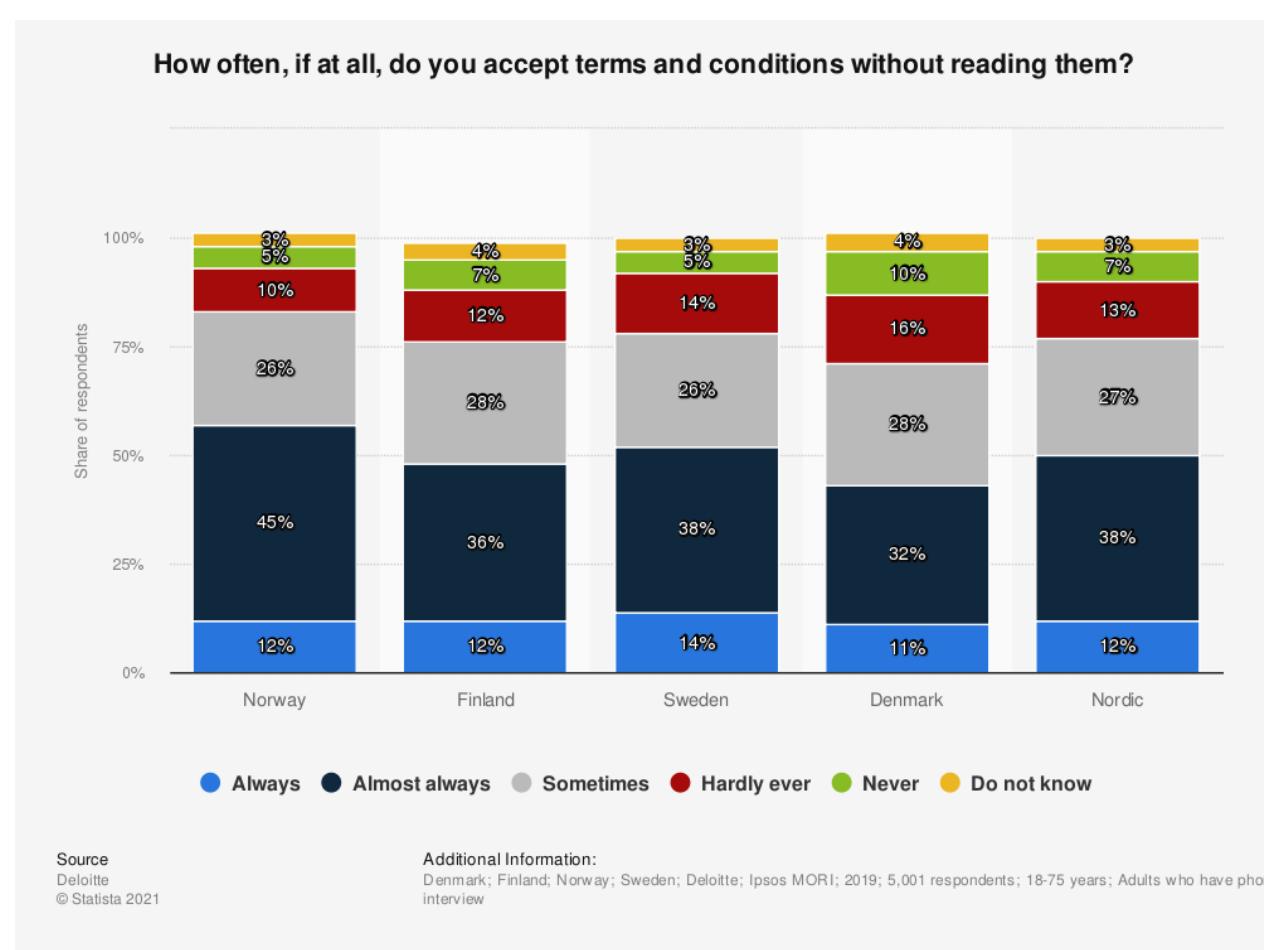
As there is a point system which accumulates over time the longer a player runs, it is possible to create competition. Subway Surfer has a point system where the longer a player spends on a single run, the more points they can gain and it is possible to see friends' personal best record. Players can feel motivated to beat their friends' records and if they are competitive, it is possible to compete against other players in your region. The game has a leaderboard where it keeps track of the highest point a player has accumulated in a run and this leaderboard resets on a weekly basis. The leaderboard also

rewards players with in-game currency (coins) and it has different ranking depending on the point accumulated.

### Most popular games:

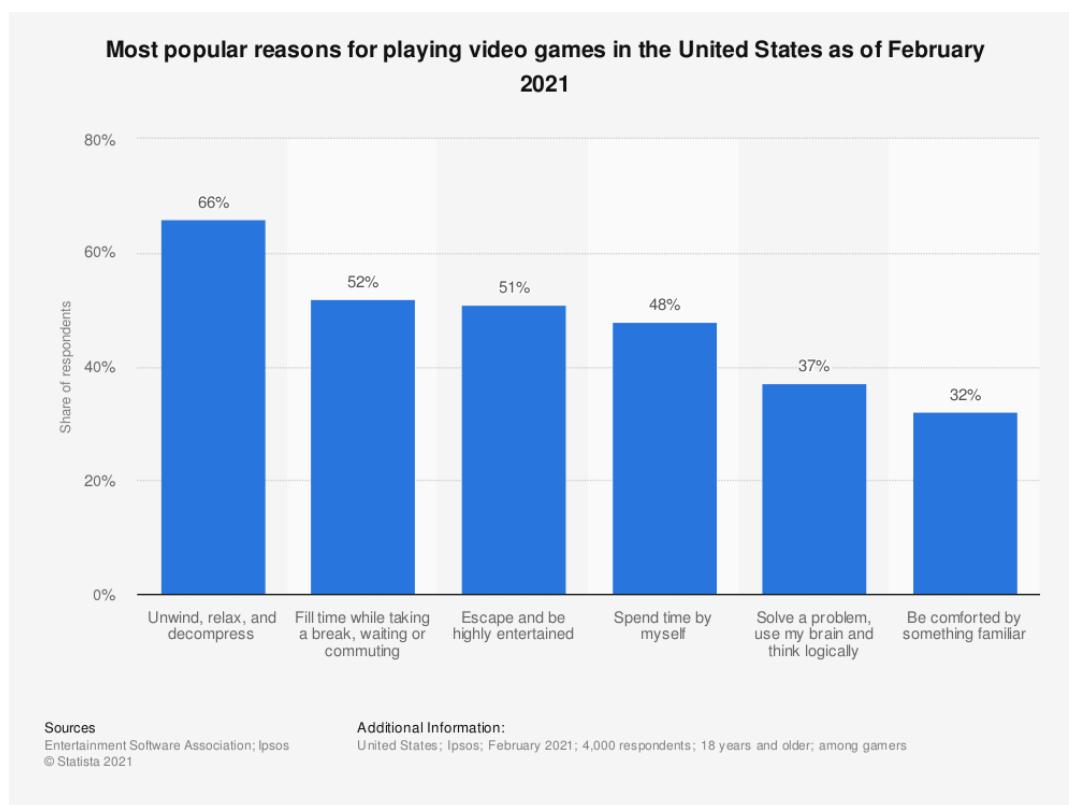
On the Google Play Store Subway Surfers boasts the most players worldwide followed by another popular game Candy Crush Saga. As mentioned before the game is not pay to win as all of the game's features and mechanics are available to each player without having to pay and paid items are available but not required to progress further. Subway Surfer is an excellent example of a popular and profitable endless runner game that while simple it is able to maintain popularity over many years since the game's release in 2012.

### How often do people read before accepting terms and conditions?



Based on the above chart, a very small percentage of people actually read the terms of conditions before installing something. Terms and Conditions usually go on for many pages and most people do not read them, however, hidden within all of that text can be clauses that after agreeing allow the companies who create that software to monitor you. Many years ago a company called “PCPitstop” hid a clause in one of their End-User License Agreements (EULA), the first person to read the clause would receive a \$1,000 prize. After 3,000 orders 1 individual called in and reported that he had seen the clause and was awarded the \$1,000 prize. The company did this to bring awareness to the importance of reading the Terms and Conditions.

### **Most Common Reason for Playing Video Games (US, February 2021)**



As shown in the graph above, the most common reason for individuals to play video games is that it is a way for them to have a moment of relaxation.

### **The Psychology of Free to Play Profits:**

Many games being marketed often hold no price tag to be downloaded. However, this can change after time playing them. In a 2014 study it found that 67% of total in

game purchases was made up of purchases of \$1-\$5, however, these purchases only make up a small percentage of the total revenue that these games make, approximately 27% of the total revenue that these games make. On the other side 9% of revenue was made by the individuals who make purchases of \$50 or more. The remaining percentage of revenue comes from people who make larger purchases who are given the term “whales”. In order to make profits the companies do not have to attract everyone, rather only true fans of the game.

In order to keep the interest of these so-called “whales” the game designers have introduced some psychological aspects into their game design. Taking advantage of the human brain causing us to become addicted. As previously mentioned, dopamine is what causes us to become addicted, studies have shown that playing games can increase dopamine levels in the brain. With this being the case, companies have perfected their designs so that it keeps players hooked and keeps them spending, making “free to play” games even more profitable than paid games. [11]

### **The Role of Background Music In the Game**

The musical background of the game is an important evaluation of the quality of the game object. Many people like games because many games are deeply rooted in people's hearts because of music. In addition to moving emotions, background music can also drive emotions. Before making game background music, you first need to design the overall style of the music.

Therefore, game creators need to provide detailed information such as game videos, pictures, etc., in order to propose specific plans for the overall style of the game. Different game styles require different game music arrangements. Chinese classical-style game music is usually based on ethnic musical instruments; Western-style game music is based on arrangement and arrangement; casual cartoon game soundtracks can also incorporate music elements such as electronics, rock, and jazz. For example, "The Ezio Family" of "Assassin's Creed" is the most famous soundtrack in the Ezio trilogy. Jesper Kyd aims to express the Italian urban temperament of the Renaissance. Use guitar, violin and keyboard instruments to compose a melodious and beautiful piece of music.

### **The Story of the Game**

The game will be outdated, but the story will never be outdated. Whether the designed game plot conforms to the designed game system/values, and can better reflect the game culture/connotation. Traditional content does not have this problem, because the plot or story itself is the absolute backbone of the product, and the others are just for it. The plot can make the behavior of the characters in the game reasonable and predictable,

and provide a sense of substitution and immersion, as long as the game plot with a human as the protagonist is indispensable. The story is an important part of the game. Even some games that do not seem to have a story will need some content to fill it, such as 'Angry Birds', "The story of Angry Birds is very short. Is it a story at all? Yes. The birds are on a mission . They hate the guts of these pigs. The Angry Birds story is one of thievery, sacrifice, parenthood, and ultimately revenge" [4].

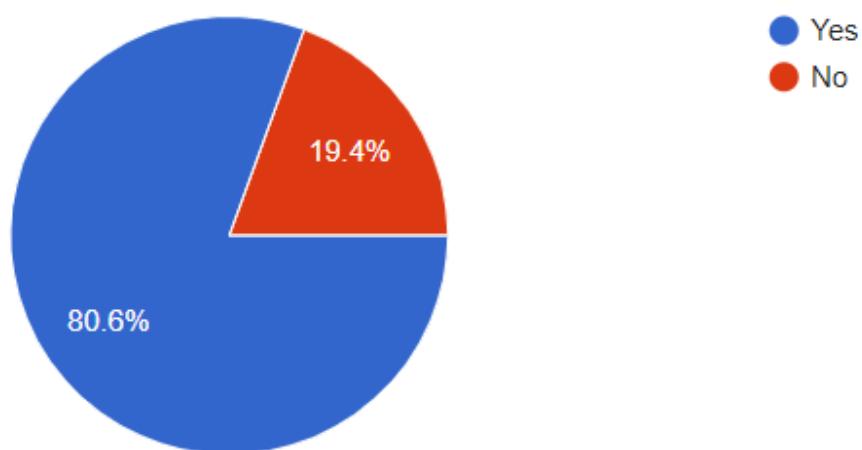
The great imagination and descriptiveness of a novel is precisely what can become the key point that readers love. This is not the case for games, because it is likely to be restricted by specific development/platforms; however, it is undeniable that an excellent game plot can always attract some users."Whichever genre, whether it be a linear or a non-linear game, if the story manages to impact players in the right way, then it will always hold a major importance in why they like the game (or hate it, eheh). That is the consistent aspect that always will be. Who would like an uneventful story? "[1] At present, the world's most profitable mobile game Honor of Kings / Arena of Valor [7] has rich and interesting plots and characters to support.

### **Personal Survey Findings:**

Our group performed a small survey to see who actually reads the Terms and Services (T&S) accurately and efficiently. Down below we can see a pie chart of students who had agreed and disagreed with our T&S.

**Do you agree with the Terms & Services?**

36 responses



Some of the key lines from our T&S that we wanted to see people point out were:

- “You must be at least 30 (thirty) years of age before you can use this website.”
- “We reserve all rights to terminate accounts, edit or remove content, buy and sell your information, and cancel orders at our sole discretion.”

It is clear that with our sample group, most participants do not read the T&S very closely and have agreed to things they might not like. This brings into the light the issues revolving around companies' grasp on user privacy. If this was a real company who was seeking a profit, we could easily go and sell user contact information, or usage information to 3rd party buyers for a profit.

### **Prototype Explanation:**

#### *Highscore:*

We save the player's high score for multiple purposes. We are going to use it to create a sense of challenge because the game would be boring if the player had no objective to beat. Most games like Temple Run and Subway Surfers constantly remind the user of other people in their friend's group with higher scores so that the player can spend more time in the application. Some incentives that the games add are score multipliers, which make it easier for users to beat and reach new scores. This is a very common theme of reward to keep the player thinking they are making a difference.

#### *Shop System:*

Our game has a simple shop system where the user can collect coins through their time playing the game. With this, they can then purchase a new vehicle player, and keep playing. For this prototype, the shopping system is not complete but the idea of it will be implemented for future upgrades and uses. The user can freely collect as many coins as they want so that whenever something of interest is added to the game, they can purchase it then.

The shop can be updated frequently with useless cosmetics. This will keep players coming back for more content because they will have something they want being added constantly. The addition of timed events which only let you get certain items in a small amount of time will keep players' attention even more during this time. All of these have been viewed and observed in the games we referenced for this project. They all incorporate events like seasonal or promotional items that can only be acquired during a set time.

### *Ads System:*

Unity provides a simple and easy ads system for mobile users. Currently, we were unable to fully implement the system because of all the prerequisites it requires but our idea was to have the ads be subtle enough to get users to press them. The ads would play every time the user finished a game and then on the end screen prompt them to watch another unskippable ad to double their coins or get another life. These systems are very prominent in all mobile games regardless of genre because of their high click rate. The addition of in-game rewards to the equations makes ads so profitable from the marketing point of view.

### *Encouraging Statements:*

At the end of each game, we will display a small message that will provoke the user to press “Play” and keep trying to beat their high score. These messages can be short encouragement statements or passive-aggressive ones. Some examples range from “You can do better than that!”, or “You did great, maybe next time you will beat your score!”. These methods will increase the user’s drive to beat a score or collect enough coins for their next reward.

### *Challenge Factors:*

To keep the game hot, there must be more fresh elements and challenges. Doing the same thing repeatedly will only make players feel simple and bored, so we have designed some simple challenge factors to meet the ideas of more expert players who want to challenge difficult games. When the score obtained by the player reaches a certain height, the speed of the car in the game will gradually increase over time. In addition, we will also introduce a time limit mode; once the mode is activated, players must obtain enough coins within the specified time to complete the challenge. We believe these will bring more fun to players.

### **Conclusion:**

Throughout our current research, we have found that the most addictive games have adopted many new methods of making revenue. These include the use of an ads system that allows users to gain rewards, creating a progression system that keeps the user's attention for longer periods of time, and finally the usage of a shop system in-game for cosmetics and perks. We also looked into how people give away their personal information to companies with consent because they skip over the terms and services at the beginning of the application usage. With these aspects, we plan to create a simple prototype game that can be published someday to help us accumulate money.

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