

## INTRODUCTION

The work in this research intends to provide a thorough examination of the sport of soccer while analyzing the video game franchise *FIFA*. The purpose of this work is to get gain on the relation between the video game and the sport with the help of the expertise of the users through the conduction of surveys, controlled observations, and in-depth analysis of both. Throughout, the thesis will be supported by soccer-specific analysis and a focus on the general topics of discussion surrounding the sport. The final results see the potential to improve both the video game and the sport in the long-term.

As this study will argue, using the *FIFA* video game franchise will allow soccer trainers to be creative in their methods and introduce these familiar video game concepts to children. This may result in the next generation playing more of the video game to learn the in-game components and mechanics such as pressing or positioning, hence coaches must be well versed in these games as well. They can then progressively take those ideas on to the training pitch and use them productively to make them better players. The game developers could also benefit as they strive towards an ever more realistic implementation of the sport.

Several methods used in this study try to develop a concrete relationship between the video game and the sport and to gain an insight into further potential areas of impact. The first one conducted was a survey through the help of the A.D.S. (Association of Diversity in Sport) Organization, in which participants answered a series of questions regarding their experience playing the video game *FIFA 19*, and then the sport Soccer, separately. At the end, they were asked to identify and key crossover elements between the two that they had observed and would be significant. The participants for this method were broad and rather diverse as it was important to gain various perspectives using the expertise of the users playing the respective

games. Questions in the survey were able to inflect the skill level of the participants in both and the results weighted accordingly to adjust for inexperience from certain groups of users.

The main idea behind this was to observe the strategies and understandings the participants had about the sport and whether that changed depending on the participants' skill, experience, or time spent on the video game or vice-versa. Here are some sample questions that were asked:

Highest level played in Soccer:  
How many years have you been playing soccer:  
How often do you play soccer?  
Position you play:  
What are your strongest skills in soccer?  
What is your preferred style of play?  
What is your objective when you have the ball?  
What is your objective when you do not have the ball?  
How many years have you been playing FIFA:  
How often do you play FIFA and for how long:  
What are your strongest skills in FIFA?  
What is your biggest complaint about the game (give some details)?  
What is your preferred style of play?  
---The full survey can accessed at

<https://forms.gle/Ln3rYoheW39caHfo6>

Another study conducted involved close observations of participants' sporting ability. Taking soccer as the sport, the participants were chosen based on their skill in the sport and carefully pre-selected to ensure that they had limited exposure to the related video game *FIFA 19* and were slowly exposed to the video game and then observed, to determine any changes in their playstyle and ability due to the video game.

The last method used was to analyze the video game *FIFA 19* and its preceding versions to develop an understanding of how the video game implements the simulation of the sport both from a scientific point of view i.e. the computer science concepts needed to develop the A.I. and the game design, to the actual principles of the sport itself and how realistically it is implemented.

The scope of this paper covers the main question regarding the effects video games have on sports performances. It answers questions of general importance concerning video games and their significance to a player's brain functions, and goes on to probe deeper into how different elements of a video game end up impacting us and in what way does it do that. It also covers how different users see the video game and the sport differently and tackles questions concerning the strategies players use and learn through physical training or through the video game, most notably in decision-making.

Another question addressed is how a video game is able to realistically implement a sport and the key areas in which it needs to be handled properly and improve, in order to effectively handle the demands of the sport and provide benefitting outcomes to a player's sporting ability. However, throughout the course of the study, several critical questions outside the scope of the paper arise such as- Can the effects from one video game be translatable not only to the respective sport but also to other sports as well? How much would be the difference in the impact of different sports? Are certain sports more inherently trainable through video games?

Although these questions are further down the line, they form an important line of thinking regarding the results of this study and the potential applications it would have to sports everywhere. The main argument is on the proposal that sports-based video games have an impact on the performance of players in the respective sports.

There often exists a divide on the term 'games' in video games considering the substitute they have provided by essentially offering an enjoyable alternative to outdoor games. People though, especially older generations, often regard it as not actually playing and would rather resort to calling a sport or more generally, a physical activity- a game. However, there seems to

be a lot more underneath the surface with the two being more closely related than it seems, as there exist several unique benefits to playing video games.

No one can argue the significance of physical abilities and motor coordination in sport, however, recently there has more attention put toward cognitive processes that are essential for different sports. This paper is interested in delving deeper into the details and trying to find an arbitrary relation between the two using video games.

The thesis only analyses an instance of this type of sports-simulation based video game due to familiarity with the sporting concepts. However, other video games similar in its execution such as *NBA 2K*, *MADDEN*, *UFC 3*, *Tony Hawk's Pro Skater*, and especially *Wii Sports*; can also be translated towards their respective sports and find the results of this study applicable to them. Considering how well they relay to the real world, users could be able to use parts of it to further enhance their real-life skills.

## **LITERATURE REVIEW**

In his research article in *Psychology Today*, the researcher Peter Gray suggests that there is an increase in creativity measured using Torrance Tests of Creative Thinking where children performed better immediately after 30 min of video-gaming. It showed a substantial improvement in an aspect of creative thinking called flexibility.<sup>1</sup> This may not be an absolute reflection as the performances compared to those who spent time on cell phones and the internet thereby giving a relative comparison. It also demonstrated other psychological benefits such as motivation or persistence to stick trying to solve longer than someone who has not played video

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<sup>1</sup> Gray, Peter. "Benefits of Play Revealed in Research on Video Gaming." *Psychology Today*, Sussex Publishers, 27 Mar. 2018

games, making them less likely to give up, and emotional benefits reducing anger and fear making them less likely to throw tantrums. Gray points out, “A general lesson from video games, reported by many gamers themselves, is that persistence pays off.”<sup>2</sup>

It also showed social benefits as players would interact with each other online, albeit it is no comparison to real human interactions, it helped improve basic conversation skills and cooperation. “Results overwhelmingly support the idea that video gaming produces many of the same kinds of benefits as other forms of play.”<sup>3</sup> In general, video games seem to have a healthy impact on our brain, at least when used in moderation and provides several benefits which argue against contrary evidence stating that video games are ‘digital heroin.’

In a study conducted by *WIRED*, they conducted cognitive experiments on a pro League of Legends player and an amateur gamer such as testing pure reaction time making them rely on their peripheral vision; testing cognitive processing overload by making them do a set of tasks while being told to do the opposite; and the ability to track multiple objects at the same time. They found that the pro player significantly outperformed in complex tasks that had more distractions.<sup>4</sup>

A question arose asking, “is it that people who are good at these tasks are playing games or is there proof that games can actually improve cognition?” It was found that specific games that involve a lot of movement and object tracking action does improve cognition. “We’ll get more learning gain from smaller sessions spread out over time than one big block”.<sup>5</sup> The main positives are in perception- ability to interpret external stimuli like sights sounds; spatial

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<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

<sup>4</sup> WIRED Senior Editor Peter Rubin, ‘Testing Gamer vs Non-Gamer Brains: How Do Video Games Affect You?’ | WIRED, YouTube, 25 Oct. 2018

<sup>5</sup> Ibid.

cognition- ability to orient oneself and navigate around environments; and top down attention- ability to focus on a task with other distractions. Senior Editor Peter Rubin exclaims that, “Gaming can help with focus, spatial attention, even memory.”<sup>6</sup>

Unfortunately, the extent of these generalizations are unknown, as although some gamers may exhibit exceptional hand-eye coordination, they may not be very good at catching a baseball.

A study conducted by researchers Tirp, Judith, Wattie and co. of virtual and real dart throwing regarding the extent of the transferability of these skills between virtual and real learning environments was conducted which involved measuring throwing accuracy (TA) and quiet eye duration (QED) in dart throwing.

Using the Microsoft X-Box Kinect, the participants were asked to throw darts in pre- and post-tests on a real and on a virtual dartboard. Throwing accuracy was based on direct distance from the bull’s eye. While Quiet Eye Duration was measured using special eye tracking equipment. The results exhibited significant differences in TA between the real training groups as they outperformed the control group while the virtual group also had better scores. Results for QED showed a significant improvement between tests especially in the virtual group where it was longer and enhanced. “One of the main findings in this line of research is that longer quiet eye duration leads to superior results”.<sup>7</sup> As more tests were conducted, there was improvement in both real and virtual training groups between tests with the control group

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<sup>6</sup> Ibid.

<sup>7</sup> Tirp, Judith & Steingröver, Christina & Wattie, Nick & Baker, Joe & Schorer, Jörg. (2015). “Virtual realities as optimal learning environments in sport – A transfer study of virtual and real dart throwing”. Psychological Test and Assessment Modeling. Pg. 58

performing the worst. “They show that perceptual-motor skills can be trained in novices in a relatively short amount of training”.<sup>8</sup>

The results showed how efficient both these types of training are and the difference in their effects between groups through which it can be concluded that actual transferability of skills could be implemented in real situations.

The paper by Rolf Kretschmann plays with the idea of playing digital sports games as a way to become more competent in the actual sport itself and then compares it results from more traditional educational methods. He explains the types of sports games such as simulation and management games that consist of games like *FIFA* and *Football Manager*, which this paper intends on analyzing. It explains how sports simulation games are capable of developing competency in a sport as its model tries to replicate the actual sport itself and has a certain element of realism to it. How these competencies are mainly centered around decision-making and reasoning (which these games improve) and extends into functions such as motor- hand-eye coordination; cognition- problem solving, creativity; as well as emotional and social competence. He also highlights, “The connection or parallelism of digital and real games has always to be made clear to the students”.<sup>9</sup>

Sport learning methods are mentioned such as in *NBA 2k live*, the player can learn the exact techniques for different types of shots (lay-up, dunk, hook shot, etc.) which they can then apply in real life. He states that, “teachers can support the learning process by using digital sport games in physical education classes by giving tasks in analyzing the variety of techniques and their structures, rules and their violations, or exploring successful tactics in the game”.<sup>10</sup>

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<sup>8</sup> Ibid., Pg. 67

<sup>9</sup> Kretschmann, Rolf. “Developing competencies by playing digital sports-games.” (2010).

<sup>10</sup> Ibid.

It mentions how sports and digital games are interdependent as they both influence each other but raises the question of actual motor skills transferability instead of just knowledge, understanding, and cognitive skills.

According to several medical studies mentioned by Siemon, Andreas, Bader, and co. in the research paper, it can be assumed that the training of sensor-motor abilities can positively affect actual sports performance in real life situations.

In their study, by using the bowling games of the Nintendo Wii as virtual training, experiments were conducted to determine positive effects, if any, on participants' performance in a real game in a bowling alley.

One group took part in a video game training session while the other group received no special training. After that, both groups took part in a game in an actual bowling alley. Results showed a significant positive effect of virtual training on the average scores of the participants in bowling stating, "It significantly showed that the console training had had a positive effect on the mean scores in bowling".<sup>11</sup>

Since the groups' average scores differ considerably, it proves that the training on the video console had had a significant influence on the performance on the bowling alley. They also concluded that, "training with video games can affect strategic thinking processes".<sup>12</sup>

A good soccer or any team player at a high level could be characterized by certain characteristics such as excellent spatial and divided attention, working memory and mentalizing capacity. They must be able to quickly adapt, change strategy and inhibit responses based on

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<sup>11</sup> Siemon, Andreas & Wegener, R & Bader, Florian & Hieber, Thomas & Schmid, Ute. (2009). "Video Games can Improve Performance in Sports—An Empirical Study with Wii TM Sports Bowling".

<sup>12</sup> Ibid.



ever-changing scenarios in the game. Torbjörn Vestberg writes, “Success in ball-sports also depends on how information is processed given the complex and quickly changing contexts”.<sup>13</sup> Many of these abilities are referred to as “in-game intelligence” in sports but in neuropsychology, these are collectively referred to as ‘executive functions’. Although he highlights that “executive functions are related to only some aspects of IQ”.<sup>14</sup>

In a study conducted by Vestberg, the participants were sorted into two parts and the approach was to use well-known neuropsychological assessment tools such as the Design Fluency Test, a color-inference test and a trail-marking test, to assess the soccer players' executive functions. The results showed that both High Division and Low Division players had significantly better measures of executive functions in comparison to the control group for both men and women. The higher division players also outperformed the lower division players in these tests as can be seen by Xavi's (one of the best midfielders of his generation) results, which showed a fast scanning ability that perhaps gives him an advantage over other players on the pitch in regards to positioning, decision-making, etc.

A question then arises asking, “Are these executive functions trainable?” Yes, they are, and the training for it is similar to video gaming. In this research, it shows that elite gamers—especially those who play action games or first person shooters, like Counter-Strike—have a lot in common with elite team-sports athletes when it comes to cognitive and executive functions.

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<sup>13</sup> Vestberg, Torbjörn et al. “Executive functions predict the success of top-soccer players” PloS one vol. 7,4 (2012): e34731, Pg. 7

<sup>14</sup> Vestberg, “Executive functions”, Pg. 31

Sport scientist Mayer says. "Increasing speed of processing, task switching experience, object tracking, all this stuff that we need on the field you can improve through actual video game play, and that's a scientific approach we're excited about".<sup>15</sup>

A study conducted involved a 3D-Multiple Object Tracking training task to improve passing decision-making accuracy in soccer players is able to exhibit an actual transfer effect of abilities developed from virtual training of executive functions to on-field decision making during game-play. Researcher Faubert states, "Virtual reality is a technology that is being recognized as an important tool to potentially improve sport performance".<sup>16</sup>

The results showed them improving their on-field decision-making skills compared to control and placebo groups as it trained their brain by increasing their information processing and concentration. "Decision-making accuracy in passing, but not in dribbling and shooting, between pre- and post-sessions was superior for the 3D-MOT trained group than the control groups".<sup>17</sup> Although in the *FIFA* video game, there is no technical way to parse the different cognitive skills and track player's improvements. Nevertheless, despite that, Mayer acknowledges that, "the noise in a typical game of *FIFA*, may improve anyone's processing speed"<sup>18</sup> and thinks, "the video game could make a difference in the way the game is played."<sup>19</sup>

A study conducted by researchers Roca, Williams, and Ford on soccer players using a real-life scenario film interpretation was done to determine the decision-making skills and game understanding. It was then compared to hours of actual soccer played in childhood or

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<sup>15</sup> Thomas Romeas, Antoine Guldner, Jocelyn Faubert, "3D-Multiple Object Tracking training task improves passing decision-making accuracy in soccer players", *Psychology of Sport and Exercise*, Volume 22, 2016, Pg. 6

<sup>16</sup> Faubert, "3D-Multiple Object Tracking", Pg. 7

<sup>17</sup> Ibid.

<sup>18</sup> Ibid. Pg. 9

<sup>19</sup> Ibid.

adolescence to conclude a relation between the hours of practice (done via a questionnaire) and level of ability of a soccer player based on decision-making metric, which based on above-mentioned articles, is a sound metric to consider.

They found that the development of anticipation and decision-making in soccer is directly influenced by the amount time spent practicing in youth i.e. there is no difference in average hours practiced for similarly skilled soccer players. They inferred that, “elite players who went on to be offered a professional contract accumulated more hours per year in childhood in soccer-specific deliberate play”.<sup>20</sup> However, some of these skilled players performed substantially better in the decision-making test meaning there is a difference in perceptual cognitive ability. They explain, “The ability to anticipate and make decisions is presumed to be particularly important at the elite level in soccer.”<sup>21</sup>

We can conclude that although playing a video game like *FIFA* will not make someone drastically improve as that can only be done by old-fashioned training and practicing for hours. However, after a certain level, these games help increase the level of ability through cognitive functions and can give players an advantage over their opponents on the field.

In the world of soccer, players are principally judged based on three metrics- physical, technical, and tactical. However, often metrics like cognitive and psychological ability are overlooked. This study published in the Journal of Sport Sciences performs several cognitive experiments in order to judge the player’s cognitive ability in relation to performance.

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<sup>20</sup> André Roca, A. Mark Williams & Paul R. Ford (2012) “Developmental activities and the acquisition of superior anticipation and decision making in soccer players”, Journal of Sports Sciences, 30:15, Pg. 1645

<sup>21</sup> Ibid., Pg. 1647

Methods such as self-talk, imagery, relaxation, music and goal setting were conducted and it was found that they all seem to have a positive effect on soccer performance, at least in terms of motor and psychological skills like self-esteem, confidence, etc.

The results showed that it reduced players' stress and made use of their cognitive training to practice technical skills and correct mistakes stating that, "cognitive training can enhance skill execution and sporting performance".<sup>22</sup> Specifically, "mental imagery was found to improve motor skills (i.e., dribbling, passing, shooting and checking off, specific soccer skills) or soccer performance in terms of time, error performance, speed and technical quality".<sup>23</sup> They also found that players in certain positions are affected differently such as a midfielder was found to be more responsive to combined cognitive strategies when compared to forwards and defenders. It suggests that coaches and teams may benefit from the implementing these trainings in order to improve their players' performances.

For these strategies involving video-game training in sports to take effect, coaches will have to implement them and incorporate them in their trainings. The article by Shane Pill describes how a coach must think as a game-developer in order to incite the most effective learning strategies. For example, developing a design that allows players to learn from experiences and solve problems, which improve their core cognitive functions. He mentions how, "thinking like a game developer requires thinking about sport teaching as a carefully designed learner-driven system of interconnected experiences"<sup>24</sup> and explains how

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<sup>22</sup> Maamer Slimani, Nicola Luigi Bragazzi, David Tod, Alexandre Dellal, Olivier Hue, Foued Cheour, Lee Taylor & Karim Chamari (2016) "Do cognitive training strategies improve motor and positive psychological skills development in soccer players? Insights from a systematic review", *Journal of Sports Sciences*, Pg. 2339

<sup>23</sup> *Ibid.*, Pg. 2341

<sup>24</sup> Shane Pill (2014) "Game Play: What Does It Mean for Pedagogy to Think Like a Game Developer?", *Journal of Physical Education, Recreation & Dance*, 85:1, Pg. 11

digital game-play is related to sports as they both similar constraints thereby making the learning principles applicable and transferable to both. An approach in teaching physical education like this goes beyond actual set-learning to a more dynamic intellect of decision-making suggesting that, “physical education teachers should consider the same learning principles as digital game designers”.<sup>25</sup>

The video game of *FIFA* perfectly serves this purpose as the endless scenarios in game and little intricacies emulating real soccer can help coaches teach players to have a better understanding of the game.

## ***FIFA* VIDEO GAME ANALYSIS**

### **History of Design**

The *FIFA* video game, developed by EA Sports, is a football simulator game, which was first introduced in 1993. At that time, there were other football video games around such as ‘Kick off’ and ‘Match Day’, however none of them could replicate the experience of the sport as realistically as *FIFA* had done.

The design of the game has significantly improved with each passing production throughout the years. Initially, the franchise started out as a 16-bit game presenting the game field from an isometric view (method for visually representing 3d objects into 2d space) instead of being side, or top-down. As the series continued, the game introduced motion capture in *FIFA* ‘95 as well as adding feature commentary. Their breakthrough in terms of design came in *FIFA* ‘98: *Road to World Cup*, as it consisted of an improved Artificial Intelligence, a refined graphics

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<sup>25</sup> Pill, “Think Like a Game Developer?”, Pg. 15

engine capable of working on 32-bit systems, new team and player customization options, as well as a new offside rule feature.<sup>26</sup>

Sound is also a major design point in the game and contributes to the feel and atmosphere of the user experience. *FIFA 98* was able to feature a licensed soundtrack consisting of sleeper hits that the fan base enjoyed and is still implemented to date.

The game moved on from 16-bit systems allowing for more memory for graphics interpolations, added new teams and leagues such as the MLS in *FIFA '00* and implemented new facial animations using an improved cartoon graphics engine to give players more emotion.

As the internet exploded, the franchise designed an online component to the game in *FIFA '01* and introduced a reward system, an in-game strategy to give users an incentive to play more and reward them for their achievements with unlockables in *FIFA '02*. With further installments, *FIFA* designed power bars for shooting and passing to give users more control, and revamped their DirectX graphics system, which can be seen by the improved stadium features including audience faces and player kits, and player responses.<sup>27</sup> They implemented features such as create-a-player and career mode, and introduced the gameplay system for tricks that is now a staple in *FIFA* taking inspiration from their *FIFA Street* series.

*FIFA* overhauled their game engine for *FIFA '06* mainly so they could sell the game on the newly released XBOX 360 platform. They then introduced a 'be-a-pro' mode, which shifts

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<sup>26</sup> "History of FIFA: Every FIFA Game Released." Goal.com. November 09, 2018. <https://www.goal.com/en-us/lists/history-of-FIFA-every-FIFA-game-ever-released/ecphoguaggy1fwscnr43azlo#1v05smbv4m29w1o05wzsimu10w>

<sup>27</sup> "EA SPORTS FIFA and Beyond: An Illustrated History of Soccer Video Games | SIDELINE." Major League Soccer. January 03, 2016. <https://www.mlssoccer.com/post/2015/11/03/ea-sports-fifa-and-beyond-illustrated-history-soccer-video-games-sideline>

the camera from a bird's eye field to a FPS controller trying to simulate a real player's perspective during a match.<sup>28</sup>

*FIFA '09* largely touted as their best release, symbolized their ascent to the top of football gaming industry mainly achieved by live features achieved through micro transactions conveying a shift to a pay-to-win system for the online mode, as well as introducing a revamped collision system and controlled goal-celebrations allowing users to imitate their favorite celebrations by real-life players.<sup>29</sup> Future versions transformed the design of the control system from an 8-directional navigation to a 360-degree player control in the Cartesian space. They also transformed the game to be playable on Mac OSX such as the iPhone and iTouch.

Features included in *FIFA 12* and onwards including constant updates consist of Attacking Intelligence, higher fidelity for precision dribbling, realistic touch loss error, and positional defending (shift from the classic 'legacy' defending which involved holding one button down for the entire duration). *FIFA 14* introduced a new game engine called 'Ignite' which allowed for dynamic environment changes allowing players to play in conditions like snow and rain with the ball and players reacting appropriately, and true player motion for realistic animations using motion capture.<sup>30</sup>

The newest versions introduce women's teams to encourage prospective female users to play the game as well a 'Journey' mode that allows users to simulate the rise of a professional footballer through life choices with more focus on the story than actual gameplay. The latest version, *FIFA 19*, uses the Frostbite 3 engine which is a significant improvement regarding the interpretation of real-time physics and kinematics in the 3D space.

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<sup>28</sup> "History of FIFA: Every FIFA Game Released.",

<sup>29</sup> *Ibid.*,

<sup>30</sup> "An Illustrated History of Soccer Video Games"

## **Mechanics & Physics**

The video game is a simulation of a real football match wherein two teams play against each other with one common ball trying to score more goals than the other in the opposing net.

*FIFA* allows the users choose one of the teams and play against a CPU-controlled team or against another user, (whether it is on the system using two controllers, or online).

During the match, the user can only select one player at a time out of the 11 possible players in his team and using the controller and has a variety of control options at his disposal. Some basic options representing key conceptual features in football involve shooting, passing, sprinting, tackling, and switching players. Hosts of more advanced options are available for more experienced users using different combinations of keys from the controller to provide a greater control and intricate simulation of the game.

The physics implemented in the game is rather realistic and is aimed to replicate the events in the real-life. For example, if two players run towards each other, the impact of their collision will depend on the two player's characteristics. If player one weighs 185 pounds, and player two weighs 150 pounds, the momentum (mass x velocity) calculations result in player two taking the brunt of the impact. Obviously, the result would differ if say player two were moving at a higher velocity. Other features are also taken into consideration such as height, direction of movement, in-game 'stats' such as "strength", and other arbitrary traits which may impact player performance in real-life such as fatigue and aggression.

This applies to other in-game situations as well such as shooting and passing. The weight of it being determined by the length of the power bar on pressing the button. The higher the more powerful the shot/pass hence, the greater the distance it will travel. The direction of it is



determined by the direction the user chooses to aim with the controller stick and finally, the timing being determined by moment of press/release of the controller shot/pass button.

A new feature has been implemented in the latest release to offer greater discrepancy on timing as before; both it and direction were largely automated by the CPU A.I. resulting in few errors and unrealistic simulation. The new feature requires the user to send in an additional input to the shot/pass, which they must synchronize with the strike animation of the player character, they are controlling in order to properly ‘time’ the ball.

This simulates reality in spades as timing the ball is notoriously one of the most difficult aspects of the sport. For example, for a simple tap-in shot from a slow pass, the timing window for the additional input will be much longer than an overhead first-time volley.

Again, other features influence these for instance in-game stats such as ‘pass accuracy’, ‘shot power’, or situational elements like pressure on the player, shooting/passing angle, distance, fatigue, etc.

Another element which *FIFA* is renowned for are skill moves. Each skill move utilizes the player’s position in the Cartesian space relative to their, the opponent’s and ball’s configuration space and animates the moves in the resultant direction. They are often a valuable tool for in real-life as they provide an ability to escape tight situations and have been given a similar advantage in the game with players often getting speed-boosts, center of gravity shifts, and extra momentum to help beat the defenders.

These are performed by completing certain key combinations on the controller much like cheat code inputs on older NES 64 games. The fancier a skill, the higher the skill level needed by the player (defined by skill stars), and the more the complex the key combination. Certain players like Neymar, who also has skill moves as part of his real-life game style, are able to

perform these moves effortlessly as they much more agile and technically proficient when compared the center backs, who are much taller, heavier, more rigid which prevents the ease of movement and agility needed to pull off the moves.

Certain elements in the physics engine are modifiable by the users using in-game sliders to change qualities such as 'Avg. User Acceleration' and 'First-touch control error'. This along with changing the difficulty level (involves dumbing down or increasing the CPU A.I.) gives the users a preference for a more customizable gaming experience.

### **Gameplay Elements**

The video game is tailor made to immerse the user in as authentic a football experience as possible. This is made possible by mimicking several events, which happen in real-life such as:

#### **Kickoff**

Each match starts with both teams on either side with a player from one of the teams (could be the home team, but most probably random) stepping up to the center-circle to start play after the referee blows the whistle.

#### **Corners**

A corner is awarded to the side (left or right) the ball went out on. The players then animate themselves in a huddle inside the box ready for a cross to attack from the corner flag but with the added gameplay features of running pre-made set play routines such as running to the far post or coming short for a pass which validly represents corners in football.

The user can also switch the kick-takers to alternate between left or right footers, which result in a different delivery (in swinging or out swinging).

## **Free kicks**

Whenever a player commits a foul, the game awards a free kick. If the ball is in distance (~18-35 yards), the user can have a shot by lining up the camera with location of the intended shot. The user then has options such as curling it, driving it, crossing it, or asking for a layoff, all of which provided variety and a chance to be unpredictable.

Perhaps not as realistic as real-life, although that may be due to the way the mechanism is deployed but nevertheless provides the user with required feel of a real-life free kick.

## **Penalties**

If a foul is committed inside their own box, the game awards a penalty. The animation of this gameplay is especially life-like however, the in-game mechanism seems computerized as the user can commit the goalkeeper either way flawlessly with no time delay, and can take the kick with perfect power and placement into a location consistently. Something that we do not see often in football.

## **Goal kicks**

During goal kicks, the camera shifts to an almost third-person view extended over the horizon. The user can control the goalkeeper and kick the ball depending upon the intended direction. Based on the style of play, the teammates would take up different positions and come short/go long. The camera however, does not provide full field of rotation nor can the ball be placed in a different kicking location in the 6-yard box.

## **Throw-ins**

The user can throw to any of his teammates who are in the nearby vicinity/throwing radius. In past games, this was implemented by simple buttons corresponding to specific players

thereby limiting the total number of options, but was replaced with the standard in-game player switch also utilizing the right stick, which plays more naturally.

## **Referees**

The referees are implemented in high detail in the game. They are largely anonymous figures during games but have recently had collision detectors attached to them allowing them to impact the ball or the players.

They are responsible for dishing out punishments in the game, which involve nothing or yellow, red cards. The game calculates using a severity metric for the foul committed which is based on features such as position of foul, number of players behind/ahead of the ball, type/location of foul on the body, etc. and also depends on the individual referee characters as certain referees are stricter while others are more lenient. At times, if deemed necessary the referee calls an advantage to allow play to go on and then later deals out the punishment. All of this reads out of the refereeing handbook in professional leagues and the video game very rarely gets calls wrong. Professional refereeing systems such as V.A.R. would benefit from implementing features of the algorithm.

## **Injuries**

As in football, injuries happen in the video game as well with type of injury varying in addition to the severity of the injury forcing the user to make a substitution. Usually players with the injury prone characteristic, result in being injured more often.

## **Substitutions**

The users can pause the match at any time and enter the game menu where they can select the team sheet and manually replace active players with a substitute from their bench. The user can only make three substitutions however, which is in line with the rules of football.

## **Offside**

The game implements the offside rule perfectly handling the many complexities that come with it. It also provides users feedback through replays and gridlines for a more convincing experience.

## **Celebrations**

After scoring a goal, the user can choose from a plethora of in-game celebrations to perform giving the user the ability to replicate a celebration from a favorite player such as Pogba's 'dab' or Ronaldo's 'calma calma'. This instills a type of narcissistic viewing pleasure.<sup>31</sup>

## **Animations**

Throughout a match, the game conveys information through cut scene animations or pop-ups. If the player misses a chance, the replay would cut to the player character holding his head in despair; or if a severe foul were committed, the replay would animate the referee surrounded by players holding out a red card in controversy. It all adds to the drama of the game and enhances the experience. Vital information such as time and score or trivial figures such as possession/shooting stats, or minor injuries are provided through realistic TV animations. Each of these individual elements enrich the authenticity of the game by presenting the user with in-game situations similar to on the pitch.

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<sup>31</sup> Duncan, M. & Brummett B. (1989) "Types and Sources of Spectating Pleasure in Televised Sports", *Sociology of Sport Journal* 6:3, Pg. 201

## **Tactics & Strategy**

The explosion of the video game in the mainstream media has brought about an increased inquisitiveness for the tactical aspect of the sport. Terms such as CAM (Central Attacking Mid), CDM (Central Defensive Mid) which perhaps didn't exist before in the nomenclature are now widely accepted and are often used by coaches to translate their instructions to the players.

In the video game, the players can choose from a variety of fixed preset formations to line their teams up using ranging from 4-4-2 to 3-4-3. Each formation also has tweaked variations in it allowing certain players to take up slightly unorthodox positions than the standard and perform a different role. For example, 4-4-2 has variations such 4-2-2-2 where the two wide midfielders are pushed forward and inside, while the two central-midfielders drop deeper. In addition, there is the option to manually tweak each player's position on the pitch inch by inch to obtain a unique custom formation. Theoretically, a user could play with a 1-3-6 formation or similar extremes of that sort if they so wished.

This helps users, especially young children, form a deeper understanding about the tactical side of the game without the need for formal coaching. For instance, elements like 'positional play' are far more commonly used nowadays which involves a player staying in respective position in the match regardless of the position of the ball in order to preserve organization and stability, instead of breaking shape and running free.

However, despite these tactical advancements in the video game, the sport remains much more organic. Formations in football rather than fixed blueprints are used more as guidelines. Each formation can be transposed to another through minute positional changes that happen constantly throughout a match: 4-4-2 -> 4-4-1-1 if one striker drops slightly deeper -> 4-5-1 if the striker (now CAM) drops even deeper -> 5-4-1 if a midfielder drops into the defensive line ->

5-3-2 if a midfielder breaks through the offensive line, and so on. These switches arise as in-game adaptations by coaches and players depending on the situations of the ball and players. For instance, a center back may break his defensive line and step into midfield to track a striker who has done the same to receive the ball.

Whereas in *FIFA* these are a lot more rigid in terms of flexibility, the center back would stay in his fixed position marking nobody because the fixed preset instruction the player is operating if the given formation is a 4-x-x template. To improve this, *FIFA* implemented a new screen in the tactical set up called instructions where users can positional-specific instructions to the players playing in those positions. User could instruct the strikers to get in behind the opposing defensive line or be a target man and bring others into play, or ask his midfielders to cut passing lanes and get forward when there is a crossing opportunity.

Another design element that *FIFA* use to simulate the strategic side of the sport is the tactics screen. This gives users freedom to set specifications for how they want their team as a whole to play. Whether it is the team's offensive width being narrow to unlock more passing options through the middle, or defensive height being high combined with a high-pressure mentality to win the ball back and entrap the opponents in their own half; the users can customize according to a game plan that suits their style of play the best.

An interesting new feature *FIFA* have tried introducing in the latest release are dynamic game plans. Users are able to set up to 5 preset custom game plans (which include combinations of formations, tactics and instructions) and the change them on the fly at any point in the game rather than pausing the screen and manually implementing the drastic changes. This allows for greater strategic flexibility. To illustrate, if the user is losing in the dying minutes and need to score, they can switch to a more attacking preset game plan which may include

tactics such as high pressing, more players committing forward, increased shooting and crossing; provided they have created one beforehand.

These components provide users in-depth control over their team and simulates real-life management or coaching conditions, as users are able to use combinations of the different teams, players, formations, and instructions to formulate a personal unique tactical game style.

This allows for considerable experimentation especially from advanced users who are more adept with the tactical concepts as they can try and emulate specific play styles of their favorite teams in real-life, and use them according to their own personal preferences whether it be a slow methodical possession style on the spectrum or fast back-and-forth counter attacks and adds to enjoyment of the experience.

The implementation of the sport's tactical system allows users to learn and gain an improved understanding about strategies used in the sport. Users could then implement this newfound knowledge in their real-life performance on the pitch to practically improve their decision-making and hence, performances. Whether this is translatable between the two is the purpose of the undertaking research in this paper.

### **Artificial Intelligence**

A large part of the game is implemented by the A.I. As users can only really control one player at any given time, the CPU renders all the remaining 21 players' actions. For the *FIFA* community, it has always been a sore spot for users, as the developers from EA have never revealed exactly how the A.I. has been implemented and has caused controversial theories to come up such as in-game scripting or 'momentum' providing handicaps for lesser-skilled players to bridge the skill-gap.



Despite that, we can analyze that the A.I. in the game is extremely efficient in replicating player behavior on the pitch. A feature introduced called Pro Player Intelligence focusing on three factors: predicting the future during an attacking play, timing of runs and passes, and ranking of space.<sup>32</sup> This provides smarter activity and better decisions by a more active intelligence system.

In scientific terms, similar systems are created using machine learning and decision trees (flow charts). This is done in two steps by: using convolution neural network (CNN) for understanding the screenshot image and using long short-term memory (LSTM) networks to decide appropriate action based on the understanding of the image. They work by calculating feature vectors such as the distance between the active player and the nearest player and repeating that constantly for every frame in the game.<sup>33</sup> This is where the game engine comes into play which allows for scripting these conditional events using programming languages such as C# and renders it for every frame per second.

As a result, the A.I. is able to understand to shoot when the character sees the goal frame angle wide open, or pass it backwards when forward options are blocked. As the A.I. gets more refined combined with in-game presets such as player characteristics and stats, the CPU players develop traits such as team understanding and analyzing strengths and weaknesses. For instance, if a fast A.I. winger has space in behind to run into, knowing that its strength is pace, it will

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<sup>32</sup> "FIFA 12: Pro Player Intelligence." Next Gen Base. May 20, 2011. <https://www.nextgenbase.com/FIFA-12-pro-player-intelligence/>.

<sup>33</sup> "Building a Deep Neural Network to Play FIFA 18 – Towards Data Science." Towards Data Science. January 14, 2018. <https://towardsdatascience.com/building-a-deep-neural-network-to-play-FIFA-18-dce54d45e675>

exploit and run in behind as soon as it can without waiting to check for the user's pass or position.

It also hyper focuses on player attributes such as vision mapping where players with high ceilings of vision or passing accuracy stats would have a 360 degree field of vision for users to utilize allowing for better technical execution of plays.<sup>34</sup> For this reason, the better the players are in the team i.e. higher the stats, higher the chance of winning the game.

## **Impact**

Football is the most popular sport in the world. It extends to more than just a game or past time for a lot people into a hobby, passion or even career. However, because of physical constraints, it is not possible to engage in playing the sport at all times, and this applies to other sports as well. Simulation games here, such as *FIFA*, become an integral part of an outlet for these people to continue their interests. Fortunately, most of these users fall under the age of 10-25, which happens to be the video game's target demographic. Because of this monopoly, *FIFA* is played regularly as part of children's' everyday routine all around the world. This extends to adults as well as the game, like the sport, essentially has no fixed playing age hence we see famous footballers such as Lionel Messi, Ibrahimović, and Andrea Pirlo being firm advocates and fans of the series, often times playing for hours on end and then trying to replicate what they did in the game onto the football pitch, and vice-versa.<sup>35</sup>

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<sup>34</sup> "Active Intelligence System - FIFA 17 Developer Interview." Electronic Arts Inc. June 08, 2018. <https://www.ea.com/games/FIFA/FIFA-19/news/FIFA-17-active-intelligence-system>

<sup>35</sup> Crawford, G. and Gosling, V. (2009) 'More Than a Game: Sports-Themed Video Games and Player Narratives', *Sociology of Sport Journal* 26(1): Pg. 54

The cultural significance has exploded recently due to its popularity with its name being mentioned in tandem with football in general. *FIFA*- the video game, is now an actual career option for many youngsters from EA holding eSports tournaments and handing out huge cash rewards to the winners to Youtubers streaming their gameplay of the game and being followed ardently by millions generating revenue.<sup>36</sup>

This huge cultural impact has undoubtedly affected the world of football as well. The public by the 'ratings' and 'stats' in the video game often views many players as skilled or talented players. Although, talent is a very subjective opinion, this classification scheme introduced by *FIFA* provides an alternate albeit possibly inaccurate method of rating players.

There seems to be a correlation between the ratings of players and the level of the teams they play for and has resulted in young players trying to force big-money moves to bigger clubs to the detriment of their own playing careers in hopes that they would be considered by the public as better players. This would beget them sponsorship deals, endorsements and build their brands, which would lead to bigger opportunities instead of actually showing it through playing ability on the pitch. Most of these players in the past 5-10 years have in turn, not had too much success. Granted, this opportunistic mindset has existed before as well but it has been accelerated due to the increased influx of these cases in the past decade. Coinciding with the boom in sales of the video game and the widespread cultural phenomenon, *FIFA* has most probably influenced these events.

The video game has also had an impact on the way the sport is played in real-life. Speaking in a broad sense, the sport recently has lost its variety. To further explain, first we must

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<sup>36</sup> Stein, Abraham, Konstantin Mitgutsch, and Mia Consalvo. "Who Are Sports Gamers? A Large Scale Study of Sports Video Game Players." *Convergence* 19, no. 3 (August 2013): Pg. 348

consider that at any point during a match in football, there exist countless scenarios regarding what is possible based on parameters such as position and movement of the ball, position of the player with the ball, positions and movements of the teammates, positions and movements of the opposition players, objective of the game, time needed, and so on.

These result in spontaneous scenarios where a player must improvise and adapt to come up with the best decision possible in the given timeframe. This is unlike American football for example, where there exist multiple time stoppages, resets, and most of the plays are predominantly set-plays or practiced routines. In these non-stop conditions, it is often the best players who consistently come up with the best decisions displaying their brilliance through spontaneous in-game intelligence, extreme physical abilities, and flawless technical execution to make their vision come to fruit. These produce ingenious creative moments in the game that the spectators love and is defined as a term called ‘wow factor’. Players known for this include Ronaldinho, Zidane, and Ronaldo, all of whom are extremely unpredictable players.

However, nowadays, these ingenious unique moments of the game are rare. Analyzing the top 25 best goals of any team for 2018 vs the same for 1998 i.e. a 20-year difference, we can see that currently, a portion of the goals are repetitive and have a certain pattern or monotony to them and are often very similar to the types of goals one can score on *FIFA* regularly.

This is perhaps due to increase in coaching standards throughout the world and the evolution of the sport in the past 20 years. The lack of variety stems from teams implementing rigid tactical systems sacrificing player freedom and creativity in favor of stability and control. So where a player previously had an assorted number of options to choose from, is now directed to choose from only a handful.

The restricted player movements take after the robotic-like, organizational play of teams in the video game. The large number of players who play *FIFA*, after spending hours on it regularly, would naturally try and mimic certain plays into their real-life game which subconsciously, would seep into their skill set and mind frame every-time they play football.

Part of this research is to see exactly how much this is affected, and if these effects are positive or could prove to be detrimental.

## **Realism**

*FIFA* was the first franchise to officially obtain licensing from the world governing body, *FIFA* - Federation International Football Association (not to be confused with the name of the video game). This has undoubtedly helped increase their sales and popularity by bring the feeling of authenticity to users who feel that they can play and control their favorite real-life players who look like them and play like them.<sup>37</sup>

This compared to another football simulator franchise such as Pro Evolution Soccer (PES), who do not have these rights, definitely impacts their sales and perception in the public eye as often times users are left frustrated playing with a team or player with a fake name closely resembling the real-life counterpart but cheapening the experience regardless the quality of the game. As a result, *FIFA* is rising and is slowly becoming a monopoly not only in football simulation games, but all football games as their alternate game modes cover other unique elements of the game such as management (career mode) or 1v1 shooting/goalkeeping (practice

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<sup>37</sup> Conway, Steven. “‘It’s in the Game’ and Above the Game: An Analysis of the Users of Sports Videogames.” *Convergence* 16, no. 3 (August 2010): Pg. 345

arena). It is popular throughout the world spanning 18 languages and 60+ countries and is already one of the best-selling video game franchises of all time.<sup>38</sup>

The players in the game are replicas of their real-life counterparts, which is done mainly through motion capture. Specific movements are extremely close in terms of the likeness to their characters. To illustrate, Ronaldo's famous choppy hand movements while running at full speed, his hang time while in the air, and free kick technique are perfectly demonstrated by his in-game character where the user gets the full impression of using that exact player unmistakably. Traits such as Pogba's wide gait while running or Neymar's flair with ball is exhibited for the user to experience as realistically as possible.

Another feature that imparts realism to the game is the scaling and proportion. The players, pitch, ball and the physics relating all of them is administered to take in account the discrepancy in size from real-life to on the TV/computer screen. A player's size does not look out of touch when compared to the ball or the full stadium by using common game world units. For instance, a player like Bale when running from one end of the pitch to the other (~100 m) would complete it in 10 seconds, approximately 10 m/s or 36 km/h which is the very close to his actual real-life top speed (36.9 km/h).

Throughout the years since, as the game engines and the graphic generation ability of computers have grown, the game has gotten more and more sophisticated, nowadays implementing a very real, physics-based interpretation of the game, which translates very well to the real world. The video game offers a very real substitute for the sport implementing many of the sport's fundamental principles in its execution and without the physical aspect, serves as a

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<sup>38</sup> Andrei S. Markovits & Adam I. Green (2017) "FIFA, the video game: a major vehicle for soccer's popularization in the United States", *Sport in Society*, 20:5-6, Pg. 730

virtual environment to experience the full game.<sup>39</sup> Considering how well it relays to the real world, users could be able to use parts of it to enhance their real-life football skills.

## **CASE STUDY**

To develop an understanding of how the video game of *FIFA* coincides with the sport of soccer and the impact they have on their respective players, several case studies were performed on a pool of prospective participants. In order to maintain validity in the results, the participants were chosen based on preselected criteria to ensure relevant applicability of the conclusions determined. Any information provided was anonymous and used solely towards the undertaking research studies. The questions asked purely intended to encourage soccer-specific details from the users and to help the study. They were performed with the pure intentions of trying to gain insight in order to ultimately help improve the video game and the sport.

For the first study, a research survey was handed to participants consisting of questions relating to the participants ability in the video game, as well as the sport and the strategies they use or have developed during their time involved with the respective activity.

Two survey inquiries were performed, one to a group of college students who were observed face-to-face while another was performed later online with the survey posted to social networking sites such as Reddit and its various subreddits in order to gain numbers and expand the pool of answers.

A total of 44 participants were involved in the initial survey. All of the participants were screened beforehand for some affiliation with the video game and sport through trivial metric questions such as favorite team/player and why? To judge interest and provide some scrutiny.

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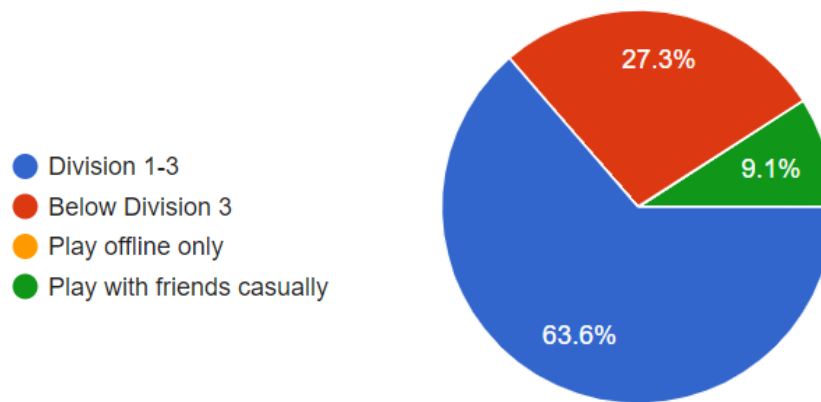
<sup>39</sup> Hayes E. & Silberman L. (2007) "Incorporating Video Games into Physical Education", *Journal of Physical Education, Recreation & Dance*, 78:3, Pg. 19

However, as a result of the second survey, although the sheer numbers and demographic was expanded significantly, it unfortunately resulted in lack of quality responses without the presence of proper screening as was expected due to the nature of online media. Although, the results were skewed from this, upon vetting the answers for vagueness, correlation between the data was found to an extent and the possible relevant results were drawn from it. Interestingly, these results drawn from this second study were found to be similar in their nature to first survey. Presented below are the combined results from both the surveys divided into the survey's respective categories.

Approximately 91% of the participants have been playing the video game for more than a year with about 72.2% out of those playing it for more than 4 years. It shows how ingrained the game is in the culture and its popularity with the majority of participants having solid experience playing it. Interestingly, the duration of time played varied between participants with 36.4% playing between once a week or two-three times a week and another 33% playing it every day, while others played it more sporadically. However, the consensus on time spent in a single sitting seemed to be unanimous with the 72 % of the responses indicating 1-2 hours. The skill level of the participants was considerably high with approximately 63% of the participants being placed currently or in the past in Division 1-3 (lowest being 10).

One of the main premises of the research is to identify a transferable ability between video game skills to sport skill. Hence, it was important to get an idea of the players' ability in a competitive sense as it provides an opportunity to use the participants as an area of expertise regarding the different aspects of the video game and their unique perspective on it.





**Figure 1: Skill Level of Participants**

Using this expertise, participants were asked to list what they believed their strongest skills in the video game were. The answers ranged quite differently from long shots/crossing to skill moves to defense to through balls, etc. perhaps indicating the allowance of the different styles of play in the game. As the participants, all had different strengths, possibly due to the video game having different elements to master providing each player with their own unique skill set which probably resonated with their own play style.

When asked about weaknesses, the results although varying, were much less diverse with 32% claiming defending was one of the more difficult areas to master in the video game. This could possibly be because of the way the video game is designed making the defensive implementation tougher than offense allowing to users to favor attacking play more. After all, the video game is a business and a way to get users to play the game more is to provide them with an easier path to score a goal.

Similarly, complaints received about the video game were mostly relating to general video game specifics such as bad animations, auto-switching, over-powered stats, etc. rather than anything regarding the video game and sport connection.

This provides us with some insight into how decent the video game is a replication of the sport that in turn would allow us to draw semantics to the sport in terms of playing ability.

In order to understand these semantics, the participants were asked to describe their preferred formations as well as why they use those and the advantages they provide.

(A detailed description regarding formations and tactical elements is provided earlier in the *FIFA* analysis)

Majority of the responses were split between two: 63.3% preferring 4-2-3-1 and 45.7% preferring 4-3-3 (users were allowed to pick multiple). Interestingly, these are the two most popular formations in the sport as well and could perhaps indicate some influence seeping in with users trying to replicate a certain team's style. Users listed the advantages of the two such as 'solid midfield setup', 'adept defensive midfield', 'numbers in center', 'balanced', etc. mainly focusing around a certain concept i.e. midfield dominance.

Similarly, when given a range using the in-game options from 1 (long ball) -5 (possession) regarding their preferred attacking and likewise 1 (drop-back) - 5 (constant pressure) for their defensive tactical set-up, majority of the users responded with 3 (67 %) for the attacking set up while the defensive was relatively evenly split between 3 & 4 ~42%).

The responses reveal a strong desire for balance in general with most of the play focusing center of the field i.e. around midfield. Considering the best chance for controlling a match lies in the middle of the field, at least for a sport akin to soccer although this concept could be applicable for other sports, it makes sense why users would prefer to not choose any of the extremes and go the general route regarding their game-play.

The users were asked strategies that are more specific about their gameplay during a match in the video game to incite detail and discrete scenarios. Majority of the answers however

seemed to involve the abuse of in-game mechanics such as ‘pace on the wing’, ‘long through balls’, ‘far-post crosses’, etc. Whether this is indicative of a style of play or merely an adaptation to succeed using the best tools at their disposal is perhaps more accurate judging from the above responses and is definitely an area where the game developers could look to improve upon. Some responses however provided some details such as ‘1-2s & third man runs’ and ‘build up from the back & transition quickly’ implying a deeper understanding of the game.

To equate these results with the sport, participants were asked similar questions about soccer and their answers observed for any potential correlations. Although, the experience of playing in this aspect increased dramatically as most participants had started playing soccer in their early childhood; the skill level of players remained at a decent level and was conducive for the survey’s intentions as they were comparable to the skill levels in the video game, with the majority of the participants (82%) having played High School Varsity or higher (Club, youth academy, or College Varsity).

The demographic of the participants (henceforth referred to as players for the duration of this segment) ranged across various positions such as fullbacks, wingers, goalkeepers, and strikers. Interestingly, when similarly asked about their strengths and weaknesses in the sport, most relied on their physical and technical skills to be something their most proud of whether that was range of passing, or sheer pace. For weaknesses however, answers tended to focus more towards specifics such as heading on crosses, or decision making for in the final third perhaps indicating past experiences with certain in-game scenarios that they were not able to cope with. Considering the difference in responses between these two questions for the video game and sport categories respectively, no significant conclusion can be drawn from it, albeit it can be

hypothesized that the experience of the sport could have had an impact on the strengths in the video game rather than vice-versa.

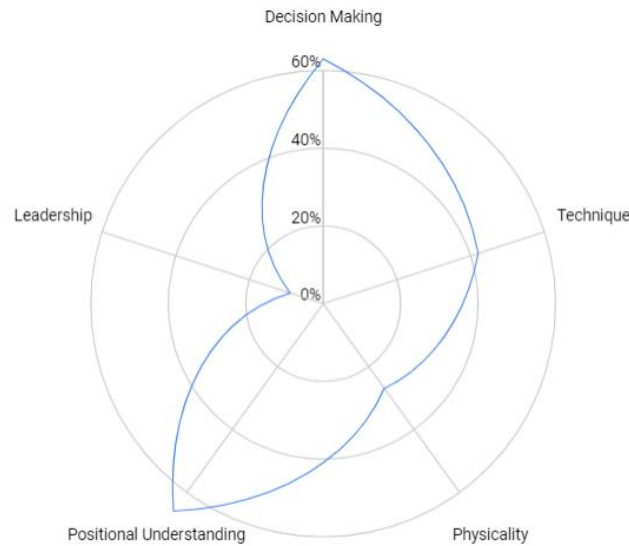
Nevertheless, upon asking for their preferred style of play or tactical set-up for attacking and defending given a range from 1 (fast counter attacking/ passive low block) - 5 (slow possession/ intense high press), a pattern emerged with players selecting 3 & 4 for both as the most common preference (~36%-45%) similar to their video game response.

This signifies the presence of imitation for either or both. Players prefer to play the video game, much like they do the sport in real life and it wouldn't be far-fetched to claim that perhaps what they do in the video game, they try and emulate back onto the pitch.

In order to gain a better perspective on the players' understanding of the game, they were asked to list their objectives as a player for scenarios in the game such as when they or their team win the ball back, lose the ball, and ultimately overall objective throughout the game. The responses provided well-informed answers with replies varying depending on the position they were playing in as well as instructions from the coach (something that was not asked in the question and was provided of their own volition).

This provided confirmation of their comprehension of the game being higher than a trivial understanding which judging from the responses and experience playing the video game, could be something they picked up from and applied to help with the sport.

More importantly, when asked about the most critical traits a soccer player needs, the responses were overwhelmingly favored towards positional understanding and decision making; two of which as demonstrated in this paper, are traits the video game help develop. The most common responses are listed below:

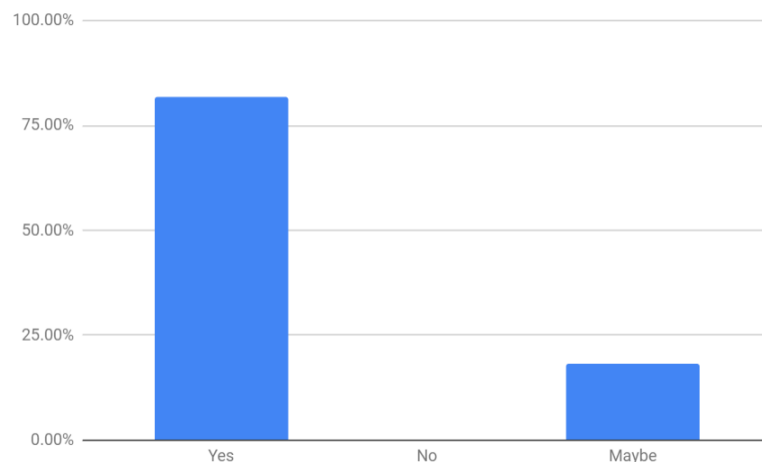


**Figure 2: Critical Traits of Soccer Players**

Overall, the players were asked to describe the two categories (*FIFA* and Soccer) together and were asked questions to extract any potential interpretations they had about them. On a scale from 1 to 5 (1 being the lowest), 54.5 % of the participants responded with 3 when asked about how realistically they believe *FIFA*- the video game, implements soccer as a sport.

Perhaps this could be frustrations with difficulties they have had while playing the game (experiencing lag online, or simply losing games can be aggravating) and listed some opinions on how the implementation could be improved such as weakening the A.I., tackling mechanisms, etc. Again, this mainly focused on the video game specific elements much like the weakness complaints in the video game section.

However, they did provide some positives on how the video game implements the sport well such as positional play of A.I., replication of player's styles, spacing and off-ball movement, team shape and organization, etc. All answers very much tending towards the tactical side of the sport. Ultimately, the participants were questioned on whether players could improve in soccer by playing *FIFA* and whether the video game has improved their soccer ability. The response was overwhelmingly positive with 82.1% of the participants believing that the video game can and has had a positive impact on the sport while the remaining 18% lingered in the maybe camp.



**Figure 3: Participants on the positive impact of the *FIFA*- Video Game on Soccer**

Interestingly, not a single participant answered a firm 'No' on whether the video game could positively influence the sport or the player's ability playing the sport.

The main aspects of the sport they believed the video game would improve concentrated around abilities such as Positional Understanding, Reading of the Game, Decision Making, and in general- Soccer IQ.

These responses provide plausible verification for the aforementioned proposals made in other sections of this thesis where it has claimed to improve certain abilities and demonstrates a potential use for the video game as a training or educational tool for the sport.

To derive further definitive affirmations, another study was performed which involved closely observing the participant's sporting ability and slowly exposing them to the video to determine any changes in their playstyle or sporting ability. Although only 5 participants were involved in this study, in order to achieve optimum results, they were chosen based on factors such as their skill in the sport (judged by level they play at) & their exposure to the video game in question. 3 of the participants had played at a high school varsity level, while the others were part of their college club and varsity team respectively. None of them had ever played *FIFA* before except for one (high school varsity player) who occasionally played with friends. Throughout the course of 3 months, the participants were exposed to the video game and phased into playing the game at more and more regular intervals under supervision. Initially, it started out at just once a week but quickly advanced to 2-3 times a week to every other day until they were playing every day for 1-2 hours. Every week, the participants would gather to play a game of soccer for 30- 45 minutes to judge their progress.

Objective was to keep the parameters equivalent to the responses gained from the survey so as not to skew the results. Idea behind it being that if followed a regimen using the responses from the survey, which overwhelmingly believe in the positive effect the video game on their own game; to extract a physical and observational conclusion on the impact the video game has on the players. Based on the experiment, it was observed that the players' style of play changed definitely. Although, not as significant as hoped, the changes seen involved players becoming more aware of their surroundings while playing the game and inherently making quicker (the

case for better could be arguable) decisions. They were also observed incorporating some of the skill moves in their gameplay from the video game towards the end while some of the players seemed more automated in their movements towards the end of the 3 months.

Interesting to note was that the change in the high school varsity players' abilities was the most out of the participants perhaps indicating an inverse relationship between the magnitude of the positive impact seen and the player's skill level i.e. the lower the skill level comparatively, the higher the video game has an effect. This conforms to the notions in soccer and makes sense as a more advanced player has developed his skill and game far more and is increasingly rigid in resisting change to their gameplay.

In closing, based on the studies conducted along with the responses received and observations made, it can be deduced that the results from these studies provide some conclusive verdicts regarding the video game's effects on the sport.

## **CONCLUSION**

This thesis has analyzed key articles that relate to the main concept behind this research paper on sports and video games. It has analyzed whether playing video games actually has an impact on our brain and what the difference is between cognitive abilities of pro-gamers and non-gamers. This helps in understanding the point of playing video games like *FIFA* in the first place and gives us a background on the benefits. Next, it analyzed whether these acquired cognitive improvements can be extended to real-life sports using dart throwing and bowling as an example. This shows that playing *FIFA* could a potential relational effect on soccer ability.

It then focused on the exact cognitive abilities that would make an impact to soccer players specifically and how to train them which is important to this project as it gives an area to focus on gives a metric like decision-making to use to compare players' abilities when



conducting the actual experiments. The remaining articles that were explored give an idea of other possible methods we can use to help improve soccer performance, which may stem from *FIFA* specifically and could help in developing the survey questionnaire. It also mentions what the next steps for coaches are to actually implement this more seriously and see its effects on a higher stage.

We can conclude that video games do have an adverse effect on our cognitive abilities and these effects have been transversely used to influence certain training patterns for sports players in order to help improve their abilities.

The results from our case studies prove the validity of these claims with the vast majority of the responses supporting our conclusions. We can infer the impact of the video games on the specifics of player abilities through the details presented by the survey and observations.

Although, the results of the second case study is rather inconclusive considering the inconsistency of the variables involved such as discipline of the participants, pre-agendas and biases towards the video-game, natural ability, outside influences, etc. and could cause deviation for such a controlled subjective experiment. However, the results do provide us with an idea of a possible method by way of which this can be integrated into training.

To conclude, the results presented in this research derives a conclusion on the positive impact that sports-based video games have on sports performances. It also forms a basis on which further research can be founded upon and performed to derive more informed conclusions regarding the depth of this topic.

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