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An Updated Classification of Cheating in Esports

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Abstract

Cheating and doping are common in sports, with various methods to illicit physiological or technical advantages. Academic research has defined many ways and reasons one would cheat within a sporting context. Nevertheless, cheating is a real threat to the virtual landscape within esports. These issues have become such a significant problem that developers of these esports are creating anti-cheat software to combat these cheaters. Most esports research discussing cheating has only recounted a handful of methods to cheat, and there is no standalone review to synthesize all the separate ways one has cheated in these games before. The work will set out to produce a review of all the current strategies that have been employed to cheat in competitions. The work will utilize Yan and Randell's original categorization of cheating in video games (2005) and apply it to the esports landscape. The review concluded that 44 words or phrases were used to describe 11 categories, and 24 sub-categories to perform a range of cheats, hacks, or doping across esports. The implication of this review shows the significant range of threats that opens esports organizations to being vulnerable from cheaters. Furthermore, there is much needed work to revise the governance of esports titles, platforms and organizations to counteract these threats.

Keywords: Cheating, Hacking, Doping, Integrity, Ethics

Highlights:

- As esports continues to grow so does the array of methods to cheat, dope and hack to subvert rules and ethics of fair play.
- 11 categories of cheating have been established with 24 sub-categories using 44 different phrases or words to describe these methods.
- Cheating methods include the use of performance enhancing drugs, match fixing, exploiting bugs in-game and the illegal modification of hardware and or software.
- The lack of oversight from national and international governing bodies has enabled cheating to flourish within esports.

Introduction

In competitive sporting events, there is always the possibility of individuals who wish to break or bend the rules to illicit an unfair advantage. The temptation to cheat is not uncommon in sports, especially since most sporting events have transitioned from the amateur to the professional game. This has increased sponsorships, athlete contracts, media and broadcasting rights for further publicity and financial prizes for winning or placing significantly well in a tournament. Traditional sports have seen many instances where people have cheated overtly and covertly to illicit an unfair advantage over their opponents.

Some of these scandals are more well-known than others, such as the Balco Lab's doping program [1], the Mitchell Report (Baseball) [2], the East Germany doping program [3], USA Postal Service (Cycling) [4] and the latest example is the Russian Anti-Doping Agency (RUSADA) [5]. Nevertheless, despite the introduction of anti-doping policies, agencies [6], stronger bans, fines, and legal implications from national governments such as the Rodchenkov-Act [7], individuals still cheat in sports regardless of their credibility and integrity risk.

However, cheating and doping are not unique features of traditional sports. We have esports, electronic games that entail various modes of competition, from single player to team events played in a competitive sporting virtual environment [8]. With esports' increased popularity and viewership, a significant investment in the prize pools and sponsorship of national and international tournament events has been seen [9 – 10]. In conjunction with this rise in funding, there has also been a range of threats to the integrity of the esports landscape, ranging from gambling, bullying, harassment, governance and the health of athletes [11]. Furthermore, in addition to the above issues mentioned, cheating, doping and hacking are becoming a reoccurring issue within the competitive electronic gaming sphere [12].

Cheating

The literature has provided many different interpretations of cheating. Green [13] first explained it as.

- To violate a fair and fairly enforced rule,
- With the intent to obtain an advantage over a party with whom it is in a cooperative, rule-bound relationship.

Tamburrini [14] defined cheating as a violation of a game's written rules, performed to gain an illicit advantage for oneself or for one's team over rival players. Finally, Loland [15] comprehensively explains what cheating entails and what it will be used for. He stated that cheating is an attempt to gain an advantage by violating the shared interpretation of the basic rules (the ethos) of the parties engaged without being caught and held responsible for it. The goal of the cheater is that the advantage gained is not eliminated or compensated for [15]. However, Russell [16] noted in his work that describing some behaviour as cheating is typically little more than expressing strong but thoroughly vague and imprecise moral disapproval or condemnation of another person or institution about a broad and ill-defined range of improper advantage-seeking behaviour. Therefore, when discussing "cheating", it is essential to be specific as to what is being mentioned and how it can be categorised as actual cheating. Unlike strategic deception or fouling [17], not all rule-breaking is cheating; therefore, it is morally wrong but not prohibited, e.g., running down the clock to waste time in a sporting event.

With this in mind, cheating in the context of esports is the illegal use of performance-enhancing drugs (PEDs) [18 – 19], match-fixing [20], use of illegal software, hardware and or equipment [21] and finally, other unfair and unsportsmanlike means that gain an advantage which is not established in the rules of the game such as exploiting bugs [22]. The work will not focus on the following types of unsportsmanlike behaviours, including "hostage-holding", which is a behaviour to purposefully keep other players in an unpleasant situation [23]. Secondly, "sledding" is often described as gamesmanship, trash-talk or chirping to insult and or intimidate another player [24]. Depending on one's subjective experiences within sports or esports, these examples may fall at different levels on the continuum of pro-social vs anti-social behaviour in sports [25]. In a competitive environment, these may not be favourable actions and morally negative behaviours known as toxic behaviours [23, 26]. However, they are carried out frequently by players and teams to disrupt a game's flow and even try to gain some advantage over their opponents [27]. Consalvo [28] conducted interviews (n = 24) and online surveys (n = 50) to understand gamers' opinions when it came to defining and negotiating cheating. The results revealed two main themes and seven sub-themes between a) cheating and b) not cheating themes. The cheating theme and its sub-themes are included in Table 1.0 below.

Table 1.0 Consalvo [28] Videogamer's Interpretations of Cheating

Cheating Theme	Not Cheating Theme
1. <i>Anything except My own Thoughts:</i> About single-player games, if a player does not use solely their efforts, it is deemed cheating.	1. <i>Because I was Stuck:</i> Respondents noted that during single-player games, when at a point, they could not progress.
2. <i>Code is Law:</i> Building on the previous point again, the participants deem hacking and cheating codes as cheating but not guides or walkthroughs.	2. <i>It is fun to play God:</i> Participants stated that using cheat codes in single-player games against friends for fun is not classed as cheating.
3. <i>You can only Cheat another Player:</i> summarised cheating in the multiplayer environment as using codes or deviant behaviours to eliminate another player that is not in the game design or rules.	3. <i>Hitting Fast Forward:</i> Cheats were used to speed up the gameplay and complete a story if they were not interested or pressed for time.
	4. <i>Being an Ass:</i> Playing multiplayer matches where the player intentionally cheats against their opponents "to be a jerk" or "I like to have any possible advantage when playing a game online against people who do not necessarily want to play fair with me".

The reason someone would cheat is multifaceted and is subjective to the individual, as there are usually multiple motivators that would incentivise someone to cheat. This is shown in Boldi and Rapp's paper [29] when reviewing their nine-month-long ethnography of Call of Duty: Warzone. They found that their players' perceptions of cheating depend on their competence, socio-material conditions and the role of the individual who conducts the unfair behaviour (cheating). Cho, Lusthaus and Flechais [30] found through interviews (n = 70) with those who had cheating experiences resulting in three overarching themes. These are the pervasiveness of toxic behaviours, the absence of ethical boundaries and the oversight of supporting roles that facilitate cheating.

Further examples of cheating include those that would dope because of loss of personal significance [31] and or the dark triad (Machiavellianism, narcissism and psychopathy) [32]. Additional behaviours, including anticipated guilt and moral disengagement, may predict cheating [33]. Then there are other motivators such as financial incentives, which can be associated with match-fixing in sports [34] and the belief that everyone else is cheating, so too, you have to engage in these behaviours [35], which is not exclusive to sports [36]. Notwithstanding, cheating within the context of video games is not unusual. It has been used to develop skills for hackers in cybersecurity and ethical hacking [37 – 38].

Some websites are dedicated to hacking guides and walkthroughs to help develop the skills to undermine and circumvent the rules within a game environment [39]. Within the realm of single-player player videogames, it has been reported by 188 players that cheating in these settings helped repair mood, stress relief and flow [40]. Cheating can be a useful skill however, within the realms of competitive sport it is against the rules and spirit of sport and unsportsmanlike. Therefore, it should not be tolerated when prize money, sponsorships and rankings are at stake. With cheating defined, the work will now explore and discuss the various methods used to cheat to date in esports.

Modes of Cheating, Hacking and Corruption in Esports

Yan and Randell [41] created the first systematic classification of cheating in video games almost twenty years ago. This framework will be utilised and revised with the new methods and terminology that have appeared in the academic literature and in the esports landscape.

Table 2.o Classification of Cheating Categories in Esports

Category of Cheating	Sub-category of Cheating	Names and Terms used to Describe this form of Cheating	Definition of each Cheating or Illegal Method	Esport Players, Coaches, Criminals and Others caught Cheating	Year this took Place with Supporting Evidence	Featured in Tournament or Event or News	Esport Game
1 Player Trust and Morals	1.1 Exploiting Trust	1.1.1 Map Hack	1.1.1 Explained [41] as using a "map hack" to view their opponent's live positions during a game. This is to reveal hidden areas of a map in real time strategy (RTS) games [41 & 44]	1.1.1 Marcos Barragán Rosado (Marki)	1.1.1 2019 [42, 43]	1.1.1 ESL Katowice Royale tournament	1.1.1 Fortnite
		1.1.2 Sniffing Cheat	1.1.2 Where it allows players to log and access a range of information sent by the game network and can be illegally accessed if the servers are not secure [45].	1.1.2 Forums online discussing how to run this for hacking.	1.1.2 2012 and 2022 [45 - 47]	1.1.2 Not applicable	1.1.2 CS:GO
		1.1.3 Rate Analysis Cheat	1.1.3 When updates are sent to players, giving them more information. By analysing said packets of information, the cheater can locate other players actively targeting him or her and try evading their attempts [45].	1.1.3 No example exists out there of a player using this specific cheat or referred to it.	1.1.3 Not applicable [45]	1.1.3 Not applicable	1.1.3 Technically could be done in any game.

	1.2 Abusing Game Procedure	1.2.1 Escaping (leaving the game abruptly when losing)	1.2.1 Requires the player to disconnect themselves from the game when they are going to lose [41].	1.2.1 Common across games such as FIFA	1.2.1 2022 [42 & 48]	1.2.1 Can happen at any game mode or tournament but yet to see it in a tournament.	1.2.1 FIFA 22 example here but can happen in other games as well.
2 Collusion	2.1 Collusion	2.1.1 Throwing	2.1.1 It requires the players to underperform on purpose to position themselves in a more favourable position for later stage qualification further in the tournament or to take a loss deliberately [20 & 22].	2.1.1 Eleven Players banned - Ma "sAviOr" Jae Yoon - Jung "By.1st" Jin Hyun - Kim "DarkElf" Sun Ki - Kim "go.go" Chang Hee - Jin "Hwasin" Yung Soo - Won "Justin" Jong Seo - Park "Luxury" Chan Soo - Choi "ShinHwA" Ka Ram - Moon "type-b" Sung Jin - Shin "UpMaGiC" Hee Shung - Park "YellOw" Myung Soo World Champion banned - Lee Seung-Hyun 2015 Match Fixing Scandal - Three Players banned	2.1.1 2010 [49 & 50] 2015 [51] 2015 [52]	2.1.1 - Pro League Round Four - Pro League, Global League Season 1 and League Season 2 - KeSPA Cup Season 1 - GiGA Internet KeSPA Cup Season 1	2.1.1 StarCraft 2

		2.1.2 Kill-Feeding	2.1.2 Collusion can also be referred to as "kill-feeding" to boost a friend's score. When players collude with each other for unfair advantages against other players [41].	2.1.2 • Ryno	2.1.2 • 2015 [53]	2.1.2 • Free for all Tournament	2.1.2 • Halo
		2.1.3 Teaming	2.1.3 Where players from opposing teams (or in free-for-all matches) work together to win a match or an objective [54].	2.1.3 • Sekosama	2.1.3 • 2020 [54 & 55]	2.1.3 • Asian leg of the Champion Series	2.1.3 • Fortnite
	2.2 Match-Fixing	2.2.1 Match Fixing	2.2.1 Tournament and or match manipulation, which has many different formats, and all involve colluding with other players to enact some form of match-fixing [58].	2.2.1 Professional players banned including. • Duc "cud" Pham • Derek "dboorn" Boorn • Casey Foster • Sam "Dazed" Marine • Braxton "swag" Pierce • Keven "AZK" Larivière • Joshua "Steel" Nissan	2.2.1 • 2014 [56 – 58]	2.2.1 • Banned from Valve events and ESL events.	2.2.1 • CS:GO
		2.2.2 Spot Fixes / Fixing	2.2.2 Which is an extension of match-fixing but involves carefully planning and manipulating critical parts or events in a game to produce the desired outcome [58 & 59].	2.2.2 • Bektiyar Bahytov and Khasenov (ongoing investigation)	2.2.2 2015 (reported in 2022) [58 & 59]	2.2.2 • StarLadder Regional Minor Championship	2.2.2 • CS:GO

3 Masking	3.1 Exploiting Machine Intelligence 3.2 Virtual Private Network	3.1.1 AI Bot "Nexto" 3.2.1 VPN to hide Location	3.1.1 AI or machine learning has now ventured into esports as undetectable software in the form of aimbots or triggerbots. 3.2.1 A, "virtual private network (VPN) when gaming on public networks, providing an extra layer of security by masking their IP addresses and encrypting traffic" [61].	3.1.1 • Cheaters use an AI bot known as "Nexto," which was initially used as a training tool to improve their practice. 3.2.1 • No example exists out there of a player using this specific cheat or referred to it. However, many players in online Call of Duty forums seem to think so [62].	3.1.1 • 2023 [60] 3.2.1 • 2024 [57, 61 & 62]	3.1.1 • Not applicable 3.2.1 • No tournament or event named.	3.1.1 • Rocket League 3.2.1 • Can be used for any game out there as it is masking the IP address which makes tracking the host difficult.
4 Software Modifications	4.1 Perception and Information 4.2 Speed and Movement	4.1.1 Wall Hacks 4.1.2 Extra Sensory Perception cheats 4.1.3 Client-side Code Tampering 4.2.1 Mobility Hacks	4.1.1 – 4.1.3 A wallhack, also known as an "Extra Sensory Perception" (ESP) cheat, is when a player is able to see their opponents through walls and can also be referred to as "client-side code tampering" [41]. 4.2.1 Defined as "higher movement speed to teleporting anywhere on the map. These hacks allow the cheater to modify game elements related to movement speed, jump height, and jump distance" [66].	4.1.1 – 4.1.3 • Jonathan Kosmala • Mingostyle • Abhay Urkude • "XektorR" 4.2.1 • No one caught yet but examples exist online of cheaters.	4.1.1 – 4.1.3 • 2019 [42] • 2020 [45 & 63] • 2021 [64] • 2007 [65 – 67] 4.2.1 • 2024 [66, 68 & 69]	4.1.1 – 4.1.3 • World Cup Qualifiers • COD 2v2 Checkmate Tournament • Riot Games the Esports Club (TEC) Invitational • German ESL Pro Series 4.2.1 • Counter Strike online matches	4.1.1 – 4.1.3 • Fortnite • Call of Duty (COD) • Valorant • CS:GO 4.2.1 • CS:GO

	4.3 Internal Misuse	4.2.2 Speedrun Hacks	4.2.2 Defined as "a practice where players compete against each other to navigate through a game as quickly as possible; a form of high-performance gameplay" [68].	4.2.2 "Dream" was caught cheating, and the Minecraft Speedrunning Team published a 30-page document supplemented with statistical analysis of how the player cheated.	4.2.2 2020 [70 – 72]	4.2.2 Official Minecraft Speed-running Leaderboards	4.2.2 Minecraft
		4.2.3 Spin Botting	4.2.3 Defined as, "which is a cheat whereby a player employs aim-assistance, vision-assistance, and "B-Hop"-assistance, whilst simultaneously spinning around in circles to make it hard for other players to accurately hit them" [73].	4.2.3 No specific example exists of a player but many on CS:GO online forums discussing it [74].	4.2.3 2013 [73 & 74]	4.2.3 Not applicable	4.2.3 CS:GO
			4.3.1 Internal misuse refers to an individual with access or privileges to the game and can modify or influence the game's outcomes or match itself [41].	4.3.1 A game developer from PUBG used an invisibility code when playing a live online multiplayer match and broadcasted it on his livestream. However, this was unintentional by all accounts and to date, there has yet to be an example of this in an esports tournament where prize money was on the line.	4.3.1 2017 [75]	4.3.1 Not in a tournament or event for money.	4.3.1 PUBG

5 Server	5.1 Distributed Denial of Service (DDOS)	5.1.1 DDOS attacks can be named as the following; Low-Rate Attacks / High-Rate Attacks / Protocol Exploitation Attacks / Reflection-Amplification Attacks / SYN Flood / UDP Flood / Lag Switch / Blinding Opponent / Reply Cheat / MSSQL / SSDP / CharGen / LDAP / NetBIOS	5.1.1 It is when an opposing player directs a significant amount of internet traffic to the opposing player to slow down their speed, resulting in lagging and making it easier to beat another player [41 & 77].	5.1.1 No one caught to be held accountable for the multiple DDOS attacks at the Le Mans Race event.	5.1.1 2023 [76]	5.1.1 Le Mans 24 Hour Race	5.1.1 Le Mans 24 Hour (Motorsport Games) – 2 categories of racing for the LMP and GTW categories racing during this event.
	5.2 Geo-Filtering or known as Geo-relocation		5.2.1 Defined as, “the use of technologies that limit the accessibility based on the location of user, is an impediment restraining choice and availability of online services” [79].	5.2.1 Sentinel’s “Royal 2” suspended for geo-filtering and “server manipulation”	5.2.1 2021 [78 – 80]	5.2.1 NA Kick Off Qualifiers 12-1 Halo Tournament	5.2.1 Halo

	5.3 Compromised Game Servers		5.3.1 A cheater hacks the game's dedicated server and modifies the settings once they have access. These usually involve some extortion or threat of blackmail for sensitive information [41].	5.3.1 Riot Games will not pay randoms after their League of Legends code was stolen by hackers.	5.3.1 2023 [81]	5.3.1 Not applicable.	5.3.1 League of Legends but could happen to any game.
6 Timing	6.1 Look-Ahead Cheat	6.1.1 Suppress-Correct Cheat	6.1.1 – 6.1.2 This refers to an individual involved in actioning a delay (update) in online competitive games where the individuals can stall their moves once they have the information from their opponent before making their next move [41 & 82].	6.1.1 – 6.1.2 No specific example found of an individual using this kind of cheat.	6.1.1 – 6.1.2 No example [41, 82 & 83]	6.1.1 – 6.1.2 Not applicable	6.1.1 – 6.1.2 Any real time strategy games could be vulnerable examples cover, Chess, Poker, Pokémon, or games where drawing cards are applicable.
	6.2 Stream Sniping	6.2.1 Stream Sniping	6.2.1 Described as watching a streamer's live online in-game play to gain an advantage usually with a second screen or live feed" [20]	6.2.1 - Azubu Frost team caught stream sniping live on camera. - Hosty caught cheating	6.2.1 2012 [84] 2014 [85]	6.2.1 - League of Legends 2012 World Championship Quarter Finals - Pinnacle 2 Hearthstone Tournament	6.2.1 - League of Legends - Hearthstone
		6.2.2 Ghosting Cheat	6.2.1 Refers to "using the game spectator mode to obtain an opponent's in-game movements and strategies" [86].	6.2.2 37 CS:GO coaches banned by the ESIC for a spectating bug.	6.2.2 2020 [87]	6.2.2 Multiple tournaments and events.	6.2.2 CS:GO

7 Verification	7.1 Unauthorised use of Passwords	7.1.1 Spoofing	7.1.1 – 7.1.2 Refers to a cheater pretending to be another player but sending messages to other players or the game itself. The consistency cheat refers to the cheater sending different updates to different players [37].	7.1.1 – 7.1.2 • It is one of the least likely forms to cheat on the list but not an unlikely method. Hackers could gain access to passwords and account details if they are not kept secure.	7.1.1 – 7.1.2 • No example [88 & 89]	7.1.1 – 7.1.2 • Not applicable	7.1.1 – 7.1.2 • However, no examples exist of esports cheaters being caught using a stolen password or account details but could be done on any game.
	7.2 Exploiting lack of Secrecy	7.1.2 Consistency Cheat	7.2.1 When communication packets are exchanged for plain text format, and this can be exploited if one illegally obtains one of these packets and deletes or modifies these packets get information on location, equipment, hitboxes and weapons [41 & 66].	7.2.1 • No names but CS:GO have a guide to spot hackers who have	7.2.1 • 2016 [90 & 91]	7.2.1 • No tournament named	7.2.1 • CS:GO
	7.3 Lack of Authentication	7.3.1 Gender Doping	7.3.1 Defined as, "an individual changing their gender identity, in the pursuit of athletic success in sport (or within an event) over another gender (mainly a male to a female)" [21].	7.3.1 • No names but multiple cases picked up in forums and media.	7.3.1 • 2019 [21]	7.3.1 • E-cycling races on Zwift (low-level races)	7.3.1 • Zwift e-cycling

		7.3.2 Ringer	7.3.2 Refers "to use a ringer in professional competition. That is, a pro player asks an impostor to use their account and compete on their behalf" [86]	7.3.2 Audi fired their Formula E-driver Daniel Abt for bringing in a ringer.	7.3.2 2020 [86 & 92]	7.3.2 The ABB Formula E Race at Home Challenge	7.3.2 Formula E-Racing
8 Exploiting Bugs	8.1 Radar Hack / Jump Hack / Map Glitch		8.1.1 Within a game, there is the opportunity to exploit "bugs" for advantages for players [22]	8.1 700,000 accounts banned in PUBG for cheats, among them 30,000 for the Radar Glitch 12 professional players banned in PUBG for Radar Glitch - CS:GO team used a bug called "Big Jump" and helped to win league - Halo Team Banned for exploiting map glitch.	8.1 2017 – 2019 [93] 2017 – 2019 [94] 2017 [22] 2016 [95]	8.1 - Across all games and low-level matches in PUBG - PUBG Europe League Qualifiers - In PGL Major competitive matches - Asia Qualifier for the World Halo Championship	8.1 - PUBG - PUBG - CS:GO - Halo
9 Performance Enhancing Drugs (PEDs)	9.1 Stimulants		9.1.1 Explained as study drugs they are defined as, "amphetamines like Adderall that are prescribed to treat Attention Deficit Hyperactivity Disorder (ADHD)" [96 & 98].	9.1 Players who admitted to using, knowing other players who have used and or have been caught using these drugs includes: - Korey Friesen - Timur Kulmuhambetov - Timo Kettunen - Adam Sloss - Kyler Garland - Tyler Mozingo - Jack Watson	9.1 2015 [21 & 99] 2020 [21] 2018 [97] 2020 [100] 2020 [98] 2016 [99] 2020 [100]	9.1 - Interviewee admitted use of drugs - Coach called out another team used PEDs - Player claimed that 20 players used PEDs in Overwatch League - No Tournament named - Call of Duty League Championship - Tournament not Named - Cash Cups and Winter Royale.	9.1 - CS:GO - Dota 2 - Overwatch - Call of Duty - Call of Duty - Halo - Fortnite

[illegible]

	10.2 Hardware	10.2.1 Non-Approved Equipment	10.2.1 Then there are hardware cheats, which may include using some form of modified equipment not approved by the tournament or the in-game rules.	10.2.1 Atún embedded macro commands into his mouse	10.2.1 2018 [107]	10.2.1 Qualifiers for Valve's International 8 Tournament	10.2.1 Dota 2
		10.2.2 Using another Device	10.2.2 This is using additional hardware that is not allowed in game e.g. more than one screen to gain additional information other players would not have access to.	10.2.2 "Raif" connected his second computer to bypass the anti-cheat technology.	10.2.2 2018 [108]	10.2.2 ESEA Advanced Match	10.2.2 CS:GO
11 Purchasing Cheat Codes	11.1 Cheat Codes to Enter		11.1 – 11.2 The final method of cheating can be applied to any of the previously mentioned examples; however, it is essential to note that some cheaters may need the technical skills to cheat. Therefore, they go out of their way to purchase said cheats for an advantage.	11.1 - Johnathan Kosmala - Criminal Enterprise arrested and named for selling videogame cheats.	11.1 2019 [42] 2020 and 2021 [109 & 110]	11.1 - World Cup Qualifiers - Criminal Ring selling Cheats.	11.1 - Fortnite - PUBG Mobile, Call of Duty Mobile and Fortnite but possibly more.
	11.2 Purchasing someone to do the Cheating			11.2 Cameron Jeffers bought a bot to mimic his cycling to obtain a virtual item	11.2 2019 [21]	11.2 Was announced after the British E-Cycling Championship	11.2 Zwift (e-cycling)

Discussing and Applying the Table to Esports

The purpose of the table is to be a spotlight on the array of cheating and hacking methods that are known within the esports and videogame communities. The work updates the previous framework set out by Yan and Randell [41] by aligning it with the modern audiences for esports. Furthermore, it not only updates their work with different modes of cheating, e.g., the use of PEDs and gender doping but there is also an expectation that the cheating methods would have advanced since the original publication as their paper is 20 years old.

The revised table provides readers with the different categories of cheating and the variations of the cheats that can be expressed within said categories. The range of names associated with said cheats supports these categories to show how it can be explained. In addition to these names, examples (where possible) of cases where these cheats have been encountered are provided. Nevertheless, the table is not to be used as a definitive list of every cheating case within esports and competitive gaming tournament history, as it is not a cheating database.

It should be stated that there may be methods out there that we are not aware of due to the secretive nature of keeping cheats hidden for an advantage. The table should be used as a reference for esports organisations, federations, platforms and anti-cheat and integrity institutions to guide their policy work and education to esports players and teams regarding the range of cheats. This is to help support their ongoing work for fair play and a cheat-free virtual environment.

Since Yan and Randell's [41] original publication, the review here has highlighted that cheaters in esports have devised new and unique ways to cheat in this environment. From the original outline in 2005, the review has revised the methods from 15 to 11 categories with 24 sub-categories to show how some cheats have multiple variations. From these variations and comparing from the previous review, there is a difference of 51 names and or phrases of cheating. These include some of the new categories such as the use of PEDs, gender doping, a "ringer," equipment modifications (hardware: non-approved equipment), equipment modifications (software: aim bot / trigger bot), geo-filtering and purchasing cheats through a third party. This review of different cheating methods spans 17 years between 2007-2024.

Within these 11 categories, there are 44 different names, phrases, or terms describe said categories of cheating. There were 99 names found from academic and esports news channels who had been caught or punished for cheating, alongside fourteen further examples where no individual was named. From these named examples, 18 different esports titles were named, with CS:GO being the most frequently named title with 12 mentions. Finally, 28 tournaments, leagues or events were named, and seven cases where a specific tournament example could not be provided. However, evidence suggested that players participated in a ranked competition, event or an online match. The largest difference between this review and Yan and Randell's work is regarding virtual assets [41]. This was left out of the revised cheating categorisation as the very nature of a "virtual asset" is not in itself cheating such as loot boxes [111], skins gambling [112] and theft of in-game assets [113]. Acquiring said assets may be the final outcome of cheating and what the cheaters seek but it is not a method of cheating.

Nevertheless, this summary of the range of cheating methods implicates the outcomes that have manifested within competitive environments. Underneath all these cases of cheating resides the virtual environment, which suggests and even tolerates a culture of cheating. As discussed earlier in this review, cheating has been employed to get past a specific mission point, have fun with friends, speed through the game and or deliberately annoy other players [27]. Other instances of cheating in games show that toxic behaviours play a role in these situations [23, 26], and individuals have used the tools they have learned from cheating to be applied to their educational and professional careers in ethical hacking and or cybersecurity [37 & 38]. Having that context of the culture of cheating with respect to the multitude of methods to cheat, the topic of governance is the most prominent issue that emerges across these esports titles, videogames and their respective host platforms. This is because there is an evident lack of oversight in dissuading cheaters from the respective game titles and esports federations [114] due to this embedded culture of cheating already existing within videogaming.

Lack of Oversight from Games and Federations

As reported earlier [114] when reviewing anti-doping measures and policies across all the esports federations. The work found a range of anti-doping frameworks between the federations when assessing this threat to the esports landscape. Notwithstanding, when discussing the varying threats to the esports landscape, there is a greater likelihood of cheating and hacking over doping due to the nature of the events being played and the online environment they occur within [11]. Schöber and Stadtmann [12] investigated these issues surrounding the institutions, their measures and their sanctions. They noted that esports-sanctioning bodies that enforce the punishments differ from traditional sports due to how the games are set up. This is because, in traditional sports, no entity owns the sport itself. In esports, the game publisher takes on this role as they own the rights to the computer game and trademark how the game is operated, how the events are organised for tournaments, and who is allowed to participate [12].

They note that the enforcement and delivery of these sanctions vary from esports to esports and nation by nation, depending on laws and ownership of these titles. Richardson [114] mentioned that the Esports Integrity Commission (ESIC) is the emerging international esports regulatory body for anti-doping, gambling, and cheating. They have an online database of all the sanctions that are currently in effect, those pending investigation [114], and the various organisations they work with, from game companies, publishers, tournaments, and criminal justice entities. However, they do not extend their reach to all esports as not all publishers are signed up to them, and this leaves out large player communities such as League of Legends, which are owned by Riot Games and are not under the ESIC for testing and sanction enforcement. This then differs again from nation to nation as not all governments would criminalise or task their esports governing bodies to enforce sanctions on those who cheat. Table 2.0 shows that match-fixing cases in South Korea are examples of cheating when individuals have been prosecuted and sent to jail when the government and national esports organisations work together [48 & 56].

However, this is only transferable to some esports governing bodies as their respective governments all view esports differently. Nevertheless, this is an interesting parallel when compared to traditional sports when it comes to doping. Not all countries punish their athletes for taking PEDs in terms of a criminal sentence and or a heavy fine. They may only face a temporary ban or be removed from the competitive circuit but still be allowed to train with their national team. However, times are changing as the United States moves towards a more robust deterrent framework with their recent introduction of the Rodchenkov Act, which aims to "impose criminal sanctions on certain persons involved in international doping fraud conspiracies" [7].

Schöber and Stadtmann [12] summarise their section on these sanction institutions by stating that the scope of actions and methods are not clearly identifiable and sometimes confusing. This is an accurate assessment of the landscape when it comes to cheating but can also be applied to anti-doping, as reported by Richardson [114] for the same reasons. The governance of esports does not make it easy to understand who is in charge or whom to take leadership from when focusing on these integrity issues, especially when there are multiple esports federations, publishers and sanctioning institutions in place covering hundreds of games out there that not all feature in every federation, publisher or sanctioning institution portfolios.

This has been reported as an issue by esports players, noting they are unclear about the governance structures and consider this to be a threat to the integrity of esports [115]. Schubert, Güre, and Haller [115] noted that their sample reported varying levels of understanding regarding esports governing bodies, and some players did not even know that they existed. The authors recommended more education and increased visibility for these organisations, especially regarding their operations. As stated earlier, one of their main findings reported that almost half of their participants supported a single global governing body, which would help eliminate many of the issues [12 & 114].

By having a unified and consistent punishment and sanctions across esports titles, platforms and federations irrespective of the prize money. This would increase consistency of the delivered punishment to said cheaters and strengthen integrity across all games for all players who wish to participate in a fair and level virtual playing field, as explained in Richardson [114] when discussing anti-doping policies, which can be applied to cheating bans here. Nevertheless, looking toward the future, a report by Fuentes and Merces [108] noted the following potential targets of cheaters and hackers within the esports landscape alongside the governance issues outlined above. The authors listed their predictions of where these cheaters and hackers will flourish and attack next, which expands upon the current work discussed including cheating and hacking services, boosting services, bank details targeted, gambling and match fixing and lastly, political attacks [108].

Conclusion and Future Implications to the Integrity of Esports

In short, there will be negative social, cultural and economic implications if esports organisations and anti-cheat developers do not curtail these instances within their virtual environments. Firstly, the industry will suffer credibility issues, which may lead to loss of sponsorship or advertisement rights if organisations feel the games are not upholding a level playing field. Secondly, there is a growing need to issue sanctions, which send a clear message to those who may consider cheating, which will promote fair, safe and clean events.

Allowing the cheaters the space to carry out these deviant behaviours sends an insufficient response to players who abide by the rules. There needs to be a consistent punishment scale across all esports, which every game organiser, esports federation and anti-cheat institution signs up for. That way, it is a holistic and collaborative effort to eliminate these cheaters and to increase the integrity of the landscape. Doing so will send a vital message that any cheating will be dealt with the harshest punishments. These may be hefty fines, permanent bans and, finally, the risk of a criminal record if severe enough.

With all the various means to cheat and hack across esports, the digital environment faces multiple threats to police and effectively maintains the landscape's integrity. This shows the potential reach these hackers and cheaters may have if frameworks and safeguards are not implemented to prevent these cases. Just like traditional sports, if people are caught cheating, the punishments should be severe to send a clear message, primarily when esports will have their own Olympic Games [117]. Esport organisers and game developers must significantly reduce or hamper cheating, or they will face ongoing issues. The work here should be used as a resource for any organisation that wants to understand the array of methods and terminology used to cheat within esports.

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