

## **Football and its Toxicity for New Enthusiasts**

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## Introduction

### **Significance of the Study**

The football community is known to be unsportsmanlike and aggressive at times. Because of this, it could be a difficult environment for people to take part in, especially for people looking to join discussions regarding the sport. This toxicity is especially prevalent in games with controversial calls from referees, which drastically change the outcome of the game. As such, this study aims to find out more about the behavior of fans during such games compared to those without a controversial call.

### **Objectives**

- To curate a textual corpus that compares a selection of certain football matches during the 2023-2024 Premier League season, enabling a detailed textual analysis of fan responses and interactions
- To conduct a comprehensive behavioral analysis of football enthusiasts' responses and attitudes in the aftermath of controversial referee decisions during select matches
- To identify common themes and topics that emerge in fan discussions and comments when games feature controversial calls compared to those without such incidents

## Context

### **Context of Football Throughout the Years**

#### ***Club Football***

Club Football essentially is set up in different leagues. There are specific leagues for either the region/country of play, such as the Premier League for English Football, La Liga for Spanish Football, MLS for Football (called soccer) in the USA, and Bundesliga for Germany serving as examples. The clubs in these countries are not limited to the citizens of these countries and are open to people from different regions (i.e. English players can play in La Liga, German players can play in the Premier League, etc.)

Aside from region of play, the level of play also is set up into different leagues. For example, the Premier League is England's top league, the Championship being the second tier, League 1 being the third, and League 2 being the fourth. The top placers of the lower leagues are promoted to the league above it (League 2 → League 1 → Championship → Premier League) and the lowest ranks of the league at the end of the season will be relegated to the division below for the next season.

### ***Premier League***

For this paper, we will be focusing on the Premier League, England's top league. Founded in 1992, it consists of 20 clubs, wherein each club plays every other team twice each season, once home and once away. The premier league is one of the most popular football leagues in the world and is arguably home to the best players to ever play football.

### ***Big Six***

The “Big Six” is the nickname given to the 6 most dominant teams in the Premier League, which are widely expected to be successful. These 6 clubs are Manchester City, Manchester United, Chelsea, Liverpool, Arsenal, and Tottenham Hotspurs. Out of the 20 clubs in the Premier League, these six clubs are the most popular and thus receive the most coverage and attention.

### ***Popularity***

It is fair to say that football is one of, if not, the most popular sport in the world. With the World Cup Final last 2022 drawing over 1 billion viewers, we can safely say that football is very widely watched and discussed. On the other hand, this also entails a larger possibility for unsportsmanlike behavior in the community— a fact that becomes readily apparent when viewing online comment sections.

### ***Refereeing in Football***

The referees have full power to enforce the rules of football in the match. Along with other match officials, they control the match in terms of keeping the time, instigate restart of play and give out disciplinary actions.

Some important calls that we will be discussing in this paper are red cards, yellow cards and the offside rule. Any player that does any sort of sending-off offense to any person in the game will be disciplined using red and yellow cards. A yellow card is seen as a warning, while the red card will send the player off the field. The offside rule is simply explained as the attacking player must be behind a defending player when getting passed the ball. If the player is ahead of the defending player once the ball is passed to him (once the ball is kicked), it is ruled as offside and the defenders are given a free kick.

## **Current Football**

### ***Football in Social Media***

Though social media has impacted the way football can connect us with different people, meeting fans, and creating new ones as well, it has also been an avenue of abuse against fans, coaches, and players. An example of such abuse is the case of Vinicius Junior, a black player for the football club Real Madrid, who was brought to tears after racial abuse from the fans (Azzoni & Douglas, 2023).

### ***Introduction of Video Assistant Referees***

Video assistant referees, or VARs, were officially included in the rules of football in the 2018-2019 Season but this was after its successful run in the 2018 FIFA World cup. VAR aims to provide the referee with crucial information to make a more accurate decision that the referee might miss. VAR involves a team that will aid the referee in different calls that they make including goals and offenses leading up to a goal, penalty decisions and offenses leading up to a penalty decision, a direct red card incident (not a second yellow). The VAR team, consisting of the VAR, and three assistant VARs, has access to a number of cameras scattered across the pitch including slow motion and ultra slow motion ones used for different match situations (International Football Association Board, n.d.).

## **Games to be Discussed**

### ***Tottenham vs Liverpool***

Given the popularity of the teams in the Big Six, any game between two of the teams in the group is bound to be subject to large amounts of attention— one such example of a game took place between Liverpool and the Tottenham Spurs. In their most recent fixture, however, a controversial call from the referee and VAR team affected the outcome of the game and its reception. Tottenham achieved a 2-1 victory over Liverpool last September after a red card was given to one of the Liverpool players, Luis Diaz, who had been able to score a goal despite Liverpool's lack of players compared to Tottenham. This goal was disallowed by the referee due to it being offside. However, it was found that Diaz was not, in fact, offside, and that miscommunications took place between the referee and the VAR team, as the VAR confirmed the referee's decision of disallowing the goal despite believing that the initial call was an allowed goal.

The comments from this game will be compared with Liverpool's 4-3 victory over Tottenham the previous season in May, which is the last time that the two clubs went against each other. This game did not feature a controversial call and could be considered a “normal” or “non-controversial” game.

### ***Manchester United vs Wolverhampton Wanderers***

Compared to the Big Six's Manchester United, the Wolverhampton Wanderers (or Wolves for short) are a relatively smaller club. When these two clubs went up against each other last August, a controversial call by the referee and VAR team led to Manchester United winning 1-0 to Wolves. This controversy started when Manchester United's goalkeeper, Andre Onana, collided with the Wolves player Sasa Kalajdzic. This would have normally been up for debate, leading to a penalty kick for Wolves and heavily impacting the result of the game. However, VAR advised the referee not to check the monitor and to allow the play to go on. This was compounded when the head coach of the Wolves was given a yellow card for arguing against the decision.

This game will be compared to Manchester United’s 2-0 win against Wolves last May, the second most recent game that featured these two teams. This game did not feature a controversial call and could be considered a “normal” or “non-controversial” game.

## **Methods**

### **Data Extraction**

In order to obtain comments discussing each game, posts from each team’s official Facebook and Youtube pages regarding the relevant games were selected. More specifically, the Facebook posts selected were the teams’ game results announcements directly after the games, while the Youtube videos selected were the teams’ highlight reels for the games. In cases where one team’s post’s comments outnumbered the opponent team’s, additional posts were selected as long as they were similar to the aforementioned posts (for example, extended highlight reels.)

Once the relevant posts were selected, Facepager (Jünger Jakob/Keyling & Till, 2019) was used in order to extract comments from each of the posts. Corresponding presets for each social media platform were used in order to obtain the raw CSV data pertaining to the comments of each post. After this, the textual corpus was compiled using methods in the pandas library and exported to a CSV file— for the sake of organization, the corpus was given columns for the comment’s platform (Facebook or Youtube), the relevant game, the team whose page the comment was on, and the comment itself. This resulted in an initial corpus of 48,808 comments.

### **Data Cleaning**

With the initial corpus compiled, the data was ready for cleaning and preprocessing. Each entry went through several processes with the use of the nltk module (Bird et. al, 2009,) namely:

- The removal of links and non-alphanumeric characters (i.e. emojis, non-English characters),

- The removal of single characters,
- The removal of stopwords (according to NLTK's predefined stopwords list,)
- The lemmatization of nouns, adjectives and verbs, and
- The removal of empty comments (i.e. those that previously only consisted of emojis and were thus empty after being cleaned.)

The new, cleaned corpus was then exported to a CSV file, which would be the final corpus file to be used for the rest of the paper. This corpus contained 45,655 comments and kept the columns of the original file.

## **Computational Analysis**

### ***Corpus Splitting***

For ease of analysis, the original corpus was divided into a dictionary of smaller sub-corpora, divided into the following formats:

- The sub-corpus pertaining to all comments from all of the relevant team's posts (ex. All Tottenham comments, labeled "Tottenham,")
- The sub-corpus pertaining to comments from the relevant team's controversial game (ex. All Liverpool comments for the controversial Tottenham-Liverpool game, labeled "Tottenham vs. Liverpool September 30, Liverpool,") and
- The sub-corpus pertaining to comments from the relevant team's non-controversial game (ex. All Wolves comments for the non-controversial Manchester United-Wolves game, labeled "Manchester United vs. Wolves May 14, Wolves.")

These sub-corpora would be subject to several computational analysis methods, namely term-frequency based analysis, sentiment analysis, and topic modeling.

### ***Term-Frequency Based Analysis***

In order to determine an initial image of the sub-corpora for exploratory data analysis, various visualizations were created based on the frequencies of terms used in the dataset. The creation of wordcloud visualizations using the WordCloud library provided a

broader picture of each dataset, while the creation of term-frequency count graphs allowed for a more detailed inspection of the most commonly recurring 1- and 2-grams and their frequencies. The latter was done through the use of the scikit-learn library to vectorize the terms and the seaborn and matplotlib libraries to visualize the frequency distributions of said terms. Additionally, tables were compiled per sub-corpus containing the 10 most frequently occurring 1- and 2-grams along with the number of times they appear (see Results and Analysis.)

For the sake of brevity, only the word clouds for the overall team sub-corpora will be explored, while only the term-frequency counts for the game-specific sub-corpora will be discussed (as the overall team counts are too broad in scope to provide insights.) The term-frequency tables will also be used over the term-frequency count graphs as these make for more precise analyses.

### ***Sentiment Analysis***

In order to obtain some gauge of commenters' general sentiments per sub-corpus, sentiment analysis was performed on the cleaned data using the nltk library. More specifically, VADER was used to analyze each comment's association with negative, positive and neutral sentiments. After obtaining each comment's scores for the three sentiments, each comment was classified according to their highest-rated sentiment. The occurrence of the three sentiment labels in each sub-corpus was then tabulated (see Results and Analysis.)

### ***Topic Modeling***

In order to look deeper into insights from the term-frequency based analysis, topic modeling was performed on the game-based sub-corpora in order to ascertain the most frequent topics of discussion regarding each game. The scikit-learn library was used in order to obtain three topics from each sub-corpus, along with each topic's ten most commonly-associated words. The topics themselves were then inferred based on their

commonly-associated words. Each comment was also classified based on the topic most relevant to it, and the frequency counts of each topic in a sub-corpus was tabulated as well.

## Results and Analysis

### Tottenham Spurs Results and Analysis

#### **Term-Frequency Based Analysis**

Performing term-frequency analysis on the general dataset of Tottenham comments can give us a general idea of discussion regarding both games largely on the side of Tottenham fans.



As seen from the wordcloud above, the discussion seems to generally center around the two teams (*liverpool, tottenham* and *spur*,) specific moments or decisions in the games (*red card, referee, VAR, point,*) and player performances (*Richarlison, Kim Hong, Lucas Moura.*) Many comments also simply expressed their feelings regarding the games (*shame, love, celebrate*) and team mottos (*COYS* or “*Come On You Spurs*”)- this is expected, given the nature of short-form comments on social media sites such as Facebook and Youtube wherein users tend to comment casually.

In order to compare discussion regarding the two games, a more precise list of commonly-recurring 1- and 2-grams was compiled for each game, listing the top 10 n-grams and their corresponding counts:

Tottenham May 1 (1-gram)						
#	Term	Count	#	Term	Count	
1	spur	472	6	get	338	
2	game	426	7	good	322	
3	team	356	8	goal	311	
4	tottenham	356	9	lucas	304	
5	moura	346	10	dier	303	
Tottenham May 1 (2-gram)						
#	Term	Count	#	Term	Count	
1	lucas moura	126	6	ayoub el	50	
2	eric dier	63	7	second half	48	
3	red card	61	8	kane son	43	
4	tottenham hotspur	61	9	next season	41	
5	el kady	51	10	come back	39	

The above table lists the most commonly-recurring n-grams for the May 1 Tottenham vs. Liverpool game, which in the context of the two games is considered the non-controversial game of the two. During this game, Liverpool won 4-3 over Tottenham. As one can see from these terms, most discussion centered around the players on the Tottenham side and the game itself. There was some discussion of in-game moments as well, given that terms like red card and second half are also common. Lastly, many comments are from fans expressing their support, such as good and next season.

Tottenham September 30 (1-gram)						
#	Term	Count	#	Term	Count	
1	liverpool	1177	6	tottenham	548	
2	spur	1118	7	team	542	
3	win	1053	8	referee	540	
4	goal	855	9	var	489	
5	game	602	10	allah	435	
Tottenham September 30 (2-gram)						
#	Term	Count	#	Term	Count	
1	red card	246	6	diaz goal	95	
2	kim hong	238	7	liverpool fan	83	
3	spur fan	122	8	man match	79	
4	sara mohamed	116	9	celebrate like	58	
5	tottenham hotspur	97	10	win win	57	

Compared to the May 1 match, the more controversial September 30 match led to much more discussion of hotly-contested topics (for reference, Tottenham won 2-1.) For example, it is notable that Liverpool, the opposing team, was the most commonly-recurring term in the entire dataset for the game, whereas for the less controversial game it failed to even reach the top 10. This could be due to comments from both Tottenham fans and frustrated Liverpool fans. The same goes for terms such as “referee,” “VAR” and “red card”—while “red card” was also noted in the previous table, it did not appear nearly as much as it did in the controversial game’s comments. This is also mixed in with celebration from Tottenham fans, given terms such as “celebrate like,” “win win,” and “allah” (usually prayers of thanks from fans.)

## **Sentiment Analysis**

Upon processing both games' datasets through sentiment analysis, the counts of each sentiment was found to be as follows:

Game	Sentiment	Count
Tottenham vs. Liverpool May 1	Neutral	3408
	Positive	615
	Negative	455
Tottenham vs. Liverpool September 30	Neutral	5382
	Positive	1593
	Negative	750

In both cases, neutral labels made for the overwhelming majority of comments, while positive comments were the second highest and negative comments were the least (this will be a recurring theme throughout the sentiment analyses performed in this paper, and the reasons as to why will be discussed in the Limitations section later on.) The uptick of positive comments in the September 30 game could be attributed to the fact that Tottenham emerged victorious, while the negative comments from the same game could be due to angry Liverpool fans commenting against Tottenham.

## **Topic Modeling**

While the term-frequency analysis is helpful in getting a general idea of discussion taking place for both games, topic modeling provides a more precise idea of the association between commonly-recurring terms, as well as the frequency at which topics are discussed.

Tottenham May 1 Topics		
Terms	Likely Topic	Count
play, team, spur, good, go, player, need, son, like, get	General positive reactions to the game	1666
game, moura, lucas, goal, spur, score, match, bad, richarlison, first	Specific events of the game on the Spurs' side (players, goals)	1554
tottenham, dier, red, iota, get, eric, liverpool, de, card, hotspur	Specific events of game generally (players from both teams)	1258

Tottenham September 30 Topics		
Terms	Likely Topic	Count
liverpool, spur, win, goal, player, red, get, good, son, 12, rob	General negative reactions to the result of the game	3888
win, goal, var, ref, game, liverpool, spur, referee, celebrate, league	Specific events of the game from Liverpool's side (i.e. goal, var, offside)	3084
allah, tottenham, hotspur, earth, great, one, would, come, world, lord	General positive reaction to the result of the game	753

These topics display a difference in the kind of discussion that took place regarding the game with a controversial call. The May 1 (non-controversial game) discussions were more tame in the sense that they talked more about the specific happenings in the game and general support for Tottenham, which makes sense given that the comments come from the team's personal page. Discussions on September 30 (controversial game) were more negative, as the primary topic was the negative reactions people had to the results of the game as well as discussions on the events of the game pertaining to Liverpool. This could be seen through terms such as "rob" (referring to Liverpool "being robbed") and "12" (referring to how the referee is the "twelfth man" on Tottenham's team, accusing them of bias.) "VAR" and "ref/referee" are also heavily mentioned in the second topic, likely meaning that the referees and VAR team are commonly blamed for the outcome of the game. These topics far outweighed the positive discussions, which in contrast were characterized by "allah," "world," and "lord" (prayers thanking Allah for the game's results).

This prevalence of negative reactions is notable because of the fact that Tottenham won the game— one would expect most comments to be positive given this, when in reality positive reactions make up less than 10% of this subcorpus. This could likely be thanks to Liverpool fans commenting on the Tottenham post in order to vent their frustrations directly against Tottenham and its fans. In the case of Tottenham fans, it is also likely that both sides discussed the controversial decision at length, leading to the prevalence of the second topic.

## Liverpool Results and Analysis

### Term-Frequency Based Analysis

The word cloud for the Liverpool sub-corpus is as follows:



The generated word cloud for the overall Liverpool sub-corpus is somewhat similar to that of the Tottenham sub-corpus. Generally, discussion revolved around the teams (*liverpool, spur*) and players (*matip, jota, diaz*). Many of the comments also seem to be casual expressions of support for the team (*YNWA* or *You Never Walk Alone*, a Liverpool slogan.) Most notably, many of the comments are discussing the controversial decision, given the prevalence of *ref, referee, var*, and *red card*. Smaller but still relevant are some positive terms, such as *love, best, great*, and *proud team*, likely support for Liverpool.

The term-frequency count tables for 1- and 2-grams for the May 1 Liverpool game (or the non-controversial game) are as follows:

Liverpool May 1 (1-gram)						
#	Term	Count	#	Term	Count	
1	game	660	6	get	369	
2	liverpool	628	7	team	331	
3	jota	414	8	good	328	
4	spur	404	9	tottenham	307	
5	goal	389	10	go	307	
Liverpool May 1 (2-gram)						
#	Term	Count	#	Term	Count	
1	lucas moura	106	6	el kady	51	
2	van dijk	84	7	ayoub el	50	
3	red card	68	8	second half	44	
4	next season	61	9	come back	42	
5	tottenham hotspur	60	10	good game	34	

Given that this game was both non-controversial and a win for Liverpool, discussion appears to be largely normal for the May 1 game. The game and its players seem to be the most commonly discussed topic— the names of Tottenham’s Lucas Moura and Liverpool’s Virgil van Dijk are the two most commonly mentioned 2-grams, while Jota, the third most mentioned term, refers to Diogo Jota, who scored the winning goal for Liverpool. Other than players, most discussion seems to simply be fans congratulating Liverpool and discussing the game itself (*second half, good game.*) *Red card* is mentioned frequently, likely referring to a decision in the game, but this seems to be the only term referring to any contentious decisions.

On the other hand, the terms for the September 30 game, which is the controversial losing game for Liverpool, can be seen in the following table:

Liverpool September 30 (1-gram)						
#	Term	Count	#	Term	Count	
1	liverpool	3746	6	goal	2141	
2	referee	2841	7	red	1858	
3	game	2443	8	team	1807	
4	var	2252	9	ynwa	1799	
5	ref	2224	10	match	1539	
Liverpool September 30 (2-gram)						
#	Term	Count	#	Term	Count	
1	red card	915	6	proud team	293	
2	diaz goal	502	7	bad referee	263	
3	walk alone	346	8	yellow card	256	
4	never walk	326	9	ref var	240	
5	premier league	326	10	liverpool fan	230	

The September 30 game provides a stark contrast to the previous May 1 game, given that while Liverpool won the May 1 game without much controversy, the September 30 game had the team lose due to a controversial decision—this reflects very heavily in the terms above. *Red card* is by far the most frequent 2-gram, while *Diaz goal*, referring to the controversial goal not awarded to Liverpool due to the decision of the referees, is the next most frequent. Meanwhile, the variations of referee (*referee*, *ref*, *VAR*) are all in the top 5 terms of the sub-corpus, while *bad referee* and *ref var* also show up in the 2-grams. Other than this, there is a lot of noticeable support for Liverpool given their “unfair” loss. Many of the other terms are either the team slogan (YNWA) or people expressing pride for Liverpool.

### **Sentiment Analysis**

Game	Sentiment	Count
Tottenham vs. Liverpool May 1	Neutral	4339
	Positive	1018
	Negative	456
Tottenham vs. Liverpool September 30	Neutral	16938
	Positive	3980
	Negative	3078

Similarly to the Tottenham sentiment analysis, both games follow the pattern of mostly neutral, then positive, then negative. The influx of positive comments for May 1 could be due to Liverpool's victory, while September 30's could be due to Liverpool fans becoming stronger in their support due to the "unfair" loss, as mentioned previously.

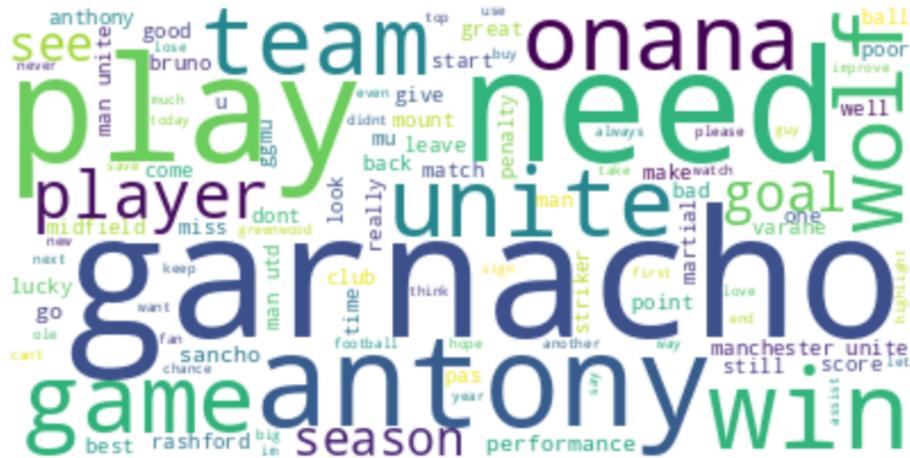
### **Topic Modeling**

Liverpool May 1 Topics		
Terms	Likely Topic	Count
liverpool, game, moura, play, lucas, team, good, tottenham, spur, time	General reactions to the results	2189
goal, richarlison, van, spur, score, liverpool, bad, still, fan, need	Specific events in the game (Tottenham side)	1900
game, jota, get, red, season, go, back, one, let, fight	Specific events in the game (Liverpool side)	1724
Liverpool September 30 Topics		
Terms	Likely Topic	Count
liverpool, referee, game, match, var, bad, ref, see, league, fan	Reactions to referee calls made during the game against Liverpool	10572
red, vnwa, goal, proud, matip, card, well, ref, team, play	Specific events in the game (Liverpool side)	9645
rob, walk, never, alone, de, liverpool, var, el, ref, la	Praise for the Liverpool team	3779

Looking at the different discussions that were had between the May 1 game and the September 30, there are a few key differences that point out how fans react to the controversy. Discussions on May 1's game were more on the game itself, with reactions to the results, and talking about specific events from both sides of the team. Fans talked about the players themselves (*Lucas Moura, Richarlison, Jota*) as well as specific moments of the game that took place on both sides. Meanwhile, September 30's game brought upon more reactions towards the referee and VAR team and the calls they made during the game— these made up most of the comments. Fans also talked more about Liverpool's side of the game and showed praise for the team. Given the nature of the loss on September 30, Liverpool fans were quick to call out the “robbery” they felt happened but were also quick to praise their team for a job well done despite the circumstances.

# Manchester United Results and Analysis

## **Term-Frequency Based Analysis**



Manchester United's word cloud gives us a cursory look at the discussions Manchester United fans had regarding both of the games being analyzed. This set of comments has an especially large emphasis on the discussion of players, given that the most common terms are *Antony* and *Garnacho*, referring to Manchester United players Alejandro Garnacho and Antony Matheus dos Santos. Other than this, the discussion seems very much

focused on the game itself, given the mentions of the team names and various football terms such as *midfield*, *goal* and *striker*.

Manchester United May 14 (1-gram)						
#	Term	Count	#	Term	Count	
1	garnacho	285	6	need	67	
2	antony	175	7	sancho	66	
3	unite	97	8	next	59	
4	goal	81	9	score	57	
5	back	71	10	martial	56	
Manchester United May 14 (2-gram)						
#	Term	Count	#	Term	Count	
1	manchester unite	29	6	garnacho back	11	
2	viva garnacho	27	7	defencive role	11	
3	next season	24	8	sabitzer defencive	11	
4	man unite	13	9	eriksen sabitzer	11	
5	next match	12	10	match eriksen	11	

The May 14 game (considered the non-controversial game) was victorious for Manchester United, and the comments seem fairly normal as a result, a large majority of the comments are about the players, especially Garnacho— *Garnacho back* likely means *Garnacho [is] back*, referring to the fact that the player had recently recuperated from an injury and was once again ready to play football, while *viva Garnacho* is assumed to be fans celebrating his performance. Other than this, there is discussion of strategies for games given *defencive role* and *sabitzer defencive*. Lastly, many of the comments once again seem to be casual comments celebrating the team's win, given the prevalence of the team's name and as mentioned, the phrase *viva Garnacho*.

Manchester United August 15 (1-gram)					
#	Term	Count	#	Term	Count
1	unite	224	6	wolf	178
2	win	207	7	game	168
3	play	207	8	team	157
4	need	201	9	get	139
5	onana	179	10	man	136
Manchester United August 15 (2-gram)					
#	Term	Count	#	Term	Count
1	man utd	43	6	ten hag	21
2	manchester unite	39	7	deserve win	17
3	man unite	38	8	first game	17
4	play like	26	9	play good	15
5	last season	22	10	bad performance	15

Sentiments seem to be much more muddled for the more controversial August 15 game when compared to the May 14 one. While Manchester United did win, discussion still seems to revolve around the fact that the game was decided by a controversial decision. The most mentioned player is Andre Onana, whose collision with a Wolves player led to the controversy, while Erik ten Hag, Manchester United's manager, was also mentioned frequently. Notable are some terms that point to sentiments against Manchester United, such as *deserve win* (usually saying that the team *did not deserve the win*) and *bad performance*. This could either be due to Wolves fans coming into the comments section, as seen with the Liverpool vs. Tottenham game, or Manchester United fans themselves expressing dissatisfaction at the game's results.

## **Sentiment Analysis**

Game	Sentiment	Count
Manchester United vs. Wolves May 14	Neutral	1198
	Positive	383
	Negative	237
Manchester United vs. Wolves August 15	Neutral	805
	Positive	181
	Negative	43

Despite covering a different pair of teams, this sentiment analysis once again follows the pattern of neutral, positive then negative. In the case of Manchester United, it could make sense that this order was found given that the team won both games.

## **Topic Modeling**

Manchester United May 14 Topics		
Terms	Likely Topic	Count
garnacho, antony, sancho, anthony, viva, ole, bruno, give, goal, player	Reactions to Manchester United players and their performances	402
antony, unite, martial, next, goal, great, score, manchester, season, match	Specific events during the game (Manchester United side)	326
back, garnacho, game, man, unite, need, come, go, ball, ggm	Reactions to the result of the match	301

Manchester United August 15 Topics		
Terms	Likely Topic	Count
win, unite, wolf, man, penalty, play, uta, good, team, lucky	Reactions to Manchester United's victory and how they won	717
need, game, mount, play, performance, season, bad, player, see, rashford	Discussion regarding Manchester United players' performance as a team	636
onana, varane, team, mu, like, play, get, season, player, save	Discussion regarding individual Manchester United players	465

Despite winning on both occasions, there are key differences that are shown in the May 14 match as compared to August 15's match. May 14's discussion seems purely focused on reacting positively to their victory and talking about the players' performances (for example, *ggmu* means *Good game Manchester United*,) whereas August 15's match talked about how Manchester United won controversially with words such as *penalty*, *wolf* and *lucky* referring to the fact that their victory was likely caused by the fact that the Wolves were not given a penalty kick by the referees. Other than this, August 15's discussion was also about the performances, most especially Andre Onana's, given that he inadvertently caused the controversy. The discussion of the controversy could once again either be caused by Wolves fans coming into the comments section of Manchester United, or alternatively fans of Manchester United expressing their dissatisfaction at the call despite their victory.

# Wolverhampton Wanderers Results and Analysis

## **Term-Frequency Based Analysis**



The word cloud for the Wolves' comments share the same characteristics as the word clouds for the other team sub-corpora. Discussion once again revolves around the players, the team and the contentious decision. *Wolf* is the most frequent term, likely due to people referring to the team, along with *team* and *good*, which points to people praising the team for their performance. *Cunha* refers to Matheus Cunha, a player on the Wolves' side, while *Bentley* refers to Dan Bentley, the team's goalkeeper during the May 14 match. Meanwhile,

other largely reoccurring terms include *penalty*, *VAR* and *ref*, once again indicating discussion about the controversial decision.

The term-frequencies for the May 14 game are as follows:

Wolverhampton Wanderers May 14 (1-gram)						
#	Term	Count	#	Term	Count	
1	bentley	15	6	season	8	
2	man	10	7	get	6	
3	wolf	9	8	player	6	
4	save	8	9	play	6	
5	unite	8	10	fan	6	
Wolverhampton Wanderers May 14 (2-gram)						
#	Term	Count	#	Term	Count	
1	man utd	4	6	man fan	2	
2	manchester unite	3	7	unite fan	2	
3	next season	3	8	dan bentley	2	
4	rest season	2	9	backwards football	2	
5	best player	2	10	man unite	2	

Despite the Wolves' loss, discussion still seems to revolve around the team's performance and the game itself. Dan Bentley, the team's goalkeeper for the game, is the most mentioned along with *best player*, possibly pointing to praise for his performance. Meanwhile, there are also many more mentions of Manchester United, possibly pointing to discussion of the opposing team or given their loss, frustration against them.

The term-frequencies for the August 15 game are as follows:

Wolverhampton Wanderers August 15 (1-gram)					
#	Term	Count	#	Term	Count
1	wolf	267	6	good	78
2	penalty	115	7	deserve	64
3	unite	113	8	win	62
4	play	93	9	fan	57
5	game	78	10	team	57
Wolverhampton Wanderers August 15 (2-gram)					
#	Term	Count	#	Term	Count
1	deserve win	33	6	play well	16
2	manchester unite	26	7	man unite	16
3	wolf play	22	8	man utd	12
4	wolf deserve	20	9	wolf player	10
5	unite fan	19	10	play good	10

As with the other controversial sub-corpora, discussion regarding the August 15 game was largely centered around the controversial decision given that the term *penalty* was very common. There are many variants of the word *deserve* that occur, likely pointing to the fact that fans believe that the Wolves deserved to win. *Unite fan* could point to Wolves fans' frustrations being pointed at Manchester United fans and their likely satisfaction with the match. Alongside the vitriol, there is also some discussion and praise for the Wolves' performance. *Play well* and *play good* were commonly mentioned, which could align with fans' belief that the Wolves were the ones who deserved the win.

### **Sentiment Analysis**

Game	Sentiment	Count
Manchester United vs. Wolves May 14	Neutral	30
	Positive	16
	Negative	6
Manchester United vs. Wolves August 15	Neutral	397
	Positive	141
	Negative	79

As with the other sentiment analyses, the neutral sentiments are the highest, followed by the positive then negative sentiments. This mix of positive and negative could be attributed to the fact that May 14's discussion was largely normal, while August 15's discussion had fans expressing their support for the Wolves and their belief that the Wolves deserved the win.

### **Topic Modeling**

Wolverhampton Wanderers May 14 Topics		
Terms	Likely Topic	Count
bentley, season, save, good, play, game, respect, see, fair, give	Praise for the Wolves' team	25
wolf, bentley, player, unite, get, forward, best, manchester, goalkeeper, save	Specific events during the game	19
man, utd, pas, donde, bad, goalkeeper, fan, go, dont, play	Discussion about Manchester United	8
Wolverhampton Wanderers August 15 Topics		
Terms	Likely Topic	Count
wolf, unite, deserve, play, win, good, fan, well, team, cunha	Discussion about the Wolves' performance during the game	305
var, game, play, ref, unite, need, like, season, get, decision	Discussion about decisions from the referees and the VAR team	157
penalty, wolf, ball, player, onana, rob, give, pen, referee, get	Discussion of specific events during the game	155

May 14's match talks more about praise for the Wolves team, specific events about the game, and discussion about the opposing team. Dan Bentley is, as mentioned, very much praised by the comments for his performance, as can be seen in the first two topics. This points to a largely normal comment section despite the team's loss. Meanwhile, August 15's match was also largely about the performance of the Wolves, with key terms *good*, *deserve*, and *win*— as mentioned in the term-frequency analysis, this likely points to their belief that the Wolves deserved the win over Liverpool. While August 15 had discussion of specific game events similarly to May 14, words like *rob*, *penalty*, and *Onana* (the Liverpool player involved in the penalty call) were used, referring to their dissatisfaction at the events of the game. Once again, *VAR* and *ref* are mentioned as well, pointing to discussion about their decisions and how they led to the Wolves' loss.

## Overall Synthesis

Many common themes can be found from the topics that were found in each sub-corpus. To recount, the computational analysis for each sub-corpus pointed to the following sentiments and ideas from each comment section:

Tottenham Spurs		Liverpool	
Non-Controversial	Controversial	Non-Controversial	Controversial
<ul style="list-style-type: none"> <li>Normal discussion about the game and team despite loss</li> <li>Some anger, but not the majority</li> </ul>	<ul style="list-style-type: none"> <li>Negative reactions regarding the controversial decision</li> <li>Some celebration from Tottenham</li> </ul>	<ul style="list-style-type: none"> <li>Normal discussion about the game and team</li> </ul>	<ul style="list-style-type: none"> <li>Most comments are about the controversial decision and anger</li> <li>Support for the team from fans</li> </ul>
Manchester United		Wolverhampton Wanderers	
Non-Controversial	Controversial	Non-Controversial	Controversial
<ul style="list-style-type: none"> <li>Normal discussion about the game and team</li> </ul>	<ul style="list-style-type: none"> <li>Despite winning on both occasions, this win was treated differently</li> <li>Discussed how they won with words like <i>penalty</i>, and <i>lucky</i></li> </ul>	<ul style="list-style-type: none"> <li>Normal discussion about the game and team despite loss</li> </ul>	<ul style="list-style-type: none"> <li>Discussion of the game itself</li> <li>Discussion about the controversial decision and about how the Wolves deserved to win</li> </ul>

These paint a comprehensive picture of the ways in which football fans behave in both non-controversial and controversial games, which are notably consistent in spite of differing team allegiances. When a game is considered normal and fair (without any major controversial decisions deciding the results of the game,) fans most commonly express their feelings about the game without much vitriol. Notably, this happens regardless of the result—fans of losing teams express some disappointment, but angry responses are a minority. Responses to non-controversial games are largely centered around moments in the game, the performance of both teams' players, and support for the team and its players.

On the other hand, comment sections for controversial games are similarly consistent for the opposite sentiment. Whether or not the team benefited from the controversial call seems to have no bearing on how prominent discussion of the controversial call is online. While there may be some celebration from fans for victories, this could be considered a minority when compared to the sheer amount of discussion regarding the controversial decision and fans' feelings regarding it. On the other hand, fans of losing teams seem to be further pushed into showing their support for their team and its players, given that the team suffered from an “unfair” loss. In either case, there is a notable feeling of dissatisfaction from fans due to the controversial outcome of the game. While it is possible as stated that this could be caused by fans of the one team going to the opposing team's social media pages in order to comment and vent their frustrations, it is similarly likely that fans of a winning team could still be dissatisfied with how the game played out.

Worth mentioning in discussion of the controversial comment sections is the prominence of references to the game's referees and VAR team. Inspection of each controversial game sub-corpus showed that *referee*, *ref* and *VAR* each had a substantial term-frequency, pointing to the fact that fans very commonly directed their frustrations towards the game's officials—this is to the point that most controversial game sub-corpora have 1 topic dedicated to these frustrations.

## Social Analysis

To start, the *social learning theory* provides a valuable framework for understanding the results of the computational analysis in the context of online aggression. This theory suggests that aggression can be learned through the experiences of individuals and by observing the behavior of others. Given the vast number of comments that have been collected and analyzed from Facebook and YouTube, it becomes crucial to examine the textual corpus as a means to mitigate and reduce these various manifestations of aggression.

In general, fans tend to get more aggressive when football games are decided by a controversial call. In discussing this, we can refer to the *Frustration-Aggression Theory*, which states that:

**Frustration** is defined as anything that blocks us from attaining a certain goal.

**Aggression** is either physical or verbal behavior intended to cause harm.

In this case, the goal is a fan's favorite football team winning a certain game and the one blocking them from attaining that goal is the controversial call made by the referee. In addition, the comments made in social media are acts of aggression. In fact, this frustration occurs when there is an expected gratification and when that blocking of the gratification is complete eventually leading to aggression.

In Myers' book on *Social Psychology: Twelfth Edition*, an example of college students being loud and exerting numerous amounts of painful noise towards soccer games was mentioned (Myers, 2016). From this, by looking at the data of Tottenham vs Liverpool and Manchester United vs Wolves, it can be clearly seen that the gap between the number of negative words such as *red card*, *player names*, *2nd half*, and others are more significant in the controversial games compared to the non-controversial ones. It can be clearly observed that football fans show valid behavioral comments in non-controversial football games and tend to have explosive overreactions whenever there is an unfair call. This type of behavior pertains to *displaced aggression* wherein people harbor anger from prior provocation or that

any type of minor offense can result in a domino effect of reactions that may exacerbate how comments and opinions are perceived. In fact, in a world using social media as the main platform to express emotions over any type of topic, bandwagoning one's feelings toward something is more common than ever.

Unfortunately, the rewards of aggression are just more types of aggression. For example, once a football fan's hatred comments on an opposing team gets an ample amount of reactions, more fans tend to support it and saturate the opinion with their own arguments. This results in the opposing team's fans whose these hatred comments are addressed to, get offended and start their own chain of hatred comments to the ones that started it. This relationship is parallel to *group influences* as riots begin to arise, aggressive acts spread rapidly after a trigger which in this case is the first person to start a chain of hatred comments. It is mentioned by Myers that groups "can amplify aggressive reactions partly by diffusing responsibility (Myers, 2016)." This means that the greater number of football fans that collectively make these comments, the more brutal these comments tend to become as if putting gasoline to an already existing fire. The book also mentions the social contagion of groups as these tend to pinpoint these aggressive acts as much as they intensify opposing viewpoints and that soccer/football fans are examples of these aforementioned groups.

### ***Social Learning Approach***

Now with aggression observed as the main psychological concept present in the results of computational analysis of the group's textual corpus, how do we reduce it?

The best way to prevent aggression from happening is finding out conflict-resolution strategies. These are suggested to be non aggressive so that teaching them will be a smooth process. With the given computational analysis, it is highly suggested that education is the root to reduce aggression. In fact it is proven that teaching problem-solving skills, emotion-control strategies, and conflict resolution techniques reduce aggression by a significant amount. This is supported by psychologists Wilson and Lipsey that these strategies reduced school violence by 7% after collating data from 249 schools (Myers, 2016).

Parallel to this is football aggression that the strategies proposed can be tweaked for a football fan-centered approach. These can be modules on proper sportsmanship, a better introduction to football rules/penalties/cards, or even having real life simulations of anger management by taking advantage of EA Sports' FIFA games that emulate real football games to test the former solutions.

Furthermore, modeling and rewarding cooperation from an early age can help reduce aggression much further. Parents, as the primary educators of their children, can be equipped with the necessary skills to foster discipline in their own children while prohibiting themselves from any manifestation of violence. Something as simple as training programs that suggest the advantage of framing statements in a positive way can benefit children in the long run. For example, saying "Once you finish doing your Math homework, you can go play with your friends," rather than "If you don't finish your Math homework, you're grounded for a week." A change of tone and perspective of looking at a solution can go a long way especially if this is done to young kids. This can result in a better development process for a child when it comes to dealing with things that challenge them on the daily. Though some forms of aggression would still be present as they grow up, it is accepted that these cannot be avoided as we are all humans but what's important is that we build a better world for future generations to live in.

In addition, we look at how we can reduce this in the media specifically. Studies show that reducing TV screen time by a third can decrease aggressive children behavior by 25%. This supports that teaching proper values for children is one of the most crucial things to invest in when it comes to making an impact on reducing aggressiveness once they grow up. This also implies the notion that as adults get older, the harder it is to teach them values that should have been taught properly when they were young. Taking advantage of psychological research and methods today can help alleviate aggression in general and ultimately to sports specifically.

### ***Philippine Context***

As third year Atenean college students, the group has already graduated from physical education offered by Philippine education. As products of the current physical education system of the country, it can be comfortably said that the education here is heavily centered on how to play certain sports and improve on basic motor skills. Little to no sportsmanship lessons were taught and fights between batches and/or sections were prevalent. Because of this, the group chose to study football as a sport because it is the most famous sport in the world and this will result in better data gathering and most of the comments in the textual corpus will be in English. It must not be forgotten that basketball is the most famous sport here in the Philippines and the amount of fights/bets/slander people get from playing this sport from street-level to UAAP/PBA level is no doubt a toxic environment whenever a new enthusiast seeks interest in the sport. This study was made to study behavior on people in a certain sport of a larger scale to make suggestions for a proper research with the Filipino people in mind not only when it comes to its national sport basketball but also in e-sports such as playing League of Legends and Valorant, two of the most toxic game fanbases in the world.

The Philippines is also the number one country that uses Facebook and places high on the other social media platforms as well. With this, huge datasets can be scraped from these comments however, the country has a diverse set of dialects and cleaning and studying a corpus made from these various types of languages merged with different contexts and classes.

## **Conclusion and Discussion**

### **Conclusion**

This research explored the widespread issue of aggression prevalent in football fans across Facebook and YouTube comments from official football accounts of the Tottenham Hotspurs, Liverpool, Manchester United and Wolverhampton Wanderers. With the use of the social computational methods, social psychological theories were applied to study the behavior of the interaction of these fans. The data and social analysis underscore and reveal

how this aggression can result from block goals and prior provocation. In fact, the study emphasizes the crucial role of education in teaching conflict resolution, emotion control, anger management, and sportsmanship.

Additionally, it highlighted the impact of media and social media on molding aggressive behavior. A proposed feasible solution addressing these issues as early as possible to children suggests a proper way of parenting can help lessen the amount of aggression of people in general and not just to football fans. Furthermore, the research is vital given the unique cultural context of physical education in the Philippines, where social media plays a vital role in shaping the values of its people. Value-centric educational approach can reduce aggression and foster a better future for generations to come.

## **Limitations**

Upon completion of the tasks for the project, the group listed several limitations to our capability to make this study as accurate as possible. The limitations are as follows:

### ***Reddit API***

One possible limitation to the project is that the Reddit API was not used to extract Reddit comments. It is known that Reddit is one of the biggest platforms when it comes to criticisms of any topic in general. However, the group believes that Facebook and Youtube are sufficient for the current scope of the paper.

### ***Twitter/X API***

One of the first platforms the group was considering was Twitter/X. Twitter is the most actively used social media platform for sports fans when it comes to tweeting live reactions to games as most tweets can be categorized into hashtags and word filtering. However, due to the recent rebranding of Twitter and subsequent management decisions, data scraping from the site has been a challenge and the group decided to forego the

extraction of Twitter data. On that note, the group also came to a conclusion that scraping data from Twitter/X would be limited in the sense that it would only scrape data from public accounts and not private ones. Additionally, given the nature of Twitter/X, some tweets would not be scraped due to their out of context content— they would not be found when extracting tweets using specific words or hashtags.

### ***Details of Accounts***

The group also did not have access to data regarding the specifics of the demographics of the comments made by the Facebook and YouTube comments. It would have been a significant addition to the analysis of data if the group had access to which accounts had the most change in behavior when a controversial call occurs in a football.

In addition to this, the analysis would have also benefited if the corpus included the age group of the accounts that commented on posts. It would shed light on the demographics of users commenting posts, most especially minors, given that one of the objectives of the project is to know what kind of environment a new fan of football is getting into when they choose to do so in 2023. Additionally, knowing other demographics (i.e. ethnicity, gender identity) of users could also give insights on whether or not people in the football community are being harassed/attacked by toxic football fans on the basis of their identities.

### ***Language Barrier***

Skimming through the data, it can be seen that some of the comments are in different languages such as Korean and Chinese. These limit the group as to how much data can be analyzed because of the unique characters these languages use. They could be pertaining to similar words in their English equivalents but unfortunately would not be included in the analyses such as the term-frequency based analysis.

### ***Selection Bias***

Another limitation is that the group did not pick posts that were posted by fan accounts as these are hard to find and contain little amounts of comments. The group picked posts that were posted by the verified team accounts to ensure that the majority of the comments are posted by the same group of fans. It should also be noted that in cases where teams won due to a controversial call, the opposing team's fans could have raided the comment section, skewing the data.

### ***Dataset Size Inconsistencies***

Given the nature of how the posts were selected, some teams' datasets were noticeably smaller than others (specifically the Wolves' comments.) This is likely due to the fact that some teams are not as popular as others, meaning less people are likely to comment or opine on the game. This is especially true for the Wolves, as they are the only team discussed in this paper that does not belong to the Big Six. Additionally, non-controversial games are understandably likely to receive less comments than controversial ones, as people would feel more strongly about the controversial games. These issues lead to noticeable inconsistencies in the sizes of the sub-corpora, which could have led to skewing.

### ***Inconsistent Data Types***

The ways in which Facebook and YouTube implement their comments are different from one another. Facebook has multiple reactions such as Like, Heart, Care, Laugh, Wow, Sad, and Angry while YouTube has Like and Dislike with only the Like count being publicly available. Hence, the group opted to remove reaction counts from the scope of this paper and use solely what words the users used to comment on the games.

### ***Explicit Data***

As these are controversial football games, there are many instances wherein users can say slurs and explicit words not meant for younger audiences to see. As a result, these posts

are removed/restricted and some of these accounts may even be banned due to the amount of profanity included in the comment. In fact, the group cannot really say how much of these skew the data as these comments are not available at the group's disposal.

### ***Social media data is not ALL data***

Being limited to Facebook and YouTube comments, the group did not take into account articles and official statements of teams and the leagues of the games used for the corpus. These articles can contain quotes from the players, coaches and/or fans during the game and even after the game in post-game interviews. These articles can also include biased comments from professional football analysts which can contain significant insights to the analysis. However, mixing comments and articles would just skew the data for both data sources.

### ***Sentiment Analysis***

It can be observed that the sentiment analysis presented a majority in the count in neutral comments. This is due to the limitation that the amount of comments per team were not equal and can skew the results drastically. Additionally, the program had a difficult time understanding internet slang as these comments are mostly neutral and some can even have a sarcastic tone which can make the result of the counts to be inaccurate.

### **Recommendations**

For future research/projects similar to studying the toxicity of football fans in recent years, the group has compiled recommendations that run parallel to the identified limitations.

### ***Conduct Surveys***

It would have been a great addition to the context of the project if surveys were conducted to obtain preconceived notions about football, its history, and how toxic the

fanbase is until today. A sample size of 30 football enthusiasts in Ateneo would suffice for a general idea of how football is viewed by the public.

### ***Diversify the Data Sources and Strategized Sampling***

With the textual corpus solely coming from Facebook and YouTube comments, an addition of news articles and post-game interviews would give more significance to the study as these forms of media are peer reviewed and by professionals themselves.

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