FRAMING THE GAME THROUGH A SABERMETRIC LENS: MAJOR LEAGUE BASEBALL BROADCASTS AND THE DELINEATION OF TRADITIONAL AND NEW FACT METRICS

by

ZACHARY WILLIAM ARTH

ANDREW C. BILLINGS, COMMITTEE CHAIR
DARRIN J. GRIFFIN
SCOTT PARROTT
JAMES D. LEEPER
KENON A. BROWN

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ABSTRACT

This purpose of this dissertation was to first understand how Major League Baseball teams are portraying and discussing statistics within their local broadcasts. From there, the goal was to ascertain how teams differed in their portrayals, with the specific dichotomy of interest being between teams heavy in advanced statistics and those heavy in traditional statistics. With advanced baseball statistics still far from being universally accepted among baseball fans, the driving question was whether or not fans that faced greater exposure to advanced statistics would also be more knowledgeable and accepting of them. Thus, based on the results of the content analysis, fans of four of the most advanced teams and four of the most traditional teams were accessed through MLB team subreddits and surveyed. Results initially indicated that there was no difference between fans of teams with advanced versus traditional broadcasts. However, there were clear differences in knowledge based on other factors, such as whether fans had a new school or old school orientation, whether they were high in Schwabism and/or mavenism, and how highly identified they were with the team. Post hoc analyses were conducted to account for two of the teams in the content analysis having disparities between graphics and commentary in their advanced or traditional nature. These analyses generally revealed the hypothesized pattern of higher knowledge for fans of teams with more advanced broadcasts. Implications for learning and unlearning are discussed as the results here show that heightened exposure, endorsements from trusted sources, and the old and new information being shown concurrently offer greater opportunities for learning and accepting lesser known information.

DEDICATION

To my parents, Tom and Laureen. I can never thank either of you enough for all you have done for me. You never pushed me to do anything, opting to instead allow me to pave my own path. But, no matter what, you supported me always. Thank you for allowing me to pursue this dream. This dissertation is for both of you.

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LIST OF ABBREVIATIONS AND SYMBOLS

BABIP	Batting average on balls in play
ERA	Earned run average
FIP	Fielding independent pitching
MLB	Major League Baseball
OBP	On-base percentage
OPS	On-base percentage + slugging percentage
OPS+	On-base percentage + slugging percentage plus
RBI	Runs Batted In
SLG	Slugging percentage
SSIS	Sport spectator identification scale
WAR	Wins above replacement
WHIP	Walks plus hits divided by innings pitched
wOBA	Weighted on-base average
wRC+	Weighted runs created plus

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CHAPTER ONE: INTRODUCTION

On April 21, 2015, the televised game of professional baseball saw the introduction of a new technology which, for the present, has changed the way the game is broadcast. It was on this day that the St. Louis Cardinals took on the Washington Nationals in the first Major League Baseball (MLB) game to feature Statcast tracking technology (Blum, 2015). By way of radar and optical tracking, Statcast allows nearly every movement in a MLB game to be quantified (Sandomir, 2015). With an increase in quantifiable data comes an increase in metrics and statistics available to be portrayed during the televised game. In addition to the classic statistics, such as batting average and errors, Statcast can provide viewers with more advanced, complimentary data, such as exit velocity, how fast a ball is hit off the bat, and route efficiency, how optimal the route was that a fielder took to catch a batted ball. Previously, some of these new concepts measured with Statcast were subject to a viewer's eye test or their feelings. Since the debut of Statcast, MLB Network has aired four MLB games as so-called Statcast games, the most recent of which occurring in August 2018 (Anderson, 2018). These games feature a much heavier dosage of statistics in the form of both Statcast data and advanced numbers, known to the baseball world as sabermetrics (Lewis, 2003). While these games have been both broadcast to a relatively small audience and are few and far between, whether or not the baseball fan community is ready for a broadcast emphasizing statistics to that extent is another story. Indeed, the issue of introducing advanced statistics into a baseball broadcast may be in the framing.

Statcast, however, is just a sport-based exemplar which illustrates our ability to quantify and measure everything. Quantification and precise measurement can occur in a number of facets of life today. For instance, many individuals actually quantify themselves by way of advancing technologies such as Fitbit and sleep trackers (Swan, 2012). These individuals even make up their own "Quantified Self community" (Swan, 2013, p. 86) which operates on a worldwide basis and features thousands of members. Lupton (2016) describes that the idea of self-tracking is not new, but that "the introduction of digital technologies that facilitate these practices has led to…an expansion of the domains and purposes to which these practices can be applied" (p. 1). Indeed, individuals have been carrying out such quantification behaviors by way of diaries for decades. However, technology has advanced to the point where individuals no longer need to manually and subjectively track their habits. In addition, individuals are now able to track a number of things they once could not. The same is true of Statcast and what it brings to baseball. Measuring certain athletic feats on a baseball field once occurred in more rudimentary ways, with perhaps the most advanced of all technology being a stopwatch. However, like many other aspects of life, baseball is able to be quantified like never before, leading to large amounts of data with which to analyze plays and the players themselves.

Of course, with the rise of new technologies and the subsequent metrics that come with them, older metrics and tools fall by the wayside. The technology that allows individuals to track their steps and sleep patterns has replaced the pen-and-paper recording methods. The technology that allows baseball scouts to track a fielder's route efficiency and the spin rate of a fastball has replaced stopwatches and radar guns. However, when an older metric is replaced by a new one, there is rarely widespread acceptance of the change. In addition, the degree to which one embraces the change as an improvement, as opposed to newer or merely supplemental, is indicative of a widening gap between those willing to think differently and those desiring something more representative of what existed in the past. The focus of this dissertation is on the influence media has in bridging this gap.

Baseball provides what may be the perfect sports lens for an analysis of these issues. On one hand, baseball is a sport that has perhaps the most advanced statistical analyses taking place to evaluate players, some of which will be discussed here. However, baseball may also be the most reluctant of all sports to enact any sort of change. For instance, MLB has been around longer than any other major professional sports leagues in the United States, beginning with the foundation of the National League in 1876. Despite how long the league has existed, MLB is typically a late adopter to new technology. For instance, they were the last of the major sports to adopt the utilization of instant replay to aid in evaluation questionable calls, first doing so in August 2008 (Curry, 2008). Even tennis, a sport perhaps even more deeply rooted in tradition than baseball, began using their challenge system a couple of years prior in 2006. Still, MLB does not allow for replay review on all calls, with balls and strikes being the most notable decision still left to the judgment of umpires. Thus, to change the way the game is broadcast and, in so doing, attempt to change the way people feel, is an enormous undertaking.

This dissertation will delve into baseball broadcasts and assess the statistics they display most frequently to describe and provide information about players. The baseball-specific purpose of this research is to understand how broadcasts have reacted to the statistical revolution that has swept through the game with the publication and subsequent movie adaptation of *Moneyball* (2003), a book written by Michael Lewis that explores the financial inequalities and subjective versus objective evaluation of players in MLB. Metrics in baseball have progressed significantly in the past fifteen years due to both improved technology and an increase in baseball research, much of which stemmed from what *Moneyball* introduced to the world. While advances have been made in research, whether or not these advances are reaching mainstream audiences is less clear. In an attempt to lay the foundation for this dissertation, it is important to discuss some of the history and development of statistics in baseball.

As referenced previously, baseball is perhaps the most appropriate venue for this type of analysis for a number of reasons. For instance, baseball has been around longer than any of the major sports in the United States, leaving significant room for knowledge about the sport to be created, revised, and recreated. In addition, the pace of the game allows more time for viewers to analyze what is occurring on the field. For instance, a fast-paced sport like hockey makes it difficult to assess every minute occurrence on the ice. Relatedly, baseball is also a game where each instance is measurable. Not only can each play be measured, but the same is true for each plate appearance and each pitch within a plate appearance. There are countless individual moments within a baseball game and each one can be measured. This is particularly true today, as technology has advanced to the point where situations previously subject to the eye test (the speed of a player) are measured and often displayed on screen during the midst of a broadcast.

Another suggestion as to why statistics are more informative in baseball than other sports is that individual performance can be measured independent of other players. Grabiner (1994) illustrates the difference in baseball and football statistics by explaining that a batter hitting a single is credited as such, whereas the ten-yard pass in football does not credit the guard who blocked a linebacker and that the same ten-yard pass would be considered a failure if it was third down with thirteen to go. In baseball, however, while situations do matter in terms of the importance of an individual event, these often wash out over the course of a season. A batter hitting a two-run home run is credited the same regardless of whether his team was down by one run or down by seventeen runs. While fans sometimes believe in the idea that some batters are clutch and that other batters only hit home runs in games with lopsided scores, there is little predictive evidence of these phenomena (Brooks, 1989). Thus, given that the goal of baseball statistics is to measure the contributions of each individual player to run scoring or wins, the statistics themselves can be evaluated in the same way as non-baseball statistics. In addition, baseball statistics are subject to the same flaws, misuses, and misinterpretations as statistics outside of baseball (Grabiner, 1994).

While baseball statistics share similarities to non-baseball statistics in important ways, the same is true of baseball research. Baseball researchers, known as sabermetricians, follow the same principles as scientists from any other field. The goals of sabermetricians revolve around creating new knowledge and correcting and improving upon existing knowledge. The extent of this was possibly never more evident than Keith Woolner creating baseball's version of Hilbert's problems (Hilbert, 1902) and publishing them in the 2000 edition of *Baseball Prospectus* (Kahrl et al., 2000), an annual book dedicated to sabermetrics and statistics. David Hilbert was a mathematician who presented 23 mathematical problems which required study over the coming century at a conference in 1900, suggesting that these unsolved problems indicated an exciting future for the field as they inspired research. Woolner (2004) attempted to do the same for baseball, outlining baseball's scientific philosophy and indicating how and why research needed to be conducted. The 23 Woolner problems were broken down into categories consisting of: defense, offense, pitching, developmental strategies, economics, and strategic and tactical decisions. Thus, a subset of analysts and, indeed, fans of baseball think deeply about the statistical and analytic side of the game and actively seek to question and improve upon existing truths.

Indeed, the "truth" in baseball has changed throughout the years. Perhaps the most significant changes have occurred with batting statistics. The game of baseball itself has changed a great deal since MLB first formed in the late 1800s. Specifically, the dead-ball era, lasting from 1900 until, roughly 1920, saw very low amounts of run scoring and a dearth of home runs. While no supported explanation for the end of the dead-ball era exists, the emergence of Babe Ruth as a prolific power hitter saw a change in the game as offense began to increase. As far as statistics go, once home runs became in vogue in baseball, they were of course tracked, along with runs batted in (RBI), and a host of other counting statistics. These statistics are important, but only in sync with other statistics; five home runs in 600 plate appearances is not the same as five home runs in ten plate appearances. RBI is particularly controversial. For years, the best hitters were known to drive in the most runs; this makes sense on the surface. However, sabermetric thinkers have realized that RBI is based largely on lineups. Specifically, a batter who hits behind good batters in a lineup will have more chances to drive in runs (Grabiner, 1994). A batter who typically hits fourth in a lineup will have more RBI chances than a batter who hits eighth or ninth. Therefore, RBI is not necessarily based on the skill of a batter and is largely ineffective in terms of evaluation.

In terms of percentage statistics, batting average has been the most popular for many years. Batting average is, simply, the number of hits divided by number of at bats. A quirk in baseball statistics is that there is a difference between and at bat and a plate appearance; when a batter walks, gets hit by a pitch, or successfully completes a sacrifice, he is not credited with an at bat, yet he is credited with a plate appearance. A plate appearance is counted, regardless of outcome, any time a batter steps up to the plate. Therefore, batting average leaves out a number of other potential outcomes when a batter comes to the plate. The larger issue is that batting average leaves out walks and weighs a single the same as a home run, thus not accounting for power. Two statistics account for both of these issues: on-base percentage (OBP) measures the percentage of plate appearances in which a batter gets on base while slugging percentage (SLG) measures the power of a hitter by weighing a double more than a single, a triple more than a double, and a home run more than a triple. Both of these statistics provide information more valuable than batting average and they are relatively simple as far as advanced baseball statistics are concerned.

One newer statistic that has managed to make it into the mainstream is OPS (Schwarz, 2007), which is the addition of OBP and SLG. Again, on the surface this sounds like an effective statistic as it combines two adequate measures of batting success. However, there are a couple of issues that have been identified in regards to OPS. One issue is that OBP and SLG have two different maximum scores; the best OBP a batter can have is 1.000 while the best possible SLG is 4.000. Relatedly, the two measures have different denominators; for OBP, the denominator is plate appearances while SLG has at bats as the denominator (Grosnick, 2015). A related, and perhaps larger issue in terms of utilizing OPS as an effective measure is that OBP and SLG have different contributions to run scoring. Tango (2007) illustrated that OBP is roughly 1.8 times more important than SLG in terms of run scoring. Therefore, OPS will always give a greater emphasis to SLG than it reasonably should as not only is the maximum SLG higher, but SLG is less important in terms of predicting run scoring. Thus, while a broadcast featuring OPS is certainly an improvement upon one that displays only batting average, they may be doing more harm than good as the information is misleading.

OBP and SLG, however, are just the tip of the sabermetric iceberg in terms of hitting statistics. Many advanced metrics are based on the linear weights system introduced in *the*

Hidden Game of Baseball (Thorn & Palmer, 1984). With linear weights, each outcome for a batter is worth a certain amount of runs. For instance, a single is worth .46 runs, a double is worth .8, a home run is worth 1.4, a caught stealing is worth -.6 runs, and so on. With this in place, a new offensive statistic, weighted on-base average (wOBA), was developed (Tango, Lichtman, & Dolphin, 2006). The impetus for wOBA was that instead of attempting to combine OBP and SLG into one statistic (OPS), wOBA utilizes linear weights to more accurately assess each outcome for a batter. Research and improvement upon existing metrics continued, however, as Tango (2009) developed wRC+. Seeking to account for additional factors surrounding offensive output, wRC+ takes league and ballpark effects into consideration. Specifically, a batter who plays their home games at Coors Field in Denver is likely to have significantly superior offensive numbers compared to the batter who plays at Petco Park in San Diego; wRC+ is able to account for this difference. It is also an effective statistic for comparing different eras in baseball. Significantly more runs were scored in 2000 than in 2014; wRC+ accounts for this, as well. Finally, while wOBA is a percentage, wRC+ is a counting statistic with 100 being league average. A batter with a 110 wRC+ is ten percent better than league average; an 85 wRC+ is fifteen percent worse. Thus, comparisons are easy to make. It should be stressed, however, that formulas for creating these statistics are relatively complicated. While something like wRC+ is easy to explain as a finished product, it may be difficult to mainstream. In 2015, MLB Network first experimented with a broadcast that emphasized advanced statistics. In addition to featuring more advanced metrics, the broadcasters themselves were also some of the MLB Network analysts most likely to emphasize sabermetric principles. Here, instead of featuring RBI in their graphics, they featured OBP and SLG (Weinberg, 2015); even in a game dedicated to advanced metrics, some of the more advanced statistics, such as wOBA and wRC+ were left off of graphics. Thus, it may be up to the broadcasters themselves to ease them in to the minds of viewers.

While offensive statistics typically received the most coverage, pitching statistics were largely ignored for many years. The classic benchmarks for pitching success were wins, losses, earned run average (ERA), and a number of rudimentary counting statistics, such as strikeouts and walks. As early as the mid-1940s, skepticism was growing around the importance of wins and losses (Basco & Davies, 2010). Specifically, whether a pitcher is attributed with a win or loss depends largely on the offense of their own team. A pitcher can, theoretically, receive a win in a game where he allows fifteen runs over five innings, but receive a loss in a game where he allows one run over nine innings. Even so, the record of a pitcher will inevitably be featured in any MLB broadcast or statistics webpage.

ERA, on the other hand, was believed to be an adequate measure of pitching effectiveness up until the mid-1990s. The first major breakthrough in pitching statistics came with the discovery that pitchers have relatively little control over batted balls (McCracken, 2001). Specifically, while pitchers are responsible for strikeouts, walks, and home runs, they are not responsible for hits allowed as no significant difference was found between MLB pitchers in terms of their ability to prevent hits on balls in play. Additionally, high correlations were found for strikeout rates, walk rates, and home run rates from year-to-year for the same pitchers, though, again, a very low correlation was found for hits. Based on this data, McCracken developed a new group of statistics designed to improve upon ERA, entitled defense independent pitching statistics (DIPS). As is the case with many new discoveries, McCracken’s work was initially met with skepticism and criticism (Kenny, 2015). True to scientific form, DIPS was improved upon and simplified shortly thereafter by sabermetrician Tom Tango, who introduced fielding independent pitching (FIP) in the early 2000s (Keri, 2011). FIP removes the impact of defense, luck, errors, and other factors that cannot be controlled by pitchers. Of the host of pitching statistics designed to improve upon ERA, FIP is largely the easiest to digest and therefore has the most potential to break into the mainstream, despite the fact that some believe baseball is now in somewhat of a post-FIP era based on the changes occurring throughout the game (Kenny, 2015).

Some new measures, of course, catch on quickly. The introduction of Statcast packaged a number of easily digestible concepts for viewers by way of catchy graphics and phrases. One of these is exit velocity, which is simply the speed with which the ball leaves the bat. This is something that is easy to understand for fans. Pitch speed has been around for years, and fans know that faster pitches, particularly those in the mid-90s and above, are exciting. Thus, the same is true for exit velocity; balls that are hit harder should result in good outcomes. Once exit velocity is combined with another Statcast measure, launch angle, a sweet spot for predicting home runs now exists. These statistics are discussed in understandable terms with no complex formulas required to figure them out. Therefore, exit velocity and launch angle have become somewhat more welcomed by a significant amount of fans (Kang, 2017). While a multitude of other statistics of varying complexity exist in baseball, such as wins above replacement (WAR) this synopsis was an attempt to overview some of the more prevalent statistics. In addition, this research is particularly timely as there has never before been this much accessible data available and ready to be purposed into new metrics.

Having provided an overview of the current state of baseball statistics and analytics, the focus turns to how they are portrayed and discussed on MLB broadcasts. In particular, how MLB broadcasts use framing (Gitlin, 1980; Goffman, 1974) and agenda setting (McCombs & Shaw,

1972) techniques to either establish the credibility or undermine the usefulness of particular statistics is of interest as it relates to viewers. Both fans and casual viewers of baseball alike can come to learn about the sport through a televised broadcast. For instance, while the average New York Yankees home game, of which there are 81 per year, has an attendance of over 39,000, the average televised Yankees game, 162 per year, is seen by over 285,000 people (Brown, 2017). Even so, the number of reported viewers also fails to take into account those watching via one of the many MLB streaming services available. Thus, the amount watching either on TV, or their laptop, tablet, or smartphone will dwarf the number that attend in person. Also, though the Yankees may be one of the biggest draws, when considering all of MLB, there are up to fifteen televised games per day in thirty different markets. Therefore, in aggregate, millions of people throughout the country are watching baseball on any given night between the months of April to October. Therefore, the televised baseball broadcast becomes the central hub of learning for the majority of baseball fans. This learning can take place not just through obvious means, but also through subtler frames and agendas. Statistics appearing on screen inform the viewer that they are meaningful in some way. A broadcaster that discusses the value of a metric then confirms its importance. Time within a broadcast is finite and valuable, which suggests that anything spoken by a broadcaster was deemed worthy of being included and, therefore, more important in some way than the statistics and stories that were excluded. Indeed, those excluded from broadcasts altogether may never even enter the mind of a viewer, even if the statistic is mathematically more useful in evaluating their favorite players. Similarly, a broadcaster that disparages a statistic tells the viewer that it is unimportant. Thus, this analysis will seek to understand both which statistics are portrayed and/or discussed on team broadcasts and, subsequently, viewers' attitudes towards statistics that both do and do not make air.

The bigger picture issue, then, is how these broadcasts influence viewers' attitudes and beliefs. While baseball statistics are of specific interest here, what is learned from this research can apply to other forms of knowledge acquisition and attitude change. Specifically, the entities studied here are omnipresent in society today: media, information, what to portray, and how to portray it. Baseball, like many other institutions and practices in the world, has a long history of doing things a certain way and valuing certain information. However, science and research seek to improve upon existing practices and information. When new information comes along, the difficulty centers around how people unlearn the old information and adopt what is new, yet demonstrably, improved. This, of course, is not just a baseball fan issue, but a human issue (Kolbert, 2017). Gorman and Gorman (2016) document examples such as false beliefs about vaccines and handguns and how to correct them. However, providing accurate information is ineffective as people will simply discredit it; the conclusion, therefore, is that addressing and reframing incorrect or outdated beliefs is a complex challenge (Gorman & Gorman, 2016). It is possible, therefore, that media may play a role in this reframing. A broadcast will provide information, but the intention is less about persuasion and more about increasing viewers' knowledge. Thus, viewers may not feel as though their beliefs, if they differ, are being threatened; instead, they can add the new information to their repertoire if they choose. What is learned through the study of baseball broadcasts and the response to what is shown by frequent viewers of these broadcasts, i.e., fans, can prove informative in other contexts featuring new information that may run counter to the status quo, yet outdated or disproven, beliefs.

From here, this proposal will first provide information pertaining to the central theoretical frameworks surrounding this research: agenda setting and framing. Subsequently, the bigger picture process of learning and unlearning will be explored, focusing largely on social cognitive theory and its application in mass media. Finally, the literature review will conclude with an overview of sports fans and their identification and desire for information. The method section will conclude the proposal, outlining the two-part study which will feature a content analysis and subsequent survey of fans of select teams. Specifically, the content analysis will assess the local broadcasts of all thirty teams and seek to uncover which teams are more traditional and which teams are more modern in terms of the statistics they portray and discuss. Once the teams are categorized, fans of the teams on each end of the spectrum will be surveyed in an attempt to understand if their beliefs about and attitudes toward statistics align with the teams they watch the most. This combined approach will allow for both an understanding of what teams are displaying, but also the effect these portrayals have on audiences.

CHAPTER TWO: LITERATURE REVIEW

The statistical portrayals featured in televised baseball games can be featured in a number of different ways. For instance, statistics can be shown on the screen by way of a graphic. These graphics, of course, are decided upon and chosen before they reach the screen. Therefore, executives from the local broadcast network or directors decide which statistics viewers should see; indeed, they are setting an agenda (McCombs & Shaw, 1972). If a graphic reaches the screen that displays the amount of home runs a batter has hit against the current pitcher, those in charge of the broadcast decided that is what the viewer should be aware of and thinking about. Additionally, broadcasters then have the choice to discuss either the same on-screen statistics, reference other stats that are not shown visually, or simply not mention any statistics and discuss something else altogether. Within the graphics themselves, certain statistics can be highlighted or perhaps only one can be displayed, suggesting it is particularly important. With this in mind, framing (Goffman, 1974) plays a role in the portrayal and discussion of statistics during broadcasts. Specifically, certain statistics can be favored over others in ways that are not always obvious to the viewer by way of framing (Tankard, 2001). Perhaps the most important point of consideration here is that not all broadcasts will show or discuss the same statistics in the same ways. Thus, both the agenda-setting and framing decisions within a broadcast can have an effect on viewers of a given broadcast; this is particularly true for fans that watch numerous games a year, as MLB teams play 162 per season. While there are disagreements about the distinction between agenda setting and framing, utilizing both is not uncommon. In particular, while they are different, they operate in complementary domains, thus indicating that there is validity to converging agenda setting and framing in this manner (McCombs & Ghanem, 2001). Thus, this two-pronged, media-based theoretical approach will attempt to account for and assess the different methods of statistical portrayals and discussion within broadcasts. However, learning theories also play a role in this research as knowledge acquisition by way of media can occur in different ways. First, however, the media-centered theories of agenda setting and framing will be discussed in depth.

Media Theories

Agenda Setting. The central premise of agenda setting is that the media does not tell us what to think, but instead tells us what to think about (Cohen, 1963). Agenda setting was initially developed to understand how much power the mass media has in influencing consumers of political news through both newspaper and television (McCombs & Shaw, 1972). In the 45 years since its development, agenda setting has persisted and continues to be one of the preeminent communication theories (Bryant & Miron, 2004; Chung, Barnett, Kim, & Lackaff, 2013). Initial research found that the issues focused on by the media were the ones that were considered to be the most important by consumers; this, in turn, is one of the basic assumptions of agenda setting. The other major assumption of agenda setting is that the press and the media do not necessarily reflect reality, but instead they filter and shape reality, thus making it seamlessly feel like the actual world in which we live. Of course, the entities doing the filtering and shaping of reality, and their reasons for it, vary.

In terms of how agenda setting works, Iyengar (1990) suggests the idea of accessibility. Mass media functions in such a way that the information provided becomes more accessible, or retrievable, from memory. A consumer, particularly one that consumes a lot of media, has an easier time recalling issues or talking points that are discussed more frequently. Another related variable that influences the impact of the media agenda is need for orientation (Weaver, 1977). Need for orientation refers to the relevance of a given topic to an individual and their uncertainty with said topic. When relevance and uncertainty are both high, individuals have a high need for orientation, thus suggesting that they will be more likely to think about the media agenda. When relevance is low, however, this is not the case as the topic is therefore unimportant to the consumer. The importance of need for orientation is that it offers an example of how individual differences can influence viewers. If no differences existed between viewers, then anything encountered through the media would influence everyone in the same way.

The development of agenda setting saw the addition of second-level, or attribute, agenda setting (Ghanem, 1997; McCombs, Llamas, Lopez-Escobar, & Rey, 1997). While first-level agenda setting initially demonstrated that the media tells viewers what to think about, second-level agenda setting explains that the media can also inform viewers how to think about it (McCombs, 2005). Ghanem (1997) explains that while second-level agenda setting does indeed involve the media informing viewers how to think about an object, it also maintains the initial first-level effects of increased salience. Relatedly, the more something is featured in the media, the more likely receivers are to have stronger, more opinionated feelings toward that which is frequently discussed (Kiousis, 2000; Kiousis & McCombs, 2004; McCombs et al., 1997; Weaver, 1991). Attribute agenda setting has garnered comparisons to framing, with some believing that they are one in the same. For instance, McCombs, Shaw, and Weaver (1997), important figures in the history and development of agenda setting, see framing as not only related to, but as an extension of agenda setting. Scheufele (1999; 2000), however, argues that agenda setting and framing differ as they have different theoretical foundations: salience for agenda setting and attribution for framing. As suggested previously, this research is conceptualizing the two theories as, at the very least, distinct processes; however, merging the two theories of this way is not unsubstantiated (McCombs & Ghanem, 2001). The agenda is set when statistics are displayed on screen, and those are then framed by the broadcasters.

While the bulk of agenda setting research has pertained to politics, the theory has also been applied and tested in sports contexts. Perhaps most notably, agenda setting has been applied to Olympic coverage on a number of occasions (Billings, Angelini, & MacArthur, 2017). Of course, the Olympics are ripe for applying a theory pertaining to media portrayals as the Games are always "the biggest show on television" (Billings, 2008, p. 1). Indeed, the NBC primetime Olympic broadcast typically achieves audiences that are greater than the other three major networks, CBS, ABC, and FOX, combined (Billings, Angelini, MacArthur, Bissell, & Smith, 2014). Evidence of an agenda was found in the 2008 Summer Olympics which gave more than 90% of its primetime coverage to just five sports (Angelini & Billings, 2010). In addition, American athletes have been found to receive the most coverage during primetime broadcasts, even if their medal count suggests the spotlight should be shining elsewhere (Angelini, Billings, & MacArthur, 2012). Sporting events like the Olympics or the Super Bowl offer prime opportunities to influence audiences as they receive more viewers than nearly any other televised programming. A single MLB game is broadcast to a smaller audience, but with a 162 game season, the aggregate audience is sizeable; influence in this context therefore occurs through repeated exposure.

Agenda setting has also been applied to American sports leagues. Fortunato (2001) explained that the National Basketball Association (NBA) utilized the tenets of agenda setting to build their popularity through strategic positioning of the best teams and players. Through interviews and replays, they also managed to increase second-level effects (Fortunato, 2001). Fortunato (2008) also found evidence of the National Football League (NFL) setting the agenda based on the time and date certain games were shown. Essentially, the NFL would schedule the most enticing matchups, those with the perceived best teams and the best players, to take place in the primetime TV slots. Logically, the NFL strategically schedules those teams and players which will receive the highest viewership. Additional evidence of market-based agenda setting was provided by Saks and Yanity (2016). Content analysis yielded an agenda working against the National Hockey League (NHL) on ESPN's *SportsCenter*. The lack of NHL coverage on the flagship ESPN highlight show was suggested to be the result of ESPN owning the rights to cover MLB, the NFL, and the NBA, but not the NHL (Saks & Yanity, 2016). Therefore, by limiting the amount of NHL exposure on their network, ESPN was setting an agenda; they were communicating to fans that certain sports, other than hockey, are more important to discuss or highlight.

While not suggesting a locally broadcast MLB game can garner the same amount of viewership as something like the Olympics, what has been found in past research can apply to a baseball context. For instance, the amount of coverage given to certain sports in Olympic broadcasts may mirror the amount of coverage given to certain stats in MLB games. Certain statistics have long controlled the landscape of baseball, particularly on television. Typically, as a game is about to begin, broadcasts typically show the batting order, which features player names, positions, and, inevitably, batting averages for each player. The choice of batting average instead of a more statistically meaningful metric, like OBP, is in itself an agenda. Indeed, this still occurs even in an era where batting average means less than it ever has before in terms of illuminating successful batters (Watt, 2018). Viewers, though, may then default to batting average as a meaningful statistic due to the accessibility; it is shown with such great frequency that its salience may lead one to believe it is also informative. Of course, while professional baseball organizations are aware that OBP is superior to batting average, baseball is also a sport rooted in tradition, perhaps more than any other sport (Butterworth, 2010). At this point, batting average has been covered and propagated since well before the days of statistics on broadcasts. Therefore, to alter that tradition at this point would be out of character for baseball.

Those in charge of the various local MLB broadcasts will set a statistical agenda, though they may be doing so outside of their own awareness. However, these agendas have a chance to influence the schema viewers have about statistics. In particular, the graphics that are shown countless times throughout a baseball game alter what viewers think about in terms of their favorite players. However, in combination with agenda setting, how statistics are framed also has a chance to influence viewers. The discussion now turns to framing, how it can occur in a MLB broadcast, and the effects it may have.

Framing. While agenda setting is focused largely on the accessibility of a concept in the minds of viewers, framing is instead about the characterization of a concept and how it influences the way viewers think about and understand said concept (Scheufele & Tewksbury, 2007). Hackett (1984) suggests that framing can be used to look at ideology, as opposed to bias, in media coverage. In terms of baseball broadcasts, this is an important distinction. It is likely that every baseball broadcast will show the foundational statistics, those being batting average, home runs, and the win-loss record of a pitcher. However, certain broadcasts may feature some of the newer or more advanced statistics, such as OBP, SLG, and strikeouts per nine innings. Inevitably, even a broadcast that portrays more advanced statistics will also portray the traditional numbers. Thus, ideology comes into play. By virtue of showing advanced stats in addition to traditional stats, these broadcasts are suggesting a different ideology than those featuring solely the baseball staples. This sort of framing can also have potentially significant effects on viewers, as well; Tankard (2001) suggests that viewers may not even realize it, either. Much of this misperception stems from the third-person effect, whereby individuals believe others are more affected by mass media messages than they themselves are (Davison, 1983). Thus, those in question may not feel the effects, though they are still being influenced.

Initially introduced by Goffman (1974), framing has become one of the more commonly utilized and tested theories in communication research (Bryant & Miron, 2004; Chung et al., 2013; Weaver, 2007). Despite its prevalence, some argue that framing is still an ambiguous concept (Matthes & Kohring, 2008; Schuefele, 1999). Thus, some clarification is needed as to the different perspectives on framing. Gitlin (1980) was the first to bring the idea of framing to mass communication when he discussed how the emphasizing of certain aspects of an issue in news coverage can influence public opinion. Gitlin (1980) is also credited with the idea of "selection, emphasis, and exclusion" (p. 7) to help describe framing, whereby the focus is on what exists, what matters, and what is left out altogether despite the fact that it could have been included. Tankard, Hendrickson, Silberman, Bliss, and Ghanem (1991) then built on this idea, adding elaboration to their definition of framing. Tankard (2001) additionally clarified that framing research is concerned with how an issue is portrayed in the news, not which issues are covered, as is the case with agenda setting. Offering another view is Entman (1993) who emphasized that selection and salience are the important framing methods used by the media. In particular, media portrayals see the selection of certain features which, subsequently, makes them more salient in the minds of viewers (Entman, 1993); with this approach, exclusion is less clear as it would require insight regarding what the media knows and considered including, yet instead decided to leave off of the broadcast.

The idea of framing as selection, emphasis, exclusion, and even elaboration (Gitlin, 1980; Tankard et al., 2001) is relevant to the discussion of statistical portrayals on baseball broadcasts. For the televised graphics, the gatekeepers behind the scenes select which statistics to show and which to exclude. Emphasis comes into play when, within the graphics, certain statistics may be bolded or larger than the others. Elaboration can take place as well, such as when another graphic goes further into detail surrounding a given statistic; a potential example of this would see a hitter's overall batting average shown on screen followed shortly thereafter by the same hitter's batting average over the past week. Thus, batting average is elaborated upon for this particular hitter by providing additional information to the viewer; it is also selected again and emphasized further, all while other statistics were excluded for this deeper look.

The same selection, emphasis, exclusion, and elaboration process can occur with broadcasters, as well. When statistics appear on screen, broadcasters, either through producers in their headset or on their own accord, can decide to select certain statistics to talk about all while excluding others. They can also select statistics not shown on screen at all and discuss those to provide additional information to the audience. Additionally, while the discussion of on-screen statistics can be a simple repeat of what is shown (e.g. "he has 39 home runs"), it can also be a form of emphasis (e.g. "he has 39 home runs on the season, a new team record for the Major League leader this season"). While the first example simply repeats the on-screen information, the second example emphasizes the magnitude of the amount of home runs that player has hit. Elaboration, then, can occur when a broadcaster provides additional information about what exactly a statistic is measuring. While the majority of baseball viewers will know what a home run is, they may not know about slugging percentage. Thus, should slugging percentage be shown on screen, a broadcaster can elaborate on what it means by explaining that it weights a double more than a single, a triple more than a double, and a home run more than a triple.

Of course, with a televised sporting event, the on-screen content has a heightened importance, as viewers have the choice to listen to the broadcasters or not. Indeed, the amount of control that viewers have over their desired sports content today is at an all-time high (Gantz & Lewis, 2014). For instance, games can be muted, radio announcers can be listened to instead, or, with the MLB.TV streaming service, fans can listen to the sounds of the ballpark and the game without hearing any commentary if they so desire. Herein again lies the distinction between what is shown on the broadcast, what the commentators discuss, and how it is discussed. Some viewers may both see and hear what is happening. Others may only be watching, and not listening, while others may only be listening, and not watching. Therefore, both the visual and verbal acts of selection, emphasis, exclusion, and elaboration can play an important role in the framing of statistics during a MLB broadcast; the discussion then becomes about how are different types of statistics are framed. Those that are selected, emphasized, and even elaborated upon will be more salient in the minds of viewers while those that are excluded will fall out of awareness.

Frames also assist in the organization of facts, which then take on meaning through their being embedded in a larger, overarching system (Gamson, Croteau, Hoynes, & Sasson, 1992). This in particular relates back to the baseball context in this study. Specifically, the larger system here is the existing, prototypical baseball broadcast. The facts being organized in this example, then, are the statistics shown throughout the game. In some games, the organized facts are those traditional numbers by themselves. In other games, however, the traditional numbers will be organized along with more advanced statistics. The subtle framing changes the interpretation of viewers as they evaluate and learn about their favorite players and teams. Indeed, the importance of that specific reality is elevated through their portrayal (Entman, 1993), even alongside traditional statistics.

Framing need not always be a clear and obvious deviation from the norm, as even subtle changes in a presentation are enough to alter the perception of a viewer (Iyengar, 1991). Regarding the norm, the fact that certain baseball statistics are considered “normal” is itself an example of framing in action. Consider the definition offer by Reese (2001): “Frames are organizing principles that are socially shared and persistent over time, that work symbolically to meaningfully structure the social world” (p. 11). The most pertinent aspect of this definition as it relates to baseball revolves around the idea that the well-known statistics in baseball have indeed been socially shared and persistent over time. Indeed, classic counting statistics like home runs, RBIs, and strikeouts as well as a percentage stat like batting average have existed in the game of baseball since its inception. These stats have always been easily found on the back of a baseball card or in a baseball telecast. Thus, they have certainly been socially shared and persistent.

Newer and more advanced statistics, however, have not yet broken through to the mainstream of televised baseball. However, the logic of framing suggests that, should a breakthrough of this nature occur, they can continue to be socially shared and persistent. Importantly, they can also become more salient in the minds of viewers (Entman, 1993). The increase in sharing, persistence, and salience that comes with framing also illustrates that the process is different from that of persuasion. As Carter (2013) suggests, while the goal of persuasion is to change the stance of an individual by way of new information, framing instead attempts to redefine opinions or perceptions by activating existing information. In terms of baseball, it is likely that fans are already aware of these statistics, even if they do not necessarily understand their underlying processes. Through the use of framing, viewers can theoretically come to realize the efficacy of these statistics, particularly when combined with, or instead of, the more salient traditional numbers.

Framing has found its way into sports research, as well. The first foray into framing within sports broadcast commentary saw an analysis of the effect broadcasters can have in terms of dramatizing the game (Bryant, Comisky, & Zillmann, 1977), making it appear more violent (Comisky, Bryant, & Zillmann, 1977), and increasing enjoyment by increasing the perceived rivalry in a competition (Bryant, Brown, Comisky, & Zillmann, 1982). Indeed, in both respects, the way broadcasters frame the contest influences audiences' perceptions of those emphasized characteristics of play. Sullivan (1991) saw similar results as manipulated commentary was able to not only make a game seem aggressive, but also make a dominated basketball team appear dominant. These principles hold today, as well, as broadcasters have been found to produce greater emotional response in viewers, thus increasing their involvement and enjoyment (Frederick, Lim, Chung, & Clavio, 2013). Research has also found that experimentally manipulating crowd noise influenced the perception of an event, as well, with an increase in crowd noise creating a perception that the competition was more exciting (Cummins & Gong, 2017).

Perhaps interestingly, there has been little research to this point featuring the intersection of framing and baseball. One case of note discusses the different types of frames used by both MLB and baseball writers to discuss the inaugural World Baseball Classic (TePoel, 2013). Here, it was found that while Bud Selig, the MLB commissioner at the time, spoke in overwhelmingly positive terms about the meaning and impact of the World Baseball Classic, the majority of baseball writers felt differently, voicing instead all of the concerns and shortcomings of the competition. In terms of the players themselves, Eagleman (2011) content analyzed the ways in which magazine articles framed MLB players and how the frames differed based on player ethnicity. For instance, over 75 percent of the articles about White players were framed around working hard to achieve their success; the same was found for Latin American players born in the United States. Black players, on the other hand, were not discussed as working hard necessarily, but as having to overcome obstacles or prove themselves to the public; the same was true for Hispanic players born outside of the U.S. (Eagleman, 2011).

The removal of baseball and softball from the Olympics was also assessed in terms of frames. In particular, the U.S. women's softball team was framed as being too dominant whereas the U.S. men's baseball was framed as not being dominant enough. Thus, the suggestion is that dominance is somewhat contradictory as it is desired from men, but is unbecoming for women (Smith, 2014). Olympic research has also found that the primetime broadcast is typically framed around a select few sports that are not necessarily representative of all Olympic sports (Angelini & Billings, 2010; Billings & Angelini, 2007). Billings (2008) uncovered that, while both men and women Olympians receive comments about their physical appearance, women athletes receive double the amounts of comments in this realm than men. Thus, the emphasis on appearance is more likely to be directed toward women, making this frame more salient in the minds of viewers and offering a good example of how emphasis can play a role in sports broadcasting. Framing of this nature has also been found in basketball, as the frames utilized for the winning team were different from those used for the losing team (Scott, Hill, & Zakus, 2014).

These differences found in past sports broadcasts provide useful information as it pertains to the study at hand. Commentary will again be a focus, but here the commentary about athletes is less important than the commentary about the statistics used to describe those players. MLB is comprised of 30 teams, each of whom have their own local broadcasting teams and graphical portrayals. Thus, these teams will likely have some degree of variance in their broadcasts, if not through the types of graphics displayed then certainly in terms of commentary. Additionally, when a team travels to another city, their broadcast team comes with them; thus, each game has, essentially, a home and away broadcast feed each with their own production. Thus, the feel of the game will vary somewhat based on which broadcast is viewed. Indeed, these local broadcasts also can act as a reflection of the organization itself. The Houston Astros are known to be one of the more analytically-inclined teams in baseball, relying heavily on advanced statistics to draft and evaluate players and make in-game decisions. Taking it one step further, the Astros have openly admitted to including more advanced statistics in their broadcasts (Barron, 2017). Their objective in doing so is not to eliminate old statistics entirely, but mix in new statistics to complement the old, allowing room for all types of viewers. Of course, the Astros are also aware that traditional metrics are not only still meaningful, but that they become more meaningful when combined with advanced measures which help paint a more complete picture. Thus, the Astros are attempting to reframe their broadcasts by way of a gradual increase in the prominence of these newer statistics in conjunction with traditional measures.

Indeed, media personnel also feel that framing sabermetrics by way of language is important. Brian Kenny (2016), MLB Network host and proponent for analytics in sports media, discusses that the way to reach viewers with advanced statistics is to, essentially, speak the language of the mainstream, casual fan (Weinberg, 2015). In this way, fans are less likely to be overwhelmed with information that they may not be familiar with. These sentiments are echoed by Mike Petriello of MLB Advanced Media who has been at the forefront of incorporating

Statcast and analytics into MLB broadcasts. Specifically, Petriello suggests that, when discussing advanced statistics, it is important to realize that not all viewers will understand them; therefore, it is more useful to explain certain statistics sporadically throughout a given year, yet not every time they are featured (Weinberg, 2016). In this way, fans can grow familiar with what a statistic is attempting to explain and, as it is featured more, it becomes normalized in their statistical vocabularies. However, there certainly exist a number of fans who understand what is being measured, exit velocity being a prime example, but may not want to see it on a broadcast; this sort of complication may also not be desired, as some fans do not necessarily watch for information, but for the aesthetic appeal of the game instead (Raney, 2006).

It is likely that other teams are attempting to do what the Astros are doing with their broadcasts. Indeed, the Houston Astros even parlayed their organizational emphasis on analytics into a World Series victory in 2017. However, a team on the opposite end of the analytic spectrum, the Kansas City Royals, also found success in the recent past, winning the World Series in 2015. While every MLB team has some form of analytics department, some are more developed than others (Paul, 2017) and, therefore, some teams are more analytically-driven than others. Indeed, when the Royals won the World Series, they were lauded by some for being the “anti-Moneyball” team, finding success through old-school baseball principles (Judge, 2015). It is likely that their broadcasts reflect their organizational philosophy.

What the difference in analytical opinion in baseball suggests is that there is some anticipated variance in broadcast portrayals in either the form of graphics and/or commentary. Agenda setting and framing jointly tell a story of MLB broadcasts, the decisions made, and the effects of those decisions on viewers. With a sport like baseball, which features a substantial amount of games per season and, therefore, viewers of those games by way of one form of media or another, there is significant potential for the set agendas and frames to influence viewers. Thus, this study seeks to answer and test the following hypotheses and research question based on the tenets of agenda setting and framing:

H_1: Local MLB broadcasts will differ in the agendas they set by way of their graphical portrayals of statistics.

H_2: Local MLB broadcasts will differ in their framing of statistics by way of commentary.

H_3: A positive relationship exists between the amount of advanced statistics featured on a local MLB broadcast and fans' awareness of advanced statistics.

H_4: A positive relationship exists between the amount of advanced statistics featured on a local MLB broadcast and fans' knowledge of advanced statistics.

RQ_1: Through both graphical portrayals and commentary, which teams will place more emphasis on traditional statistics and which will place more emphasis on advanced statistics?

Learning Theories

Having discussed agenda setting and framing, the theories which largely pertain to media content, the discussion now turns to theories that are more focused on how individuals learn. Indeed, at its core, this research is largely focused on knowledge acquisition by way of media. While this study uses a baseball context to assess knowledge acquisition, sports provide a particularly strong venue for such a study. For instance, sports have been suggested to be the primary avenue through which Americans consume information, specifically statistical information that, in any other context, would seem complicated (Otto, Metz, & Ensmenger, 2011). Indeed, watching a sporting contest on television imbues individuals with some of the most sophisticated forms of information management today. At a more granular level, the interest here is in how new knowledge comes to replace old knowledge that attempted to explain the same thing. For instance, how a baseball fan can change their schema surrounding a productive hitter; for decades, batting average was known to be one of the most important statistics when attempting to evaluate a hitter. However, thanks in part to a number of sabermetricians and a book, *Moneyball* (Lewis, 2003), that achieved mainstream attention, particularly with its release as a motion picture, a subset of the baseball world is aware that there are countless measures more important than batting average in terms of player evaluation. MLB teams have now, with varying degrees of acceptance, adopted sabermetric principles into their player evaluation schemas. Fans, for the most part, have been more resistant to change. When Felix Hernandez won the 2010 American League Cy Young award, granted to the best pitcher in each league, he had a win-loss record of 13-12; much of the baseball community was unsettled by the fact that he beat out another pitcher, David Price, with a 19-6 record (Kepner, 2010). The same happening again in 2018 as Jacob deGrom won the National League Cy Young despite having very few wins, but exceptional underlying statistics, all while Aaron Nola and Max Scherzer both had significantly more wins. Whether fans have grown more accepting over the past eight years is uncertain, but most MLB teams are and have been aware that advanced metrics, more often than not, lead to successful outcomes.

The first of the more advanced metrics to catch on, based largely on the attention it received in *Moneyball*, was OBP, though there are many metrics that are far more advanced as of now. Even so, a baseball fan replacing batting average with OBP in terms of player evaluation would represent a critical advance in their statistical and baseball knowledge. However, the process of unlearning batting average and then replacing it with OBP is crucial, though, potentially, exceedingly difficult when batting average has been pushed on MLB broadcasts for decades.

Social Cognitive Theory. Therefore, the discussion turns to learning and unlearning. Thus, it is important to consider social cognitive theory (Bandura, 1986). Initially developed to explain that social leaning largely occurs by way of modeling the behavior of those in the immediate environment, social cognitive theory was later applied to mass media (Bandura, 2001). Here, it was suggested that mass media has a direct impact on how people learn about human values, behavior, and ways of thinking. Through modeling the actions of proximal individuals, one can only learn so much.

In the mediated world in which people exist today, a great deal of modeling and learning take place by way of mass media. Individuals act on their images of reality, many of which are presented through media. Television, specifically, has been found to be particularly prescient, as per the tenets of cultivation theory. Gerbner and Gross (1976) postulate that television is the central cultural arm of society in the United States and that it serves to maintain and spread certain beliefs and behaviors in viewers; it is, indeed, a medium of socialization. Through various research methods, television has been found to influence viewers' beliefs (see Bandura, 2009); this is particularly true for heavy viewers of television. Therefore, the identified fan that views large amounts of televised baseball will be more likely to have their beliefs about the efficacy of certain statistics dependent upon their viewing behaviors. Of course, with 30 teams playing 162 games each, there is a lot of baseball to be viewed for fans.

Bandura (2006) also assessed the relationship between social cognitive theory and diffusion of innovations (Rogers, 1962). Specifically, the processes through which new information is diffused typically include acquiring knowledge about the innovation, adopting the innovation and putting it into practice, and social networks through which the innovation is spread. Of course, the rate of adoption at first is typically slow due to unfamiliarity, resistance to change, and the uncertainty surrounding potential results. The same was largely true for baseball teams. *Moneyball* (Lewis, 2003) documents how the Oakland Athletics were driven to try something new due to their inability to compete financially with big market teams that would be able to spend the money needed to reel in the best players in free agency. Thus, the Oakland front office was motivated to find market inefficiencies in order to compete with big market teams. Despite being uncertain of the outcome, the Athletics took a chance on an analytical approach to scouting players and found that the players they discovered were as effective, yet significantly cheaper, than those getting paid in free agency. However, once the effectiveness of these players was realized, they began to receive more money from teams with higher payrolls. Finally, as is typically the case with innovations, fifteen years later a significant amount of laggards (Rogers, 1962) continue to exist as some teams are still resistant to the analytical approach.

Innovations are also subject to gaps between each stage in the process. The largest of which typically occurs between the early adopters and the early majority. Indeed, Moore (1999) considers this substantial gap a "chasm" as many ventures fail to make it across. In baseball, the Athletics played the role of innovator, as they felt they needed to change in order to survive in an environment where they were at a monetary disadvantage. Once the effectiveness of the methods used by Oakland were established, teams like the Yankees and Red Sox followed shortly thereafter, making up some of the early adopters. The chasm here was prominent due to teams like the Phillies, Orioles, and Royals, who operated with a more classic approach to baseball, still achieving success in the years after *Moneyball*. However, over the past five years, the rapid downfall of some of these teams – the Phillies and Royals, in particular – coincided with the success of sabermetric dream teams like the Cubs and Astros. Indeed, the current 2018 season saw some of the latest adopters commit to changing their approach to player development, perhaps ushering in a new era.

The same sort of diffusion of innovations approach can be found with baseball fans themselves. There are a number of fans who were early adopters of the analytics movement. It is possible that fans of the Athletics were some of the first to accept analytics based on the success Oakland had in light of their adoption of sabermetrics. In addition, fantasy baseball players also likely adopted sabermetrics in an attempt to succeed or gain a competitive advantage (Billings & Ruihley, 2013). Early participants in fantasy baseball leagues likely realized just how fickle statistics like wins, saves, and RBIs were and, thus, conducted their own research to improve their chances and more accurately assess players. Indeed, when Voros McCracken (2001) discovered the revolutionary finding that pitchers have little control over batted balls, he was conducting research mainly to improve his own fantasy baseball team (Lewis, 2003).

However, the casual fan likely has little reason to adopt a new statistical framework. Not only can the information be difficult to interpret and somewhat hard to find, but the need for adopting an innovation may be low. Indeed, while the chasm appears to have already been bridged for MLB organizations, the same does not appear to be the case for baseball fans. While getting on base may be the most fundamental tenet of hitting, some fans still underappreciate its importance (Leitch, 2017). However, this chasm may remain because, while their favorite team may be changing its identity, the change may not be communicated to fans all that effectively.

Identified fans, however, desire information (Gantz, 1981). Therefore, these identified fans may be more receptive to new statistics when delivered in an optimal fashion. While it is difficult to say what the best vehicle for statistical delivery may be, it is possible that local broadcasts provide the best opportunity. A baseball fan that wants to learn more about analytics may attempt to visit a website like “Fangraphs,” which provides a glossary of various statistics. However, reading about the inner workings and formulas that make up a statistic like wRC+ may confuse more than assist an uninformed reader. Therefore, it may be up to broadcasts and announcers to provide graphics and commentary which facilitates the understanding of some of these advanced statistics and both their benefits and shortcomings.

However, Bandura (1986) discusses how modeling influences can impede or promote the diffusion process. The modeling influences in this case are, of course, the broadcasters themselves. Should a commentator endorse and embrace a new metric, viewers may be more inclined to accept it into their schema. On the other hand, a commentator that scoffs at new information, which they themselves may not have accepted, will influence viewers in a different way. In some ways, with broadcasters acting as the collective voice of a given team, they act as models and provide an opinion to rely on for identified fans of that team. In this way, not only can positive or negative reactions to statistics influence audiences, but indifferent announcers will also have an effect, perhaps resulting in fans feeling the metrics are unimportant (Bandura, 2009). Indifference may be most vividly communicated in a baseball context by a broadcast team offering no comment when a graphic is shown featuring new statistics. It is important to note that the process likely is not quite so linear. Broadcasters may discuss how a team is adopting a philosophy grounded in advanced statistics, but team success or failure will also play a role in how fans react. Prior to the 2018 season, the Philadelphia Phillies hired a new manager, Gabe Kapler, who is a proponent of sabermetric principles. A drastic change from previous Phillies teams, his hiring was met with mixed fan reviews and, after the first week of the season, many were calling for his release based on poor results (Heifetz, 2018). However, as the team improved throughout the season, even reaching first place as late as July for the first time since 2011. With this came an increase in both fans' acceptance of Kapler and television ratings (Blumenthal, 2018). Thus, the importance of team success, or lack thereof, is important to consider.

Thus, the road to unlearning previously accepted information is complicated. Baseball fans have largely grown up with statistics, but typically only a few statistics that have since started to fall by the wayside in terms of their efficacy. Batting average, RBI, ERA, and wins and losses for pitchers are all outdated in terms of what they explain, but still prescient in the minds of a large subset of fans. Of course, it is not being suggested that high home run and RBI totals or batting averages are bad. Instead, these traditional metrics are simply incomplete measures of batting success; a .300 hitter one year may be a .250 hitter the next based little on his own skill. Moving a player with 100 RBI one year from fourth in the lineup to first in the lineup in the next year will likely result in lower RBI totals. However, a batter who earns a lot of walks in one year is likely to earn a lot of walks the next year, as well.

Even so, the adoption of new statistics by both fans and MLB broadcasts has been slow for the most part. It seems, however, that through the pathways of social cognitive theory, cultivation theory, and diffusion of innovations, advanced statistics can gain a level of acceptance from fans. These theories combine and interact in such a way that helps explain how the knowledge acquisition process takes place, specifically in a mediated context. Specifically, broadcasts have a chance to help identified fans accept advanced statistics if they regularly feature them, explain them in understandable terms, and speak of them positively. In this case, fans will simply add to their statistical knowledge; while they may still look to batting average or

ERA, they will do so knowing those statistics do not tell the whole story and they will now have alternatives to turn to for more information. Broadcasts that fail to feature advanced stats at all or, when they do, speak ill of them, will likely breed fans that feel the same way and thus rely on the traditional numbers they already know and understand.

In an attempt to establish the theoretical grounding for this research, both the content-based and learning-centered theories and their respective connections to media have been discussed. The agenda setting and framing that takes place on MLB broadcasts is important, and the pathways to learning are necessary to understand, but it is also essential to understand the specific group that is being targeted: sports fans. The presumed effects can be speculated upon, but understand and tapping into the respective fan bases of teams that either emphasize or ignore advanced statistics will allow for the questions at hand to be answered. As the following section will explain, fans are a unique complex group.

Fanship

There is a longstanding segment of literature dedicated to understanding nearly all aspects of sports fans. Of all the factors that distinguish sports fans, one thing is certain: sports fans, particularly in terms of viewing behaviors, are indeed a unique group (Gantz, 1981; Gantz & Wenner, 1995), even when compared to fans of other genres (Gantz, Wang, Paul, & Potter, 2006). It is also worth noting the difference between the concepts of fandom and fanship. Fandom refers to the social identification one feels with a team and other fans of that team; it is the group membership and the feelings that come with it that make up fandom (Reysen & Branscombe, 2010; Tajfel, 1978). Fanship, on the other hand, is related more to an individual identification and connection one feels with a team (Reysen & Branscombe, 2010; Wann, 1997). This dissertation is focused more on the concept of fanship as an individual’s team identification.

In addition, the effect it has on their statistical knowledge, by way of consuming the broadcast of their favorite team, is of keen interest.

One of the unique aspects of sports fans is their desire for information and learning (Gantz, 1981); Raney (2006) considered these cognitive motivations for consuming sports on television as one of the three distinguishing needs for sports fans met by mediated sport consumption, along with emotional and social needs. Indeed, Gau and James (2013) consider the knowledge acquired through watching sports as one of the central reasons for sport spectatorship. One of the methods used by sports fans to acquire the information they desire is not just through watching the competition, but also through pre- and post-viewing behaviors (Gantz et al., 2006; Gantz & Wenner, 1995). In particular, the pre- and post-viewing are largely research endeavors, seeking information about the players and teams involved. Thus, the effect of being a sports fan continues after a competition ends and before another begins. Herein lies a central benefit of the internet for sports fans, as well. Real (2006) suggested that the internet is something of an ideal medium for a typical sports fan as it provides a wealth of content the likes of which was never seen previously in terms of information and media. Indeed, one of the main motivations for online sport consumption is the ability to acquire largely any sports information imaginable (Hur, Ko, & Valacich, 2007).

Of course, a prime example of how sports differ from other genres of television are the statistics involved with sports, and baseball in particular (Schwarz, 2004). Indeed, the love affair between baseball and statistics dates back to 1886, when *Sporting News* published a collection of baseball statistics, entitled the *Official Baseball Register* (Otto, Metz, & Ensmenger, 2011). Statistics provide another avenue for sports fans to meet their cognitive needs as they attempt to evaluate players and engage in discussions with other sports fans (Melnick, 1993). These discussions can, at times, be framed as disagreements, but there is still a social aspect that is somewhat particular and often desired by sports fans (Karp & Yoels, 1990; Raney, 2006); it is through watching televised sports that fans receive training, of sorts, for these discussions, as the commentary and graphics provide information. In particular, they provide sports fans with a framework for which information is important. It is even more likely, then, that fans of the same team who frequently watch the same broadcasts (i.e., the local broadcast of their favorite team) will develop similar frameworks. Thus, if the Cincinnati Reds broadcast continually suggests that Joey Votto walks too much and does not provide clutch hits, Reds fans may come to see that as fact.

In addition, fans today are not quite as limited geographically as they once were. Roughly twenty years ago, the aforementioned Reds fan would have only been able to watch their team play either in person through attending a game, by watching the local broadcast of the game, or by watching a nationally broadcast Reds game on a major network. Given that the Reds likely are not a team to be featured nationally (Family, 2015), if a Reds fan lived outside of the boundaries of the local broadcast network, they would be largely unable to see their team play. Today, however, with a host of out-of-market streaming services available for a baseball fan, Reds fans from around the country are able to watch the local broadcast for the Cincinnati Reds, complete with the team's television (or radio, if preferred) broadcasters. The same is true for fans of any MLB team as well as fans of other sports. Indeed, even fifteen years ago, 55 percent of MLB fans identified as fans of a team that played in a different city from their own (Walker, 2003). Real (2006) referred to the ability of geographically dispersed fans to follow teams from all over the world as the "death of distance" (p. 191). Indeed, the increase in content and accessibility has helped fans maintain their identification for teams that may be geographically distant (Collins, Heere, Shapiro, Ridinger, & Wear, 2016). The point here is that the sports television, and internet, landscape of today has transformed what it means to be a fan. In particular, the internet has allowed a subset of fans to buck the traditional couch potato narrative typically surrounding sports fans. Instead, fans can use the internet to consume additional information about sports or even create their own (Otto, Metz, & Ensmenger, 2011).

As referenced previously about sports fans, they have a desire for content and information. Previously, these needs were met by pre- and post-viewing behaviors (Gantz & Wenner, 1995). However, the mediated sports landscape was certainly different in the early nineties than it is in 2018. Today, as is the case with other forms of news, there is a 24-hour sports media news cycle (Billings, Butterworth, & Turman, 2017; Gantz & Lewis, 2014). Any thoughts of sports fandom reaching a sort of critical mass due to the amount of content have not yet come to fruition, however. In fact, the opposite has happened as sports fans today are more invested than ever before. Indeed, fans are both spending more money on sports content and are constantly consuming content across a number of mediums as both viewership and spectatorship continue to grow (Billings, Butterworth, & Turman, 2017). Given the proliferation of content today, the question may not be as much about fans ability to acquire information about players as it is about from where they want the information to originate Specifically, knowing that an enormous, and still growing, amount of sports team and player information is available online, whether or not fans want this sort of information on televised broadcasts is uncertain. However, given fans' desire for information, it would seem that an increase in statistics on a MLB broadcast would be something that fans want.

However, information within sports broadcasts has been on the rise for a number of years at this point (Hahn, VanDyke, & Cummins, 2018). In baseball, perhaps the most recent major addition was that of a strike zone superimposed over home plate, which first debuted on ESPN in 2015 and has since made its way to other national and local broadcasts, as well (O'Connell, 2015). Of course, baseball broadcasts feature a number of other pieces of information throughout a game. Score bugs today typically feature not just the score, but the current inning, number of outs, whether anyone is on base, pitch velocity, and number of pitches thrown for the current pitcher as just a few of the consistent pieces of information on screen. Additional graphics appear throughout the game, as well, that feature various statistics and information about the players and teams. With sports broadcasts being a relatively popular area of study, the effect and feelings toward graphics has been relatively unexamined. Cummins, Gong, and Kim (2016), however, studied the attention paid towards information graphics in the 2012 World Series by way of eye-tracking technology. Results found that viewers attend to a graphic when it first appears on screen. However, those with the higher amounts of interest in both sports and sports statistics focused on them for a longer duration, thus suggesting an increase in cognitive processing of the information on the graphic (Cummins, Gong, & Kim, 2016).

With this in mind, however, it is important to consider the effects of potential information overload. Fans, of course, desire information (Gantz, 1981; Gantz et al., 2006). However, while the concept of displaying a wealth of information to viewers may be attractive, too much information will almost certainly turn people away. This is particularly true when the information presented (i.e., the specific statistics themselves) is unfamiliar. Given that the overwhelming majority of baseball fans are familiar with batting average, it seems less likely that broadcasts would reach the overload stage with that particular statistic. Indeed, broadcasts often display overall batting average for a player, as well as situational examples (e.g., batting average with runners in scoring position, in a specific count, against left-handed pitchers, during day games, etc.). However, substantially fewer fans are familiar with a statistic like wRC+. Therefore, if the goal is to help viewers understand that statistic, it may be more effective to display it more sparingly. If a viewer does not have an understanding of what the statistic is, continually displaying it in different contexts and situations will likely only confuse viewers. Another factor at play is the amount of additional information on the screen concurrently. Again, if too many statistics are displayed on screen at one time, viewers simply may not be able to process all of the information at once. In addition, there may be a combination of both familiar and unfamiliar statistics displayed at the same time. This, in turn, may cause viewers to focus their attention in one place or another. Presenting a new statistic alongside traditional statistics may be an effective strategy. However, if too much is on the screen when this occurs, viewers may not be able to attend to it properly.

Identification is another factor that has been found to influence how fans process and respond to information related to their team (Potter & Keene, 2012). Thus, it appears that while an interest in sports statistics is an important variable, perhaps statistics about one's favorite team are of even more interest to a fan. Therefore, it seems likely that a local MLB broadcast displaying statistics about their own team may lead those statistics to be most well-received by highly identified fans of that team. Of course, this suggests that team broadcasts do have the ability to set an agenda and frame statistics in a way that influences fans. It is also likely that some of this is dependent on how fans feel about their own local broadcasters (Engel, 2017). However, it seems as though the trend of viewer disdain for broadcasters typically comes with nationally broadcast contests, due in large part to lack of announcer familiarity with the team and players involved (Best, 2017).

Moving beyond sports as a whole, identification is an important variable in politics, as well. Notably, the phrase "all politics is local" illustrates the importance of identification with a locality or party. Attributed to a strategy adopted by Tip O'Neill in the 1982 Congressional elections, a national issue in the form of a $1 billion jobs bill was translated to a local issue when O'Neill brought up examples from Peoria, Illinois, the backyard of his main opponent, Robert Michel of Illinois. Thus, "O'Neill translated a *wholesale* debate over national economic policy to the local, *retail* level (Matthews, 1999, p. 53). Trounstine (2009) reiterates the importance of local politics, explaining that most elections in the United States are local elections, meaning that most campaigns and votes are also at a local level. An important implication, therefore, is that the quality of American democracy and its functioning is impossible without paying attention to local legislature. Additionally, and relating to the idea of the identified fan, residents care a great deal about the outcomes of local elections (Trounstine, 2009). Local-level decisions are more likely to directly affect those living in that area, whereas national decisions may be felt more indirectly or after a longer latency period. Thus, individuals will be more identified with their local politics, just as sports fans will be more identified with their team and, likely, their local broadcast team, which has meaningful implications.

Another factor at play pertaining to both sports broadcasts and statistics is second screen usage during televised sporting events (Cunningham & Eastin, 2017; Rubenking & Lewis, 2016; Voorveld & Viswanathan, 2015). Second screening can best be defined as "a form of media multitasking in which a second electronic device is used by audience members while also watching a TV program" (Cunningham & Eastin, 2017, p. 289). The specific second screen can be one of a number of possibilities; smartphones and tablets are the most likely, but using a laptop would also apply. Here again those watching sports have been found to categorically differ from viewers of other programming, as the extent of second screening is significantly greater for those watching sports, even with others present (Voorveld & Viswanathan, 2015). Furthermore, a slower-paced sport such as baseball may cause viewers to be more inclined to use a second screen during the game. In terms of what viewers use the second screen for, Cunningham and Eastin (2017) found that nearly 80 percent engaged with social media and 65 percent searched for information related to the game or the sport itself.

Therefore, second screening provides the potential to inform viewers of MLB. Should a broadcast provide a graphic featuring a statistic such as OBP, the uninformed viewer may be more inclined to use their phone to learn more (Gantz & Lewis, 2014). Once the viewer knows what goes into a batter's OBP, they may come to realize its importance. An oversimplification to be sure, such a situation is not out of the realm of possibility. A broadcast that does not feature these newer and more advanced statistics does not allow the uninformed viewer the possibility for such information to become salient (Cunningham & Eastin, 2017). Of course, some fans will already be aware of these statistics and, upon not receiving them from their team's broadcast, may be inclined to use a second screen to acquire the information they desire.

However, despite the potential to acquire additional statistical information, second screening may be a double-edged sword. For instance, second screen usage has been found to decrease recall of the televised product (Oviedo, Tornquist, Cameron, & Chiappe, 2015). In addition, it is also likely that viewers may miss some of the statistical graphics displayed due to their focusing on the second screen instead. Thus, it may be important for commentators to discuss some of the less well-known statistics should they appear on screen as it may capture the attention of a viewer focusing on their phone. Even so, the current proliferation of second screening while watching sporting events provides broadcasts the opportunity to give viewers something to research. An unknown statistic may be something that viewers want to know more about due to fans' desire for knowledge. Moreover, if the statistic is something in support of a fans' team or a specific player on the team, the desire to look into it may increase.

Old and New School. One factor that may influence whether or not a given fan decides to look up or accept newer statistics is the type of fan they are, particularly in terms of how they approach the game. Sukhdial, Aiken, and Kahle (2002) developed a scale that measures how old school or new school a fan is in terms of their ideology. The idea of old school is something that typically is applied to players and often pertains to work ethic and style of play (Aiken & Sukhdial, 2004). The concept of individuals being old or new school is not limited to sports, either. A person that is more old school will typically embrace tradition while someone more new school will question the status quo and attempt to create change, or simply do things a different way. These related concepts span from, again, not just sports, but from politics to teaching, as well (Luther, 2000). The scale, however, was developed initially to understand sports fans' orientations towards the importance of winning, materialism in sports, and the social responsibility of athletes. Fans that fall more towards to old school side of the spectrum believe that too much emphasis today is put on winning, that athletes have become too greedy, and that athletes have an obligation to be role models. Gender differences were found, as well. Specifically, men were found to be less old school on the winning dimension, meaning that winning is the most important thing and more old school on the materialism dimension (Sukdial, Aiken, & Kahle, 2002). Women have also been found to be more old school on the role model dimension, believing that athletes have a responsibility to be good role models (Aiken, Campbell, & Sukhdial, 2010). Relatedly, it has been found that fans, whether more old school or new school, feel their favorite athletes have similar values to their own (Sukhdial, Aiken, &

Chakraborty, 2017). Old school baseball fans, therefore, likely perceive a bond with Chase Utley, a player so well-known for his classic playing style that some believe his retirement will mark the end of an old school era (Cervenka, 2018). Of course, those lauded for being old school may just as well be labeled as such due to typical media representations of masculinity (Trujillo, 1991).

Even so, the idea of old school and new school in baseball can mean any number of things. For instance, when the pitching team hits an opposing batter with a pitch, the old school thing to do, if you were the team hit by the pitch, would be to retaliate by hitting one of their batters with a pitch (Nightengale, 2018). While old school fans and former players typically accept this practice, new school fans often reject this concept (Felder, 2015), with one reason likely being that hit batsman becomes a baserunner, and each additional baserunner allowed affects the retaliating team's chances of winning. Other old school/new school points of contention revolve around showing emotion on the field. A batter that "flips" his bat upon hitting a home run likely provokes the ire of old school fans; new school fans, however, typically enjoy this sort of emotional expressivity (Witz, 2017). Even the game of baseball itself is becoming more new school as a whole. Analytics indicate that the best way to succeed as a batter is through taking pitches you would be unable to hit well, swinging for the fences when you see a pitch you like, and caring little about striking out. Pitchers are no longer deemed successful based on how many innings they pitch, but instead on how hard they throw for however long they are able. Therefore, baseball today is predicated on the three true outcomes: walks, home runs, and strikeouts. Due to the information suggesting the best way to win, regardless of what happens to the pace of a game, baseball today does not much resemble the baseball of forty years ago (Baumann, 2017).

Of course, old school and new school debates in baseball today almost always come down to analytics. At the end of the 2017 season, three MLB managers were fired after leading their respective teams to 90 or more wins and playoff appearances: Dusty Baker of the Nationals, Joe Girardi of the Yankees, and John Farrell of the Red Sox. Each of those three managers could safely be considered old school. Indeed, Dusty Baker is essentially the quintessential old school baseball manager as, until the end, he made decisions based on his gut instincts instead of analytics (Gilberg, 2016). The three dismissed managers, while they had experience and a successful track record, lacked some of the features of the modern manager. In particular, managers today are expected to have people skills, a deference to the front office, and, perhaps most importantly, comfort with advanced statistics and analytics (Putterman, 2017). The three managers hired in their place, Dave Martinez, Aaron Boone, and Alex Cora, all share these new school qualities. Alex Cora stressed as much upon his hiring, suggesting that the communication of advanced statistics from the front office to the players was perhaps his most important task (Kepner, 2018).

The suggestion, therefore, is that baseball fans may also feel a certain way about advanced statistics based on whether they are old school or new school. For instance, Fisher (1998) found that one of the most important factors influencing identification with a team is the perceived similarity a fan feels with their favorite team. A new school team, such as the Los Angeles Dodgers, may therefore have new school fans. The Royals, still more of an old school team in many ways, may have old school fans. However, despite the Dodgers and Royals falling where they may on the spectrum, where their respective broadcasts fall has not been established to this point. In addition, the same is true of how fans feel about those broadcasts. Therefore, this old school/new school variable can assist in the understanding of how viewers react to the prevalence or lack of advanced statistics on their team's broadcast. Speculation, therefore, is that old school fans may react positively to traditional numbers, whereas new school fans may want more advanced statistics if they are lacking on broadcasts. Additionally, while the belief still remains that advanced statistics will be more accepted by viewers if they receive positive portrayals on team broadcasts, the old school variable could act as an explanation if they are rejected by certain fans. With the original old school/new school scale providing a means of understanding fan bases for marketing purposes (Sukhdial, Aiken, & Kahle, 2002), this context appears to be a good fit for developing a baseball-specific old school/new school scale. Thus, once the new scale has been developed and established, the following hypothesis will be tested:

H_5: Fans higher in new school beliefs will have a higher level of knowledge about advanced statistics.

Fantasy Sport, Schwabism, and Mavenism. Another factor pertaining to viewers' perceptions of and feelings toward statistical portrayals and discussions during a game may be their motives for understanding statistics. In particular, interest has picked up in researching fantasy sport participation with which statistics are undoubtedly intertwined (Billings & Ruihley, 2013; Brown, Billings, & Ruihley, 2012; Ruihley & Billings, 2013; Ruihley & Hardin, 2011). Indeed, fantasy sports have been suggested to spurn the beginning of a growing demand for sports information and the development of web sites and programs dedicated to stats (Otto, Metz, & Ensmenger, 2011). Fantasy sports have also allowed fans to not just research and discuss statistics, but also put them to use in an effort to succeed. While this research is not directly interested in fantasy sports, related concepts may influence the ways in which viewers attend to televised portrayals of statistics. In particular, Schwabism (Billings & Ruihley, 2013) and mavenism (Feick & Price, 1987) are two concepts that have been assessed in the fantasy sport literature that pertain to sports knowledge. Schwabism was named after sports aficionado Howie Schwab who formerly had a show on ESPN entitled *Stump the Schwab*, which featured contestants attempting to best him in a sports trivia contest. Schwabism is related to how much sports knowledge someone feels they have. However, it is not just about their perception of how much they know, but also about how much others think the individual knows. For someone high in Schwabism, their status as a knowledgeable sports fan is a point of pride. Mavenism, a term largely popularized by Malcolm Gladwell's (2000) book, *the Tipping Point*, refers to someone that not only seeks out a lot of information, but does so with the desire to disseminate that information to others. Mavenism is not necessarily a new concept, however, as Feick and Price (1987) assessed the topic in terms of marketing. Specifically, mavens in marketing combined their unwavering interest in knowledge of the marketplace and information seeking with the desire to inform others. Differing from Schwabism somewhat, the desire for a maven to acquire sports knowledge is not as much about the self, and more about sharing what you know with others so as to change their perceptions about something (i.e., statistics). Indeed, the sabermetric revolution in baseball was largely propagated by Michael Lewis, author of *Moneyball*, acting as a maven in regards to the knowledge created in the late 1970s and onward by writer and sabermetric-pioneer Bill James.

The relationship of Schwabism and mavenism to the study at hand is that those high in both are more likely to be influenced by statistics, particularly those that are newer and more advanced. By virtue of being high in Schwabism, a viewer will want to take note of advanced statistics to thereby either establish or maintain their position as someone with knowledge. People high in mavenism may be even more inclined to pay attention to advanced statistics as the additional knowledge they acquire can be passed on to those that will listen. Of course, these factors are contingent upon broadcasts showing and discussing advanced statistics. A broadcast that portrays advanced statistics will likely provide those high in Schwabism and mavenism with the information they desire. Of course, those lower in these traits will be watching the same broadcasts and, thus, should also be influenced. However, their influence will likely be at a different level; while they will have a heightened awareness to some of the advanced statistics, they may lack in a strong understanding. Here, those high in Schwabism and mavenism can aid individuals in their respective networks that may have lesser understanding by providing them with more information about what the statistics mean and why they are optimal.

However, if broadcasts do not show advanced statistics, those high in Schwabism and mavenism will likely be affected in somewhat different ways. Those high in Schwabism may not mind a lack of advanced statistics on a broadcast as this would allow them to maintain their position as the person that has a lot of sports knowledge. Mavens, however, may be more bothered by the lack of advanced metrics as they will then have less knowledge to share with others. Either way, given their interest in statistics and sports knowledge in general, they may be more inclined to do their own additional research. When a broadcast spends time discussing Bryce Harper's batting average, those high in Schwabism and mavenism can do their own research and discover that, despite his low batting average, his OBP and SLG are still well above league average, thus leading them to conclude that he is still and elite and productive player. Of course, the previous example presupposes that these individuals are discovering these additional statistics for the first time through an online source. However, it is more likely that they are already well aware of a sizeable amount of advanced statistics by virtue of their status as a knowledgeable fan. Thus, the value in measuring these variables is that they may help explain why fans of teams that feature traditional statistics on their broadcasts still have above average knowledge of advanced statistics.

H_6: Those high in Schwabism will have above average knowledge of advanced statistics regardless of the broadcast content of their favorite team.

H_7: Those high in mavenism will have above average knowledge of advanced statistics regardless of the broadcast content of their favorite team.

Identification. One of the more established lines of sports research pertains to fan identification and its causes and consequences (Wann & Branscombe, 1993; Wann, 2006). Team identification, specifically, refers to the extent with which a fan feels a psychological connection to a team and the outcomes of team competitions. Of course, for the purposes of this research, the causes of team identification are not vitally important. However, it is possible that some fans were drawn to a team based on their organizational characteristics (Sutton, McDonald, Milne, & Cimperman, 1997). Specifically, the popularity of *Moneyball* may have bred a new fan base for the Oakland Athletics, one that is interested by and appreciates the scientific approach taken to player evaluation. On the contrary, another subset of fans may be drawn to a team like the Baltimore Orioles due to their traditional scouting and development approach to baseball. Thus, based on these contributing factors surrounding their fanship, certain fans may be predisposed to more readily accept or reject advanced statistics; the A's fan might be more inclined to appreciate them while the Orioles fan may not. However, given that most MLB teams fall somewhere in the middle, these factors likely will not have much of an effect in terms of fan response to statistical portrayals on a broadcast.

Research on the consequences of team identification is also substantial with, again, much of it not necessarily applying to the study at hand. However, identification has been found to be the most powerful factor in terms of attending a game (see Wann, 2006). More importantly, identification is also an important predictor for watching a game through mediated means (Fisher, 1998). Passion has also been studied in conjunction with identification with the finding that they are two of the most important predictors for game-related media consumption (Wakefield, 2016). It is likely that many of the participants sampled will be highly identified and passionate about their team and, therefore, it is anticipated that they watch a substantial amount of their team's competitions either on TV or by way of the internet. Thus, the more fans watch, the more chance they have to be influenced by what they are seeing and hearing regarding statistics. Interestingly, another variation of identification, sport identification, has been shown to influence the attitudes of sports fans, as well (Billings, Butterworth, & Turman, 2017). Specifically, despite the well-documented issues surrounding performance enhancing drug use in the game of baseball, highly identified baseball fans have been found to have more liberal attitudes towards doping (Solberg, Hanstad, & Thøring, 2010). Given their softer stance on steroids, a controversial issue that plagued their sport, it is possible that highly identified baseball fans will also be more accepting of the new wave of statistics which, some feel, are negatively influencing the game (Costa & Diamond, 2017). Relatedly, combining an increase in the exposure of advanced statistics on broadcasts with the liberal attitudes of identified baseball fans, it seems they will be more inclined to accept and remember these statistics.

Additionally, while this study intends to measure team identification, the performance of a team will likely not be a factor as identification has been found to be relatively stable across time (Wann & Schrader, 1996). Of course, that is not to suggest that a well-performing team influences identified fans in the same way as a poorly-performing team. Specifically, research suggests that fans bask in the reflected glory when their team is successful (Cialdini et al., 1976) and cut off the reflected failure when their team is unsuccessful (Snyder, Lassegard, & Ford, 1986). However, it has been found that highly identified fans are less likely to cut off reflected failure (Wann & Branscombe, 1990), largely because their allegiance to the team is strong enough to where acting inconsistently is not an option. In addition, while the strength of team identification itself may not differ, fans have been found to follow successful teams due to the associated psychological rewards they receive (End, Dietz-Uhler, Harrick, & Jacquemotte, 2002). Thus, though team record typically does not alter the identification of fans, Wann (2000) found that team identification does decrease throughout the season. For the study at hand, while the content analysis will be performed around the midpoint of the MLB season, fans will not be surveyed until the offseason. Research has shown, however, that identification levels do not change significantly during the offseason, regardless of team record from the previous or expectations for the coming season (Wann, Keenan, & Page, 2009).

Therefore, to assess team identification, this study will use the Sport Spectator Identification Scale (SSIS; Wann & Branscombe, 1993). The measure has been frequently utilized to assess identification and has been established as both highly reliable and valid (Wann, Melnick, Russell, & Pease, 2001). The importance of identification lies in the idea that highly identified fans of a team are more likely to consume more games on television or the internet and, therefore, will face more exposure to the statistical portrayals commonly found on their team's respective broadcast. The speculation is that highly identified fans will also be more likely to accept the statistics typically shown by their team's broadcast due either to the substantial amount of exposure or the desire to remain consistent with the message set forth by their team. Fans that are not as identified likely consume less of the games and thus will be less exposed to the typical statistical portrayals and, therefore, they will be less salient.

H_8: Team identification will moderate the relationship between the portrayal of advanced statistics on a team broadcast and its effect on fans of that team.

CHAPTER THREE: METHOD

Method I: Content Analysis

Sample. A total of 60 MLB games from the 2018 season were selected for the purposes of this study. Each of the 60 coded games were broadcast to a local audience by the home team announcers. The maximum amount of times a team was involved in a coded game was four, ensuring player and team heterogeneity within the sample as the 30 MLB teams were shown exactly four times each. Additionally, each team was the home team in two games and the road team in the other two games. Put more succinctly, each team had their home broadcast, featuring their announcers, graphics, and statistical portrayals, analyzed two times each, thus allowing for comparison between broadcasts.

Games were randomly selected going team-by-team in alphabetical order. Thus, the first game sampled featured the Arizona Diamondbacks as the home team, meaning there were, theoretically, 81 games from which to sample. However, given the nature of sample sizes, early season games can feature players with extreme percentage-based statistics as they have only a relatively small amount of plate appearances or innings pitched. The same situation can occur late in the season when MLB teams are allowed to call up an additional fifteen players to their active rosters. Additionally, the effect of being a playoff team may have some influence on commentary and graphics. Thus, to account for these circumstances, midseason games were sampled. Specifically, an attempt was made to draw from as close to the 81st game for each team as possible. Thus, for each team, a game that took place somewhere between their 70th and 90th game was randomly selected. This purposive sample allowed for a typical representation of statistical portrayals and discussions in MLB broadcasts without some of the aforementioned limitations. Additionally, if an extra-inning game was selected, a new random selection was made as this study was limited to the standard nine inning game. While purely speculative, there is likely a chance that broadcasts change somewhat once the game goes past nine innings; more importantly, under 8% of MLB games go past nine innings (Sheinin, 2017). Rain-shortened games were also not included in the analysis. Thus, this analysis included only games that lasted exactly nine innings. Additionally, some MLB games are nationally broadcast. These national telecasts, typically broadcast on ESPN or FOX, have their own broadcasters and their own graphics and statistical portrayals. In addition, the audience to which these games are broadcast is different. Instead of the local audience that is comprised largely of fans of a given team, these games are broadcast nationwide to a much larger audience with varying team affiliations; this is particularly true for the ESPN Sunday Night Baseball game which is typically the only MLB game on during its broadcast. Thus, these broadcasts were also excluded from the analysis.

Therefore, the criteria for the randomly selected game was that it had to be a nine inning game and it needed to be broadcast by the home team network and broadcasters. With those criteria in place, once the Diamondbacks first game was randomly selected, the Atlanta Braves then had one of their midseason home games selected based on the same requirements. This process continued through the final team, the Washington Nationals. Once those thirty games were in place, the process started over with Arizona to acquire the remaining thirty games. It should also be noted that as the random selection was occurring, any time a certain team was selected for the third time (as the road team), a new game was randomly selected as otherwise a certain team would be overrepresented.

Administration. For each selected game, coding began after the last commercial break and before the first pitch was thrown. This beginning point was selected due to the fact that viewers may not be tuning in or paying attention beforehand, knowing that coverage begins five to ten minutes before the game actually starts. For instance, the broadcast for a normal night game begins at 7:00pm, but the first pitch is usually not thrown until 7:05pm or 7:10pm. Additionally, it is after that last commercial break where the starting pitcher will have his statistics displayed, typically occurring while he is throwing his final warm-up pitches. Thus, as per baseball broadcasts, this was deemed to be the optimal starting point. Coding then continued throughout the game until the final out was recorded.

Instrumentation. During the game, one unit of analysis was any instance where a statistic describing a player was shown on screen. For instance, when a batter comes to the plate, it is common to provide statistics in a graphic about their performance. In this example, if the graphic featured the batting average, home runs, and runs batted in for a player, then the code associated with each of those categories would be marked, meaning the player would have three individual codes for this particular plate appearance. Additionally, statistics that were shown in a graphic together were noted as appearing together. More in line with the notion of framing, a graphic that featured batting average, home runs, and runs batted in is demonstrably different from one that shows those same three statistics alongside OBP and SLG. The addition of OBP and SLG, two statistics that lean more towards the advanced side of the spectrum, can potentially, if shown enough, cause viewers to become more aware of those statistics and the information they provide. Additionally, when a graphic featuring statistics was shown, the number of statistics featured was noted. Broadcasts that graphically feature a higher or lower number of statistics as a whole may also have different effect on viewers. For instance, showing just one statistic in a standalone fashion highlights its importance, whereas a screen with significant statistical clutter can potentially be more distracting than informative. Also, if any additional statistics appeared during a plate appearance, then those were each coded individually, as well; this is true even if said statistics for the player in question appeared previously. Thus, if home runs were shown at the beginning of the at bat and then again a few pitches into at bat, home runs were individually coded twice for the player in question.

For each individually coded statistic, also coded was the type of statistic (traditional, advanced, or neutral), the position of a player (pitcher or batter), the team they play for (home or road), and the broadcast itself. For games played under National League rules, when pitchers came to bat they received their original pitcher code, but were also included in analyses involving the batting lineup. For the statistics themselves, the exploratory nature of this study saw new categories created when a not-previously-coded statistic was shown on screen. The intention was to encompass all observations at first and pare down from there as needed. Additionally, statistics that were rarely utilized were still meaningful as they provide an example of relative exclusion.

Broadcast commentary was also subject to coding. In particular, another unit of analysis was any comment involving the use of statistics. These comments were transcribed and coded based on the statistic(s) in question as well as the valence it ascribes to the statistic(s). In terms of valence, there were three levels: positive, negative, and neutral. Specifically, if a statement was coded as having positive valence, the broadcaster was suggesting that the statistic is valuable in some way. A statement with negative valence statement would feature the statistic(s) discussed in derogatory terms, thereby suggesting that it lacks importance. Coded statements about statistics were also coded as neutral when no detectable valence is applied, indicating that broadcasters were merely providing information without an attempt to persuade a viewer about the efficacy of a statistic. The goal of this portion of the analysis was to see which statistics are not only discussed most frequently, but also to understand the tone that broadcasters use to describe them. Additionally, whether the statistic was featured through a graphic, through commentary, or through both a graphic and commentary was coded. Arguably, the most salient method to discuss a statistic is through both a visual and a discussion of it; coding for this accounted for these instances.

The goal of the aforementioned coding methods was to then group the 30 teams into different clusters based on the statistics shown and discussed on their broadcasts. Specifically, one end of the spectrum featured the team broadcasts that were heavily traditional. These broadcasts emphasized, for example, the importance of classic statistics such at batting average, runs batted in, and the win-loss record of a pitcher. These broadcasts were also more likely to disparage advanced statistics, questioning the importance of concepts like launch angle, defensive shifting, and WAR. Of course, these broadcasts also typically silenced advanced statistics by neither showing them on screen nor speaking of them. Per framing and agenda setting, ignoring advanced statistics is just as much a support of traditional metrics; what is not shown will not be salient in the minds of viewers. On the other end of the spectrum were the broadcasts that were heavily sabermetric. These broadcasts featured an increased emphasis on advanced statistics both in graphics and commentary. There is, of course, a range to advanced statistics. At their most extreme, advanced statistics deal in theoretical concepts, as is the case with WAR, or they account for ballpark or league factors, which take into consideration the stadium or run-scoring environment in which a player competes. However, sabermetric principles can also be simpler, like OBP, while still not reaching universal acceptance for baseball fans. While OBP may not be as advanced as other statistics, it is still an improvement over batting average. Thus, broadcasts featuring statistics from WAR to OBP fell towards the sabermetric side of the spectrum. There were broadcasts that fell in the middle somewhere, as well. These teams were of less consequence here as the goal was to acquire four to five teams from each end of the spectrum to then survey their fans in an effort to understand the effects of team broadcast on their understanding and acceptance of advanced statistics.

Team broadcasts were categorized based on the statistics shown in graphics and discussed by broadcasters. Broadcasts that feature the highest percentage of advanced statistics both in terms of graphical portrayals and positive or neutral commentary fell towards the advanced side of the spectrum. The other side of the spectrum featured team broadcasts with a low percentage of advanced statistics being displayed and discussed; high amounts of negative comments about advanced statistics were also found for broadcasts on this end of the spectrum. The five broadcasts with the highest percentage of advanced statistics and the five with the lowest percentage were then selected for the survey portion of the analysis. The coding sheet featured in Appendix A has a more detailed breakdown of which statistics fell into which category. For intercoder reliability, a second coder was used to perform the content analysis on nine of the sixty games, which accounts for fifteen percent of the sample. Reliabilities were established using Cohen's (1960) kappa and all exceeded the desired alpha level of .8 (Riffe, Lacy, & Fico, 2005). Specifically, reliabilities were established for the individual statistics (κ = .99), whether each statistic was traditional, advanced, or neutral (κ = 1.00), and the overall ranking of each graphic on a 5-point scale ranging from very traditional to very advanced (κ = .92). Overall reliability exceeded .98, indicating a high level of agreement as a whole.

Method II: Survey

Sample. Part two of the study featured an analysis of the fans of the teams on both ends of the sabermetric broadcast spectrum. Therefore, once the five teams that featured a high amount of advanced statistics were identified, and once the five teams that featured little to no advanced statistics were identified, the analysis turned to their fans to see if the broadcasts they watch influenced their knowledge of statistics. To find fans of these teams, MLB team subreddits were utilized. Each MLB team has its own subreddit, ranging from 3,427 subscribers for the Miami Marlins to 52,680 subscribers for the Boston Red Sox as of mid-March 2019. The total number of subscribers does not include lurkers of reddit, either, indicating that each team subreddit will have a substantial number of potential participants. With ten teams being selected, there was a chance that the varying amounts of subscribers for each team would cause certain fanbases to be overrepresented. However, with the goal of the analysis being more about advanced versus traditional broadcasts and less about team-by-team differences, these concerns are lessened. Even so, team-by team analyses were carried out to assess whether or not over or underrepresentation was altering the data.

Even with the potential variance in the amount of responses, the decision to sample from subreddits allowed a large number of highly identified fans of the teams in question to be discovered. For instance, a typical undergraduate population at a single, or even multiple, universities would not have been as effective in this case as a high number of university students were not be the kinds of fans desired for this research. MLB subreddits, on the other hand, allow for MLB fans of a given team to read or post about their favorite team with other fans during both the season and offseason. Therefore, a collection of identified fans that watch a lot of baseball, particularly their favorite team, were accessible in ways they would not have been through other means of sampling.

Instrumentation. The full survey instrument is included in Appendix B. Respondents were asked about the amount of games they watch in a given MLB season. Relatedly, the medium through which they watch their favorite team as well as the specific broadcast they watch was of interest. MLB fans today are not relegated to their own team's broadcast; it is possible that fans prefer to not watch their own team's broadcast, thus it was important to ask about fan preferences. Participation in fantasy baseball during either the 2018 MLB season or at some point in the past three years was also assessed as those that play fantasy baseball may be more inclined to seek out more knowledge pertaining to advanced statistics in an effort to succeed. Additionally, experienced and invested fantasy baseball players may be more likely to seek out more highly researched information, whereas novice players may rely more on mainstream information.

Additional measures employed within the survey were a moderately altered version of the SSIS (Wann & Branscombe, 1993) to assess participants' identification with their favorite MLB team, meaning, the team subreddit through which they accessed the survey. Identification with a team may be an important factor in terms of how fans respond and what fans gain from team broadcasts. Additionally, the Schwabism and mavenism scales (Billings & Ruihley, 2013) were utilized to understand how participants perceive themselves in terms of their knowledge and sharing of baseball statistics. Finally, while the old school scale developed by Sukhdial, Aiken, and Kahle (2002) provided conceptual direction, it also provided the impetus for the development of an old school/new school scale specific to baseball. Such a measure was developed to indicate differences in how participants attend to statistics based on their orientation to baseball. For each of these scales, participants' average scores were acquired and tests were conducted accordingly.

Given that the old school/new school baseball scale was created as part of this research, the results of the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) need to be discussed. Featuring an initial survey consisting of 32 present day issues in the game of baseball with a scale ranging from 1 to 7 (strongly disagree through strongly agree), a sample of 140 participants were acquired through Amazon Mechanical Turk. The participants held Mechanical Turk Master status, awarded to users that have demonstrated high performance over time and excellence across a number of tasks; participants were also paid $0.50 each for completing the survey. In addition, it was requested that those wanting to take the survey be baseball fans. After cleaning the data, 135 participants successfully completed the survey.

The EFA for the old school/new school scale revealed five distinct factors that collectively explain 57.24% of the variance in the data. The first factor, a new school belief that the game today is better than ever, had an Eigenvalue of 7.232 and explained 22.60% of the variance. The second factor, and old school-focused about game strategy and statistics, had an Eigenvalue of 4.357 and explained 13.62% of the variance. The third factor, an old school approach to watching and studying the history of baseball, had an Eigenvalue of 2.971 and explained 9.28% of the variance. The fourth factor, comprising of old school beliefs about how baseball should be played, had an Eigenvalue of 2.143 and explained 6.70% of the variance. Finally, the fifth factor, comprising of new school strategies for making the game more accessible for fans, had an Eigenvalue of 1.614 and explained 5.04% of the variance. For the purposes of the survey here, however, only two of the factors were added to the overall survey distributed to participants with the intention of keeping the survey length reasonable. In addition, the two factors selected, factor one and factor four, represented new school and old school attitudes, respectively. These factors were selected as they best represented the desired facets of new and old school beliefs as it pertained to the content of the overall survey.

Five questions loaded onto each of the two factors selected. For the new school factor, the questions are as follows: 1. Since I've been a fan, the quality of baseball today is better than it has ever been (.920); 2. Today's players are better than players from previous generations (.916); 3. I believe that the game of baseball, in general, is better now than it was 30 years ago (.915); 4. The golden age of baseball is now (.659); 5. Overall, when rule changes are made in baseball, I am likely to support them (.419). Question five on the new school factor was removed before the CFA due to questionable face validity; while it is indeed a new school belief, it did not align with the first four questions in terms of the type of new school attitude assessed. For the old school factor, the questions are as follows: 1. Starting pitchers today should pitch deeper into games (.702); 2. Today's baseball players swing for the fences too often (.665); 3. A batter should bunt when the defense employs a shift (.545); 4. The game should return to its roots, focusing more on hits and less on home runs (.423); 5. The game was better when "small ball" was utilized more often (.411). None of the old school questions were removed before conducting the CFA. The CFA, which was conducted based on the five factors discovered in the EFA, indicated that the final measurement model was considered a good fit without dropping any of the items per the following indicators: χ^2/df = 1.395, root mean square error of approximation (RMSEA) = .054, Bentler-Bonett normed fit index (NFI) = .843, Tucker-Lewis coefficient (TLI) = .926, and comparative fit index (CFI) = .947. Appendix D provides the measurement model for the final scale.

In an effort to compare participants based on the team broadcasts they spend the most time watching, the overall survey instrument also features questions that pertained to their knowledge and usage of advanced statistics. Specifically, participants were asked which statistics they typically use when assessing players and they were also assigned a baseball statistics knowledge quiz as part of the overall survey instrument. The quiz was comprised of 12 statistical acronyms and asked participants to describe what they stand for and what they measure. Fans of teams featuring few advanced statistics were expected to report using traditional statistics and, though they likely have substantial knowledge of those statistics, they were predicted to have less understanding of advanced statistics. On the contrary, fans of teams that feature high levels of advanced statistics during their broadcasts were expected to cite more advanced statistics as being important and useful, and they were expected to not only be knowledgeable about traditional statistics, but advanced statistics, as well. General demographic information was also collected.

Administration. Surveys were administered on select MLB team subreddits only after permission was granted by the moderator of each desired subreddit. The selection of the subreddits was informed by the content analysis conducted in the first part of this dissertation, which is to be discussed in Chapter Four. The process of administering the survey required two steps. First, after the ten teams were identified as having unique broadcasts in terms of statistics, the ten corresponding subreddit moderators were contacted in an effort to post the survey on the subreddit. Of those ten teams contacted, eight allowed the survey to be posted: The Cubs (30,980 subreddit subscribers), Giants (27,824), Athletics (11,077), Phillies (22,221), Pirates (10,543), Dodgers (33,995), Brewers (14,745), and Tigers (13,865). Neither the Twins nor White Sox moderators responded to the initial request. The eight teams, however, represent four advanced broadcasts and four traditional broadcasts. With the confirmation acquired from eight team subreddits, the second step was posting the survey. Surveys were posted only once to each subreddit, with postings taking place over a span of three days. Additionally, there were eight versions of survey with the only difference being the team name inserted into certain questions and prompts. Once posted, surveys were left on the site for about ten days before the results were downloaded. During the time when surveys were active, subreddit subscribers and visitors occasionally had questions about the research; these questions were fielded, though specific goals of the research were not revealed so as not to influence respondents.

CHAPTER FOUR: RESULTS

Results I: Content Analysis

Within the 60 complete games from the 2018 MLB season that were content analyzed, a total of 21,501 statistics, with an average of 358.35 statistics displayed per game, comprising 48 different statistics in total, were portrayed within 4,890 graphics shown on screen for an average of 81.5 graphics per game. 16,213 (75.4%) of the statistics were used to describe position players, while 5,159 (24.0%) described pitchers and the remaining 129 (0.6%) were in graphics describing statistics pertaining to the team as a whole. 11,049 (51.4%) statistics were used to describe players on the home team, compared to the 10,452 (48.6%) describing away team players. Of the total amount of statistics shown, 20,929 (97.3%) were shown alongside other statistics in the same graphic, while 572 (2.7%) were shown alone. Of the statistics shown in graphics, 18,994 (88.3%) were shown solely in graphics and not discussed by commentators; 2,507 (11.7%) statistics, however, were discussed by the commentators while concurrently being shown on screen in a graphic.

H1 suggested that the 30 MLB teams would differ in the agendas they set by way of graphical portrayals of statistics. To test this hypothesis, the individual statistics within the graphics were coded as being either traditional, advanced/modern, or neutral. Table 4.1 provides the results for all 30 teams as it pertains to individual statistical portrayals. In total, 17,423 (81.0%) statistics were coded as being traditional, 2,768 (12.9%) were advanced/modern, and

1,310 (6.1%) were neutral. For some comparisons, the advanced/modern and neutral categories were combined as the traditional category was substantially larger. Of the statistics shown both on screen and simultaneously discussed by commentators, 2,287 (13.1%) were traditional while 220 (5.4%) were advanced/modern or neutral; a chi-square analysis ($\chi^2 = 191.77$, $df = 1$, $p < .001$) thus revealed that broadcasters as a whole were significantly more likely to discuss the traditional statistics shown in graphics as opposed to those that were advanced or neutral. A chi-square analysis revealed a significant difference between traditional and advanced/neutral statistics shown either alone or in a group, such that significantly more ($\chi^2 = 32.22$, $df = 1$, $p < .001$) advanced/modern and neutral statistics, 161 (3.9%), were shown alone when compared to the 411 (2.4%) traditional statistics. However, the proportion of statistics shown alone was comparatively small to begin with, thus hindering the practical significance of this result. In terms of player position, a significantly higher proportion ($\chi^2 = 241.03$, $df = 1$, $p < .001$) of advanced/modern and neutral statistics, 3,453 (85.3%), were used to describe position players compared to 12,760 (73.7%) traditional statistics. The opposite was found for pitchers as 4,562 (26.3%) traditional statistics were used to describe pitchers, compared to 597 (14.7%) advanced/modern and neutral statistics. No significant difference was found between portrayals of traditional or advanced/neutral statistics and whether the team in question was home or away ($\chi^2 = 4.371$, $df = 1$, $p = .112$).

Regarding the 4,980 graphics themselves, an average of 4.32 (*SD* = 2.18) statistics were featured within the graphics. The minimum number of statistics in a graphic was one, occurring on 538 (10.8%) occasions, with a maximum of 15, which occurred just six (0.1%) times. Graphics featuring four statistics occurred most often with 1,411 (28.3%) such instances, followed by graphics with three (20.8%) and graphics with five statistics (20.4%). 4,138 (83.1%)

graphics were about position players, with 796 (16.0%) highlighting the statistics of pitchers; 46 (0.9%) were about the team as a whole. The average number of statistics in a position player graphic was 3.92 (*SD* = 1.53), while pitcher graphics had an average of 6.48 (*SD* = 3.43) statistics.

Table 4.1: Advanced/Traditional Breakdown by Team for Individual Statistics

Team	Total Stat	Adv Stat	Neu Stat	Trad Stat
White Sox*	972	29.1%	3.1%	67.8%
Cubs*	975	29.0%	4.1%	66.9%
Giants*	883	28.3%	4.3%	67.4%
Athletics*	873	27.0%	4.0%	69.0%
Phillies*	933	23.2%	4.5%	72.3%
Orioles	898	20.6%	3.7%	75.7%
Mets	825	20.4%	6.2%	73.5%
Blue Jays	1017	20.0%	2.6%	77.5%
Yankees	693	19.0%	0.1%	80.8%
Nationals	870	15.7%	3.9%	80.3%
Rays	508	15.4%	0.0%	84.6%
Red Sox	965	14.5%	14.6%	70.9%
Royals	621	8.5%	11.8%	79.7%
Indians	581	7.1%	0.2%	92.8%
Astros	518	6.8%	2.1%	91.1%
Angels	526	6.8%	2.5%	90.7%
Reds	642	6.1%	1.9%	92.1%
Padres	619	6.1%	0.0%	93.9%
Braves	676	5.9%	2.7%	91.4%
Mariners	475	5.9%	3.6%	90.5%
Diamondbacks	779	4.4%	17.3%	78.3%
Marlins	766	4.3%	1.8%	93.9%
Rockies	437	4.1%	1.4%	94.5%
Rangers	605	3.5%	19.7%	76.9%
Cardinals	680	1.5%	14.0%	84.6%
Brewers**	585	1.4%	9.7%	88.9%
Tigers**	711	1.1%	15.3%	83.5%
Twins**	741	1.1%	16.3%	82.6%
Dodgers**	592	1.0%	1.0%	98.0%
Pirates**	535	0.2%	6.0%	93.8%
Average	**716.7**	**12.9%**	**6.1%**	**81.0%**

*Categorized as advanced
**Categorized as traditional

While the individual statistics were coded as being traditional, neutral, or advanced, the overall graphics were coded on a one-to-five scale, ranging from *very traditional* to *very advanced*. The average statistical content of all 4,980 graphics was 2.84 (*SD* = 1.56). Position player graphics were at an average of 2.83 (*SD* = 1.59) while pitcher graphics were at 2.94 (*SD* = 1.42). The most commonly occurring ranking ascribed to graphics was *very traditional*, with 1,835 (36.8%) such occasions, followed by *advanced* with 1,179 (23.7%), *neutral* with 928 (186%), *very advanced* with 914 (18.4%), and *traditional* occurring the least with 124 (2.5%). Table 4.2 provides the results for all 30 teams as it pertains to graphical portrayals.

The final area of interest was with broadcast commentary. H2 suggested that the 30 MLB teams would differ in their framing of statistics by way of commentary. To test this hypothesis, any comments made by broadcasters about statistics were transcribed and coded for the specific statistic they discussed, whether it was traditional, advanced/modern, or neutral, if it was about a position player, a pitcher, or the entire team, if it was only discussed or if it was discussed while also being shown on screen, and if it was about the home team or away team. 5,002 comments were transcribed, for an average of 83.37 statistical comments per game, comprising 50 different kinds of statistics. 3,085 (61.7%) comments were about position players, with 1,817 (36.3%) comments focusing on pitchers, and 100 (2.0%) comments being about the overall team. Additionally, 2,603 (52.0%) comments focused on the home team, while 2,399 (48.0%) were about the away team. 2,709 (54.2%) comments were brought up by broadcasters only, while 2,293 (45.8%) comments occurred about statistics that were also being featured in a graphic.

Table 4.2: Advanced/Traditional Breakdown by Team for Graphics

Team	# Graphics	Avg Graph	VTrad/Trad	Neu	Adv/VAdv
White Sox*	190	4.36	13.7%	0.0%	86.3%
Cubs*	187	4.40	12.3%	1.1%	86.7%
Giants*	171	4.26	16.4%	0.0%	83.6%
Athletics*	182	3.96	23.6%	0.0%	76.4%
Phillies*	167	3.93	24.6%	0.0%	75.5%
Orioles	236	3.18	34.8%	0.0%	65.3%
Mets	171	3.79	14.6%	1.8%	83.6%
Blue Jays	213	3.41	28.2%	0.9%	70.9%
Yankees	155	3.68	8.4%	9.0%	82.5%
Nationals	221	2.95	42.1%	0.0%	57.9%
Rays	115	3.31	20.9%	12.2%	66.9%
Red Sox	213	3.15	26.3%	8.5%	65.2%
Royals	164	2.85	24.4%	47.6%	28.1%
Indians	162	1.93	67.3%	9.3%	23.5%
Astros	133	1.92	68.5%	10.5%	21.1%
Angels	158	1.87	72.1%	4.4%	23.4%
Reds	169	1.94	66.9%	8.9%	24.3%
Padres	159	1.91	70.4%	0.0%	29.5%
Braves	162	2.02	66.1%	1.9%	32.1%
Mariners	112	2.27	51.8%	25.9%	22.4%
Diamondbacks	177	2.86	14.7%	74.6%	10.8%
Marlins	158	1.91	65.8%	15.8%	18.3%
Rockies	117	1.87	76.1%	13.7%	10.2%
Rangers	154	2.74	21.4%	70.1%	8.4%
Cardinals	146	2.79	26.0%	54.8%	19.2%
Brewers**	134	2.15	47.0%	49.3%	3.7%
Tigers**	158	2.58	27.2%	68.4%	4.4%
Twins**	200	2.35	35.5%	61.0%	3.5%
Dodgers**	152	1.26	90.1%	7.2%	2.6%
Pirates**	144	1.67	67.4%	31.9%	0.7%
Average	**166.0**	**2.84**	**39.2%**	**18.6%**	**42.1%**

*Categorized as advanced
**Categorized as traditional

Of the commentary about statistics, 4,457 (89.1%) comments were about traditional statistics, 332 (6.6%) were about advanced/modern statistics, and the remaining 213 (4.3%) were coded as neutral, falling somewhere between traditional and advanced/modern. Table 4.3 provides the results for all 30 teams as it pertains to graphical portrayals. Again, for some comparisons, the advanced/modern and neutral categories were combined as the traditional category was again substantially larger. Of the statistics both discussed by commentators and simultaneously shown on screen, 2,094 (47.0%) were traditional while 199 (36.5%) were advanced/modern or neutral; a chi-square analysis ($\chi^2 = 21.44$, $df = 1$, $p < .001$) thus revealed that broadcasters as a whole were significantly less likely to discuss advanced/neutral statistics shown in graphics as opposed to those that were traditional; a higher proportion of advanced/neutral statistics (63.5%) were brought up in commentary only as compared to traditional statistics (53.0%). In terms of player position, a significantly higher proportion ($\chi^2 = 4.25$, $df = 1$, $p = .039$) of advanced/modern and neutral statistics, 215 (41.2%), were used to describe pitchers compared to 1,602 (36.6%) traditional statistics. The opposite was found for position players as 2,778 (63.4%) traditional statistics were used to describe position players, compared to 307 (58.8%) advanced/modern and neutral statistics. A significant difference was found between portrayals of traditional or advanced/neutral statistics and whether the team in question was home or away ($\chi^2 = 7.125$, $df = 1$, $p = .008$), such that a higher proportion of advanced/neutral statistics were used to describe the home team, 313 (57.4%), as compared to the away team, 2,290 (51.4%).

Once these overall trends across the 30 teams in the 60 coded games was established, each of the 30 teams were compared to these overall findings to establish which were the most traditional and which were the most advanced/modern. The Toronto Blue Jays displayed the highest amount of individual statistics, with 1,017 over two games, for an average of 508.5 statistics per game. The Colorado Rockies displayed the fewest, with 437 over two games, averaging out to 218.5 per game. In terms of graphics, the Baltimore Orioles featured the most, with 236 (118 per game) while the Seattle Mariners showed the fewest at 112 (56 per game). The Philadelphia Phillies featured the most statistics per graphic, with 5.59 (*SD* = 2.89), while the

Los Angeles Angels had the fewest, with 3.33 (*SD* = 1.57) statistics per graphic. The Orioles broadcasters made the highest amount of comments about statistics, with 303 (151.5 per game); the Pittsburgh Pirates broadcasters made the fewest comments about statistics, with 86 over two games, for an average of 43 per game. It should also be noted that the intended valence measure for commentary was nearly entirely coded as neutral, suggesting that broadcasters generally do not refer to statistics in a way that is positive or negative. Thus, this measure was not utilized when determining results.

Table 4.3: Advanced/Traditional Breakdown by Team for Commentary

Team	Total Comm	Adv Stat	Neu Stat	Trad Stat
White Sox*	157	8.9%	5.7%	85.4%
Cubs*	162	19.1%	8.6%	72.2%
Giants*	140	2.9%	0.0%	97.1%
Athletics*	120	12.5%	3.3%	84.2%
Phillies*	105	14.3%	5.7%	80.0%
Orioles	303	5.3%	3.3%	91.4%
Mets	156	7.7%	1.9%	90.4%
Blue Jays	203	5.4%	5.9%	88.7%
Yankees	103	8.7%	4.9%	86.4%
Nationals	197	6.1%	8.6%	85.3%
Rays	111	3.6%	2.7%	93.7%
Red Sox	260	1.9%	2.7%	95.4%
Royals	122	12.3%	5.7%	82.0%
Indians	154	2.6%	0.6%	96.8%
Astros	167	9.0%	5.4%	85.6%
Angels	287	2.8%	6.6%	90.6%
Reds	163	6.7%	0.7%	90.8%
Padres	153	3.9%	2.5%	95.4%
Braves	163	1.8%	3.1%	95.1%
Mariners	194	4.1%	2.1%	93.8%
Diamondbacks	163	4.3%	1.2%	94.5%
Marlins	232	6.0%	7.3%	86.6%
Rockies	140	17.9%	8.6%	73.6%
Rangers	182	13.7%	7.7%	78.6%
Cardinals	136	3.7%	5.1%	91.2%
Brewers**	151	3.3%	1.3%	95.4%
Tigers**	147	8.2%	5.4%	86.4%
Twins**	161	4.3%	0.6%	95.0%
Dodgers**	184	7.1%	4.9%	88.0%
Pirates**	86	1.2%	1.2%	97.7%
Average	**166.7**	**6.6%**	**4.3%**	**89.1%**

*Categorized as advanced
**Categorized as traditional

The teams identified as the most advanced/modern in their portrayals were the Chicago Cubs, Chicago White Sox, Oakland Athletics, Philadelphia Phillies, and San Francisco Giants. The Cubs were the most advanced/modern as they were in the top two for individual advanced statistics portrayals, at 29.0%, compared to the 30-team average of 12.9%. The Cubs also featured the smallest proportion of traditional statistics, at 66.9%, compared to the 30-team average of 81.0%. In terms of the graphics featured by the Cubs, they also had the highest average rating of 4.40 (*SD* = 1.30), compared to the 30-team average of 2.84, thus indicating, on average, their graphics fell between *advanced* and *very advanced*. More specifically, 76.5% of their graphics fell into the *very advanced* category, second most for any team, and 10.2% were considered *advanced*; just 11.2% were considered *very traditional*, second least for any team. Furthermore, the Cubs broadcast also had the highest average for both position player graphics (*M* = 4.51, *SD* = 1.28) and pitcher graphics (*M* = 4.00, *SD* = 1.04). Cubs commentators were also both the most advanced/modern and the least traditional; 19.1% of their commentary was about advanced/modern statistics, compared to the 30-team average of 6.6%, while 72.2% was traditional, compared to the overall average of 89.1%.

The White Sox were identified as having an advanced broadcast due to featuring the highest percentage of advanced statistics in their broadcasts, with 29.1%, and the third lowest percentage of traditional statistics, at 67.8%. In addition, they had the second highest average graphic rating of 4.36 (*SD* = 1.37), the highest percentage of *very advanced* graphics at 76.8%, and the third lowest percentage of *very traditional* graphics at 13.7%.

The third team identified as having a more advanced/modern broadcast was the Oakland Athletics. The Athletics had the fourth most advanced statistics featured, at 27.0% of all statistics displayed, and the fourth fewest traditional statistics portrayed, with 69.0% of all individual statistics being categorized as such. In addition, they had the fourth highest average graphic rating of 3.96 (*SD* = 1.67) and the fourth highest proportion of *very advanced* graphics at 66.5%. In terms of commentary, the Athletics featured the fifth highest percentage of advanced statistics at 12.5%.

The fourth and fifth teams selected as having particularly advanced/modern broadcasts were the San Francisco Giants and Philadelphia Phillies. The Giants featured the third highest percentage of advanced statistics at 28.3% and the second lowest percentage of traditional statistics at 67.4%. In addition, they had the second highest average graphic rating of 4.26 (*SD* = 1.45), the third highest percentage of *very advanced* graphics at 73.7%, and the sixth lowest percentage of *very traditional* graphics at 15.2%. With commentary, however, 97.1% of comments about statistics were traditional, the second highest percentage of any team, with just 2.9% of comments being about advanced statistics, sixth lowest of all teams.

The Phillies featured the fifth highest percentage of advanced statistics at 23.2% and the fifth lowest percentage of traditional statistics at 72.3%. In addition, they had the fifth highest graphic rating of 3.93 (*SD* = 1.65), the fifth highest percentage of *very advanced* graphics at 64.1%, and the most statistics featured per graphic (*M* = 5.59, *SD* = 2.89). As for commentary, Phillies announcers had the third highest percentage of comments about advanced statistics at 14.3% and the fourth lowest percentage of comments about traditional statistics at 80.0%.

The teams identified as the most traditional in their portrayals were the Los Angeles Dodgers, Pittsburgh Pirates, Milwaukee Brewers, Minnesota Twins, and Detroit Tigers. The Dodgers featured the highest percentage of traditional statistics, 98.0%, of any team by more than four percentage points; just 1.0% of the statistics portrayed on their broadcasts were advanced, second fewest of any team. Additionally, their average graphic rating was the lowest of any team at 1.26 (*SD* = 0.81); the same is true for their average graphic rating for position players, which was 1.08 (*SD* = 0.53). The Dodgers also featured the highest percentage of *very traditional* graphics at 88.8% and just 2.6% of their graphics were *advanced* or *very advanced*, the second lowest mark for any team.

The Pirates featured the lowest percentage of advanced statistics at just 0.2% and the fourth most traditional statistics with 93.8%. Additionally, their average graphic rating was the second lowest of any team at 1.67 (*SD* = 0.98); the same is true for their average graphic rating for position players, which was 1.51 (*SD* = 0.87). The Pirates also featured the fourth highest percentage of *very traditional* graphics at 67.4%, the third lowest percentage of *very advanced* graphics at 0.7%; furthermore, just 0.7% of their graphics were *advanced* or *very advanced*, the lowest mark for any team. Regarding commentary, Pirates broadcasters not only made the fewest comments about statistics of any broadcast team with 86, but they also featured the highest percentage of traditional statistics discussed at 97.7% and the lowest percentage of advanced statistics at 1.2%.

The Brewers featured the fifth lowest percentage of advanced statistics at just 1.4% with 88.9% of their statistical portrayals being traditional. Additionally, 19.0% of the time that a traditional statistic was on screen, the commentators would discuss it, which was the fourth highest percentage of any team; the 30-team average for such an occurrence was 13.1%. While their average graphic rating was 2.15 (*SD* = 1.13), their 3.7% average graphic rating was the fourth lowest among teams. In terms of commentary, the 95.4% of comments about traditional statistics was tied for fourth most and the 3.3% of comments about advanced statistics was seventh lowest.

The fourth and fifth teams selected as having particularly traditional broadcasts were the Minnesota Twins and Detroit Tigers. The Twins and Tigers were tied for the third lowest percentage of advanced statistics at just 1.1% with 82.6% and 83.5% of their respective statistical portrayals being traditional. Additionally, their percentage of graphics that are *advanced* or *very advanced* was 3.5% for the Twins and 4.4% for the Tigers, third and fifth lowest, respectively. Twins commentators discussed traditional statistics 95.0% of the time, while Tigers broadcasters did so less at 86.4%. The remaining 20 teams were excluded from further analysis based on their statistical portrayals in terms of both graphics and commentary generally falling more towards the middle of the spectrum.

Therefore, based on the collective results of the content analysis, H1 and H2 are supported; the 30 MLB teams did differ in their respective portrayals of statistics in terms of graphics and commentary.

Results II: Survey

After the data was collected and cleaned, the surveys from the eight MLB team subreddits combined to yield 1,271 responses for an average of 158.9 responses per team. Giants fans provided the most completed responses with 297 (23.4%), followed by the Phillies (n = 194; 15.3%), Pirates (n = 191; 15.0%), Cubs (n = 172; 13.5%), Brewers (n = 143; 11.3%); Athletics (n = 135; 10.6%), and Dodgers (n = 117; 9.2%), while the Tigers fans provided the least at 22 (1.7%). Comparing the four advanced teams and the four traditional teams, the majority of responses were from fans of teams with advanced broadcasts with 798 (62.8%).

Regarding demographics, the average age of respondents was 30.4 (SD = 9.1) with a minimum age of fourteen (which was discarded as participants were required to be at least 18 years of age) and a maximum of 70. All told, just over ten percent of the sample was over the age of 40. Fans of advanced teams were slightly older at 30.9 (*SD* = 9.2) than fans of traditional teams (*M* = 29.5; *SD* = 8.9). In terms of gender, 93.9% of respondents were male; no proportional differences were found for advanced or traditional teams. Participants were also overwhelmingly White, with 84.3% identifying as such; 7.5% chose the other category as their race (it is likely that the majority choosing other were Hispanic/Latino), while 6.5% were Asian and just 0.6% were Black. Traditional team fans were slightly more White (87.3%) than fans of advanced teams, while there were slightly more Asian fans for fans of advanced teams (7.7%) as opposed to fans of traditional teams. In terms of education, 45.9% of participants had a four-year college degree while 18.1% had either a Master's or PhD. The proportion of fans that had a four-year degree or more was slightly higher for fans of advanced teams (65.5%) than traditional teams (62.5%).

To test H3, which predicts a positive relationship between fans awareness of advanced statistics and the amount of advanced statistics featured on broadcast of their favorite team, respondents were asked to indicate whether or not they reported seeing or hearing about the 12 statistics featured in the survey. The twelve statistics were as follows, with the first five being categorized as traditional and the last seven as advanced: Batting average, home runs, walks, ERA, WHIP, OBP, OPS, wRC+, WAR, SLG, FIP, and BABIP. For this analysis, only participants' recollection of the seven advanced statistics was of interest. For each instance a participant reported seeing or hearing about an advanced statistic, they received a score of one with all such instances being summed; thus, the highest score possible was seven. Only the advanced statistics were summed as the remaining five are known to be commonplace on MLB broadcasts. Overall, all participants reported seeing an average of 4.12 (*SD* = 1.45) of the seven advanced statistics. To assess differences between fans of advanced or traditional broadcast teams, a univariate ANOVA was conducted. The ANOVA did not yield a significant difference between fans of advanced (*M* = 4.13, *SD* = 1.46) and traditional (*M* = 4.11, *SD* = 1.44) broadcasts as $F(1, 1083) = .061$, $p = .805$, $\eta^2 = .000$.

Despite the lack of significance between the two groups, differences between the eight teams were explored to understand how specific fan groups differed. Thus, an ANOVA was conducted with all eight teams included as the independent variable. For this analysis, Levene's test for equality of variances was significant ($p < .001$), thus equal variance cannot be assumed between the eight groups. The ANOVA yielded a statistically significant difference between the groups such that $F(7, 1077) = 9.54$, $p < .001$, $\eta^2 = .058$, indicating that 5.8% of the variance in awareness of advanced statistics is explained by team broadcast. A Bonferroni post hoc analysis was conducted to assess differences between the teams. Cubs fans reported the highest awareness of advanced statistics (*M* = 4.79, *SD* = 1.48), significantly higher than fans of the Giants (*M* = 3.83, *SD* = 1.27, $p < .001$), Phillies (*M* = 3.87, *SD* = 1.49, $p < .001$), Pirates (*M* = 3.98, *SD* = 1.39, $p < .001$), and Brewers (*M* = 3.95, *SD* = 1.21, $p < .001$). Dodgers fans reported the second highest level of awareness at 4.61 (*SD* = 1.76), which was significantly higher than the Giants ($p < .001$), Phillies ($p = .001$), Pirates ($p = .012$), and Brewers ($p = .016$). Tigers fans reported the lowest awareness of advanced statistics at 3.81 (*SD* = 1.03), though, likely due in part to the comparatively small sample size, this was not significantly lower than any of the other teams.

To assess awareness of advanced statistics in another way, participants were also asked to report the three batting statistics and three pitching statistics they use to evaluate players. To make comparisons, the statistics listed were assigned point values: 1 for traditional statistics, 2 for advanced, and 1.5 for those neither clearly traditional or advanced in nature, which were largely OPS and WHIP. Scores were then summed for all participants and the average was taken, with the highest possible score being 2.00 and the lowest at 1.00. The average score for the six statistics listed was 1.52 (*SD* = 0.26). To assess differences between fans of advanced or traditional broadcast teams, a univariate ANOVA was conducted. The ANOVA did not yield a significant difference between fans of advanced (M = 1.53, SD = 0.25) and traditional (M = 1.51, SD = 0.26) broadcasts as $F(1, 1204) = 1.73$, $p = .189$, $\eta^2 = .001$.

Despite the lack of significance between the two groups, differences between the eight teams were again explored to understand how specific fan groups differed. Thus, an ANOVA was conducted with all eight teams included as the independent variable. For this analysis, Levene's test for equality of variances was significant ($p = .007$), thus equal variance cannot be assumed between the eight groups. The ANOVA yielded a statistically significant difference between the groups such that $F(7, 1198) = 3.80$, $p < .001$, $\eta^2 = .022$, indicating that 2.2% of the variance in statistics utilized to assess players is explained by team broadcast. A Bonferroni post hoc analysis was conducted to assess differences between the teams. Cubs fans again reported the highest utilization of advanced statistics (M = 1.59, SD = 0.24), significantly higher than fans of the Dodgers (M = 1.46, SD = 0.23, $p = .002$), Giants (M = 1.49, SD = 0.26, $p = .004$), and Brewers (M = 1.49, SD = 0.25, $p = .041$). Based on the overall results, H3 was not supported.

To test H4, which predicts a positive relationship between fans knowledge of advanced statistics and the amount of advanced statistics featured on broadcast of their favorite team, respondents were asked to identify and/or describe the 12 aforementioned statistics featured in the survey. Participants were shown the acronyms of the 12 statistics and then, in an open-ended format, were asked to write what statistic corresponded with the acronym and offer any other description of what the statistic seeks to assess. With this essentially being a statistical knowledge quiz, it was "graded" accordingly. Correct answers for the five traditional statistics received a maximum of 1 point, while correct answers for advanced statistics received a maximum of 2 points. Partial credit was also given in some cases in the form of either 0.5, 1, or 1.5 points, depending on the particular statistic and the quality of the answer. Scores on the statistical knowledge test were then summed for a maximum score of 19; the maximum score for the traditional statistics was 5, while the maximum score for advanced statistics was 14. Overall, the average quiz score was 14.64 (SD = 3.75). To assess differences in quiz scores between fans of advanced or traditional broadcast teams, a univariate ANOVA was conducted. The ANOVA did not yield a significant difference between fans of advanced (M = 14.66, SD = 3.77) and traditional (M = 14.61, SD = 3.73) broadcasts as $F(1, 1230) = 0.61$, $p = .805$, $\eta^2 = .000$.

Again, despite the lack of significance between the two groups, differences between the eight teams were explored to understand how specific fan groups differed. Thus, an ANOVA was conducted with all eight teams included as the independent variable. The ANOVA yielded a statistically significant difference between the groups such that $F(7, 1224) = 4.91$, $p < .001$, $\eta^2 = .027$, indicating that 2.7% of the variance in quiz scores is explained by team broadcast. A Bonferroni post hoc analysis was conducted to assess differences between the teams. Tigers fans had the highest average quiz score at 15.64 (SD = 2.63), however likely due to the small sample size (n = 21), no significant differences were found when comparing them with fans of the other teams. Cubs fans had the second highest average quiz score at 15.49 (SD = 3.75), which was significantly higher than that of the Giants (M = 14.02, SD = 3.78, p = .001) and the Dodgers (M = 13.70, SD = 4.05, p = .002). The other significant results indicated that Pirates fans (M = 15.27, SD = 3.63) scored significantly higher than Giants (p = .011) and Dodgers (p = .013) fans.

Another area of interest was knowledge of the advanced statistics in particular. For this, the average scores for both the traditional and advanced statistics portions of the quiz were calculated and presented as percentage, such that a perfect score equated to 1.00. From here, difference scores between the traditional and advanced portions were calculated in the format of advanced scores subtracted from traditional scores; it was anticipated that scores on the traditional portion of the quiz would be higher and, in an effort to avoid dealing in negative numbers, difference scores were calculated as such. Indeed, scores were higher on the traditional portion of the quiz (M = .955, SD = .095) than the advanced portion (M = .705, SD = .249). Therefore, the average difference score was .250 (SD = .216). To assess differences in difference scores between fans of advanced or traditional broadcast teams, a univariate ANOVA was conducted. The ANOVA did not yield a significant difference between fans of advanced (M = .250, SD = .220) and traditional (M = .252, SD = .208) broadcasts as $F(1, 1230) = 0.27$, $p = .870$, $\eta^2 = .000$. Table 4.4 provides the results of the three statistical knowledge assessments.

Table 4.4: Knowledge Assessment Means and Standard Deviations, ANOVA

Assessment	Overall	Advanced	Traditional	*F*	*P*
Stats Used	1.52 (.26)	1.53 (.25)	1.51 (.26)	1.728	.189
Quiz Score	14.64 (3.75)	14.66 (3.77)	14.61 (3.73)	.061	.805
Difference Score	.250 (.22)	.250 (.22)	.252 (.21)	.027	.870

Differences between the eight teams were again explored to understand how specific fan groups differed. Thus, an ANOVA was conducted with all eight teams included as the independent variable. The ANOVA yielded a statistically significant difference between the groups such that $F(7, 1224) = 4.98$, $p < .001$, $\eta^2 = .028$, indicating that 2.8% of the variance in difference scores is explained by team broadcast. A Bonferroni post hoc analysis was conducted to assess differences between the teams. Cubs fans featured the smallest difference score at .193 (SD = .213), indicating the strongest performance on the advanced portion of the quiz. This difference score was significantly smaller than that of Giants fans (M = .293, SD = .223, $p <$ .001), Brewers fans (M = .281, SD = .197, p = .009), and Dodgers fans (M = .276, SD = .207, p =

.042). Additional significant results indicate that Phillies fans (*M* = .230, *SD* = .201) had a significantly smaller difference score than Giants fans (p = .041); Pirates fans (*M* = .217, *SD* = .215) also had a significantly smaller difference score than Giants fans (p = .005). Table 4.5 provides the team-by-team differences in the three statistical knowledge assessments. Based on the overall results, however, H4 was not supported.

Table 4.5: Knowledge Assessment Scores by Team

Team	*n*	Quiz Score	Difference Score	Stats Used
Cubs	169	15.49 (3.75)	.193 (.21)	1.59 (.24)
Giants	288	14.02 (3.78)	.293 (.22)	1.49 (.26)
Athletics	134	14.47 (3.84)	.255 (.23)	1.54 (.28)
Phillies	190	15.03 (3.55)	.230 (.20)	1.54 (.23)
Pirates	181	15.27 (3.63)	.217 (.22)	1.55 (.27)
Dodgers	111	13.70 (4.05)	.276 (.21)	1.46 (.23)
Brewers	138	14.31 (3.54)	.281 (.20)	1.49 (.25)
Tigers	21	15.64 (2.63)	.227 (.18)	1.50 (.32)

H5 suggested that fans with higher new school beliefs would also have higher knowledge of advanced statistics. To test this hypothesis, a simple linear regression was conducted to predict statistics knowledge quiz scores based on level of new school attitudes. The new school measure consisted of four questions on a seven-point scale; the average of the four questions is each participants' new school score, with higher scores indicating more new school beliefs. Participants' average new school score was 4.52 (*SD* = .98). A significant regression equation was found $F(1, 1227) = 46.48$, $p < .001$ with an $\eta^2 = .037$, indicating that 3.7% of the variance in quiz scores was based on new school score. Thus, the null hypothesis is rejected as $t = 6.818$, β = .733, and $p < .001$. For every 1-point increase in new school score, there is a .733 increase in quiz scores. Knowing that new school score significantly predicts quiz score, and that quiz score does not differ by broadcast, an ANCOVA was conducted with quiz score as the outcome variable, new school score as the continuous predictor (covariate), and broadcast (advanced or traditional) as the categorical predictor. Table 4.6 features the results of the ANCOVA. While quiz scores did not significantly differ by broadcast, when controlling for new school scores, the quiz score means between the two groups changed only slightly. Additionally, a general linear model indicated that there is no interaction (p = .605).

Table 4.6: Knowledge Assessment Adjusted Means, New School ANCOVA

Assessment	Overall	Advanced	Traditional	*F*	*P*
Quiz Score	14.64	14.68	14.58	.212	.646
Difference Score	.250	.248	.253	.137	.711
Stats Used	1.52	1.53	1.51	2.126	.145

Difference scores were also assessed, replacing quiz scores as the dependent variable. The regression predicting difference scores based on level of new school attitudes was significant $F(1, 1227) = 40.63$, $p < .001$ with an $\eta^2 = .032$, indicating that 3.2% of the variance in difference scores was based on new school score. Thus, the null hypothesis is rejected as $t = -6.374$, $\beta = -.039$, and $p < .001$. For every 1-point increase in new school score, there is a .039 decrease in difference scores. An ANCOVA was conducted with difference score as the outcome variable, new school score as the continuous predictor, and team broadcast (advanced or traditional) as the categorical predictor. While difference scores did not significantly differ by broadcast, when controlling for new school scores, difference score means between the two groups moved slightly further apart. Additionally, a general linear model indicated no interaction effect (p = .660).

Mentioned previously as a measure of awareness was the listing of six statistics used by participants to evaluate players. Such a measure can also be used to assess statistical knowledge as more knowledgeable fans will utilize statistics that are more advanced, or, predictive of performance. Again, the average of the six statistics was calculated, ranging from 1.00 on the traditional end to 2.00 on the advanced end. A simple linear regression was conducted to test the effect of new school attitudes on statistics utilized. A significant regression equation was found $F(1, 1203) = 60.82$, $p < .001$ with an $\eta^2 = .048$, indicating that 4.7% of the variance in statistics utilized was based on new school score. Thus, the null hypothesis is rejected as $t = 7.799$, $\beta = .058$, and $p < .001$. For every 1-point increase in new school score, there is a .058 increase in statistics scores. Additionally, an ANCOVA was conducted with statistics score as the outcome variable, new school score as the continuous predictor, and team broadcast (advanced or traditional) as the categorical predictor. When controlling for new school scores, the statistics score means remained largely the same. Additionally, a general linear model indicated no interaction effect ($p = .790$).

To further assess quiz scores and attitudes about baseball, participants also completed the old school scale as part of the overall survey. The old school scale consisted of five questions, also on a seven-point scale, which was then averaged to create an old school score. The average old school score was 4.47 ($SD = .99$). Another simple linear regression was conducted to predict quiz scores based on old school attitudes; in an inverse of the previous test, higher old school beliefs should yield lower quiz scores. A significant regression equation was found $F(1, 1222) = 39.08$, $p < .001$ with an $\eta^2 = .031$, indicating that 3.1% of the variance in quiz scores was based on old school score. Thus, the null hypothesis is rejected as $t = -6.251$, $\beta = -.664$, and $p < .001$. For every 1-point increase in old school score, there is a .664 decrease in quiz scores. Relatedly, when assessing the effect of old school beliefs on difference scores, a significant regression equation was found $F(1, 1222) = 41.88$, $p < .001$ with an $\eta^2 = .033$, indicating that 3.3% of the variance in difference scores was based on old school score. Thus, the null hypothesis is rejected as $t = 6.471$, $\beta = .039$, and $p < .001$. For every 1-point increase in old school score, there is a .039 increase in difference scores.

A simple linear regression was also conducted to test the effect of old school attitudes on statistics utilized. A significant regression equation was found $F(1, 1197) = 107.15$, $p < .001$ with an $\eta^2 = .082$, indicating that 8.2% of the variance in statistics utilized was based on old school score. Thus, the null hypothesis is rejected as $t = -10.351$, $\beta = -.073$, and $p < .001$. For every 1-point increase in old school score, there is a .073 decrease in statistics scores. Therefore, based on the combined results, H5 is supported.

H6 suggested that fans with higher in Schwabism would also have higher knowledge of advanced statistics, regardless of team broadcast. To test this hypothesis, a simple linear regression was conducted to predict statistics knowledge quiz scores based on levels of Schwabism. The Schwabism measure consisted of three questions on a seven-point scale; the average of the three questions is each participants' Schwabism score, with higher scores indicating higher perceived statistical knowledge. Participants' average Schwabism score was 4.76 ($SD = 1.59$). A significant regression equation was found $F(1, 1227) = 345.48$, $p < .001$ with an $\eta^2 = .220$, indicating that 22.0% of the variance in quiz scores was based on Schwabism scores. Thus, the null hypothesis is rejected as $t = 18.587$, $\beta = 1.106$, and $p < .001$. For every 1-point increase in Schwabism, there is a 1.106 increase in quiz scores. In an additional measure, an ANCOVA was conducted with quiz score as the outcome variable, Schwabism score as the continuous predictor, and team broadcast (advanced or traditional) as the categorical predictor. Table 4.7 features the results of the ANCOVA. While quiz scores did not significantly differ by broadcast, controlling for Schwabism moved the quiz score means between the two groups closer together. Additionally, a general linear model indicated no interaction effect ($p = .818$).

Table 4.7: Knowledge Assessment Adjusted Means, Schwabism ANCOVA

Assessment	Overall	Advanced	Traditional	*F*	*P*
Quiz Score	14.64	14.68	14.58	.256	.613
Difference Score	.250	.249	.253	.130	.718
Stats Used	1.52	1.53	1.51	2.709	.100

Assessing knowledge of advanced statistics in particular, difference scores were also assessed as the dependent variable. A significant regression equation was found $F(1, 1227) = 220.82$, $p < .001$ with an $\eta^2 = .153$, indicating that 15.3% of the variance in difference scores was based on Schwabism scores. Thus, the null hypothesis is rejected as $t = -14.86$, $\beta = -.053$, and $p < .001$. For every 1-point increase in Schwabism, there is a .053 decrease in difference scores. Controlling for Schwabism in an ANCOVA did not produce a significant difference in difference scores based on broadcast. The general linear model also indicated no interaction effect ($p = .353$).

A simple linear regression was also conducted to predict statistics utilized based on levels of Schwabism. A significant regression equation was found $F(1, 1202) = 141.84$, $p < .001$ with an $\eta^2 = .106$, indicating that 10.6% of the variance in statistics scores was based on Schwabism scores. Thus, the null hypothesis is rejected as $t = 11.91$, $\beta = .054$, and $p < .001$. For every 1-point increase in Schwabism, there is a .054 increase in statistics scores. An ANCOVA was conducted with statistics score as the outcome variable, Schwabism score as the continuous predictor, and team broadcast (advanced or traditional) as the categorical predictor. Controlling for Schwabism did not significantly alter statistics scores based on broadcast. Additionally, a general linear model indicated no interaction effect ($p = .347$). Therefore, H6 is supported.

H7 suggested that fans with higher in mavenism would also have higher knowledge of advanced statistics, regardless of team broadcast. To test this hypothesis, a simple linear regression was conducted to predict statistics knowledge quiz scores based on levels of mavenism. The mavenism measure consisted of three questions on a seven-point scale; the average of the three questions is each participants' mavenism score, with higher scores indicating higher desire to share statistical knowledge. Participants' average mavenism score was 5.81 (*SD* = 1.14). A significant regression equation was found $F(1, 1228) = 162.31$, $p < .001$ with an $\eta^2 = .117$, indicating that 11.7% of the variance in quiz scores was based on mavenism scores. Thus, the null hypothesis is rejected as $t = 12.74$, $\beta = 1.123$, and $p < .001$. For every 1-point increase in mavenism, there is a 1.123 increase in quiz scores. In an additional measure, an ANCOVA was conducted with quiz score as the outcome variable, mavenism score as the continuous predictor, and team broadcast (advanced or traditional) as the categorical predictor. Table 4.8 features the results of the ANCOVA. While quiz scores did not significantly differ by broadcast, controlling for mavenism caused the quiz score means between the two groups to be nearly equal. Additionally, a general linear model indicated no interaction effect ($p = .996$).

Table 4.8: Knowledge Assessment Adjusted Means, Mavenism ANCOVA

Assessment	Overall	Advanced	Traditional	*F*	*P*
Quiz Score	14.64	14.64	14.64	.000	.989
Difference Score	.250	.251	.250	.001	.974
Stats Used	1.52	1.53	1.51	1.589	.208

Assessing knowledge of advanced statistics in particular, difference scores were also assessed as the dependent variable. A significant regression equation was found $F(1, 1228) = 96.89$, $p < .001$ with an $\eta^2 = .073$, indicating that 7.3% of the variance in difference scores was based on mavenism scores. Thus, the null hypothesis is rejected as $t = -9.843$, $\beta = -.051$, and $p < .001$. For every 1-point increase in mavenism, there is a .051 decrease in difference scores. Controlling for mavenism in the ANCOVA did not produce a significant difference in difference scores based on broadcast. The general linear model also indicated no interaction effect ($p = .278$).

A simple linear regression was also conducted to predict statistics utilized based on levels of mavenism. A significant regression equation was found $F(1, 1203) = 61.51$, $p < .001$ with an $\eta^2 = .049$, indicating that 4.9% of the variance in statistics scores was based on mavenism scores. Thus, the null hypothesis is rejected as $t = 7.843$, $\beta = .051$, and $p < .001$. For every 1-point increase in mavenism, there is a .051 increase in statistics scores. An ANCOVA was conducted with statistics score as the outcome variable, mavenism score as the continuous predictor, and team broadcast (advanced or traditional) as the categorical predictor. Controlling for mavenism did not significantly alter statistics scores based on broadcast. Additionally, a general linear model indicated no interaction effect ($p = .471$). Therefore, H7 is supported.

H8 suggested that team identification would moderate the relationship between type of broadcast and knowledge of statistics. First, a simple linear regression was conducted to predict statistics knowledge quiz scores based on level of team identification. The SSIS consists of eight questions on an eight-point scale; the average of the eight questions is each participants' team identification score, with higher scores indicating higher identification. Participants' average level of identification was 6.30 ($SD = .95$). A significant regression equation was found $F(1, 1224) = 6.65$, $p = .01$ with an $\eta^2 = .005$, indicating that 0.5% of the variance in quiz scores was based on team identification. Thus, the null hypothesis is rejected as $t = 2.58$, $\beta = .290$, and $p = .01$. For every 1-point increase in identification, there is a .29 increase in quiz scores.

To assess potential interaction effects, a general linear model was conducted with quiz score as the outcome variable, SSIS score as the continuous predictor, and type of broadcast as the categorical predictor. Based on the results of the general linear model, the null hypothesis for the interaction term is not rejected as $p = .102$. Despite the lack of significance, the trends in the data indicate that, while quiz scores for fans of teams with advanced broadcasts remain stable regardless of identification level, fans of teams with traditional broadcasts see an increase in quiz scores as their identification rises, surpassing those of the advanced group at the high end of identification. The GLM did reveal a significant main effect for identification (p = .004), as was found in the linear regression. There was not a significant main effect for team broadcast (p = .099).

As with previous analyses, difference score was also assessed, replacing quiz score as the dependent variable. A significant regression equation was found $F(1, 1224) = 5.08$, $p = .024$ with an $\eta^2 = .004$, indicating that 0.4% of the variance in difference scores was based on team identification. Thus, the null hypothesis is rejected as $t = -2.254$, $\beta = -.015$, and $p = .024$. For every 1-point increase in identification, there is a .015 decrease in difference scores. To assess potential interaction effects, a general linear model was conducted with difference score as the outcome variable, SSIS score as the continuous predictor, and type of broadcast as the categorical predictor. Based on the results of the general linear model, the null hypothesis for the interaction term is not rejected as $p = .364$. Despite the lack of significance, the trends in the data indicate that, while difference scores for fans of teams with advanced broadcasts remain relatively stable regardless of identification level, fans of teams with traditional broadcasts see a slight decrease in difference scores as their identification rises. The GLM did reveal a significant main effect for identification (p = .017), as was found in the linear regression. There was not a significant main effect for team broadcast (p = .359).

For another method of testing H8, quiz scores were replaced with statistics utilized. Another simple linear regression was conducted to predict statistics utilized based on level of team identification. The linear regression was not significant as $F(1, 1200) = .000$, $p = .991$. Thus, the null hypothesis is not rejected as $t = .011$ and $p = .991$. To assess potential interaction effects, a general linear model was conducted with statistics score as the outcome variable, SSIS score as the continuous predictor, and type of broadcast as the categorical predictor. Based on the results of the general linear model, the null hypothesis for the interaction term is not rejected as $p = .271$. Main effects for identification ($p = .779$) and broadcast ($p = .197$) were also not significant. Based on the results, H8 is not supported.

Participants were also asked whether or not they played fantasy baseball over any of the previous three MLB seasons. 38.9% of participants reported participating in fantasy baseball at some point within that timeframe. To understand the relationship between fantasy baseball participation and the advanced or traditional nature of team broadcasts, a chi-square analysis was conducted. The results indicate that there is no significant relationship between fantasy baseball participation and team broadcast ($\chi^2 = .914$, $df = 1$, $p = .339$). Next, to understand the effects of fantasy baseball participation on statistics knowledge quiz scores, a univariate ANOVA was conducted. For this analysis, Levene's test for equality of variances was significant ($p < .001$), thus equal variance cannot be assumed between the two groups. The ANOVA yielded a significant difference in quiz scores between those that have participated in fantasy baseball ($M = 15.82$, $SD = 3.31$) and those that had not ($M = 13.88$, $SD = 3.83$) broadcasts as $F(1, 1229) = 83.587$, $p < .001$, $\eta^2 = .064$, indicating that 6.4% of the variance in quiz scores is based on fantasy baseball participation.

Difference scores were also assessed as they related to fantasy baseball. A univariate ANOVA was conducted and yielded a significant difference in difference scores between those that have participated in fantasy baseball ($M = .196$, $SD = .206$) and those that had not ($M = .285$, $SD = .215$) broadcasts as $F(1, 1229) = 52.899$, $p < .001$, $\eta^2 = .041$, indicating that 4.1% of the variance in difference scores is based on fantasy baseball participation.

Statistics utilized were also assessed as they related to fantasy baseball. A univariate ANOVA was conducted and yielded a significant difference in statistics utilized between those that have participated in fantasy baseball (M = 1.59, SD = .245) and those that had not (M = 1.48, SD = .253) broadcasts as $F(1, 1204) = 51.472$, $p < .001$, $\eta^2 = .041$, indicating that 4.1% of the variance in statistics utilized is based on fantasy baseball participation. Thus, fantasy baseball participation does significantly influence knowledge of statistics.

Participants were also asked to indicate their feelings about the amount of graphics featuring advanced statistics on a 1-7 scale, with 1 indicating a desire for fewer graphics with advanced statistics and 7 indicating a desire for an increase in such graphics. On average, participants desired more graphics with advanced statistics (M = 4.93, SD = 1.43). This desire was then predicted based on new school score by way of a linear regression. The regression was significant as $F(1, 1265) = 53.058$, $p < .001$ with an $\eta^2 = .040$, indicating that 4.0% of the variance in desire for graphics was based on new school scores. Thus, the null hypothesis is rejected as $t = 7.284$, $\beta = .292$, and $p < .001$. For every 1-point increase in new school score, there was a .292 increase in desire for graphics with advanced statistics.

Participants also indicated their feelings about the amount of commentary pertaining to advanced statistics on the same 1-7 scale. On average, participants desired more graphics with advanced statistics than they currently perceive (M = 5.16, SD = 1.37). This desire was then predicted based on new school score by way of a linear regression. The regression was significant as $F(1, 1265) = 53.394$, $p < .001$ with an $\eta^2 = .043$, indicating that 4.3% of the variance in desire for commentary was based on new school scores. Thus, the null hypothesis is rejected as $t = 7.510$, $\beta = .288$, and $p < .001$. For every 1-point increase in new school score, there was a .288 increase in desire for graphics with advanced statistics.

The same regressions were run again, but this time new school score was replaced with old school score as the predictor. The regression for graphics was significant as $F(1, 1260) = 29.775$, $p < .001$ with an $\eta^2 = .023$, indicating that 2.3% of the variance in desire for graphics was based on old school scores. Thus, the null hypothesis is rejected as $t = -5.457$, $\beta = -.217$, and $p < .001$. For every 1-point increase in old school score, there was a .217 decrease in desire for graphics with advanced statistics. The regression for commentary was also significant as $F(1, 1260) = 49.685$, $p < .001$ with an $\eta^2 = .038$, indicating that 3.8% of the variance in desire for commentary was based on old school scores. Thus, the null hypothesis is rejected as $t = -7.049$, $\beta = -.267$, and $p < .001$. For every 1-point increase in old school score, there was a .267 decrease in desire for commentary with advanced statistics.

Post Hoc Analyses

The trends in the data indicated that two teams consistently featured results than ran contrary to expectations: The Giants and the Tigers. The Giants, though coded as an advanced team, consistently scored lower on the measures of statistical knowledge. After assessing the content analysis data, it appears this may be due to the conflict between graphics and commentary. While graphics on the Giants broadcasts were consistently highly advanced, their commentators were highly traditional when discussing statistics. The Tigers, coded as traditional, also saw similar inconsistencies in their results; it is likely that some of the issues stem from the minuscule sample size, as well. Thus, these post hoc analyses were conducted after removing the data from Giants and Tigers fans to see if they were driving some of the results.

Regarding H3, when the Giants and Tigers were removed from the analysis, the average statistic recall rose to 4.22 ($SD = 1.50$). The ANOVA still did not yield a significant difference between advanced ($M = 4.30$, $SD = 1.53$) and traditional ($M = 4.13$, $SD = 1.46$) broadcasts as

$F(1, 823) = 2.751$, $p = .098$, $\eta^2 = .003$, though the means were trending in the hypothesized direction. Additionally, the average statistics score remained largely the same ($M = 1.52$, $SD = 0.27$). The ANOVA, however, yielded a significant difference in statistics utilized between advanced ($M = 1.54$, $SD = 0.27$) and traditional ($M = 1.50$, $SD = 0.27$) broadcasts as $F(1, 920) = 6.697$, $p = .01$, $\eta^2 = .007$, indicating that 0.7% of the variance in statistics utilized was based on team broadcast. While this was not found initially, removing the two teams offers meager support for H3.

Regarding H4, with the Giants and Tigers removed from the analysis, the average quiz score rose to 14.81 ($SD = 3.74$). The ANOVA yielded a larger, though still non-significant, difference in quiz scores between advanced ($M = 15.04$, $SD = 3.71$) and traditional ($M = 14.55$, $SD = 3.77$) broadcasts as $F(1, 921) = 3.80$, $p = .052$, $\eta^2 = .004$, indicating that 0.4% of the variance in quiz scores was based on team broadcast. In addition, the average difference score fell to .237 ($SD = .212$). Unlike the initial analysis, the ANOVA yielded a significant difference in difference scores between advanced ($M = .224$, $SD = .215$) and traditional ($M = .253$, $SD = .209$) broadcasts as $F(1, 921) = 4.247$, $p = .04$, $\eta^2 = .005$, indicating that 0.5% of the variance in difference scores was based on team broadcast. Table 4.9 provides the results of the three statistical knowledge assessments. Again, though not found initially, removing the two teams offers meager support for H4.

Table 4.9: Knowledge Assessment Means and Standard Deviations, Post Hoc ANOVA

Assessment	Overall	Advanced	Traditional	*F*	*P*
Stats Used	1.52 (.27)	1.54 (.27)	1.50 (.27)	6.697	.010
Quiz Score	14.81 (3.74)	15.04 (3.71)	14.55 (3.77)	3.800	.052
Difference Score	.237 (.21)	.224 (.21)	.253 (.21)	4.247	.040

Regarding H5, with the Giants and Tigers removed from the analysis, controlling for new school scores by way of an ANCOVA indicated a significant difference in quiz scores based on broadcast (p = .031). Table 4.10 features the results of the ANCOVA. Thus, if new school score was kept constant, the difference in quiz scores between fans of advanced (M = 15.06) and traditional (M = 14.54) broadcasts is significant, unlike in the ANOVA. A general linear model indicated that there was no interaction (p = .974). The ANCOVA featuring difference scores as the dependent variable also indicated a significant difference based on broadcast (p = .023) when controlling for new school scores. Thus, if new school score was kept constant, the difference in difference scores between fans of advanced (M = .222) and traditional (M = .254) broadcasts increases somewhat, though it was significant in the ANOVA, as well. A general linear model indicated that there was no interaction (p = .957). Finally, the ANCOVA featuring statistics utilized as the dependent variable also indicated a significant difference between the broadcasts (p = .008) when controlling for new school scores. Thus, if new school score was kept constant, the difference in statistics scores between fans of advanced (M = 1.55) and traditional (M = 1.51) broadcasts remains largely the same as it was when not controlling for new school attitudes, though it was statistically significant in both cases. A general linear model indicated that there was no interaction (p = .709). These results offer support for H5 in that those higher in new school beliefs had higher statistical knowledge.

Table 4.10: Knowledge Assessment Adjusted Means, Post Hoc New School ANCOVA

Assessment	Overall	Advanced	Traditional	*F*	*P*
Quiz Score	14.81	15.06	14.54	4.648	.031
Difference Score	.237	.222	.254	5.191	.023
Stats Used	1.52	1.55	1.51	7.181	.008

Regarding H6, with the Giants and Tigers removed from the analysis, controlling for Schwabism by way of an ANCOVA indicated a significant difference in quiz scores based on broadcast (p = .007), contrary to what was found in the ANOVA. Table 4.11 features the results of the ANCOVA. Thus, when Schwabism was kept constant, the difference in quiz scores between fans of advanced (*M* = 15.08) and traditional (*M* = 14.50) broadcasts increased enough to become significant. A general linear model indicated that there was no interaction (p = .860). The ANCOVA featuring difference scores as the dependent variable also indicated a significant difference in difference scores based on broadcast (p = .009) when controlling for Schwabism. Thus, when Schwabism was kept constant, the difference scores between fans of advanced (*M* = .222) and traditional (*M* = .255) broadcasts increased somewhat. A general linear model indicated that there was no interaction (p = .376). Trends in the data indicate that when Schwabism scores are low, difference scores are nearly the same; however, the gap gets wider as Schwabism increases, such that fans of advanced broadcasts have lower difference scores. The ANCOVA featuring statistics utilized indicated a significant difference based on broadcast (p = .002) when controlling for Schwabism. When Schwabism was kept constant, the difference in statistics utilized between fans of advanced (*M* = 1.56) and traditional (*M* = 1.51) broadcasts generally remained the same as when Schwabism was not controlled for. A general linear model indicated that there was no interaction (p = .764). Thus, keeping Schwabism constant strengthens the effect of team broadcast on statistics knowledge.

Table 4.11: Knowledge Assessment Adjusted Means, Post Hoc Schwabism ANCOVA

Assessment	Overall	Advanced	Traditional	*F*	*P*
Quiz Score	14.81	15.08	14.50	7.304	.007
Difference Score	.237	.222	.255	6.937	.009
Stats Used	1.52	1.56	1.51	9.755	.002

Regarding H7, when the Giants and Tigers were removed from the analysis, controlling for mavenism by way of an ANCOVA indicated a significant difference in quiz scores based on broadcast (p = .048), contrary to what was found in the ANOVA. Table 4.12 features the results of the ANCOVA. When mavenism was kept constant, the difference in quiz scores between fans of advanced (*M* = 15.02) and traditional (*M* = 14.56) broadcasts remained largely the same, but changed enough to become significant. A general linear model indicated that there was no interaction (p = .902). Thus, while quiz scores increase as mavenism increases, broadcast type appears to outweigh mavenism in this instance. The ANCOVA featuring difference scores as the dependent variable also indicated a significant difference in difference scores based on broadcast (p = .04) when controlling for mavenism. When mavenism was kept constant, the difference in difference scores between fans of advanced (M = .225) and traditional (M = .252) broadcasts remained the same as was found with the ANOVA. A general linear model indicated that there was no interaction (p = .296). While not significant, difference scores were somewhat higher for fans of advanced broadcasts when mavenism was low, but when it was high difference scores were lower than traditional broadcast fans. The ANCOVA featuring statistics utilized indicated a significant difference based on broadcast (p = .008) when controlling for mavenism. When mavenism was kept constant, the difference in statistics scores between fans of advanced (M = 1.55) and traditional (M = 1.51) broadcasts remained largely the same. A general linear model indicated that there was no interaction (p = .729). Thus, keeping mavenism constant alters knowledge very little, but enough for statistically significant differences to be found in quiz scores.

Table 4.12: Knowledge Assessment Adjusted Means, Post Hoc Mavenism ANCOVA

Assessment	Overall	Advanced	Traditional	*F*	*P*
Quiz Score	14.81	15.02	14.56	3.935	.048
Difference Score	.237	.225	.252	4.235	.040
Stats Used	1.52	1.55	1.51	7.085	.008

Regarding H8, when the Giants and Tigers were removed from the analysis, the GLM with quiz score as the dependent variable, team broadcast as the categorical independent variable, and team identification as the covariate revealed that the interaction term was not significant (p = .376), though a slight pattern was found with fans of traditional broadcasts seeing a greater increase in quiz scores as identification increased. A significant main effect for identification was found ($p = .001$), while the main effect for broadcast was not ($p = .235$). Replacing quiz score with difference score as the dependent variable, the GLM revealed again that the interaction term was not significant ($p = .904$), A significant main effect for identification was found ($p = .001$), while the main effect for broadcast was not ($p = .835$). Finally, with statistics utilized as the dependent variable, the GLM revealed again that the interaction term was not significant ($p = .822$). Main effects for identification ($p = .391$) and broadcast ($p = .875$) were also not significant.

Thus, it appears that the post hoc analyses resulted in some of the anticipated findings, thus indicating that the influence of commentary on fans may be greater than initially perceived.

CHAPTER FIVE: DISCUSSION

This dissertation sought to reveal the statistical portrayals commonly found among the 30 MLB teams during their televised game broadcasts and, subsequently, the effect of those portrayals on their respective fanbases. The results here of both the content analysis and survey offer some meaningful insights into the decisions made by both the networks that set the statistical agendas as well as the commentators who frame the discussion surrounding said statistics. This two-pronged approach ended up revealing that, while there were significantly more statistics shown on screen, the commentary seemed to play more of a role in influencing fans' knowledge and perceptions of statistics. Additionally, this dissertation has also ascertained information about what fans know about statistics, what they want from broadcasts, and how they are influenced by the broadcast of their favorite team. Furthermore, there are also other factors at play for baseball fans which influence their statistical knowledge, such as whether they are more old school or new school in their attitudes about baseball, their perceived level of statistical knowledge, participation in fantasy baseball, and how identified they are with their team. Thus, this discussion will take some of these different facets in turn, starting first with the content analysis results, which thereby lead into the findings from the survey.

Key Content Analysis Insights

In order to attain an understanding of the statistics featured during a typical broadcast, two midseason games from each of the 30 MLB teams were content analyzed, with an emphasis on both statistics shown on screen and discussed by commentators. The content analysis revealed differences among the teams and, more importantly, a clear spectrum whereby some teams were heavily traditional in the statistics they portrayed while others were much more advanced and modern. Of course, determining those teams was not simply based on one metric. Some teams were more advanced in their graphics, yet very traditional in their commentary, such as the San Francisco Giants; these cases turned out to be particularly meaningful in terms of the effect on fans. Other teams were traditional in the graphics that they displayed, but were much more advanced in their commentary, such as the Colorado Rockies. Some teams, however, were easier to identify as being either traditional or advanced. The Chicago Cubs were the clear leader in advanced broadcasts, based both on their graphics and commentary. The Los Angeles Dodgers and the Pittsburgh Pirates were also unquestionably traditional in their broadcasts in both facets of the production.

The teams selected as advanced and traditional covered an interesting variety of MLB teams. The advanced teams in particular were somewhat clustered geographically, with both Chicago teams as well as Oakland and San Francisco being selected; the Phillies represented the only east coast team. For the traditional teams, there was somewhat more variety with Pittsburgh and the Los Angeles Dodgers featured, through the other three teams – Milwaukee, Detroit, and Minnesota – were somewhat more Midwestern. However, each team cluster featured representation from all parts of the country, thus removing the possibility for any unanticipated geographical differences.

These advanced and traditional dichotomies may have also been somewhat of a function of the network broadcasting the games, particularly in terms of graphics. For instance, NBC Sports Group, a division of NBCUniversal, produces and broadcasts the games for each of the five advanced teams selected. The New York Mets are the only other team peripherally related to NBC Sports, who are a part owner of the network developed largely for the Mets, SportsNet New York. Thus, it is likely that NBC Sports may be driving more of these advanced portrayals as they likely have a substantial say in what graphics make the TV broadcast. However, the announcers likely still have the freedom to discuss the statistics they want to discuss. As for the traditional teams, the Brewers, Tigers, and Twins all have their games broadcast through Fox Sports regional networks, while the Pirates are broadcast through AT&T SportsNet with the Dodgers are broadcast through the network they own, Spectrum SportsNet. Here there is slightly more variance in the networks, though Pittsburgh and Los Angeles were clearly more traditional than the three Fox Sports teams. Given that the Dodgers own their network it seems that their push for traditional statistics may indeed come from the organization itself.

In addition to the broadcast networks playing a role in how statistical each team was on TV, it is also worthwhile to assess where the organizations themselves fall in terms of their usage of analytics. While things have changed in the past four years, Baumer's (2015) analysis of the 30 MLB teams in terms of their acceptance and use of sabermetric principles when evaluating players acts as a reliable indicator of team philosophies. In terms of the teams with advanced broadcasts, both the Cubs and A's are considered to be two of the more sabermetrically-inclined teams in MLB (Baumer, 2015), thus aligning with their respective broadcasts. Indeed, the Oakland A's were the original *Moneyball* team. As for the Cubs, their signing of Theo Epstein, the first of the new wave of young, highly educated general managers, cemented their sabermetric status, eventually consummating with the 2016 team that won the World Series – the first Cubs team to do so since 1908. It is possible that this on-field success combined with the preponderance of advanced statistics within their broadcasts have helped create the fanbase which consistently performed above the others in terms of statistical knowledge, as will be discussed in more detail later in this chapter.

The White Sox, Phillies, and Giants, however, were considered to be more traditional in their philosophies (Baumer, 2015). The White Sox present a particularly interesting case as their main play-by-play announcer is Jason Benetti, who is perhaps the biggest proponent of advanced statistics of all baseball broadcasters. However, during the 2018 season he split time with Ken “Hawk” Harrelson who offers a very traditional, old school approach to baseball broadcasting. With this content analysis featuring two randomly selected midseason games for each team, one White Sox game was broadcast by Benetti and the other by Harrelson. Even so, in terms of graphics, the White Sox were still heavily advanced regardless of who was broadcasting.

The Phillies are also an interesting case as, before the 2018 season, they hired Gabe Kapler to be their manager. Kapler represents a sea change from the Phillies of a decade ago as he is heavily focused on sabermetric principles when it comes to managing a team. This change, however, occurred only recently and success has still not been attained. Thus, a large subset of Phillies fans may still be hesitant to fully buy in to this new brand of baseball. The Giants, as has been discussed, may align more closely with their ranking as a more traditional team in terms of philosophy as their commentators were overwhelmingly traditional in their portrayals.

As for the teams with traditional broadcasts, the Pirates and Dodgers were actually identified as being more advanced in their team philosophies (Baumer, 2015). The Pirates are similar to the Phillies, however, in that they may have a different philosophy now than they did four years ago. While that is not to suggest the Pirates have become less analytical, in some ways their analytics are somewhat misguided. Specifically, their approach to developing pitchers, which was once their strength, has since become somewhat of a weakness against today’s home run-focused hitters. Thus, while the Pirates may be more advanced in some ways, it appears that some of their metrics are perhaps leading to misfiring on the field.

Furthermore, some of the least sabermetric teams were also found to have a higher degree of traditional statistics on their broadcasts; these teams were the Brewers, Twins, and Tigers (Baumer, 2015). For the Brewers and Twins, there is likely some degree of the broadcasts not catching up to the current product. Both organizations have recently made front office changes that show a trend towards more advanced thinking. In particular, the Brewers have become a team driven primarily by analytics. Perhaps the most pressing example came in the 2018 playoffs when the Brewers used their starting pitcher for just one batter before replacing him with a reliever who had a significant platoon advantage over the remaining hitters in the lineup (Wagner, 2018). In any event, despite the recent success of the team, the Brewers broadcast has still proven to be perhaps appealing to their more traditionally-rooted fanbase.

The Tigers, however, are one of the few teams remaining that reside much more firmly on the traditional side of player development. Indeed, the current top decision makers in the Tigers franchise, led by general manager Al Avila, are old school with their backgrounds all primarily based around scouting (Fenech, 2018). Even so, the Tigers are developing an analytics department of sorts, starting from the ground up in 2018 (Bultman, 2018). Though the Tigers may be slowly catching up to the rest of baseball, it therefore is understandable that their broadcast was found to be more traditional in nature.

The Tigers, along with the Giants, were particularly meaningful for this research. While these teams were identified as being on opposite sides of the spectrum in terms of statistics, more emphasis was placed on their graphics when it came to categorizing these teams. Specifically, while the Tigers were graphically traditional, they were more advanced in their commentary, due in large part to Kirk Gibson's presence as color commentator. The reverse was true for the Giants as 97 percent of comments made about statistics focused on traditional statistics, one of the highest numbers for any of the 30 teams. Post-hoc analyses would go on to reveal that excluding these teams would alter the results in a significant way, specifically in that fans of advanced and traditional teams would differ on a number of measures when they did not with these teams included. Therefore, there is some support for the idea that broadcast commentary may outweigh the graphics.

The content analysis also revealed that the 30 MLB team broadcasts each present viewers with very different experiences, specifically in terms of statistics. MLB local broadcasts were found to be different enough to indicate that one's experience as a baseball fan will be colored by the local broadcast of one's favorite team. While statistics were the primary interest here, future research should also look into some of the other facets of these local broadcasts, spanning aspects such as broadcaster humor and even production value; on the surface, it appears that some broadcasts (e.g. the Mets) are higher in both respects than others (e.g. the Royals), though fan reception is generally unknown. However, the results here show that the broadcasts differ not only in content, but in their effects on fans, as well.

Indeed, baseball broadcasts are not the carbon copy they might appear to be if one only watches nationally televised games. In recent years, nationally televised baseball has come under fire for featuring announcers who come off as less than pleased with the state of the game, particularly as it pertains to analytics (Normandin, 2018). While there are local broadcasters that feature similar attitudes, there are also a number of local broadcasts which endorse and support the way baseball is headed, particularly with respect to analytics.

With this in mind, it would likely behoove MLB to feature some more variety with respect to statistics in their national broadcasts. For example, the 2018 National League Wild Card game was broadcast on ESPN who, for the first time, offered two broadcast options. The first was the standard baseball broadcast with their normal Sunday Night Baseball announce team. The second option, which aired on ESPN2, was dubbed the Statcast broadcast and featured an announce team comprised of sabermetric supporters, one of whom was the aforementioned Jason Benetti (Torres, 2018). The graphics within the Statcast broadcast also primarily featured advanced statistics. The broadcast was generally well-received by those who enjoy such statistics and, as expected, criticized by those opposed (Vrabel, 2018). While it is not economically viable to offer two different broadcasts for the same game, this research suggests that finding a way to mesh the two together could be beneficial for all.

Key Survey Insights

Stemming from the results of the content analysis, the survey was distributed to fans of eight of the ten teams previously discussed. Despite the non-response from the moderators for the White Sox and Twins subreddits, the data collected from fans of the remaining eight teams spoke to the value of the site for such targeted research, even with some of its limitations to be discussed later. However, the ability to find a substantial amount of fans of specific MLB teams is limited, particularly when those teams are geographically dispersed as they were here. In terms of the survey itself, the baseball-related issues assessed were wide-ranging, though centering around the advanced and traditional broadcast dichotomy.

To start, while the content analysis revealed that the advanced and traditional broadcasts did demonstrably differ in terms of statistics displayed and discussed, fans did not significantly differ in their recall. The recall assessment in this case had fans first identify the 12 statistics featured in the quiz and then indicate whether or not they had ever seen or heard about each of the statistics on their team's broadcast. As with other analyses, only the seven advanced statistics were assessed as the five traditional statistics inevitably appear in every baseball broadcast. Additionally, some of the seven advanced statistics, such as wRC+ and FIP, almost never came up in the content analysis, so a fan unable to recall seeing them is likely being truthful. However, a two-game sample from each team likely suggests that there may have been other instances where such statistics did appear. The lack of difference in recall between fans of advanced or traditional broadcasts was also one of the few that remained the case for the post hoc analysis, too. With the Giants and Tigers out of the analysis, the average recall did end up both further apart and in the anticipated direction based on broadcast, but the difference was not significant. Thus, there are likely larger factors at play when it comes to the inability for fans to recall seeing advanced statistics.

For instance, while the majority of the sample were heavy viewers of baseball, those that watch less would understandably be less able to recall prominently featured advanced statistics. Similarly, previous research has found that those with greater knowledge of fantasy sports and sports statistics spend more time looking at graphics (Cummins, Gong, & Kim, 2016). Support was also found here for such phenomena as both those with fantasy baseball participation and higher quiz scores recalled seeing more advanced statistics in broadcasts. This research also revealed some of the predictors for knowledge, thus indicating that new school fans or those high in Schwabism may have been the ones looking for the advanced statistics in the first place. In addition, when it comes to graphics, viewers may suffer from inattentional blindness, whereby they fail to recognize something despite it being in their field of vision (Rock, Linnett, Grant, & Mack, 1992). With an average of over four statistics per graphic, it may be difficult for viewers to attend to them all. In addition, an important facet of inattentional blindness is that the unseen stimulus is unexpected (Driver, 1998). Given that 81% of all individual statistics shown were traditional, the appearance of an advanced statistic in a graphic would likely be somewhat unexpected and, therefore, potentially unattended to by viewers. Finally, with the survey portion of the research occurring in January, fans had not seen a live, local broadcast of their favorite team in over three months. Combine the fallibility of our memories with limited exposure to advanced statistics and accurate recall becomes more challenging.

While recall was somewhat challenging, participants as a whole performed reasonably well on the quiz. With the quiz being structured to include both traditional and advanced statistic acronyms, this allowed participants the opportunity to identify and explain these statistics in their own words by way of an open-ended format. Participants were also notified that they were not to search online for the answers; while there was no way to know for sure, the results suggested that the majority did follow that instruction. While correct answers for advanced statistics were weighted more – two points for advanced, one point for traditional – it was still assumed that the traditional statistics would be correctly identified by an overwhelming majority of the participants. This was found to be true as the five traditional statistics were correctly identified over 95% of the time. Thus, the additional dependent variable, the difference score between traditional and advanced, was developed. The difference score measure allowed for a comparison between participants' ability to correctly answer the advanced versus traditional questions. The third measure of knowledge featured a different facet, that being the statistics used when assessing players. Here, participants were again able to use an open-ended format to simply write in the statistics they prefer to use when attempting to determine good players from bad.

While none of these measures featured a significant difference in the overall analysis, the post hoc analyses did reveal differences for both difference score and statistics utilized. Regardless, this method proved effective as it allowed participants, who were indeed highly identified fans, a chance to test their knowledge and voice their opinions. Anecdotally, this method was well-received by nearly each of the fans that offered a comment in the subreddit threads where surveys were posted. The subreddits themselves appear to feature a large percentage of fans that are very advanced in their views on baseball, but the results, particularly as it pertained to statistics utilized, show that there are a number of fans, even in a likely more advanced online community, that rely on traditional metrics.

Notably, fans of both advanced and traditional broadcasts indicated a desire for an increase in graphics and commentary featuring advanced statistics. Additionally, whether fans' teams were categorized as advanced or traditional made no difference; both sets of fans equally want at least a marginal increase. This is particularly meaningful as MLB as a whole should be aware that a sizeable portion their fanbase is desiring some more advanced content. In recent years, MLB has grown more concerned with marketing the game to younger fans, as the average viewer is around 57 years old (Lombardo & Broughton, 2017). With the subreddit sample being significantly younger than the average MLB fan at just over 30 years of age, perhaps increasing some of the metrics featured on broadcasts is a way to market to these younger fans. With this being true for fans of both types of broadcasts, this could be a chance for MLB to embrace the new direction of the game. While not to suggest it would be a selling point to bring people in, an increase in advanced statistical portrayals may be something that keeps analytically-minded people watching as they come to see that the game is more than just the on-field product.

Theoretical Contributions

This research sought to apply two prominent media theories, agenda setting and framing, to a baseball context. In addition to assessing the agendas set and the framing techniques within broadcasts, and whether or not they exist in the first place, a survey sought to understand whether these messages had an effect on audiences. Indeed, among the 30 teams, there were clear differences and, in many cases differences were found among fans of the different types of broadcasts, though such a finding was not universal.

The agendas set came in the form of graphics featuring statistics during MLB local broadcasts. Among the 60 games coded, the 30 teams covered a range of statistical portrayals, spanning from the heavily traditional Los Angeles Dodgers to the, comparatively, advanced Chicago Cubs. The data itself was analyzed in different ways, thus leading to some varying conclusions depending on which was the category of interest. For instance, when the individual statistics within the graphics were assessed, the consensus was that, essentially, all teams are overwhelmingly traditional. Specifically, 81% of all individual statistics were traditional, with the Dodgers (98%) and Cubs (66.9%) at the far ends of the spectrum. Compare this to the average amount of advanced statistics, 12.9%, and it certainly seems obvious that the data is one-sided; this time it was the Pirates (0.2%) and White Sox (29.1%) at each end.

However, each graphic featured, on average, 4.32 statistics within them. Here, the analysis turned away from the raw statistics and more to the collection of statistics within a portrayal. Specifically, even if a graphic has five traditional and one advanced statistic, it does not necessarily imply that the graphic is traditional. For instance, a statistic typically means less when there is nothing to compare it to, which is true both within and outside of this baseball context. For instance, even Bill James, the forefather of sabermetrics, does not focus solely on advanced statistics when analyzing players. However, many current fans feel James advocates for a sabermetrics-or-nothing approach. Instead, James has become more outspoken about such fans as they tend to ignore some of the nuances of baseball (Greenberg, 2017). The same is true, then, when it comes to a graphic. While a graphic may feature batting average, home runs, and RBIs, three classic traditional statistics, the addition of on-base percentage would be enough to push it towards the advanced side of the spectrum. In particular, a .400 on-base percentage is known to exceptional. However, that alone fails to tell the whole story. If batting average is included next to the .400 OBP, we can understand more about the player. For instance, a .360 batting average would indicate that the batter rarely walks, and that there may be a high degree of luck when they make contact. A .260 batting average, on the other hand, would make it clear that the batter walks a lot and, therefore, is a more complete hitter. Thus, in many cases, the traditional statistics are required to complement the advanced and provide more information about the player as a whole.

With that in mind, the next level of statistics analysis moved to the graphics themselves and, as such, revealed some different trends. Placing each of the nearly 5,000 graphics on a five-point scale ranging from very traditional to very advanced, the average was much closer to the center at 2.84 with, again, the Cubs (4.40) and Dodgers (1.26) at each end. Thus, two separate evaluations reaching the same conclusion on teams provides additional evidence of the statistical content on their broadcasts and, consequently, made them obvious choices for the survey portion of the analysis.

The dichotomies became somewhat more complicated when looking at the percentages within each of the five points on the scale. For instance, the Atlanta Braves broadcast featured zero graphics that were considered very advanced (a five on the scale). However, they were not chosen as one of the traditional teams due in large part to 32.1% of their graphics being considered advanced (a four on the scale). Thus, it was more a function of points three of lower on the scale, not necessarily the proportion of graphics that were considered the highest levels of advanced. However, it was also a case that the Yankees, who had 80.6% advanced graphics, were not considered as advanced as a team like the Phillies, who had 64.1% very advanced graphics. This disparity becomes more complicated when considering the Yankees had the lowest amount of very traditional graphics at 8.4% while the Phillies were at 21.6%. In this case, it was the commentary which made the Phillies broadcast more advanced than the Yankees. While the agenda set by the Yankees broadcast was indeed advanced, the way it was framed in the commentary was too traditional to warrant inclusion.

Indeed, the first three determinants of traditional or advanced broadcasts, comprising of the individual statistics, the overall rankings for the graphics, and the proportions of each point on the five-point scale, centered around agenda setting. However, the framing by way of commentary played a crucial role as well in terms of placing teams on the spectrum. Of course, combining agenda setting and framing in research is not a novel concept by any stretch (Jasperson, Shah, Watts, Faber, & Fan, 1998), but here it was crucial to understanding the interplay between what is seen in the form of graphics and what is heard in the form of commentary about either the statistics on screen or others not shown. The example of the Yankees not making the advanced cut due in large part to commentary is not the only one. For instance, the Twins were largely traditional in their graphics, but with traditional statistics comprising of 95% of their statistical commentary, it was clear that they should be selected as one of the five traditional teams; however, the lack of approval from their subreddit moderators prevented an analysis of their fans from occurring.

The framing of advanced statistics, however, appeared to play a crucial role in terms of how they are received by audiences. Indeed, scholars have uncovered that framing is an important tool for reducing complexity (Gans, 1979). As such, framing is therefore essential for presenting complicated issues, such as some advanced baseball statistics, in an efficient manner, thus making them more accessible (Scheufele & Tewksbury, 2007). While Cubs fans are certainly a good example of the power of simply portraying advanced statistics with increased frequency, it is difficult to delineate the effects of graphics and commentary as both were at high levels for Cubs broadcasts.

Giants broadcasts, however, did appear to shed light on what may be more important for fans and their learning or accepting of advanced statistics. In particular, Giants broadcasts set a clear agenda geared toward advanced statistics, coming in as, roughly, the third-most advanced team graphically. The average Giants broadcast graphic was at 4.26 (out of five) and 28.3% of the individual statistics shown were advanced, both third highest among all teams. Based on that, the Giants were an obvious choice to be considered one of the five advanced teams. Giants commentary, however, framed statistics in the opposite way altogether. Specifically, 97.1% of all transcribed comments were about traditional statistics, which was the second highest of any team; their 2.9% of comments being about advanced statistics were sixth fewest of all 30 teams, as well. Despite this, the Giants were still selected as one of the five advanced teams based on their graphical portrayals. Here, the question became about whether or not one function, agenda setting or framing, was more powerful than the other. Data from the Giants fans in particular indicated lower levels of statistical knowledge, in the three different forms it was measured, than any of the other seven team fanbases sampled.

Among the differences between Giants fans and all others, they reported the lowest levels of desire for an increase in both graphics and commentary about advanced statistics within their broadcasts. Additionally, they had the second lowest overall quiz score, with only the very traditional Dodgers performing worse on average. Giants fans also had the highest difference score regarding their performance on the advanced portion on the quiz compared to the traditional portion. Regarding statistics used to evaluate players, Giants fans were again towards the bottom with the third lowest average score. Such evidence indicates that, while the Giants were very advanced in their graphics, it seems that the overly-traditional nature of the broadcast commentary is more influential to fans regarding their knowledge of statistics. Specifically, the Giants were both always the lowest scoring of the four advanced teams and in no other cases were there significant differences among those teams.

The Tigers also presented the same sort of case for the power of commentary, though they were originally selected as a traditional team. Graphically, the Tigers were roughly the fifth-most traditional team. Just 4.4% of their graphics were coded as being very advanced, with zero graphics coded as advanced; the majority (68.4%) of their graphics did fall into the middle category, however. In addition, their average graphic score of 2.58 was below the 30-team average and their featuring advanced statistics just 1.1% of the time, tied for third fewest of any team, all helped indicate that the Tigers were indeed a traditional team. However, like the Giants, their commentary did not necessarily align with the agenda set by the graphics. For instance, 8.2% of their commentary was about advanced statistics, which was both higher than any other team categorized as traditional and also higher than the 30-team average. Another measure of commentary assessed how many times a statistic shown in a graphic was concurrently discussed by a broadcaster; higher proportions indicate that the agenda is not only set, but reinforced by the broadcasters. For the Tigers, 9.4% of the individual advanced statistics shown on screen were also discussed by broadcasters. This percentage was higher than any of the teams categorized as advanced and also higher than the 30-team average of 5.4%. Thus, as was the case with the Giants, the Tigers commentary illustrates a lack of alignment between what was shown on screen and what the commentators discussed.

This misalignment also appeared to affect Tigers fans as it did Giants fans. In particular, Tigers fans had the highest quiz score of all sampled fanbases. Due largely to sample size, however, this score did not significantly differ from any of the others. Tigers fans also had the third lowest difference score. However, an important caveat that requires addressing is the small sample of Tigers fans. While there were roughly 300 Giants fans that completed the survey, the most of any team, there were just over 20 Tigers fans to do so. The reason as to why this occurred are unknown as the same protocol was followed on the Tigers subreddit as the others, and it does not appear to be due to the sheer number of subscribers as the Tigers have over 13,000, eclipsing the Pirates who have roughly 10,500 subscribers but significantly more survey responses at nearly 200. Such a small sample size, of course, cannot be ignored.

However, the performance of Tigers fans on these measures is nonetheless meaningful, despite never significantly differing from other teams, as it follows a pattern similar to that of the Giants. Such a pattern indicates that commentary may be the driving force for knowledge of advanced statistics. Indeed, significant differences were found when these teams were removed post hoc. For instance, the six statistics utilized to assess players did not differ between fans of advanced and traditional broadcasts when all teams were included. However, removing the Giants and Tigers resulted in a significantly higher average score for fans of advanced broadcasts. The same occurred when assessing difference scores, as well, as a non-significant difference ended up becoming a significantly smaller score for advanced teams as initially predicted. Quiz scores also saw a drastic change; removing the Giants and Tigers did not result in significance, but controlling for other variables did result in significantly higher quiz scores for fans of advanced broadcasts.

The goals of these post hoc analyses without two of the eight sources of data was not about searching for significant differences. Instead, it was more about clarifying the driving forces behind fans' knowledge and acceptance of advanced statistics. These initial decisions after the content analysis about dichotomizing traditional and advanced teams based on broadcast portrayals were not quite so clear cut, which likely led to some of the conflicting results in the survey portion of the research. Much like baseball statistics themselves, there was no one all-encompassing metric to distinguish between advanced and traditional. The rankings, though accounting for both graphics and commentary, were weighted more towards graphics due in large part to the sheer number of statistics shown on-screen. In total, there was over four times as many individual statistics shown within the graphics as there were comments about statistics made by broadcasters. In addition, with this being largely unexplored territory, there was not necessarily any theoretical indicators which would have clarified the effect of spoken word over visualization, particularly within the context of televised sport. The results are nonetheless meaningful moving forward, suggesting that commentary may be the place where more powerful impressions can be made on fans regarding their knowledge of advanced statistics.

Of course, the results align with Bandura (1986) who suggested that models can impede or promote learning. With the Giants, the models, those being the broadcasters themselves, appear to impede the learning process. While the graphics were some of the most consistently advanced of any team, the commentators chose to discuss either the traditional facets of the graphics or other traditional statistics. Compare that to a team like the Cubs who had the most advanced graphics by nearly each measure, while also having broadcasters who discussed advanced statistics. Here, the Cubs announcers promoted learning which, it appears, leads Cubs fans to adopt these advanced statistics into their respective schemas.

Relatedly, commentary may have also been as influential as it was due to levels of identification fans feel with their team's broadcasters. Bandura (1995) suggests that individuals are more likely to learn from and model the behaviors of those with whom they identify. Though fans, particularly those here, highly identify with their team, results appear more mixed when it comes to commentators. The one measure of some form of commentary satisfaction asked whether or not fans watched their team's broadcast when watching a game; the ever-popular streaming services today allow fans to choose between the home and road team broadcast feeds. However, nearly all participants indicated that they watch the broadcast of their team, suggesting that they like their own announcers enough to watch them more consistently than those of the opponent. Anecdotally, however, fans on the subreddits offered differing opinions on the state of their broadcasts. For instance, fans of the Giants were very clearly positive when speaking about their announcers. Phillies fans, on the other hand, were less positive in their attitudes about their broadcasters. This, however, offers some additional insight as to why Giants fans scores as low as they did on the statistics assessments. Given their affinity for the broadcasters, Giants fans were likely more inclined to follow their lead when it comes to issues of statistics. Even though the graphics may feature some more advanced concepts, Giants broadcasters instead discussed the traditional ones. Thus, fans may come to see less need to adopt the on-screen advanced statistics knowing that their broadcasters, with whom they identify, essentially ignore them.

Keeping with the discussion of broadcasts, the Colorado Rockies fanbase would have made for an interesting test case. Rockies broadcasts, in terms of graphics, were far towards the traditional side, with 94.5% of individual statistics shown being categorized as traditional and an average graphic score of 1.87; they also featured the fewest statistical portrayals of any team with just 437 over the two games. However, Rockies broadcasters were second only to the Cubs in terms of offering the lowest percentage of comments about traditional statistics (73.6%) and the highest percentage of comments about advanced statistics (17.9%). Rockies broadcasts also featured the highest percentage of instances where an advanced statistic was shown on screen and concurrently discussed by the broadcasts, occurring 62.5% of the time; while the percentage is high, this only occurred 15 times due to the limited amount of advanced statistics in graphics. This, of course, is part of the reason why the Rockies were not selected for further analysis initially. The conflicting disparity between graphics and commentary was one aspect, but also the thought that graphics should be weighted more heavily due to sheer quantity leaves the Rockies for future research.

One other theoretical thread that also requires discussion is that of cultivation theory. The MLB season is the longest of any sport and it features 162 games per team in less than 190 days. With that in mind, not only is being a fan of a team with an advanced or traditional broadcast impactful in terms of learning, but the fact that there are so many games can only contribute to acquiring the statistical information portrayed (Gerbner, Gross, Morgan, & Signorielli, 1986). In this way, the agenda set by graphics and the associated framing with commentary are magnified by the cultivation process. As fans consume more and more baseball broadcasts as the season progresses, the statistics repeatedly seen and heard become ingrained in the minds of viewers. In particular, a fan whose primary mode of baseball consumption is through televised games (as opposed to searching internet content) will almost certainly feel that the most important baseball statistics are those that they hear about when watching.

Furthermore, not only are there a substantial amount of games per season, but, across all teams, fans reported high levels of consumption. The question of amount of games consumed was cut off at 41 or more, with the belief that anyone watching that many games can safely be considered a heavy viewer. Indeed, not only were the fans here highly identified with their respective team, but nearly 80% of participants indicated that they watched over 40 games last season. Therefore, the potential for cultivation to play a role in influencing statistical knowledge of viewers is high. Perhaps the clearest indicator of this is not necessarily knowledge, but the notion of which statistics fans use, as those more likely to utilize advanced statistics have begun to see them as a legitimate measure of player ability. Indeed, with fans of advanced broadcasts being found to use advanced statistics more frequently, there is some evidence for potential cultivation effects. However, it is more likely that the theories discussed here are interacting in some way to influence viewers.

Implications

Old School and New School. This dissertation also saw the development of a new measure for fans of baseball which assessed attitudes towards the state of the game. This old school/new school baseball measure was developed in an effort to build off of a similar concept from Sukhdial and colleagues (2002) which pertained to general sports fans. While this new measure is specific to baseball fans, it provided an important assessment of attitudes for the fans in question. More importantly, considering the levels of new or old school beliefs for fans significantly altered their knowledge of and desire for statistics. As anticipated, as the level of new school beliefs rose, statistical knowledge also rose; this was true for all measures of knowledge, as well. New school fans were also found to have higher levels of desire for an increase in both graphics and commentary featuring advanced statistics. Conversely, fans higher in old school beliefs saw the opposite trend in all cases. The more old school a fan was, the less statistical knowledge they had and they also had less desire for graphics and commentary featuring advanced statistics.

When broadcast was factored in, these results for both new school and old school fans remained largely the same. First, there were no differences in new school or old school fans by broadcast, indicating that broadcasts did not necessarily create any sort of approach to baseball fandom. From there, the influence of both broadcast and new or old school beliefs on statistical knowledge was assessed. Of course, quiz scores, difference scores, and the statistics utilized scores did not significantly differ between fans of teams with advanced or traditional broadcasts in the initial analyses. Controlling for either new school or old school scores still did not result in significant knowledge differences between broadcasts, however, and the means changed only somewhat. However, in the post hoc analyses without data from Giants and Tigers fans, the non-significant difference in quiz scores (though close with a p-value of .052) became significant when keeping new school scores constant, even though the effect size was small. Therefore, if viewers of advanced or traditional broadcasts had the same new school score, they would differ in their statistical knowledge. Thus, it appears that knowledge differences in this case are at least somewhat based on whether fans are subjected to a general pattern of advanced or traditional statistics within broadcasts and not necessarily how new school one is.

The ramifications here offer some support for the idea that just because one is more new school in their beliefs there is still some important influence coming from the broadcast. In theory, the new school fan would end up with the same levels of knowledge regardless of the statistical content found on the broadcast of their favorite team. The results here, however, show that those subjected to advanced broadcasts do end up with more knowledge regardless of their attitudes about the state of the game. Additional ramifications lend support to the idea that baseball fans do indeed differ in their attitudes about the game and that these attitudes lead to different outcomes. Without accounting for broadcast at all, new school fans have higher statistical knowledge than old school fans. There are also clear differences in what new school and old school fans want from broadcasts in terms of statistical content. Given that there were no differences in the amount of new school and old school fans between the four traditional and four advanced teams, broadcasts should indeed strive for a combination of traditional and advanced graphics and commentary, thus attempting to appeal to as many viewers as possible.

The results also indicate that the old school/new school baseball scale should continue to be tested. The factor analysis for the scale yielded five distinct factors, yet the survey measure here utilized only two of them in an attempt to prevent participant fatigue. The two factors tested, one old school and one new school, did yield the anticipated results. However, a complete version of the survey should also be tested in the future to attain a greater understand of how these differences influence other areas of baseball fandom.

One such area is the on-field product itself. The sabermetric revolution in baseball is not just about new statistics, but about how these statistics change the way baseball is played (Costa & Diamond, 2017). For instance, when on-base percentage was identified as being one of the more important predictors of run scoring, the ability for a batter to walk became desirable. With walks, however, come more pitches taken by batters, which then leads to less action due to fewer balls in play. On the pitching side, starting pitchers are not pitching quite as deep into games, largely because data illustrates that the more times they face a batter in a game, the worse their outcomes. Lichtman (2013) discovered that this times through the order penalty is due more to a batter's familiarity with the pitcher than pitcher fatigue; batters who see more than four pitches in a plate appearance were found to have a significant advantage in their next plate appearance. With this, however, is an increase in team emphasis on short bursts out of their pitchers. This, in turn, causes pitchers to train and prepare differently; in particular, they now throw harder than ever before, knowing that facing fewer batters per outing allows for more maximum effort pitches to be thrown (Passan, 2016). Much like walks have lessened action in baseball, the modern pitcher has caused the same to happen as strikeouts continue to increase. In addition to that, 2017 was the first season where foul balls outnumbered balls put in play, due in large part to batters trying to catch up to the modern pitcher (Sawchik, 2019). Indeed, the old school fan is sure to subscribe to the idea that the one of the biggest issues with this all-out pitching trend is that the role of the starting continues to be lessened (Lindbergh, 2018) or removed altogether as "openers" take over the game (Kram, 2018). Therefore, to assess old school and new school attitudes may help understand viewership itself. Results here indicate that as age rose, so did old school attitudes; the opposite relationship was found with new school attitudes. Thus, these orientations to the game may offer insight into who is tuning in and who is tuning out. The next step would, of course, be to figure out how to fix the potential problems with televised baseball.

Schwabism and Mavenism. The most powerful predictor of statistical knowledge found here was participants' levels of Schwabism. To review, Schwabism is not just about how much statistical knowledge one feels they have, but how much they feel others believe they have, as well. However, it seems that perception is reality for these participants as 22% of the variance in quiz scores was explained by Schwabism. The statistical knowledge quiz was out of 19 points; for every one point increase in Schwabism, quiz scores went up over one whole point. When comparing fans of advanced and traditional broadcasts, there was no difference in Schwabism. Broadcast type had no discernable influence on quiz scores when accounting for Schwabism, however. When Schwabism was low, quiz scores were low for the both fans of advanced and traditional broadcasts; these scores consistently rose in a nearly identical pattern as Schwabism rose. This signifies that statistical knowledge was very much affected by Schwabism and, when controlling it, those differences disappeared.

However, the post hoc analyses that removed the data from Giants and Tigers fans led to slightly different conclusions. Here, while there was again a non-significant difference in quiz scores overall, the differences became significant when keeping Schwabism constant. Therefore, if viewers of advanced or traditional broadcasts had the same level of Schwabism, they would differ in their statistical knowledge, which was not the case if Schwabism fluctuated naturally. When controlled for, however, fans of advanced broadcasts saw an increase in their quiz scores while fans of traditional broadcasts saw a slight decrease. As mentioned previously, Schwabism is powerful enough to wash away differences between advanced and traditional broadcasts, hence why it was important to control for it. Thus, in this case, it again appears that knowledge differences are based on whether fans are subjected to either advanced or traditional statistics within broadcasts and that this difference is discovered when keeping other variables constant.

The same general pattern was found with mavenism, as well. Differing from Schwabism somewhat, mavenism is about, again, not just your own perceived knowledge of baseball statistics, but your desire to share the knowledge you have with others. Mavenism was not found to be quite as powerful a predictor as Schwabism, though it still accounted for nearly 12% of the variance in quiz scores. Fans generally rate themselves high on mavenism, as well, averaging a 5.8 on a seven-point scale; Schwabism ratings were about a full point lower. No differences in mavenism were found based on broadcast, either. Interestingly, controlling for mavenism brought quiz score means to be very nearly identical, 14.638 for fans of advanced broadcasts and 14.636 for fans of traditional broadcasts. While quiz scores did not significantly differ in the first place, mavenism made the non-relationship even more evident. Thus, what differences there were initially, though small, were very much driven by mavenism. The post hoc analyses also followed the same pattern as Schwabism. Quiz scores ended up significantly differing when controlling for mavenism; if viewers had the same level of mavenism, fans of advanced broadcasts would have significantly higher quiz scores.

As evidenced by the similar patterns in the data, mavenism and Schwabism are indeed highly correlated; the .704 positive correlation they share is enough to indicate a strong relationship. However, despite their similarity, they are indeed two separate variables with one, Schwabism, having much more of an effect on statistical knowledge. Interestingly, a previous assessment of these knowledge factors found higher levels of mavenism for both fantasy and traditional sports consumers (Billings & Ruihley, 2013). While fantasy baseball participation was indeed found to be an important predictor of statistical knowledge, this study was concerned with knowledge itself, thus suggesting that Schwabism and mavenism interact differently with that outcome.

Understanding why Schwabism was a more powerful predictor of statistical knowledge requires only a reflection on what it is; Schwabism is about perceived statistical intelligence in the eyes of others. Actual knowledge, particularly about advanced statistics, would likely follow from there. The majority of baseball fans are highly knowledgeable about traditional statistics; indeed, on the five questions about traditional statistics in the quiz, participants scored a 95.5%, an A to A+ level if being graded accordingly. On the advanced statistics portion, however, participants average score was a 70.5%, which is down in the C- range. Thus, those high in Schwabism naturally should be more knowledgeable about advanced statistics as just about any baseball fan can comfortably be seen as "intelligent" when it comes to traditional statistics; the same is not true for those on the advanced side. Mavenism, on the other hand, is more about a desire to share knowledge. While certainly predictive of statistical knowledge, wanting to share can encompass all statistics; sharing does not necessarily need to be limited to just complicated statistics and others need not see the sharer as someone of exceptional statistical intellect.

These qualities of sports fandom appear to warrant additional consideration, as well. It is clear that they are important predictors of statistical knowledge, but it is worthwhile to understand what leads individuals to become high in Schwabism or mavenism. While no differences were found by broadcast type, it can be speculated that consumption is an important predictor. Furthermore, while the actual game consumption is likely important, it may also be overall sports consumption in the form of highlight and talk shows that are also important predictors. This is particularly true for Schwabism as, again, being seen as someone who has a great deal of knowledge should naturally flow from also being seen as someone that watches a lot of sports content. Mavenism, on the other hand, may be more a function of identification. As this sample was acquired though an online space for fans to congregate, the majority of fans were highly identified, averaging 6.3 on an eight-point scale. However, 20.5% of the variance in mavenism was explained by identification, along with a moderate positive correlation. Schwabism, on the other hand, was still significantly predicted by identification, but it explained less than 10% of the variance and the correlation was weaker. Thus, future research should seek to test mavenism and Schwabism with a less identified sample to more accurately assess the influence of identification on these knowledge-related variables. Even so, it appears that there is some evidence to indicate the importance of identification when it comes to mavenism.

Team Identification. Regarding identification, there was a slight increase in quiz scores as it rose, though it was not a powerful relationship. It is likely that such a result occurred due to the slight negative skew in the identification data; while skewness was within the range of acceptability, the high mean identification score along with the appearance of the distribution is enough to suggest the data was not entirely normal. Thus, with the majority of participants being highly identified, it is likely that differences between those high and low in identification were washed away somewhat. In any event, the idea that a more identified fan would also have higher statistical knowledge is largely intuitive. However, the broadcast differences were of greater interest. It was hypothesized that there would be an interaction between broadcast and identification with respect to statistical knowledge. Particularly, the speculation was that highly identified fans of advanced broadcasts would have greater knowledge than highly identified fans of traditional broadcasts. While not attempting to suggest that a null finding is significant (the p-value for the interaction was .102), a plot of the data and trend lines saw more of the reverse. Specifically, the data was trending towards the following: when identification was low, fans of advanced broadcasts had more knowledge, yet when identification was high it was the fans of traditional broadcasts who had slightly more knowledge. In the post hoc analyses, however, this pattern largely disappeared indicating the Giants broadcast commentary may have been playing a role initially. Regardless, these are just non-significant patterns though the trends were still interesting in that they were contrary to expectations.

Additionally, the identification measure here was the SSIS (Wann & Branscombe, 1993) which is noted to be the “most widely and extensively used tool for measuring sports fan identification…" (Dietz-Uhler & Lanter, 2008, p. 105). The SSIS, however, focuses on how identified one is with a team, not necessarily the sport itself. In addition to acquiring a sample with greater variance in identification to better assess differences, future research may also want to distinguish between team fandom and sport fandom. Though these two facets of fandom may seem the same, and while they are indeed correlated, they are unique variables (Wann, 2002; Wann et al., 2001). Thus, there may be meaningful differences found in knowledge acquired when accounting for these differences. For instance, while one could be highly identified with their team due to any number of factors, they may not be much of a fan of the sport itself; such a case could manifest itself when one supports the hometown MLB team without having much interest in baseball itself. Alternatively, a fan may have never adopted a specific team, but instead is a fan of the game or MLB as a whole. It would be anticipated that the highest levels of statistical knowledge would come from those who are high in both team and sport fandom; the Cubs fan that watches most games but is not really a passionate baseball fan may be less interested in the statistics of the game as their main reason for watching may simply be to see if the Cubs win. The data here indicated that the majority of respondents were highly identified with their teams, but their baseball fandom was not assessed in such a way. Thus, assessing this other aspect of fandom in the future could add to some of the insight garnered from this research.

In addition, this study has implications for other sports, as well. While baseball has always been at the forefront of the statistical revolution, other sports have seen such changes, as well. In particular, with leagues like the NBA and NHL also having specific local television broadcasts, these results suggest some strategies for disseminating and potentially mainstreaming new statistics. In particular, it appears important to utilize a two-sided approach (O'Keefe, 1999) whereby the statistics fans grew up with are still included, but are now portrayed along with the more modern, advanced metrics. Commentators should also seek to discuss the new metrics on a more frequent basis as the nature of local broadcasts suggest that fans may identify with these familiar voices.

In many cases, fans of any sport will likely come to learn about advanced statistics through their own internet interactions and research. However, it seems that broadcasts play at least somewhat of a role when it comes to creating a more informed fanbase. The question may then become more about what happens to fans of sports that do not feature such local broadcasts, such as golf, tennis, and, to some degree, football. Specifically, NFL teams have their own radio voices, but televised games feature somewhat less explicit team-by-team commentators. Even so, the results here may still inform these other sports even though the voices are less consistent for viewers. Indeed, the key tenets likely remain the same. Broadcasts should seek to subtly increase the amount of advanced statistics they feature on screen, being sure to display them alongside those fans have supported for years in a two-sided fashion. Commentators should also strive to discuss them more frequently, though the effects here may be more varied as national broadcasters are certainly not always universally loved. It is also possible that more specialized networks, such as the Golf Channel and Tennis Channel, may produce more knowledgeable fans if the statistical content featured on broadcasts is synchronized with other programming on the networks which seek to keep fans informed about advances in metrics, though that is purely speculation and a potential avenue for future research.

Learning and Unlearning. One of the larger goals of this dissertation was to use this baseball context as a proxy of sorts for how individuals learn and, more specifically, unlearn. Unlearning in this context was not about forgetting traditional statistics, but instead utilizing and accepting other, more advanced statistics. As it pertains to learning, the central hypothesis predicted that fans who were subject to higher levels of exposure of advanced statistics would have higher knowledge of them. This hypothesis, however, was not supported. As was discussed previously, this may have been a function of the teams that were selected as advanced or traditional. Specifically, while none of the three measures of knowledge significantly differed by broadcasts originally, the post hoc analyses revealed significant differences for two of the three, difference scores and statistics utilized, with quiz scores also coming close to statistical significance, as well. The post hoc analyses suggest that all is not lost for the idea that we learn from exposure.

Perhaps the most important measure regarding knowledge pertaining to learning and unlearning is the question of which statistics fans utilize. While scoring well on the quiz indicates knowledge, it still does not necessarily suggest that fans utilize those statistics in their own research or conversations. However, asking fans which statistics they like to use in those contexts provides insight to which statistics have penetrated their schemas. Baseball is, without question, consumed by statistics – and likely more than any other sport. Of course, statistics are not just for the teams to evaluate talent. Statistics take up considerable airtime within a baseball broadcast, as evidenced by the over 350 statistics shown on screen and the nearly 85 comments about them per game. The fact that so many statistics find their way onto baseball broadcasts makes them important reference points for fans, who, as a group, have cognitive motivations which are one of the key drivers of sport consumption (Raney, 2006). Applying the knowledge acquired through sports broadcasts naturally follows from there. Fantasy sport participation has been found to be one avenue for fans who seek to apply their knowledge (Lee, Seo, & Green, 2013). How fantasy sport pertains to the utilization of statistics, however, depends more on one's league. While many fantasy leagues do offer a number of advanced statistical categories, as recently as 2016 over 99% of Yahoo leagues still feature RBIs, one of the most traditional of all statistics (Lindbergh, 2017). Other motivations for applying sports knowledge, particularly in the form of statistics, are somewhat more intrinsic, particularly taking the form of a desire to be seen as an expert, as is likely the case with those high in Schwabism. Such desires also manifest themselves on social media for some fans (Wang, 2013). Of course, some fans simply desire to be more effective in their communication about sports (Gantz, 1981).

With this in mind, the difference found between advanced and traditional broadcasts in statistics utilized in the post hoc analyses which accounted for inconsistent commentary has ramifications for fans. If fans of teams with advanced broadcasts are receiving a higher quality of baseball information they may benefit socially through their conversations and also potentially monetarily by way of fantasy baseball. While some fans will feel that information is just information, there are still many more who enjoy the idea of learning more about their favorite sport. In baseball, statistics offer the primary avenue for increasing knowledge and acquiring a better understanding of how the game is evaluated. For fans of advanced broadcasts, out of the six preferred statistics listed, with each being coded as 1, 1.5, or 2, their average statistic was just over 1.5. This average shows how far baseball has come in just under 20 years as it was not long ago when baseball fans were confused by the comparatively traditional box score (Tuggle, 2000). This indicates that fans are indeed learning about and growing more accepting of advanced statistics, while still holding on to some of the classic traditional statistics.

However, this also harkens back to one of the main points: increasing the coverage of advanced statistics is not about eliminating those that are more traditional, but instead complementing them. In particular, broadcasts should be striving for more of a two-sided approach (O'Keefe, 1999), whereby both forms of statistics are acknowledged. Evidence for this exists outside of baseball, too. Specifically, those on the side of the ever-controversial anti-vaccine movement have been found to have their attitudes unchanged (Horne, Powell, Hummel, & Holyoke, 2015) or even strengthened (Nyhan, Reifler, Richey, & Freed, 2014) when presented with corrective information that illustrates the importance and efficacy of vaccines, indicating a one-sided approach (O'Keefe, 1999). For baseball, this makes it important to integrate both forms of statistics for those who are less supportive of advanced statistics. With more fans than not seeming to desire an increase in statistical portrayals on screen, and the accompanying learning that comes with them, this should be something for MLB broadcasts to consider as they prepare statistical portrayals.

Moving beyond baseball, the idea of learning and unlearning manifests itself a number of contexts. The aforementioned anti-vaccine movement offers an example, though of a somewhat different nature. Specifically, despite a long-since retracted paper (Eggertson, 2010) linking autism to the measles, mumps and rubella vaccine, there is little to no evidence suggesting vaccines cause autism. Indeed, more evidence to the contrary continues to be uncovered (Hviid, Hansen, Frisch, & Melbye, 2019). Thus, the vaccine debate becomes less about old and new information and more about skepticism and conspiracy.

The electric car debate falls into a similar category in that it is fraught with misinformation, though here the consensus is less clear. While technology has certainly advanced significantly since the days of concern over electric shock and battery acid (O'Day, Bunch, & Huang, 1978), there is still a great deal of uncertainty over the efficacy of electric cars. In particular, depending on which statistics are cited, electric cars can appear either more or less expensive overall than gas-powered cars. While consumers have concerns over increased electric bills, uncertainty about battery life, and the cost of the cars themselves, there are also fewer components on an electric car that need maintenance and less strain on the brakes (Douris, 2017). Even so, convincing those that have always driven gas-powered cars to change is yet another instance of great difficulty. While the context is different, there still may be information gleaned from the results here that could help the learning and unlearning processes. Specifically, consumers likely do not accept methods that solely push statistics about electric cars on them. Instead, combining information from both types of vehicles in a two-sided format may be a way to make electric cars more appealing as these comparisons can illustrate the benefits.

Additionally, there are other contexts that specifically focus on old and new metrics to assess the same problem. For instance, there is the issue of unemployment. When looking at unemployment statistics, it appears that the United States is in a good place, even with the varying complexities of these numbers (Sherman, 2018). However, other statistics paint a different picture. For instance, rates of underemployment, which assesses those that are in lower-paying positions than they should be based on their education, are suggesting that all is not well as those numbers increase and may help explain the low level of wage growth (Bell & Blanchflower, 2018). More importantly, this provides a case for the statistic of choice influencing the appearance of an issue. This research could therefore inform effective methods of portraying the traditional unemployment statistics against the more advanced underemployment numbers. Again, it is likely not enough to show one or the other; instead, both should be displayed with the differences between the two being explained. Despite it being a common issue, many Americans likely are not familiar with the intricacies of unemployment or, particularly, underemployment. Thus, being more informative about both can help lead news consumers to more accurate conclusions.

Professionals are also subject to misinformation and a lack of ability to unlearn. One of the more prominent and high stakes examples is that of police officers and their beliefs about the physical manifestations of lying. While laypeople have not been found to be effective lie detectors with an accuracy rating of 54% (Bond & DePaulo, 2006), police officers have been found to be more accurate with a rating of 65% (Mann, Vrij, & Bull, 2004). Even so, with lie detection being of crucial importance in a law enforcement context, officers' ratings would, ideally, be higher. A major issue, however, is that police officers are trained to look for cues that are not actually indicative of lying. For instance, both the Reid technique (Inbau, Reid, & Buckley, 1986) and the kinesic interview technique (Link & Foster, 1989) center around the idea that deception causes an increase in anxiety and stress in the perpetrator. However, this view ignores that fact that any police encounter will likely have the same effect on both liars and truth tellers. Indeed, Kassin and Fong (1999) have suggested that the training police receive actually reduces the detection accuracy of police officers. One potential reason is that not only are officers typically receiving incorrect information, but feedback regarding their accuracy, or lack thereof, is often delayed (Vrij, Granhag, & Porter, 2010). Thus, officers often do not receive the corrective information at the appropriate time, which may mean their incorrect assumptions are already ingrained. However, when officers were trained to utilize evidence strategically, their accuracy ratings increased (Hartwig, Granhag, Strömwall, & Kronkvist, 2006; Luke et al., 2016), though this method is far from common in police training. Additionally, as Levine (2015) has begun to uncover more effective methods of deception detection, it is likely that attempts to persuade law enforcement of their efficacy will be met with resistance.

Despite the previous examples existing in present day America, these issues of learning and unlearning are not new. Indeed, decades ago Festinger, Riecken, and Schachter (1956) wrote that “a man with a conviction is a hard man to change” (p. 3). Not only is this stull true today, but it may be truer now than ever before. The proliferation of fake news, be it the content of the news itself or simply the oft-repeated term, has made the world more skeptical. Political polarization is also at one its highest points in history, if not the highest (Beck, 2017). Fake news has preyed on this polarization, with both conservatives (Fessler, Pisor, & Holbrook, 2017) and liberals (Meyer, 2017) falling for misinformation that supports their beliefs. It is not necessarily a matter of education level, either. For instance, regardless of education level, anti-vaxxers held onto their beliefs when presented with corrective information (Larson, Jarrett, Eckersberger, Smith, & Paterson, 2014). In fact, higher levels of education have been found to make people more firm in their positions as they are better equipped to come up with arguments in favor of their beliefs (Perkins, Farady, & Bushey, 1991). Individuals have also been found to have an easier time learning facts that support their beliefs (Jerit & Barabas, 2012). This is found in baseball, too; when new measures are developed that run contrary to the eye test, fans are more skeptical of them, as is often found with defensive metrics (Cwik, 2013). Here again, however, might be an area where both old and new information need to be portrayed alongside one another. And, while the goal will always be to eradicate incorrect beliefs, this may always be the toughest of asks, particularly in today’s climate (Khazan, 2017). Thus, perhaps a more attainable goal is move individuals away from the poles to where the other side or new information can at least be acknowledged as potentially credible.

Limitations and Future Research

Perhaps the most pressing limitation relates to the selection of teams to be surveyed. However, it is a limitation inasmuch as it was more of an imperfect process. As has been discussed, greater emphasis was placed on graphical portrayals when selecting which teams were advanced or traditional in their presentations of statistics. The reason behind this choice was more about the sheer amount of statistics shown on screen, particularly when compared to the amount of commentary about statistics. Based on the patterns found in the survey data, it seems that commentary had much more of an influence on fans' knowledge than anticipated. While this did alter the overall results, removing the two teams with commentary contrary to their graphics did have the anticipated result on the data, leading it to be more in line with expectations.

However, what was a limitation here can be used to inform future research which should seek to categorize teams in a way that weights graphics and commentary equally. One such method of that here would have been to simply sample from fewer teams. However, choosing five teams from each end of the spectrum was done to assure an adequate sample size and also due to uncertainty regarding how far broadcasts would need to go to be considered either advanced or traditional. On the latter note, that is still somewhat uncertain. While the teams sampled from did provide results in the anticipated direction when accounting for commentary, it is still unknown which other teams close to either end of the spectrum would provide the anticipated results. Another alternative for future research, to better predict the effect of commentary, would be to assess teams that were less advanced in graphics while being highly advanced in commentary, such as the Rockies. If Rockies fans would show high statistical intelligence then it would illustrate that commentary is not just important for learning, but perhaps demonstrably more important than graphics.

Another primary limitation here revolves around the demographics of the overall sample which were, indeed, skewed. For instance, 84.3% of the sample was White. However, that number is actually close to reported demographics for MLB viewers, which is about 83% (Chang, 2017). Additionally, 93.9% of the sample were men. For comparison, MLB viewers are about 70% male on average (Thompson, 2014). The average age of fans in this sample was just over 30 which, compared to viewer demographics, is significantly lower as the average baseball fan is 57 years old (Lombardo & Broughton, 2017) and over 50% of baseball viewers are age 55 or older (Thompson, 2014). Indeed, it is likely that the skew in the data is due in large part to the sample coming from subreddits. For instance, about 70% of Reddit users are White, over two-thirds are men, and roughly 93% of users are between the ages of 18 and 49 (Sattelberg, 2018). Indeed, the sample was not a perfect representation of the average MLB fan, though the numbers were closer to the average Reddit user.

Perhaps the most pressing demographic issue is the age disparity. Indeed, older participants were found to have less statistical knowledge. Desire for more advanced statistics in graphics and commentary was also found to decrease with age. This is consistent with the anecdotal belief that younger fans are the ones who are more in favor of advanced statistics, while older fans want the classic statistics they grew up with. However, it is also consistent with research which suggests that younger fans, particularly those who play fantasy sports, consume more sports media and have higher surveillance motivations than those above the age of 35 (Brown, Billings, & Ruihley, 2012). Thus, perhaps an older sample, one closer to actual MLB viewing demographics, would have yielded a greater disparity between the advanced and traditional broadcasts. However, the lack of women in the sample is an issue, as well, largely because it is unknown whether women have a different orientation to statistics and the number here was simply too small to make meaningful comparisons. For those reasons, the results here lack the desired generalizability as the sample was substantially younger and male-dominated than the average baseball fan.

Therefore, the demographic limitation here can essentially be categorized as a subreddit limitation. Future research should seek to acquire samples of fans from other sources in an effort to attain not just a more representative gender and age spread, but also to ensure that it isn't just subreddit users being assessed, but instead the more average baseball fan. Similarly, the subreddit sample also suggests that some of the implications discussed need to be qualified due to the questionable generalizability brought by the sample.

Future research should also seek to understand the effects of statistical portrayals in other sports broadcasts, as well. Baseball provides the most important test case as it has always been statistically-driven, thus leading fans and researchers to continue advancing knowledge. Also, in other sports, sometimes statistical revolutions are not all that influential (Bialik, 2014). That is starting to change however as other sports have started to become more data-driven, such as basketball (Kubatko, Oliver, Pelton, & Rosenbaum, 2007), ice hockey (Stinson, 2014), and golf (Yousefi & Swartz, 2013). Thus, to understand whether or not these sports are beginning to increase their coverage of advanced statistics is important to understand. For basketball and hockey in particular, the same sort of broadcast differences can be assessed as well with each team having their own unique broadcasts much like baseball. Thus, understanding whether these effects occur in other sports will help to illustrate whether or not these differences are specific to baseball fans or indeed a result of exposure through viewership.

An additional direction for future research should also try to assess the amount of time spent searching statistics online. Sports fans are known for their propensity to search for information both before and after televised competitions (Gantz et al., 2006) and the internet provides one of the best opportunities for them to do so (Hur, Ko, & Valacich, 2007; Real, 2006). While the actual televised competition may be the reason fans are fans in the first place, it is clear that fandom exists at all hours outside of the game, as well. Thus, this dissertation would not attempt to suggest that only source of information for fans when it comes to statistics is the broadcast. Online sport consumption should also be measured in the future as it likely interacts in some way with the statistical content on broadcasts. For instance, those who like searching player statistics when not watching a game will likely want more statistical portrayals within broadcasts. Also, and perhaps more importantly, those who search for statistics on their own time will almost certainly be more knowledgeable of them regardless of the statistics they see on screen. Here, it is possible that advanced broadcasts have a much larger effect on those who do not engage player statistics outside of the game itself.

Another potential avenue for future research would be to understand how much fans identify with the local broadcasters for their favorite team. As mentioned previously, there was no measure here assessing how much fans actually liked or identified with their broadcasters, though subreddit comments indicated that just because one is a fan of a team does not mean that one is a fan of their announcers. Based on the results here, there may be implications regarding the effect of commentary on knowledge. Specifically, if broadcasters discuss advanced statistics, fans may only acquire knowledge about and adopt these statistics into their frameworks if they identify with the broadcasters in the first place. The reverse can also be possible; a fan who identifies with an announcer who pushes traditional statistics only may feature a similar statistical schema.

Conclusion

The dissertation sought to understand whether or not baseball fans have greater knowledge of advanced statistics when they are portrayed by the local broadcast of their favorite team. While the context appears limited, these advanced statistics are simply a form of new information that is demonstrably more effective than the old, which has the advantage of being deeply ingrained. Baseball fans themselves are also just individuals who are exposed to a great deal of content and feature high levels of investment and involvement with the entity they support, and the new information is challenging the status quo they accepted for many years. All of this is to say that the topic at large is not quite as specific as it may seem.

Indeed, individuals are faced with new forms of truth on a near daily basis. Whether it is the push towards electric cars (Ballard, 2019) or the anti-vaccination movement that continues to rise (van Panhuis et al., 2013), people face a constant stream of conflicting facts and ideologies. Researchers in many different disciplines and with many different contexts have attempted to understand why people are resistant to factual information, often with little luck (Bain, Hornsey, Bongiorno, & Jeffries, 2012; Hornsey, Harris, & Fielding, 2018). While the topic at hand here is certainly not of the magnitude as some of the others plighting the world, there are related aspects. This dissertation has also provided some insight regarding the factors that facilitate the learning of new information which potentially conflicts with long-held beliefs. In that way, the similarities do exist.

What this research discovered is that not only does an increase in advanced statistics during broadcasts potentially promote learning, but also that the facilitators of that information appear to play an important role. What separates this context from others is that the recipients are sports fans who we know to be a highly identified and motivated group of people, particularly when it comes to their team. Additionally, the facilitators are broadcasters who happen to work in some capacity for the entity, the team, that the recipients are motivated to support. The recipients, therefore, build up a relationship with not just the team, but with the facilitators as well. These facilitators thus become trusted sources of information. If information, in the form of statistics, appears on screen, it may have an effect on the recipients. However, if this information is corroborated by the facilitators, the recipients appear to be more accepting and, thus, adopt it into their own frameworks. Other factors play a role too, such as the desire to be seen as intelligent regarding the subject (Schwabism), the desire to share information (mavenism), and a positive orientation to the current state of affairs (new school beliefs). Thus, it again goes without saying that one of the reasons that this baseball context is unique is due to the relationship fans build with a team and its broadcasters. For issues such as climate change, vaccines, or electric cars, these sorts of relationships likely do not exist. But, while some of these concepts are specific to baseball, others align with traits found in other contexts, as well. Wanting to be known either as an authority on a topic or as an information sharer are natural personality traits, and the new school-old school dichotomy can reasonably be categorized similar to political affiliations or related concepts. The goal from there should be to then find a way to target the desired audiences and attempt to communicate the information in a way that accounts for both sides of the issue so as not to push people away.

Honing in again on the baseball-specific context, differences were first discovered in the broadcasts themselves, which then led to differences in fan knowledge. The 30 teams are not all presenting the same broadcast and the varying degrees of information presented did influence fans in some way. Of course, this is not to suggest any sort of hypodermic needle-type effect on fans. As mentioned, fans differ on a number of traits. Additionally, as with anything, some fans will always want more advanced statistics and some will always want none. But, this research has uncovered that through the combination of setting an agenda in the form of graphics and combining it with framing from the commentators with whom fans identify with and model, baseball fans may come to have higher levels of knowledge when it comes to advanced statistics as well as a potential adoption of these statistics into their own baseball frameworks.

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APPENDIX A

Baseball Statistics Codebook

Player (1 = position player, 2 = pitcher)

Team (1 = home, 2 = road)

For Graphics:

Statistics (Each individual statistic will receive its own unique code; the following is not necessarily a complete list as others may appear):

1. Games
    a. amount of games the player has played in
2. Starts
    a. Amount of games the player has started
3. Batting Average (AVG or BA)
    a. Can also be framed as Hits per At-Bats, will look like “0-7”, “1-3”, etc.
    b. Can also be Opponent Batting Average (Opponent AVG or Opp BA) if talking about pitchers
4. Home Runs (HR)
5. Runs Batted In (RBI)
6. Hits (H)
7. Singles (1B)
8. Doubles (2B)
9. Triples (3B)
10. Strikeouts (SO or K)
11. Stolen Bases (SB)
    a. Also written as “Steals”
12. Pitcher Win-Loss Record (W-L)
    a. May just say “Record”

b. If they mention one (e.g. only wins), but not both, this category still applies

13. Earned Run Average (ERA)
14. Innings Pitched, or, Innings (IP)
15. Complete Games (CG)
16. Saves
17. Errors (E)
18. Fielding Percentage (FLD%)
19. On-base plus Slugging (OPS)
20. Walks plus Hits divided by Innings (WHIP)
21. Extra-Base Hits (XBH), total bases
22. Runs (R)
23. Walks (BB)
24. On-base Percentage (OBP)
25. Slugging Percentage (SLG)
26. On-base plus Slugging Plus (OPS+)
27. Spray Chart/By Direction
    a. The direction of a batter's hits, home runs, ground balls, fly balls, etc. Will likely appear as a chart/graph.
28. Walks per 9 (BB/9), BB%
29. Strikeouts per 9 (K/9, or, K/9 IP), K%
30. Strikeouts to walks (K/BB)
31. Hits per 9 (H/9)
32. Home runs per 9 (HR/9), HR rate, HR%
33. Defensive Runs Saved (DRS)
34. Pitch Breakdown
35. Statcast Data
36. Bunts
37. Earned Runs
38. Holds
39. Grand Slams
40. Quality Start
41. At-bats
42. Plate appearances
43. Inherited runners
44. 1st batter efficiency
45. Multi-hit games
46. Run support
47. Pitches per plate appearance
48. Strikeout rate
49. Swing statistics (chase rate, swing%)
50. Assists
51. Double plays
52. WAR
53. BABIP

For each statistic, the following are select cases which are to be indicated.

1. Splits (1 = no, 2 = yes)
    a. A player's numbers vs right handed or left handed pitchers or batters
    b. 1st half vs 2nd half
2. Runners in scoring position (RISP) (1 = no, 2 = yes)
    a. Describes a batter's statistics when baserunners are in scoring position (2nd and/or 3rd base). Any and all stats described here apply; no need to distinguish between the stats shown with RISP.
3. Career stats (1 = no, 2 = yes)
    a. One or multiple stat categories from a player's entire career, or, previous season
    b. How well a player has done against a given team/player/in a certain stadium/interleague play/at home/on the road
    c. How well a batter has done in a previous season(s)
    d. A player's statistics from his time on another team
4. Recent Stats (1 = no, 2 = yes)
    a. How well a batter/pitcher has done over their past "X" number of batters/inning/games/weeks, during the course of a given month(s), or during a given series
    b. "Last [number of] games"
5. Portrayal (1 = alone, 2 = in a group)
    a. Whether the statistic on screen appears alone or in a group with other statistics
6. Type of statistic (1 = traditional, 2 = advanced)
    a. Statistics will be categorized based on their being traditional or advanced stats

Coding for broadcast commentary:

Comments pertaining to statistics will be transcribed and then coded based on the following:

1. The statistic it refers to (see previous list of stats for coding)
2. Type of statistic (1 = traditional, 2 = advanced)

APPENDIX B

Survey

1. How many Major League Baseball games do you watch (at least 3 innings or more) in person, on TV, and/or stream online per year?

   0 1-5 6-10 11-15 16-20 21-25 26-30 31-35 36-40 41 or more

Sport Spectator Identification Scale (Wann & Branscombe, 1993) – 8-point scale

1. How important to YOU is it that the [insert team] win?

   Not Important Very Important

   1 2 3 4 5 6 7 8

2. How strongly do YOU see YOURSELF as a fan of the [insert team]?

   Not at all a Fan Very much a Fan

   1 2 3 4 5 6 7 8

3. How strongly do your FRIENDS see YOU as a fan of the [insert team]?

   Not at all a Fan Very much a Fan

   1 2 3 4 5 6 7 8

4. During the season, how closely do you follow the [insert team] by attending games in person?

   Never Every Day

   1 2 3 4 5 6 7 8

5. During the season, how closely do you follow the [insert team] by watching on television, the internet, or the MLB At Bat app?

Never Every Day

1 2 3 4 5 6 7 8

6. How important is being a fan of the [insert team] to YOU?

Not Important Very Important

1 2 3 4 5 6 7 8

7. How much do YOU dislike the [insert team] greatest rivals?

Do Not Dislike Dislike Very Much

1 2 3 4 5 6 7 8

8. How often do YOU display the [insert team] name or insignia at your place of work, where you live, or on your clothing?

Never Always

1 2 3 4 5 6 7 8

1. When you watch/stream a [insert team] game, how frequently do you watch/listen to their home, regional broadcast (as opposed to the opposing team's broadcast)?

Never Sometimes About half the time Most of the time Always

Mavenism (Billings & Ruihley, 2013) – 7-point scale

1. I like helping people by providing them with information about baseball

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

2. My friends think of me as a good source when it comes to baseball information

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

3. If someone asked me baseball-related questions, I could provide them with answers

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

Schwabism (Billings & Ruihley, 2013) – 7-point scale

1. I probably know more about baseball statistics than anyone I know

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

2. When someone has a question about baseball statistics, they ask me first

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

3. I know more about baseball statistics than most people I know

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

Baseball Old/New School Scale – 7-point scale (* = Old school)

1. The game should return to its roots, focusing more on hits and less on home runs.*

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

2. Today's baseball players swing for the fences too often.*

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

3. The game was better when "small ball" was utilized more often.*

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

4. I believe that the game of baseball, in general, is better now than it was 30 years ago.

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

5. Starting pitchers today should pitch deeper into games.*

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

6. A batter should bunt when the defense employs a shift.*

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

7. The golden age of baseball is now.

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

8. Today's players are better than players from previous generations.

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

9. Since I've been a fan, the quality of baseball today is better than it has ever been.

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7

10. Show me a good loser and I'll show you a real loser*

Strongly Disagree Strongly Agree

1 2 3 4 5 6 7 8 9

Fantasy Baseball:

1. Have you played fantasy baseball during any of the previous three MLB seasons?

   Yes No

2. Did you play fantasy baseball during the 2018 MLB season?

   Yes No

Team/Viewing:

1. What is your preference regarding the amount of ***discussion*** about advanced statistics during [insert team] broadcasts?

   I would prefer less discussion I would prefer more discussion

   1 2 3 4 5 6 7

2. What is your preference regarding the amount of ***graphics*** featuring advanced statistics during MLB broadcasts?

   I would prefer fewer graphics I would prefer more graphics

   1 2 3 4 5 6 7

Statistics:

Please explain what each of the following baseball acronyms stand for (provide as much detail as you'd like). For example, "RBI" = run batted in, when a batter drives in either himself and/or runners on base.

Also, we ask that you not look up any of the acronyms; answering correctly is not important. We are instead interested in your own knowledge of the following acronyms.

1. AVG
2. HR
3. OBP
4. WHIP
5. BB
6. OPS
7. wRC+
8. WAR

9. SLG
10. FIP
11. ERA
12. BABIP

For each statistic: Do you recall seeing or hearing about this statistic during a typical [insert team] broadcast?

Yes No

13. Please list three statistics you feel are the most essential to use when evaluating the offense of a position player.

    Statistic 1: ______________________________

    Statistic 2: ______________________________

    Statistic 3: ______________________________

14. Please list three statistics you feel are the most essential to use when evaluating a pitcher.

    Statistic 1: ______________________________

    Statistic 2: ______________________________

    Statistic 3: ______________________________

Demographics:

1. What is your age? ______________________________
2. What is your gender?
   - Male
   - Female
   - Other
   - Prefer not to say
3. What is your race/ethnicity?
   - White
   - Black or African American
   - American Indian or Alaska Native
   - Asian
   - Native Hawaiian or Pacific Islander
   - Other
4. What is the highest level of education you have achieved?

Less than high school
High school graduate
Some college
2 year degree
4 year degree
Professional degree
Doctorate

APPENDIX C

Overall Statistical Plan

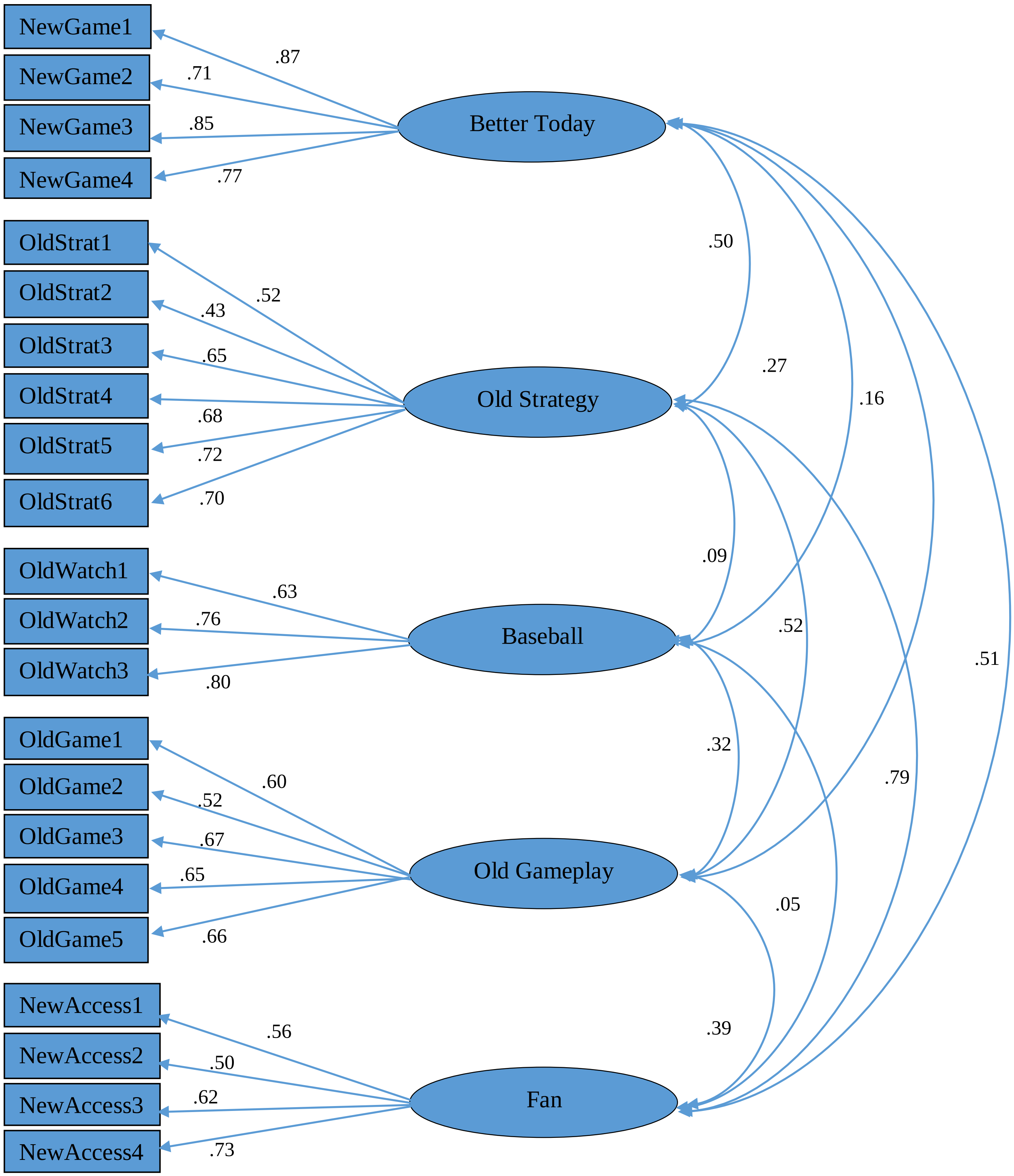
Hypothesis/Research Question	Variable Levels	Statistical Test
H1: Local MLB broadcasts will differ in the agendas they set by way of their graphical portrayals of statistics.	Broadcasts: Categorical Statistics in Commentary: Categorical (Traditional or Modern/Advanced)	Chi Square
H2: Local MLB broadcasts will differ in their framing of statistics by way of commentary.	Broadcasts: Categorical Statistics in Graphics: Categorical (Traditional or Modern/Advanced)	Chi Square
H3: A positive relationship exists between the amount of advanced statistics featured on a local MLB broadcast and fans' awareness of advanced statistics.	Type of Stats on Broadcasts (IV): Categorical Fans' Awareness (DV): Continuous	Univariate ANOVA

H4: A positive relationship exists between the amount of advanced statistics featured on a local MLB broadcast and fans' knowledge of advanced statistics	Type of Stats on Broadcasts (IV): Categorical Fans' Knowledge (DV): Continuous	Univariate ANOVA
RQ1: Through both graphical portrayals and commentary, which teams will place more emphasis on traditional statistics and which will place more emphasis on advanced statistics?	Amount of Stats: Continuous Teams: Categorical	Percentage of advanced stat portrayals will assessed for each team. The three with the highest percentage and three with the lowest will have their fans sampled.
H5: Fans higher in new school beliefs will have a higher level of knowledge about advanced statistics.	Type of Fan: Continuous Knowledge: Continuous	Linear Regression
H6: Those high in Schwabism will have above average knowledge of	Schwabism (IV): Continuous Team (IV): Categorical (Low/High Stats)	General Linear Model

advanced statistics regardless of the broadcast content of their favorite team.	Knowledge (DV): Continuous	
H7: Those high in mavenism will have above average knowledge of advanced statistics regardless of the broadcast content of their favorite team.	Mavenism (IV): Continuous Team (IV): Categorical (Low/High Stats) Knowledge (DV): Continuous	General Linear Model
H8: Team identification will moderate the relationship between the portrayal of advanced statistics on a team broadcast and its effect on fans of that team.	Identification (IV): Continuous Team (IV): Categorical (Low/High Stats) Knowledge (DV): Continuous	General Linear Model with team identification producing an interaction effect.

APPENDIX D

Measurement Model for Old School/New School Baseball Scale



APPENDIX E

IRB Approval

THE UNIVERSITY OF ALABAMA | Office of the Vice President for Research & Economic Development
Office for Research Compliance

January 8, 2019

Zachary Arth
Communication & Information Sciences
The University of Alabama
Box 870172

Re: IRB # EX-19-CM-004: "MLB Fandom Survey"

Dear Mr. Arth,

The University of Alabama Institutional Review Board has granted approval for your proposed research. Your application has been given exempt approval per 45 CFR part 46.101(b)(2) as outlined below:

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

This approval will expire on January 7, 2020. If the study continues beyond that date, please submit the Continuing Review Form within e-Protocol. If you modify the application, please submit the Amendment Form. Changes to this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, please submit the Final Report Form. Please use the IRB-approved consent form.

Should you need to submit any further correspondence regarding this application, please include the assigned IRB approval number. Good luck with your research.

Sincerely,

358 Rose Administration Building | Box 870127 | Tuscaloosa, AL 35487-0127
205-348-8461 | Fax 205-348-7189 | Toll Free 1-877-820-3066

Informed Consent
(provided through Qualtrics Link)

MLB Fandom Survey

Investigator: Zachary Arth, MA, Doctoral Candidate

You are being asked to take part in a research study.

This study is called the MLB Fandom Survey. The study is being done by Zachary Arth, who is a doctoral candidate at the University of Alabama. Mr. Arth is being supervised by Professor Darrin Griffin, who is an Assistant Professor in Communication Studies at the University of Alabama.

What is this study about? What is the investigator trying to learn?
This study is being conducted to understand how MLB fans feel about the televised portrayal of baseball. This study also seeks to understand the knowledge possessed by baseball fans and their opinions on the state of baseball.

Why is this study important or useful?
The knowledge attained through the results of this study is important/useful because it will help inform broadcast entities of what fans desire and value in the portrayal of baseball on television.

Why have I been asked to be in this study?
You have been asked to be in this study because of your subscription to, or visiting of, this particular MLB team Subreddit. You must be at least 18 years old to participate in this study.

How many people will be in this study?
About 400 other people will be in this study.

What will I be asked to do in this study?
If you agree to participate in this study, you will consent to answering a variety of questions pertaining to your baseball fandom, attitudes, and knowledge about topics pertaining to baseball.

How much time will I spend being this study?
The survey itself is your only task for this study and it should take about 30 minutes.

Will being in this study cost me anything?
The only costs for participating in this study is the time required to complete the survey.

Will I be compensated for being in this study?
There is no compensation for participating in this study.

What are the risks (dangers or harms) to me if I am in this study?
There are no anticipated risks associated with your participation in this study.

UNIVERSITY OF ALABAMA IRB
CONSENT FORM APPROVED: 1/8/2019
EXPIRATION DATE: 1/7/2020

What are the benefits (good things) that may happen if I am in this study?
Though there are no direct benefits associated with your participation in this study, your responses seek to inform those who produce and direct baseball on television and, thus, provide you with a better viewing experience. In addition, given your baseball fandom, you may enjoy completing the survey.

How will my privacy be protected?
Your privacy will be protected in full as we will not be acquiring or asking for any of your contact information; not even your Reddit username will be collected.

How will my confidentiality be protected?
All data for this study will be stored on locked/password protected computers and servers that are used for research purposes at the university and are approved for storing research data.

What are the alternatives to being in this study? Do I have other choices?
The alternative to being in this study is nonparticipation.

What are my rights as a participant in this study?
Taking part in this study is voluntary. It is your free choice. You can refuse to be in it at all and you are welcome to cease your participation at any time while taking the study.

The University of Alabama Institutional Review Board ("the IRB") is the committee that protects the rights of people in research studies. The IRB may review study records from time to time to be sure that people in research studies are being treated fairly and that the study is being carried out as planned.

Who do I call if I have questions or problems?
If you have questions, concerns, or complaints about the study right now, please ask them. If you have questions, concerns, or complaints about the study later on, please call the investigator, Zachary Arth, at 716-783-4645 or contact Professor Darrin Griffin at 205-632-0777. If you have questions, concerns, or complaints about your rights as a person in this research study, call Ms. Tanta Myles, the Research Compliance Officer at the University, at 205-348-8461 or toll-free at 1-877-820-3066.

You may also ask questions, make suggestions, or file complaints and concerns through the IRB Outreach website at http://ovpred.ua.edu/research-compliance/prco/ or email the Research Compliance office at rscompliance@research.ua.edu.

I have read this consent form and:

☐ Yes, I agree to participate in this study.

☐ No, I do not agree to participate in this study.

UNIVERSITY OF ALABAMA IRB
CONSENT FORM APPROVED: 1/8/2019
EXPIRATION DATE: 1/7/2020