Fall 12-1-2021

Robo-Ump: A Study of the Prospective Impact of Automated Strike Zone Use in Major League Baseball Games from the Perspective of Broadcasters and Media

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by

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A THESIS

Presented to the Faculty of
The Graduate College at the University of Nebraska
In Partial Fulfillment of Requirements
for the Degree of Master of Arts

Major: Journalism and Mass Communications

Under the Supervision of Professor Richard Alloway

Lincoln, Nebraska

December 2021

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University of Nebraska, 2021

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A qualitative analysis of the Major League Baseball industry's perspective on the use of technology within the game, specifically the incorporation of an automated strike zone in place of traditional umpires, through targeted survey results from current MLB broadcasters and journalists or media members. Evidence from the research suggests that though those who are in favor of umpires being replaced by technology within the game, at least in some fashion, there are concerns that the technology in place is currently ready to provide the type of experience desired for MLB play when it comes ruling on balls and strikes with an automated system. In addition, there was a sentiment that the human element within the game as it relates to umpires has value and the complete loss of the human element would not be wanted.

The evidence also shows there is a belief that an automated strike zone within MLB games could have a profound impact on the balance between offense and pitching that could change the game considerably. In terms of the impact an automated strike zone would have on the work of media and broadcasters, it was generally considered limited, though broadcasters did note that there would be a change in their rhythm and timing of calls on pitches and the data illustrate that a move to automated strike zone would provide a new topic for media to discuss.

Introduction

"Despite all the nasty things I have said about umpires, I think they're one-hundred percent honest, but I can't for the life of me figure out how they arrive at some of their decisions." -Philadelphia Athletics Manager Jimmy Dykes during the 1939 World Series (Umpire quotes, n.d.)

The element of human beings adjudicating athletic events has been present in organized sports since its inception. Be it baseball, basketball, football, soccer or any other sport; it has been human beings who have been tasked with managing and maintaining order and ultimately ruling on plays and outcomes at all levels of sports from small-town local youth contests to professional sporting events.

The role of the official or umpire has been significant and at times controversial. The job of the official or umpire is as difficult as it is important, though they often have to fulfill their tasks while facing a great deal of angst and very little positive feedback from others watching or competing.

However, until recent years, the rulings passed down by the athletic arbiter were final. As with many professions, technology can alter the needs of an individual or the demands of the job and this has certainly been the case for sports officials.

Professional sports and then later major collegiate athletics have adopted the use of technology to review game action from multiple camera angles slowed down to catch the smallest of details in an effort to confirm or ensure that a call from an official or referee is correct or if it needs to be changed in order to correct a wrong (Norris, 2019) (Norris, 2019) (Norris, 2019).

As the technologies have continued to advance in this area, the emphasis on using said technologies to reach perfection in accuracy of rulings has grown. More and more,

the human element of sports officiating is being removed all in the name of getting the call right.

This study will gauge and analyze where we are currently and where we may be headed regarding the use of technology in the adjudication of sporting events – specifically focusing in on the sport of baseball and the baseball industry's view on the prospective use of expanded technology to incorporate computerized or automated strike zones in place of traditional umpires for decisions on ball and strike calls on pitches.

Replay Review Rules in North American Major Professional Sports

The National Football League (NFL) has the most linked history of any of the major professional sports leagues in North America to the use of instant replay as a mechanism to adjust officials' calls.

The NFL began testing the possibility of replay as far back as 1976 and implemented the use of a replay system in select preseason games, for testing, in 1978 (History of instant replay: Upon further review..., n.d.)

At that point, the technology was not quite up to par, but the league revisited the use of replay in the mid-1980s, ultimately implementing a system in regular season games for the 1986 season (History of instant replay: Upon further review..., n.d.). The use of replay was scrapped by the league after the 1991 season, but after some testing of a new system, using coaches' challenges to initiate replay reviews, the basis for the league's current system was introduced into regular season play for the 1999 season and has continued to grow in its use and application since without interruption (History of instant replay: Upon further review..., n.d.).

The National Basketball Association (NBA) introduced replay during the 2002-2003 season to review last-second shots, to see if a player got a shot off before or after time had run out (Allen, 2010, para. 16).

Since then, the league has expanded replay to include situations such as: a review to determine if a foul should be ruled "flagrant," if a shot was a two or three-point made basket and which player touched the ball out of bounds in the final two minutes of play (Allen, 2010, para. 16). The league has even added situations in which a play can be reviewed to see if a block or charge foul should have been called. (Rule no. 13: Instant replay, n.d.) and the league has added a very limited coaches' challenge option to trigger replay reviews in specific situations (Rule no. 14 - Coaches challenge, n.d.).

The NBA has a high-tech Replay Center to correspond with officials at various arenas throughout the league to support officials in the replay review process (Rule no. 13: Instant replay, n.d.).

The National Hockey League (NHL) began using replay review as far back as 1991 to identify if a puck had crossed the goal line or not (NHL adopts instant replay to review goals, 1991).

In 2003, the league incorporated a central replay room in Toronto, Canada to review goals and monitor illegal hits in every location across the league. These calls are handled by those in the replay center and are outside of the authority of the in-game officials (Allen, 2010, para. 15).

In recent years, the NHL has adopted coaches' challenges on goals to see if a player was offsides (NHL Adopts Rule Changes for 2017-18 Season, 2017, para. 3) or if there was goaltender interference (Rule change: NHL updates coach's challenge on

goaltender interference, 2018). And, they expanded upon their use of categories in which coaches' challenges could be used going into the 2019-2020 season, along with giving on-ice officials the opportunity to review their own calls involving significant types of penalties, such as major penalties, which result in a player being unable to participate for five minutes, while the team skates a player down (Rosen, 2019).

Major League Baseball (MLB) was the most resistant of the major sports leagues in the United States to implement replay (Allen, 2010).

MLB put replay in for the purpose of reviewing home runs in 2008, before ultimately instituting the basis for the system that is used today prior to the 2014 season (Allen, 2010)

MLB's replay review system is largely unchanged now from the one implemented in 2014, with some slight alterations and additions, some of which came about due to rule changes within the game.

There is a replay review command center in New York, with current Major League umpires rotating through as Replay Officials on a given day (Hagan, 2014). After a call is challenged by a manager or initiated by the umpire crew chief, the crew chief and a second umpire get on a headset to communicate with the Replay Official in the command center (Hagan, 2014).

Over time, the number of types of reviewable plays on judgement calls from umpires has risen to 17 in total, along with crew chiefs being able to use replay to get record-keeping items corrected or confirmed, such as the correct ball-strike count on a batter or number of outs in an inning (2020 MLB replay review chart, n.d.).

The Replay Official has three options – the call on the field is confirmed, due to clear evidence, the call on the field stands and is unchanged because of no clear evidence to change it or the call on the field is overturned because of clear evidence supporting that the call was incorrect (2020 MLB replay review chart, n.d.).

Computerized Strike Zone Technology and Usage

All 30 Major League Baseball ballparks are equipped with triangulated tracking cameras that are used to follow pitches out of a pitcher's hand to its location at home plate. These cameras used with systems such as Statcast, which is a branch of MLB, are utilized to create strike zone graphics for broadcasts (Williams, 2019). These strike zone graphics, along with the measurement of the pitch provide feedback to the television or internet viewer, along with those viewing records of pitches, if a particular pitch came in to home plate within the computerized strike zone or not.

Statcast is "a state-of-the-art tracking technology that allows for the collection and analysis of a massive amount of baseball data in ways that were never possible in the past," (Statcast, n.d.). Major League Baseball Advanced Media installed pitch tracking hardware in the MLB parks in 2015 (Statcast, n.d.).

The use of automated strike zones has been implemented in some form and degree in two baseball leagues as of 2020 - the Atlantic League, a professional league not affiliated with any Major League organizations and the Arizona Fall League (Polacek, 2019), which is tied to MLB. In addition, there had been plans to use automated strike zones in some fashion in MLB-affiliated minor league professional baseball games for the 2020 season (Polacek, 2019). However, the 2020 minor league baseball seasons for all leagues were ultimately cancelled due to the COVID-19 pandemic. More movement

was made toward the possibility of bringing computerized strike zones to Major League Baseball games when it was reported in December of 2019 that the Major League Baseball Umpires Association, as part of a new five-year labor agreement, had signaled their cooperation in testing of a computerized strike zone system (Associated Press, 2019). Ahead of the 2021 minor league baseball season, a myriad of rule experiments were announced for implementation to test how they impact the game, including the use of a two-dimensional automated strike zone in select games of the Low-A Southeast League, formerly the Florida State League (Passan, 2021).

As a way to test the use of automated strike zones in professional games, MLB partnered with the Atlantic League and invested in the implementation of technology in the independent league's ballparks for use during the 2019 season. The league used a system called TrackMan and home plate umpires wore ear pieces to be given an audio signal from the system to relay if a pitch should be called a strike or ball (Cooper, 2019). The TrackMan system was also implemented in some games played in the Arizona Fall League's six-week season in 2019 (Norris, 2019).

As far back as 2015, an automated strike zone using the Pitch F/X system was used in an independent professional baseball game played in San Rafael, California (Schmidt, 2015). The concept of automated or computerized strike zones was experimented with as early as the 1950s, using lenses and photoelectronic cells, according to a post on Twitter.com by BaseballHistoryNut (BaseballHistoryNut, 2021).

Mixed Reviews on Preliminary Use of Computerized Strike Zones

During the 2019 Arizona Fall League baseball season, an automated strike zone was used in games played in the Salt River Stadium, the home of two teams in the league

– Salt River and Scottsdale. The TrackMan system was used as part of MLB's testing and the reviews on its benefits and quality were mixed (Norris, 2019).

Overall, the consistency of the strike zone was the clear benefit and it created a balance in advantages for the hitter and pitcher – with hitters benefitting from the system not giving pitchers strike calls on pitches that were just off the sides of the plate and pitchers benefitting from what appeared to be more strike calls on pitches around the top or bottom of the strike zone area that may usually be called balls by many human umpires (Norris, 2019).

One issue that arose during the use of the automated strike zone was a roughly four-second delay between when the pitch hit the catcher's glove and when the home plate umpire received and was able to make the call based on the ruling of the computerized strike zone (Norris, 2019).

Seattle Mariners pitcher Raymond Kerr, who pitched in an AFL game with an automated strike zone was unhappy with it. "I don't like that. It takes away the catcher's ability to frame, and the umpires are delayed on calls. I just think it slows down the game a little bit" (Norris, 2019).

AFL player Tampa Bay Rays outfielder Josh Lowe said, "I think I'd rather deal with a human error rather than a computer error. It's still really tough to get this zone adjusted to everything. Like I said, the top and bottom of the zone are the hardest part, and if they're ever going to use that in the big leagues or any other levels, they're going to have to work on that. But, for the most part I'd rather deal with a human umpire" (Norris, 2019).

The Atlantic League's experience using the TrackMan system also supported the feedback from the AFL that pitchers benefit on pitches up or down and hitters benefit on pitches that are around each edge of the strike zone. After the first fews days of use, the automated strike zone had to be recalibrated to lower the top of the zone by a few inches because setting the zone up in accordance with the rule-book strike zone made for unhittable pitches being called strikes (Cooper, 2019).

Another issue that arose during Atlantic League games was that the automated system would stop working at times. The league had to put in a rule that if the system went down for at least two batters in one half inning then the system would remain off for the following half inning in order to keep play fair and balanced (Cooper, 2019).

Studies on Computerized Strike Zones

Boston University lecture Mark T. Williams and a group of graduate students (Williams, 2019) analyzed data from Baseball Savant, MLB.com and Retrosheet in breaking down called pitches over 11 MLB seasons from 2008-2018. In total, over 4 million called pitches were analyzed. Called pitches and strike-zone overlays came from Baseball Savant, Pitch F/X from 2008-2016 and Statcast data from 2017-2018 (Williams, 2019).

The analysis of the data found that umpires made 34,294 incorrect calls on balls and strikes in 2018, which equates to 14 missed calls per game and that overall umpires bias in two-strike situations and strike zone blind spots (Williams, 2019).

Close Call Sports & Umpire Fantasy Ejection League, is a website and media content provider which describes what it does at the top of its web page as, "objectively tracks and analyzes close and controversial calls in sport, with great regard for the rules

and the spirit of the game," (Close Call Sports & Umpire Fantasy Ejection League, n.d.). Close Call Sports produced a podcast in 2019 stating its position that the information available to the public used in studies such as the one put together by professor Mark T. Williams and the technology used for computerized strike zones that are seen by the public through websites and television broadcasts are inaccurate and less reliable than the data used to rate and grade out umpires that MLB uses. Close Call Sports stated that the data that MLB uses to grade umpires remains private (Podcast - Truth About Baseball's Electronic Strike Zone, 2019).

The concept that umpires are improving, in part, due to training through feedback from the use of modern technologies was supported by Brian Mills from the University of Texas in 2014. (Mills, 2018). Mills' study found that variability in umpire performance had decreased significantly over time (Mills, 2018).

Statement of Problem and Research Questions

The implementation of an automated or computerized strike zone within baseball, specifically at the Major League level, has become an increasingly discussed and debated topic within and around the world of baseball. As the technology has advanced, along with the adoption of greater usage of technology through replay in other areas of the game, the idea of the game involving technology in its most significant adjudicated aspect – calls of balls and strikes on pitches – has become a greater possibility. Questions about the technical reliability and overall impact on the game and those involved with it have come to the forefront.

This study will examine these four research questions:

Research Question 1 – How do individuals involved with the Major League Baseball industry view the possibility that human beings will be taken out of the adjudication system of baseball?

Research Question 2 – How will human beings being removed from making the decisions on ball and strike calls on pitches impact the experience of those playing, umpiring and broadcasting Major League Baseball games?

Research Question 3 – How does the current technology available for automated strike zones align with expectations of those within the Major League Baseball industry on consistency and efficiency of calls?

Research Question 4 – What do individuals involved with the Major League Baseball industry consider the most significant factors in umpiring – accuracy of calls, consistency of calls, maintaining order and flow of the game or something else entirely?

Methodology

This study gathered information and drew conclusions around the aforementioned research questions related to the Major League Baseball broadcast and media industry's view of increased technology through umpiring and ruling on ball and strike calls on pitches.

This was done through collecting qualitative data from a cross section of broadcasters and journalists or media members within the Major League Baseball community.

A survey instrument with four open-ended interview-style questions was sent to a targeted group of broadcasters and journalists or media members who do or have covered Major League Baseball.

The four questions selected were related to the research questions listed above and were as follows:

- What is your general perspective on the concept of technology replacing and, in some instances, eliminating an umpire's involvement in making decisions in games?
- What sort of impact would an automated strike zone potentially have on your professional work within a baseball game?
- In your professional opinion, which aspect of umpiring is the most important?
- Based on what you understand about the current technology available for automated strike zones, what is your belief regarding if an adoption of an automated strike zone could currently work well in Major League Baseball games?

Each respondent answered the exact same open-ended questions in the exact same order through the digital survey link that was provided through email or social media correspondence. Each respondents' answers were logged in the order in which they were completed and stored within the Google Form document used to house the survey.

66 broadcasters and 46 journalists or general media members were targeted directly for their respective feedback. Eight of the contacts were made through a baseball reporter, who had been sent the survey and passed the information onto them. 37 contacts were targeted through direct messages on Twitter, while 2 contacts were targeted through direct messages on Instagram. 5 contacts were initially reached through text message and phone conversations followed with each of those contacts to explain the nature of the

research and then they were later emailed the survey instrument. All of the other contacts were targeted directly through email.

In addition, all 30 Major League Baseball teams, as well as the President of the American Sportscasters Association, Lou Swartz, were contacted through email in hopes of connecting with additional Major League Baseball broadcasters.

The broadcasters targeted for this study were play-by-play broadcasters, game analysts or in-game reporters who either work for a Major League Baseball team or have experience calling Major League Baseball games as a fill-in broadcaster for spring training or regular season games.

The media members or journalists targeted for this study were largely writers who cover baseball, including many who are currently listed as members of the Baseball Writers' Association of America, along with some radio and television show hosts, radio show producers, content providers or reporters who have or currently do cover Major League Baseball.

13 respondents who identified as baseball broadcasters and 12 respondents who identified as baseball media members responded and provided feedback to the questions. All respondents were provided anonymity, as no one was asked to provide their name with their response.

The coding used to craft results was largely deductive with a bit of inductive coding mixed in. A majority of the codes were crafted ahead of the review of data and based around the questions posed in the survey and the research questions that this study was attempting to answer. There were some codes that emerged after beginning to review the data, as well.

This approach helped reach a greater number of respondents, but created limitations on knowing exactly who had responded to the survey. Also, the survey allowed for respondents to answer more than once. Though, this does not appear to be the case within the feedback and is highly unlikely, this technically allowed for a respondent to present feedback multiple times and it would register as if they were different people. Again, based on the feedback provided by the respondents, the nature of this work and the group targeted for this study, such an occurrence is highly unlikely.

Results

Of the 12 media/journalist respondents, there was feedback related to sentiments if they were in favor or against technology replacing umpires' decisions within Major League Baseball games. Half of the media/journalists referenced that they were in favor of such a result, while a number of broadcasters made reference that they would be against such a result. There were some who provided statements that illustrated that they liked the concept of technology and umpires working together.

Table 1

Respondent	In Favor of Technology Replacing Umpires' Decisions	Quotes	Against Technology Replacing Umpires' Decisions	Quotes	Mix of Both	Quotes
Media/Journalists	**50%**	*"I think I would be in favor of it. It seems like so long as the technology is advanced enough -- i.e., accurate and immediate -- it would be an upgrade." – Respondent #187* *"The more technology, the better" – Respondent #1*	**33%**	*"Awful. It takes the human element out of the game. You know, people do like ejections and managers and umpires screaming at each other." – Respondent #4*	**.08%**	*"I don't think they should all be replaced and stripped of all their duties, but just certain ones." – Respondent #2*

			"I think it would ruin the game completely." – Respondent #6	

Of the 12 media/journalist respondents, about a third gave feedback that they believed that an automated strike zone could work currently, based on the standard of technology in place. However, a majority gave feedback that they believed the technology was not yet ready for implementation in MLB games.

Table 2

Respondent	Automated Strike Zone Could Currently Work	Quotes	Technology Not Ready for Implementation of Automated Strike Zone	Quotes
Media/Journalists	33%	*"I believe it would work very well considering the technology used to quickly relay information to MLB At Bat and MLB Gameday that's readily available." – Respondent #1* *"Absolutely." – Respondent #5*	50%	*"Based on some of the video I have seen where pitches that look like clear balls are being called strikes, it might need some tweaking. It's also possible those center field camera angles are skewed enough to make a borderline pitch look way off the plate." – Respondent #187* *"My understanding is the technology isn't quite ready but will be soon." – Respondent #189*

Of the 12 media/journalist respondents, below is a breakdown of the percentage of respondents who made reference to these types of aspects of umpiring as being significant to them.

Table 3

Respondent	Game Management	Efficiency	Consistency	Balls and Strikes/ Strike Zone	Getting Calls Correct	Professionalism/ Integrity
Media/Journalists	**20%**	**.08%**	**33%**	**42%**	**25%**	**.08%**

Of the 12 media/journalist respondents, half of the respondents stated that the addition of an automated strike zone would have limited or no impact on their professional work. From the responses about the possible impact on the work of journalists or media members, the one theme that emerged related to having a new topic or topics to cover, while one respondent stated that the change to his or her work would be that they were far less interested.

Table 4

Respondent	Impact on Work	Limited or No Impact on Work
Media/Journalists	**Reporting Impact – New Topics to Cover** *"The storylines that we write about a controversial strike or ball call would disappear and less of the umpires will be known nationally around baseball. The obvious perk of umpires being replaced is an opportunity to write and discuss the transition as it's happening with reactions from players and others involved in the game." – Respondent #2* *"It would give me something to write about, though." – Respondent #1*	50%

"My first reaction is that it would give players one less thing to complain about after games -- and thus give me one less thing to write about. But I bet that's actually not how it would play out. I'm sure guys who disagreed with calls would question the accuracy of the technology, so I'd still have fodder for stories." – Respondent #187

Impact on Reporting – Loss of Interest

"It would make me far less interested." – Respondent #4

Of the 12 media/journalist respondents, a third of the respondents stated that the addition of an automated strike zone would foster less arguing or complaining by players, coaches or fans toward umpires. Themes that emerged related to the possible impact an automated strike zone would have on Major League Baseball games were – an impact on catcher's play regarding framing pitches and throwing out possible base stealers, while one respondent referenced that an automated strike zone would increase offense and make games longer.

As it related to questioning the technology available, one respondent stated that the automated strike zone graphic that the public views on television broadcasts or on internet feeds is not as accurate as the public seems to believe.

Table 5

Respondent	Less Arguing or	Game Impact:	Game Impact:	Questioning of Technology

	Complaining by Players, Coaches and Fans Toward Umpires	Catchers' Play	More Offense, Longer Games	
Media/Journalists	**33% of respondents referenced that an automated strike zone would lead to less arguing or complaining about umpires' calls**	**33% of respondents referenced that an automated strike zone would have an impact on catchers' play** *"There would be some serious losses to the catching position from a game strategy and roster-building standpoint, so I would want to know that the marginal gains achieved by implementing the automated strike zone would*	**.08% of respondents referenced that an automated strike zone would have an impact on offense** *"A lot more walks and offense, way longer games." – Respondent #6*	**Technology Seen on TV/Internet not as Good as Public Believes** *"Most people take live pitch-tracking as gospel anyway. (It is not as accurate as they assume.)" – Respondent #190*

	outweigh those losses." – Respondent #188 *"Nobody would ever steal a base again because the catcher could set up in a throw position all the time. The art of stealing strikes would go away too." – Respondent #6*	

Of the 13 broadcaster respondents, there was feedback related to sentiments if they were in favor or against technology replacing umpires' decisions within Major League Baseball games. A majority of the broadcasters referenced that they were against such a result, while a number of broadcasters made reference that they would be in favor of such a change. There were some who provided statements that illustrated that they liked the concept of technology and umpires working together.

Table 6

Respondent	In Favor of Technology Replacing Umpires' Decisions	Quotes	Against Technology Replacing Umpires' Decisions	Quotes	Prefers a Mixture of Umpires and Technology	Quotes
Broadcasters	**38%**	*"I think it is viable way of improving the adjudication of a game." – Respondent #183* *"I would love to stay with the human element, but am tired of seeing pitchers squeezed when they throw a perfect pitch on the corners of the zone." – Respondent #185*	**54%**	*"My initial, kind of visceral reaction, is that I don't like it. That's somewhat of an anachronistic reaction, but I have a built-in feeling that I don't like the human element being eliminated." – Respondent #194* *"I LOVE the home plate umpire and the amount of care they have for the job they do. I understand the automated strike zone but truly believe the "eye test," not only by players/staff but*	**23%**	*"Technology should be there as an aid." – Respondent #184*

			fans will really struggle with it." – Respondent #191	

Of the 13 broadcaster respondents, a small fraction gave feedback that they believed that an automated strike zone could work currently, based on the standard of technology in place. However, a majority gave feedback that they believed the technology was not yet ready for implementation in MLB games.

Table 7

Respondent	**Automated Strike Zone Could Currently Work**	**Quotes**	**Technology Not Ready for Implementation of Automated Strike Zone**	**Quotes**
Broadcasters	**15%**	*"My understanding is that the technology is pretty exacting. So it's not a matter of it working well or being accurate. I think we're there." – Respondent #193*	**46%**	*"Based on what I know, it seems like we are still a few years from finding technology that will clean up the strike zone issue. It seems that the potential of three dimensions in "the zone" remains something that is confusing or unknown for people around the game, and maybe something the*

					computer can't tell us just yet, with better than current umpire accuracy. – Respondent #192 *"I do not think Major League Baseball has a system it can adopt that has been perfected." Respondent #173*

Of the 13 broadcaster respondents, below is a breakdown of the percentage of respondents who made reference to these types of aspects of umpiring as being significant to them.

Table 8

Respondent	Consistency	Balls and Strikes/ Strike Zone	Getting Calls Correct	Professionalism / Integrity	Knowing the Rules
Broadcasters	**0.8%**	**38%**	**31%**	**23%**	**0.8%**

Of the 13 broadcaster respondents, roughly a third of the respondents stated that the addition of an automated strike zone would have limited or no impact on their professional work. From the responses about the possible impact on the work of broadcasters, themes that emerged were – rhythm of calls on balls and strikes, new

discussion topics during broadcasts, loss of some artistry within the craft of broadcasting and broadcaster's attitudes toward umpires and the automated system itself while on the air.

Table 9

Respondent	Impact on Work	Limited or No Impact on Work
Broadcasters	**Impact on Broadcast – Rhythm** *"It would simplify my calls of balls and strikes" – Respondent #7* *"Depending on how it is executed, it could impact the rhythm of our calls but not something to which we couldn't adjust. We'd just have to re-train the way we process the result of a pitch that does not yield a swing." Respondent #183* *"We're used to reacting immediately calling pitches. "Here's the pitch, outside for a ball." I suppose the only issue would be if there was a delay in getting the call." – Respondent #194* **Impact on Broadcast – New Discussion Point** ***"****It obviously also adds a different layer of discussion." – Respondent #183*	31%

"Initially, creating a different talking point about balls/strikes. Later, how the "robo ump" strike zone calls certain pitches/locations differently than human. Eventually, it becomes the new normal." – Respondent #196

"I'm sure I'd have to be mindful to keep educating the viewers to how it works and whatnot" – Respondent #193

Impact on Broadcast – Loss of Some Artistry

"It would take the artistry out of describing the strike zone on a given night, which always varies from night-to-night." – Respondent #184

"Balls and strikes and knowing a particular umpires strike zone is one of my favorite things to talk about." – Respondent #191

Impact on Broadcast – Attitude Towards Umpires/Automated Strike Zone

"No criticism of umps." – Respondent #185

"I'd criticize it too much." – Respondent #197

Of the 13 broadcaster respondents, a small percentage of the respondents stated that the addition of an automated strike zone would foster less arguing or complaining by players, coaches or fans toward umpires. Themes that emerged related to the possible impact an automated strike zone would have on Major League Baseball games were – an expanded/larger strike zone, loss of the human element and the frustration levels of players.

Themes related to the questioning of the technology related to an automated strike zone's ability to adjust to the height of each particular player at-bat, as well as the impact on the pace of play.

Table 10

Respondent	Less Arguing or Complaining by Players, Coaches and Fans Toward Umpires	Game Impact: Expanded Strike Zone	Game Impact: Loss of Human Element	Game Impact: Frustration Level of Players	Questioning of Technology
Broadcasters	**15% of respondents referenced that an automated strike zone could lead to less arguing or complaining about umpires' calls**	**38% of respondents referenced that an automated strike zone could lead to a bigger strike zone/impacting offense** *"If a pitcher has the ability to graze the black of the plate let's not make it arbitrary. Let's make the batter swing and move the game along." –*	**23% of respondents referenced an automated strike zone creating a loss of human element that hurts entertainment value and balancing of the game** ***"****Applying the same standard of whether or not the arguments and controversy enhanced my*	**Automated Strike Zone Increases Player Confidence** ***"****A universal strike zone would allow hitters more confidence in pitches they are seeing and pitchers on ability to know what a strike is." – Respondent #198*	**Automated Strike Zone's Ability to Adjust to Player's Height** *"What happens when Juan Soto gets to 2 strikes and now spreads out an extra 3-4 inches, squats down a smidge more does the strike zone change? A hitter who stands straight up before he*

		Respondent #185 *"What if a pitcher has the ability to bounce a CB just behind home plate, but it touches the bottom of the zone at the start of home plate, should they benefit from the technology?" – Respondent #191* *"If pitchers learn to manipulate the extreme reaches of the zone or master other tricks to steal strikes, it could become extremely contentious. My biggest fear is that it could introduce additional difficulty for hitters." – Respondent #193* *"More breaking balls, high and low, would get called more for strikes." – Respondent #8*	*enjoyment of the game, I would have to say that most times IT DID! Seeing Earl Weaver or Lou Piniella go nose-to-nose with Joe West or Tim McClelland was always entertaining!" – Respondent #193* **"***would eliminate the variables of certain umpires' personalities and how they have developed and tweaked their personal strike zones over the years." – Respondent #7* *"I think it was also adversely effect hitters who have discerning eyes and keen strike zone judgement as pitches they'd normally take for ball 4 would often times be strike 3. The human element helps the game increase variance just enough on multiple levels." – Respondent #184*	**Automated Strike Zone Could Increase Player Frustration** **"***But I can also see a scenario in which an automated strike zone creates more argument and angst than it alleviates. If pitchers learn to manipulate the extreme reaches of the zone or master other tricks to steal strikes, it could become extremely contentious." – Respondent #193*	*loads into his legs, is the initial stance the zone?" – Respondent #191* **"***Establishing the zone and its ability to vary hitter-to-hitter will also be important, obviously." – Respondent #183* **Impact Pace of Play** **"***At that point, the biggest concern for me is the timing of it and how it flows within a game. It is necessary for it to not mess with the already slow rhythm." – Respondent #183* *"No one wants to see a substantial reduction to the pace of play because of these advancements" – Respondent #192*

Additional themes that came out of the 25 total responses between broadcasters and media/journalists were related to the difficulty of the task that umpires face attempting to accurately judge pitches and that the automated strike zone will eventually make its way into MLB games.

Table 11

Difficulty of Calling Balls and Strikes	**Automated Strike Zone Eventual Addition to MLB**
"Umpires too often seem to allow themselves to be fooled by the way the catcher pulls the pitch into the zone. Between framing and the extreme increase of pitch velocity and movement, I get the sense plate umpires are overmatched." – Respondent #186 (Media/Journalist)	**"**…but I've been told by MLB umpiring personnel that it's on the way and is just a matter of time." – Respondent #7 (Broadcaster)
"As time has gone on and seeing from the macro point of view especially with every pitch recorded we understand calling balls and strikes is as tough of a thing to do. High velocities, crazy movement, longer games play apart of that and the concentration level of the human umpire!" – Respondent #191 (Broadcaster)	"I understand, in talking to many people who have more knowledge on the subject than me, that the computerized strike zone is likely to happen." – Respondent #194 (Broadcaster) "I think it's a matter of time before the automated strike zone is implemented in the major leagues." – Respondent #186 (Media/Journalist)

Discussion

This research study provided a look into how media or journalists and broadcasters within and around Major League Baseball view the current and future state of umpiring and technology related to umpiring and adjudicating the game.

The data related to Research Question 4 (What do individuals involved with the Major League Baseball industry consider the most significant factors in umpiring – accuracy of calls, consistency of calls, maintaining order and flow of the game or something else entirely?) consistently pointed to an umpires' ability to call balls and strikes and/or their overall strike zone as the most significant aspect of umpiring. Getting the calls correct being a significant factor in umpiring, as well. This shows that decisions related to the use of an automated strike zone are important, as it directly impacts what is considered the most important part of umpiring.

In looking at the data as it relates to Research Question 1 (How do individuals involved with the Major League Baseball industry view the possibility that human beings will be taken out of the adjudication system of baseball?), takeaways from the data include that while a good number of individuals do not completely oppose or are even in favor of umpires being completely replaced by technology, there are concerns within the industry that the technology is not yet at a level which could work within MLB games. These findings are in line with what some of the feedback was from the trial use of automated strike zones during Arizona Fall League games in 2019 (Norris, 2019) and show that in examining the data as it relates Research Question 3 (How does the current technology available for automated strike zones align with expectations of those within the Major League Baseball industry on consistency and efficiency of calls?), there are

concerns that the current technology can properly work to meet the standard of game pace and efficiency that people within the game expect. The references made to concerns over the automated strike zone's ability to adjust the height of a strike zone depending on the height of the player batting, which is a key component to what makes the strike zone what it is for each player, per the rules of the game, illustrates the lack of faith in the automated strike zone's ability to be as accurate in a way that meets the desired standard.

Moreover, there is a sentiment within the data that the human element within the game is positive and something that people on some level understand is needed and even enjoyed. This is especially true for broadcasters, perhaps because they come at the game from a bit of a different perspective than that of a general media member or journalist in that they sometimes work for a specific team rather than holding a position as a completely unbiased journalist. In some cases, current broadcasters are former players, who know and have worked directly with umpires in the past.

In reviewing items related to Research Question 2 (How will human beings being removed from making the decisions on ball and strike calls on pitches impact the experience of those playing, umpiring and broadcasting Major League Baseball games?), the two major game impacts an automated strike zone would create are an impact on catcher's play, according to the media/journalists and a larger strike zone impacting offense within the game, according to the broadcasters.

The alteration of catcher's play is largely centered on pitch framing for the purpose of getting a strike call on a pitch, which would seem to no longer be a need if an automated strike zone were implemented. This would have an impact on the value that

particular players bring to that position and alter, at least to a degree, who was valued as a catcher within the game.

A larger strike zone could have a potentially drastic impact on play and specifically the balance of hitting versus pitching, which is the most elementary and significant part of the game. This particular prospective game impact was referenced when reviewing some of the tests of an automated strike zone in Atlantic League games (Cooper, 2019).

Also, though one respondent said that an automated strike zone would lead to greater arguments and frustration by players. There were also references to how an automated strike zone would decrease arguments and frustration within the game. This is interesting in that we currently see with replay that is used within the game that there still is plenty of frustration and angst over the ruling made using technology for review.

Both media or journalists and broadcasters alike note that a move to an automated strike zone and removing umpires from aspects of the game would give them a new topic to write or talk about, which would have an effect on how the public talks and thinks about the game. One aspect that an automated strike zone would have on broadcasters that showed itself in the data is that of a change in the rhythm and timing of broadcast calls on balls and strikes. This is a significant consideration because of the sheer number of pitches that broadcasters call over a game, season and career and could lead to a change in how broadcasters go about regularly executing that part of a broadcast. The reference of a loss of some artistry of broadcasting by no longer needing to describe or refer to an umpire's particular strike zone during a given game could give way to a new form of description or work describing that aspect of the game. This may move the

broadcast industry or broadcasters themselves in a different direction in how they handle this part of a broadcast and could lead to new innovations.

Probably the most surprising aspect from the data was the idea that the human element within umpiring is valuable within the game regardless of what technology advancements are introduced. Though there is a strong sense that getting the call correct is important, the data suggests that there is not a strong desire to completely rid baseball of human umpires, as too many aspects of the game would be lost or hurt by such a change. This type of information could shape the way that MLB advances technology going forward, as it inserts more technology, but keeps human umpires in place for many vital roles. It is also interesting that there is a sense that MLB going to an automated strike zone is inevitable. That aspect of the data being present suggests that such a change, which seemed hard to envision not long ago may soon be a reality and the game will take on a new look and feel at the highest levels.

In reviewing possible limitations for this study, it is clear that getting feedback from Major League Baseball umpires would have value and extend the research. Also, research about the current technology available and feedback from individuals who manage and understand the technology would add value to the research. Furthermore, the use of structured questions in a survey instrument may have limited the fullness of a response from a respondent on a given question and doing semi-structured interviews may have led to fuller answers and uncovered more information.

Conclusion

This study set out to analyze the current state and the future use of technology in the adjudication of Major League Baseball games by looking at baseball industry's view

on the prospective use of expanded technology to incorporate computerized or automated strike zones in place of traditional umpires for decisions on ball and strike calls on pitches.

A survey instrument featuring open-ended, interview-style questions was used to gather qualitative information from a targeted group of broadcasters and journalists or media members within and around the Major League Baseball industry regarding their perspectives on the use and quality of technology for the use of adjudicating baseball contests.

The questions posed in the survey were related to the following research questions for this study.

Research Question 1 – How do individuals involved with the Major League Baseball industry view the possibility that human beings will be taken out of the adjudication system of baseball?

Research Question 2 – How will human beings being removed from making the decisions on ball and strike calls on pitches impact the experience of those playing, umpiring and broadcasting Major League Baseball games?

Research Question 3 – How does the current technology available for automated strike zones align with expectations of those within the Major League Baseball industry on consistency and efficiency of calls?

Research Question 4 – What do individuals involved with the Major League Baseball industry consider the most significant factors in umpiring – accuracy of calls, consistency of calls, maintaining order and flow of the game or something else entirely?

Evidence from the research suggests that though there are a number of individuals who are in favor of umpires being replaced by technology within the game, at least in some fashion, there are concerns that the technology in place is currently ready to provide the type of experienced desired for MLB play when it comes ruling on balls and strikes with an automated system. In addition, there was a sentiment that the human element within the game as it relates to umpires has value and the complete loss of the human element would not be wanted.

There is a sense that an automated strike zone within MLB games could have a profound impact on the balance between offense and pitching that could change the game considerably.

In terms of the impact an automated strike zone would have on the work of media and broadcasters, it was generally considered limited, though broadcasters did note that there would be a change in their rhythm and timing of calls on pitches and the data illustrate that a move to automated strike zone would provide a new topic for media to discuss.

Overall, this study provided a look at how media professionals covering baseball view the prospect of technology being more involved within the umpiring of the game. Further research could be done on this topic through examining feedback from other sources, such as umpires or experts in the technological fields related to automated strike zones, as well as answer similar or different questions with a different segment of baseball broadcasters and media.

As the research suggests, an increased use of technology, ultimately leading to the use of an automated strike zone within MLB games appears on the horizon. This should

lead to further studies of the use of an automated strike zone and its quality compared to that of a traditional umpires' strike zone.

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