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Augmented Reality in Sport Broadcasting

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

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Abstract

For a large portion of its history, sport broadcasting has been stagnant when it comes to incorporating new and innovative technologies. However, due to declining viewership and consumer desire for customizable content, augmented reality graphics have begun to be incorporated into multiple sport broadcast products. In fact, the UEFA Champions League, NBA, NFL, and NHL have all used or indicated their intention to utilize AR graphics in future broadcasts. Considering that media rights revenue is the main source of revenue to sport properties and organizations, it is important to carefully consider how the core product (the broadcast) is presented. The study examined consumer attitudes and intentions towards AR in sport broadcasts by utilizing three types of broadcasts of an NBA game. One of the broadcasts was a traditional broadcast format with no AR enhancement and the other two were enhanced with AR graphics, a coach-mode broadcast that featured AR player tracking and play diagramming while the other enhanced broadcast, mascot-mode, featured AR graphics similar to a video game with over-the-top animations. Results of the current study provide insight into consumer preferences towards AR in sport broadcasting and guidance to sport properties planning to utilize broadcast AR graphics. Specifically, that sport consumers were significantly more likely to re-view ($p < .05$) and recommend via word of mouth ($p < .05$) the coach-mode AR than the mascot-mode AR. Sport involvement was a significant factor for how sport fans perceive the AR broadcast types through incorporating the perspective of the elaboration likelihood model.

Keywords: Augmented Reality, Sport Broadcasting, Marketing, Sport fan behavior

Chapter One: Introduction

According to the Pricewaterhouse Coopers' (PwC, 2018) annual report, the North American sports market was $69.1 billion in 2017 and projected to grow to $80.3 billion by 2022. The four main categories identified by PwC (2018) that make up the sports market are media rights, gate revenues, sponsorship, and merchandising. While gate revenue was the largest source of revenue for the sport industry for a long time, it has recently been surpassed by media rights. That is not projected to change soon as sport-based media rights were valued at just over $19 billion in 2017 and expected to continue to grow to $23.8 billion by 2022 (Gallagher, 2018).

Television broadcasting and sport have experienced similar growth and adoption curves so much so that some authors have referred to their relationship as symbiotic (McChesney, 1989; Neal-Lunsford, 1992). One of the main drivers in the growth of sport broadcasting has been the rapid technological advancements and improved broadcast capability (Potts & Thomas, 2018). Thanks in large part to the improved broadcast capabilities, sport broadcasting holds a unique position in television broadcasting as it is one of the last genres of television that consumers choose to view in real time (Paul & Weinbach, 2015). In fact, Funk, Alexandris, and McDonald (2016) stated that one of the most attractive aspects of sports to broadcasters is that it is consumed as it happens. This real time consumption of sport through television broadcasting has been very successful due to the loyalty of sport consumers (Gladden & Funk, 2001).

However, even with a loyal audience of sport fans, there are concerns among some broadcasters related to an ever-increasing number of potential sport viewing modalities including computer, tablet, or even smartphone (Turner & Shilbury, 2010). With more ways to watch and consume sports than ever before (Fujak, Frawley, McDonald, & Bush, 2018) it is vitally

important that sport media managers understand how to attract and retain an audience. In order to satisfy sport media consumers that have a plethora of options, Karg, McDonald, and Leckie (2019) suggest that media stakeholders such as teams, leagues, and broadcast companies need to customize their products to meet consumer preferences. The big question with regard to the future of sport media is stated clearly in the PwC (2018) North American sports outlook report "How will media rights suitors cater to the personalized experience that audiences have come to not only seek, but expect?" (p. 11).

One emerging option to create a customized and interactive viewing experience for sports consumers is broadcast augmented reality (AR). AR, like virtual reality (VR) is a technology that is categorized as an immersive technology. However, while VR completely immerses the user in a virtually created digital environment, AR incorporates digitally created graphics or visuals into the real-world environment (Azuma, 1997). VR is almost exclusively experienced through a headset of some kind while AR is not limited to one piece of hardware such as a headset (Handa, Aul, & Bajaj, 2012). Instead, AR can be experienced in a myriad of ways including head-mounted displays, projector-based AR, smartphone AR, and broadcast AR (Schmalstieg & Hollerer, 2016). Each of these classifications of AR will be discussed in greater detail in the literature review. However, this study focuses primarily on broadcast AR and its use in sport broadcasting. Broadcast AR augments a sport broadcast by overlaying digital images and game information on the sport action that is taking place (Han & Farin, 2007).

According to the Gartner Hype Cycle (2018), AR is currently five to ten years from being a fully accepted and productively used technology. However, there are many sport industry executives that believe the time to invest in and develop AR uses in sport is now (Moore, 2017).

Among them is NASCAR's Vice President and Chief Digital Officer Tim Clark, who thinks AR and sport seem to be a perfect fit:

> Augmented reality is helping us revolutionize the way that NASCAR fans engage with the sport. Our goal is to bring fans as close to the sport as possible, and AR is an ideal medium to help us accomplish that as we look to engage the NASCAR fans of both today and tomorrow. (NASCAR, 2019, para. 7).

To further bolster the belief that AR will play a significant role in sport, the technology was named one of the five biggest sports marketing trends of 2019 (Mulcahy, 2019). In much the same way that the sport industry and media rights in the sport industry have grown, the AR market is projected to experience massive expansion, growing from $11.14 billion in 2018 to $60.55 billion by 2023 (Markets and Markets, 2018).

AR could potentially enable broadcasters to educate and entertain viewers by supporting the game product with informational and hedonic content (Ogus, 2019b). While AR is a potentially powerful tool to utilize during sport broadcasts, it is important to keep in mind that it should be seen as a complimentary technology and not one that will replace the core sport contest product itself (Goebert & Greenhalgh, 2020). Second Spectrum CEO Rajiv Maheswaran believes sport broadcasts customized with AR graphics will soon be the norm saying: "There will be a day we look back and say, I can't believe we used to watch everything the same way at the same time" (O'Connor, 2018, para. 16).

While AR has been examined in a variety of academic disciplines (Cipresso et al., 2018), little empirical research has been conducted on AR use in broadcasting. Specifically, there has been a dearth of research into consumer attitudes towards AR enhanced sport broadcasting. One factor that bodes well for the potential acceptance of AR technology in sport broadcasting is that

sport audiences have been shown to be receptive to new forms of consumption (McCosker & Dodd, 2013). As AR use in sport broadcasting becomes more common, it is important to understand consumer attitudes and intentions towards the enhanced broadcasts.

Rationale for the Current Study

It is vitally important for sport broadcast managers to understand consumer behavior and the attitudes of sport media consumers (Trail, Fink, & Anderson, 2003). Media rights are the largest source of revenue for the sport industry (PwC, 2018). Broadcast revenue now outpaces all other types of revenue including ticket sales for sport franchises (Foster, O'Reilly, & Dávila, 2016). It is important to specifically investigate the motives of sport media consumers as they have proven to be unique even amongst other types of media consumers (Gantz, Wang, Paul, & Potter, 2006). To that point, sport media consumers are one of the last groups of media consumers that overwhelmingly watch their programming as it happens in real-time (Rowe, 2018). Additionally, previous research into sport fan viewership behavior has revealed that fans are most interested in watching games that involve their favorite team or games that involve the team that is the biggest rival of their favored team (Mahony & Moorman, 2000). This is an attribute unique to sport fans as it demonstrates that they can be motivated to watch an event that involves a team other than their favorite team. All of these unique attributes of sport consumers make it vitally important that this study focuses on sport fans as they are the key population driving sport consumption. While there has been a lot of research focused on sport fan viewership, to the researcher's knowledge, there is no research that has been conducted to evaluate the use of AR enhanced broadcasts on sport consumer attitudes and intentions. This study is an attempt to empirically explore how fans perceive AR enhanced broadcasts and build a foundation for future research into this topic.

Sport offers a unique perspective through which to research consumer perceptions of AR. Due to the inherently competitive nature of sport, sport organizations have been shown to be more likely to incorporate innovative technology into their strategy when they believe that it might provide them with a competitive advantage over other teams or organizations (Ringuet-Riot & James, 2013). Not only are sport entities early to use technology, often sport is the impetus to create or utilize innovative technologies (Gratton & Taylor, 2000). Similarly, sport fans and consumers have been shown to be highly receptive of technological innovations that are implemented by sports, teams, players, or organizations that they support (Ratten & Ferreira, 2016).

Although AR elements have been used in sport broadcasts in the past, there is still some uncertainty sport broadcasters have when it comes to deciding how often to utilize an emerging technology like AR. ESPN president James Pitaro summarized the potential concern from sport broadcast producers surrounding the implementation of AR graphics into sport broadcasting saying

> We do not believe AR or VR is a fad. We want to be very careful in this space in that we don't want to address one problem and create another. We don't have enough data yet to tell us we should have more virtual graphics than we currently have as a part of our primary ESPN broadcast (Sharma, 2019, para. 13).

One of the outcomes of the current study is to provide sport broadcast managers with the data specifically addressing consumer attitudes and behavioral intentions towards AR enhanced broadcasts. This data could potentially be used by sport broadcast decision makers to craft more informed decisions in regard to whether or not they choose to implement AR enhanced broadcasts.

In addition, this study provides information concerning hedonic and utilitarian attitudes of consumers of AR enhanced sport broadcasts. Hedonic consumer behavior is more subjective than utilitarian behavior as it revolves around fun and playfulness and is often expressed through an emotion driven response (Babin, Darden, & Griffin, 1994). Hedonic attitudes tend to be reflected in affective gratification and relate to the amount of pleasure a consumer derives from the product or interaction they are experiencing (Voss, Spangenberg, & Grohmann, 2003). Hedonic consumer attitudes although mostly experienced on affective levels can also be experienced on cognitive levels (Nabi & Oliver, 2009). Hedonic attitudes towards sport broadcasts have been shown to positively impact a viewer's reflection on and appreciation of the broadcast (Hall, 2015). Utilitarian consumer behavior is generally a task-oriented information seeking behavior that is concerned with the functionality of a product or the functional information able to be derived from a product (Babin et al., 1994). Utilitarian consumer attitudes are generally considered to originate from the practical or informational value of the product or interaction a consumer is experiencing (Voss et al., 2003). In contrast to hedonic consumer attitudes utilitarian consumer attitudes are almost completely experienced on cognitive levels. Utilitarian attitudes in a sport context were shown to significantly influence consumers that were exposed to a product or event that featured detailed or logical information (Jang, Ko, & Stepchenkova, 2014). This study builds upon the sport literature focused on the hedonic and utilitarian attitudes by examining the attitudes consumers have towards AR enabled sport broadcasts.

Finally, the results of this study provide direction for sport entities that are seeking to provide unique content to attract viewers. Due to the amount and diverse array of spot consumption offerings, the sport consumption marketplace has never been more competitive

(Fujak et al., 2018). This has led to an environment in which multiple sport entities must compete for the attention of consumers by producing more impactful viewing experiences (Foster et al., 2016). The investigation into and results of participants word of mouth (WOM) and re-viewing intentions can be beneficial to sport entities by providing them with a more complete understanding of sport consumers intentions to speak positively about and continue to view a sport product supplemented with AR technology. Mahony, Madrigal, and Howard (2000) emphasize the value of being able to explain viewership and repeat viewership for consumer loyalty in sport media. The data from this study can help sport managers understand consumer intentions via re-viewing intention and WOM. These findings could impact how broadcasters choose to deliver their specific sport broadcast product to their viewers.

Statement of Purpose

The purpose of this study was to explore consumer attitudes towards AR enhanced sport broadcasts. Specifically, this study utilized the Elaboration Likelihood Model (ELM) to investigate the relationship of the traditional broadcast, AR enhanced coach mode activation and AR enhanced mascot mode activation and the ensuing impact on WOM intention, re-viewing intention and consumer attitudes. These broadcast modes will be discussed in greater detail later in the paper. Currently there are multiple instances of AR being utilized in sport broadcasts including in-game graphics, studio-based AR, player-tracking AR, ball or puck tracking AR, and AR statistics. A detailed discussion of the current uses of AR in sport broadcasting is conducted in the literature review portion of this paper. Each of the uses of AR serves a different purpose for the viewer of the broadcast. This study will focus on the two types of AR broadcast that are currently offered by the technology company Second Spectrum: coach mode and mascot mode. The coach mode broadcast diagrams plays, updates statistics and is intended to be informative in

nature while the mascot mode updates statistics with over-the-top graphics and AR interactions that are intended to be more entertaining. Some of the uses of AR in sport broadcasting are intended to inform and educate while others are intended to amuse and entertain. In an attempt to evaluate select behavioral outcomes of some of the different forms of AR broadcasting in a systematic way, a model was created which can be found in Figure 1.

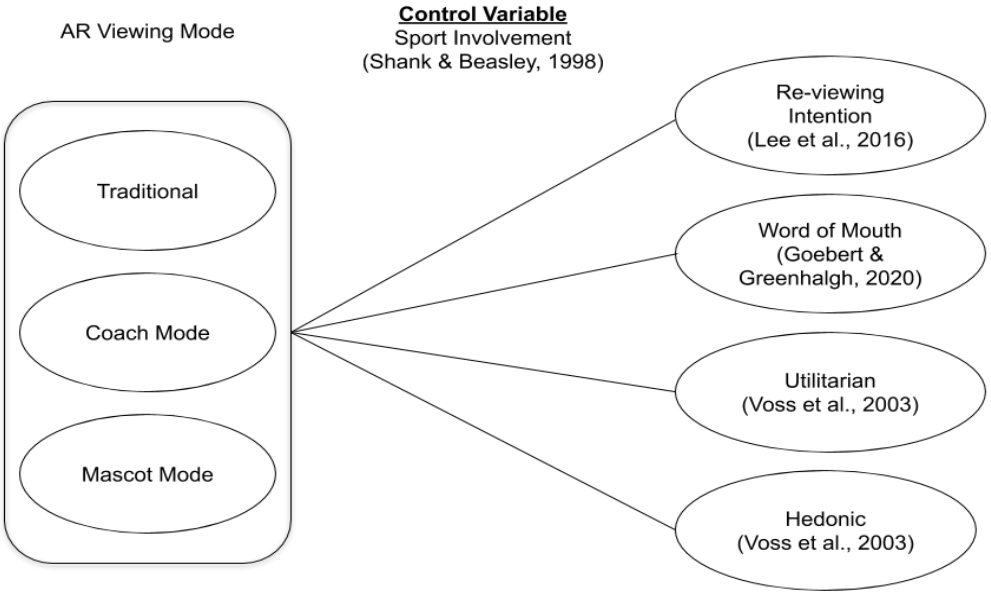


Figure 1. Hypothesized model of sport consumer intentions and attitudes towards AR enhanced broadcasts.

The research questions crafted to guide this study are as follows:

Research Questions:

RQ1) Is there a significant difference across all four outcomes simultaneously by broadcast type while controlling for sport involvement?

RQ2) Is there a significant difference in re-viewing intention by broadcast type while controlling for sport involvement?

RQ3) Is there a significant difference in WOM by broadcast type while controlling for sport involvement?

RQ4) Is there a significant difference in UT attitudes by broadcast type while controlling for sport involvement?

RQ5) Is there a significant difference in HED attitudes by broadcast type while controlling for sport involvement?

RQ6) Does the relationship between the level of sport involvement and the outcome variables differ based on broadcast type?

Delimitations

This study was designed to investigate how augmented reality enhanced sport broadcasts impact consumer attitudes. This study also examined the impact of AR enhanced sport broadcasts on re-viewing intention and WOM intention. Due to the focused nature of this study there were some areas that were excluded from the research. This study investigated the use of only one type of AR, broadcast AR. By choosing to focus on broadcast AR this study does not take into consideration the other types of AR that are discussed later in this document.

Specifically, in regard to sport broadcasting, this study focuses on the graphics used in the broadcast not how the broadcasters themselves impacted re-viewing intention. Lee, Kim, Williams, and Pedersen (2016) found that participants who were satisfied with the commentary of a sports broadcast saw a significant increase in re-viewing intention. However, this study chose not to investigate the commentary factor and kept the commentary consistent across each of the interventions.

Limitations

The data for the current study was collected through the use of a survey. As with any survey-based study there could be issues such as self-selection bias and social desirability (Stanton, 1998). Along the same lines, there is a potential for participants to provide answers that they believe the researcher wants to hear. There is a chance that the participants taking the survey have different views or characteristics than individuals that did not respond therefore non-response bias is also a limitation (Fleming & Bowden, 2009). The participants watched only a predetermined clip of a sport contest. There could potentially be different results if the study allowed participants to watch a full-length sport broadcast. It is possible that while viewing a full-length broadcast any potential novelty effect of the AR technology could dissipate over time.

A limitation of this study is that participants could not choose the broadcast type that they would like to view. Random assignment in this study allows for it be a true experiment, but does not allow the participant to function as they might in real life. That is, in a real-world sport viewing situation, a consumer would not be randomly assigned a broadcast type to view, they would be free to view the broadcast of their own choosing and could also alternate back and forth between broadcast types if they so desired.

Another limitation is that although responses can be evaluated, there was no place for narratives as to why participants felt the way that they did. Future research could use qualitative methods or mixed-methods to examine not only a participants' attitudes and intentions but also the underlying reasoning for why the participants felt the way that they indicated on their surveys. Finally, as AR in sport broadcasting becomes more commonplace, future researchers could further investigate this technology by examining the actual viewing habits of consumers as an outcome in place of intentions.

Definitions of Terms

Augmented Reality (AR). A technology that allows users to see virtually created objects superimposed on the real-world setting. In this way AR enhances reality instead of replacing it. AR usually displays three characteristics: (1) combines real and virtual, (2) is interactive in real-time, (3) is registered in three dimensions (Azuma, 1997).

Broadcast Augmented Reality. A technology that adds graphical outputs to broadcasts in a complimentary manner. AR virtual graphics are used to enhance broadcast content to provide further information for the viewer (Han & Farin, 2007).

Coach Viewing Mode. This broadcast mode diagrams the plays and movements of the players and the ball during live gameplay. Kevin O'Connor (2018) a sports writer covering the NBA for The Ringer noted that coach mode is for the fan that wants to really understand what is happening in the game saying: "Coach mode has visualizations of off-ball screens and pick-and-rolls, among other offensive actions, as well as how a team defended a pick-and-roll and whether a player is open based on their distance from a defender" (para. 10).

Elaboration Likelihood Model (ELM). The ELM focuses on how marketing stimuli impact cognitive activity and affect changes in attitude (Schumann, Kotowski, Ahn, & Haugtvedt, 2012). The ELM focuses on how participant elaboration influences persuasion and attitude (Petty, Briñol, Teeny, & Horcajo, 2017).

Gartner Hype Cycle. Produced by research and advisory company Gartner, the Hype Cycle is the longest running annual report on industry and business views on innovation and technology (Gartner, 2018).

Hedonic/Utilitarian Attitudes Scale (HED/UT). A semantic differential scale intended to measure the hedonic and utilitarian attitudes of consumers corresponding to a product or experience (Voss et al., 2003).

Immersive Technologies. A grouping of interactive technologies that includes augmented reality, virtual reality, haptic technology, and tools for tele-immersion (Handa et al., 2012).

Mascot Viewing Mode. This AR-enhanced mode strongly resembles a video game or video game broadcasts on the popular video game platform Twitch (O'Connor, 2018). The mascot mode version of the broadcast often features graphics that seem to be intended for visual entertainment alone (starburst symbol on shot release, lightning strikes, net catching fire, clapping hands, foam fingers).

Re-viewing Intention. A participant's intent to watch another broadcast with similar characteristics after they have a positive experience with the content or quality of the media that they have watched (Choi & Bum, 2019).

Sport Broadcast Media. The most utilized sport consumption medium. Consumers' "main connection to sport itself" (Boyle, 2009, p. 9). Though there are a variety of mediums in which sport can be consumed, this study is focused on televised sport broadcasts.

Sport Consumption. The method that a spectator uses to interact with a sport product whether in person or through sport media (Madrigal, 2006).

Traditional Viewing Mode. The traditional broadcast includes a play-by-play broadcaster and color commentator accompanying a visual broadcast of the on-court action without the addition of AR-enhanced graphics.

Word of Mouth (WOM). A way in which interpersonal communication is used by a consumer to recommend a product to a fellow potential consumer. WOM can be used to make predictions about future consumer behavior (Zhang, Craciun, & Shin, 2010).

Chapter Two: Review of Literature

In the past, research into sport media consumption has compared newspapers, television, radio broadcasts, and online media. However, new technology allows for a wide array of sport consumption possibilities (Fujak et al., 2018). There are now broadcasts that are enabled with AR computer-generated graphics that list player information, entertainment graphics, and statistical information during game broadcasts. However, the increase in technology and broadcast options creates a challenge to sport organizations in regards to how they will allocate their resources to provide the most impactful broadcast content (Karg et al., 2019). This is especially important as broadcast revenue has become the main source of income for sport franchises (Foster et al., 2016). It is a goal of this research to provide some clarity for organizations as to the preferences of consumers in regard to traditional versus AR sport broadcasts.

Sport Consumption

According to Robert Madrigal (2006), sport consumption can be interpreted as a form of "skill performance consumption" and he defined it by stating "Skill performance consumption, therefore, refers to the manner in which a spectator (an attendee or media consumer) interacts with the witnessed action that occurs during an event for which the outcome is uncertain" (p. 268). As the definition states, there are multiple ways to consume sporting events. Live attendance has traditionally been considered the primary way to consume sports. After all, sport broadcasts only began to show up on the radio in the early 1900s (McChesney, 1989). While sport broadcasts are a much more recent phenomena than live attendance, there has been a paradigm shift in regard to what is the most important form of sport consumption. For much of the history of sport, gate revenues from live attendance had been the largest financial driver of

the sport industry (Mason, 1999) however, in 2017 media rights moved ahead of gate revenues to become the largest source of income for sport organizations (Gallagher, 2018). While attendance is still an important part of sport consumption, this study will focus on what Foster et al. (2016) identify as a crucial source of revenue for sport business: sport media.

Media-dominant Sport Consumers

There has been a great deal of academic research conducted into attempting to understand the sport viewing habits of consumers. This topic has received a great deal of attention for good reason. There are more than 134,000 hours of sport content and programming available to consumers each year (Nielsen, 2018). Further in 2018, 89 of the 100 most-watched programs on television in the United States were sporting events with Super Bowl LII rating as the most-watched program (Dixon, 2019). Televised sporting events have exploded in both numbers of channels and type of programming (Raney, 2016). Due to this fact, fans of sport have many different ways in which they can consume sport (Dwyer & Kim, 2011; Ha, Ha, & Han, 2013).

Zhang, Pease, and Smith (1998) looked at media coverage in sport settings and came to the conclusion that sport media consumption negatively impacted event attendance as it allowed fans an outlet to view a contest without needing to attend in person. Subsequent research then indicated that sport media viewing was only a step on the path to the ultimate goal of getting the consumer to attend live events and thus was not the ultimate priority for sport managers (Mullin, Hardy, & Sutton, 2000). This idea became known as the "escalator" model and suggests that someone first becomes involved in media surrounding a sport then progresses towards sport attendance. However, Jeffres, Neuendorf, and Atkin (2003) found that media use was not just a precursor to attendance but rather it was intertwined in a complementary relationship "the more one uses media, the greater one's participation as a spectator" (p. 181).

Pritchard and Funk (2006) further investigated whether the sport spectator's consumption of sport through media was a compliment or replacement for sport attendance. These researchers had somewhat of a breakthrough as they were the first to coin the phrase "media dominant consumers" as they compared that group to "event dominant consumers". Media dominant consumers did the majority of their sport consumption through telecasts, webcasts, or some other medium without being physically present at the sport venue. Event dominant consumers were defined as those that frequently attended sporting events in person and felt great satisfaction from witnessing the competition at the site. The authors found that previous studies failed to considered sport consumer relationships over time and only considered one-time attendance. The authors suggest future studies consider whether other constraints not related to fandom might make it difficult for even highly identified fans to attend games. The most impactful finding of their study was the identification of the group of media dominant consumers. Pritchard and Funk (2006) found that this group was an import group for those in the sport industry to understand. Their finding suggested that media-dominant consumers are more likely to purchase team merchandise and wear team-branded apparel than their event-dominant counterparts. Also, media-dominate consumers rated as more involved in their teams and experienced a greater sense of satisfaction from their favorite team's games than did event-dominant consumers.

Karg et al. (2019) extended this line of research as they examined channel preferences among sport consumers. Specifically, they attempted to profile the group of consumers that Pritchard and Funk (2006) had previously identified as media-dominant consumers. Karg et al. (2019) postulated that a growing number of viewing options paired with the improved quality of those viewing options may be leading consumers from live attendance to media consumption

habits. The authors utilized a nationally representative sample of season ticket holders (STH) from Australian Rules Football. They specifically were interested in STH's that chose not to attend an event they had tickets for and the reasoning behind their decision. The results of the study showed that media-dominant consumers had higher scores than event-dominant consumers on a number of factors including attitudinal scores, merchandise purchasing, fantasy sport participation, and TV package subscription. Media-dominant consumers also had significantly higher scores on four out of the seven factors that encompass STH overall satisfaction. The findings of their study indicate that there are fans that clearly have preferences in regards to how they consume their sport media whether it be through media or through live attendance. The researchers recommend that with the new-found knowledge of the highly committed nature of media-dominant sport consumers, that sport organizations and leagues should "tailor products around channel preferences" (Karg et al., 2019, p. 303). The fact that these highly committed fans that have access to live events would actively choose media consumption over event consumption suggests that sport managers should place greater emphasis on ensuring that their broadcast products provide access and interactivity for those fans.

Media-dominant Sport Consumers Needs

Sport media consumers are unique even amongst other groups of media consumers. In fact, sport media consumers demonstrate more enjoyment and greater motivation to watch programming than consumers of media in other categories (Gantz et al., 2006). However, much like the motivations of consumers in other categories, sport media consumers motivations are wide-ranging. Considering Karg et al.'s (2019) call to customize products to address the needs of media-dominant consumers, it is important to identify what some of those needs might be. The literature lists many motivations for sport media consumption including emotional

motivations, entertainment motivations, eustress motivations, self-esteem motivations, escape motivations, learning motivations, aesthetic motivations, behavioral motivations, and social motivations (Raney, 2006).

While there are clearly many different motivations for consumers to watch sport media, two, in particular, stand out in the literature. The first motivation that stands out is hedonic motivation. Raney (2006) states that sport consumers tune in to sport broadcasts to be entertained or to experience enjoyment more than any other reason and that it is the most important motivation for sport media consumption. However, sport media consumption is not just about hedonic motivation. The second motivation that is highlighted in the literature is the utilitarian motivation of information seeking pertaining to teams and players (Wenner, 1998). This motivation is cognitively driven as consumers watching sport media, for this reason, are trying to increase their knowledge about a sport, team, or player. As hedonic and utilitarian motivations are cited throughout the literature as reasons fans consume sport media, it is important to gain a more in-depth understanding of these motives.

Hedonic Viewing Motives

Raney (2006) indicates that there are multiple emotional or hedonic motivations for mediated sports consumption including: entertainment, eustress, self-esteem, and escape. Raney (2006) states that entertainment motives revolve around team and player allegiances. He cites one of the primary factors influencing the entertainment motive as what Gantz (1981) refers to as the "thrill of victory" (p. 268). That is, the main force behind the hedonic entertainment motive is fans cheering their favorite team or player on to victory. Eustress is the positive form of stress often referred to as arousal or excitement (Raney, 2006). Multiple studies have cited viewers listing eustress as a hedonic form of viewing motivation through indicating their excitement

(Krohn, Clarke, Preston, McDonald, & Preston, 1998) and arousal (Wann, Melnick, Russell, & Pease, 2001). The third hedonic motivation that Raney (2006) identified was common amongst sport media viewers was self-esteem. He states that viewers that witness their favorite team win a competition can show signs of increased self-esteem and confidence. Cialdini et al. (1976), similarly identified this motivation as when a fan basks in reflected glory (BIRG). Finally, Raney (2006) lists a hedonic viewing motive that is not tied directly to the outcome of a contest, but instead is a way for viewers to get away from the daily stresses of life: escape. A study by Wann, Allen, and Rochelle (2004) found that roughly 40% of fans indicated that they watch televised sports as a way of escape to avoid boredom.

Hedonic motivations are generally thought of as emotional responses to stimuli. However, studies have shown that in a media context, hedonic enjoyment is actually a process and not strictly an emotional reaction (Nabi & Oliver, 2009). This process of hedonic enjoyment happens as a consumer interacts with environmental variables and the content that is being displayed by the media. Hall (2015) found that hedonic enjoyment of a sports television broadcast was significantly and positively linked with emotional responses. So, if viewers experience hedonic entertainment from a broadcast, they will likely have positive emotions when reflecting on that broadcast.

Utilitarian Viewing Motives

The repository of sport knowledge that fans build through sport media consumption plays multiple roles for the sport consumer. Sports knowledge allows consumers to understand the sport action they are viewing, inform fantasy sports decisions, and provide sports fans with information to discuss and debate with others before, during, and after the game (Gantz & Lewis, 2014). Gantz (1981) listed “to learn” as one of the four dimensions he discovered in his seminal

work on why consumers view sports on television. The author found that one of the key elements of viewing sports on television was to acquire information saying "Some sports fans appear to be walking record books, storing and categorizing information about athletes and teams" (Gantz, 1981, p. 270). These information-seeking consumers "want immediate, continuous, and fan-directed access to sports data" (Gantz & Lewis, 2014, p. 25). This view of utilitarian viewing motives would make utilitarian attitude a natural fit to be considered part of the ELM's central route of processing that takes place when participants engage in higher-order thinking about a stimulus they have been presented. The utilitarian motivation of information seeking is clearly a strong driver of sport consumption.

Even though there is a great deal of research that indicates that a fan's level of entertainment can be dependent on results of contests involving their favorite or least favorite teams (Mahony & Howard, 1998) it is clear that fans watch sports for entertainment. However, hedonic enjoyment of sport is not reserved only for those with a rooting interest in the competition. While the strongest hedonic emotions tend to come from cheering for your favorite team or against your least favorite team, neutral attitude fans can still derive enjoyment from an athletic contest based on the content of game (Mahony & Moorman, 2000). Big plays such as buzzer-beaters, long touchdown passes, towering home runs, can also elicit feelings of enjoyment from fans that do not have a favorite team playing in the contest (Bryant, Rockwell, & Owens, 1994).

Rather than looking at motivations for why fans consume spectator sport, Gau and James (2013) investigated values that are associated with spectator sports. Their reasoning for doing this is that motives can be fleeting and situation-dependent (i.e., watching a sporting event because your favorite team is playing). However, values have been found to be longer-lasting

and more fundamental in the behavioral response process (Vinson, Scott, & Lamont, 1977). Gau and James (2013) held focus groups and utilized interviews to gain a better understanding of the values sport spectators hold. The first of the nine value types that Gau and James (2013) uncovered was enjoyment. This theme of enjoyment was consistent across both highly identified and novice fans. While the highly identified fan may find enjoyment from the gameplay and strategy of competition, the casual watcher may find enjoyment based on the pageantry and the show of what is taking place. Respondents from Gau and James' (2013) interviews cited fun, diversion, atmosphere and escape as reasons for their enjoyment. In their own words the authors found that "Enjoyment may come from entertainment, excitement, and feelings of pleasure from a release of tension or stress" (Gau & James, 2013, p. 7). Consumer enjoyment is a key area of focus for sport marketers (Funk, Ridinger, & Moorman, 2004). One of the most recent trends in this area include the implementation of AR to enhance gameday events, game presentation, and sport broadcasts (Ogus, 2019b).

Augmented Reality

Augmented reality is a technology that falls under the umbrella of a grouping of interactive technologies often referred to as immersive technologies. Immersive technologies are technologies that "consists of several tools which can be used for management such as virtual reality (VR), augmented reality (AR), haptic technology, and tele-immersion" (Handa et al., 2012, p. 1). Due to being grouped together as immersive technologies and sharing similar terminologies augmented reality (AR) and virtual reality (VR) are often confused with each other. However, the two technologies are very different mediums. VR is a technology that takes the user and places them in a virtual environment that is completely digital and computer-generated. Whereas AR takes digitally created content and images and overlays them on the

actual real-world environment in which they are being utilized (Berryman, 2012). VR also utilizes head-mounted displays (HMD) that the user physically wears while interacting with the virtual environment that they enter into (Handa et al., 2012). AR, on the other hand, can be experienced through a variety of mediums including haptic (touch), audio, olfactory and visual (Schmalstieg & Hollerer, 2016).

Haptic AR applications simulate the feeling of touch that one would experience by interacting with an object in the real-world environment. There are many different types of haptic AR technologies that have been investigated including: shoes, vests, jackets, and gloves (Schmalstieg & Hollerer, 2016). The haptic technologies currently available for AR use rely on programming specific to the scenario in which they will be used and are not yet able to provide a realistic touch sensation for most of the situations in which they might be utilized (Schmalstieg & Hollerer, 2016). An example of haptic AR generally being bound to a specific scenario comes from the medical field. A program called ImmersiveTouch has been used to train medical students and doctors to perform surgical tasks by providing small electrical impulse signals to their hands to guide their actions (Jeon & Choi, 2009). Audio AR uses are generally attached to other technologies such as headsets or stationary speakers. With audio AR sounds are attached to specific items and sound as though they are emanating from that item. For example, assistive audio guidance has been implemented to assist visually-impaired individuals by alerting them to their surroundings with audio notifications (Loomis, Golledge, & Klatzky, 1998). By using global positioning, the AR voice system could help a visually-impaired individual to navigate through a variety of locations without assistance. Olfactory AR uses mostly rely on scented air being propelled in the direction of the user in the form of air rings, air blasts, or bubbles (Schmalstieg & Hollerer, 2016). Olfactory AR has been used in food and taste studies and has

been found to influence taste. Narumi, Nishizaka, Kajinami, Tanikawa, and Hirose (2011) found that participants that were given visuals and smells of chocolate cookies when eating a regular cookie reported that they tasted chocolate.

Now that the other types of AR have been discussed, this paper will focus primarily on the visual uses of AR. Visual uses of AR include broadcast AR, computer-based AR, HMD AR, projector-based AR and smartphone-based handheld AR (Schmalstieg & Hollerer, 2016). These different visual modes in which AR can be experienced will be discussed more thoroughly later in the paper. One of the most novel aspects of AR is its ability to combine both the physical environment and digitally created content simultaneously in one display. Carmigniani et al. (2011) emphasize the importance of the ability of AR to enrich the environment and experience in which it is being utilized. Or, as Schmalstieg and Hollerer (2016) state, "Augmented reality holds the promise of creating direct, automatic, and actionable links between the physical world and electronic information" (p. 2). While there is clearly optimism for the future uses and implementation of AR, understanding the timeline in which it will take place is less clear.

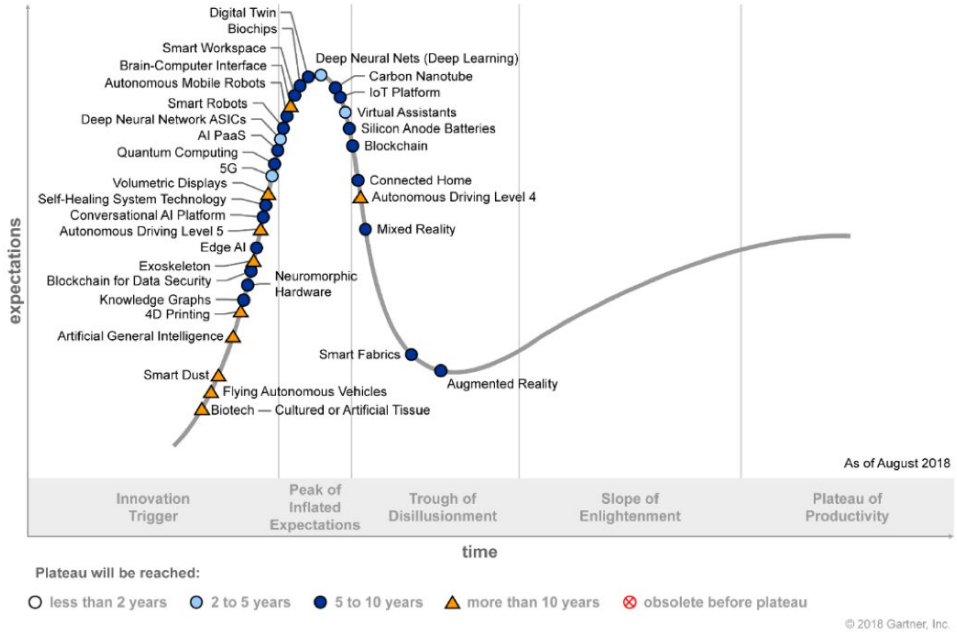


Figure 2. Hype Cycle for Emerging Technologies, (Gartner, 2018)

When considering the trajectory of the future use and adoption of AR it is important to consult the Gartner Hype Cycle for Emerging Technology. Gartner creates their Hype Cycle from expert opinions and data-driven research (Gartner, 2018). The Gartner Hype Cycle is the longest running annual report on emerging technologies. The Hype Cycle organizes emerging technologies into trends based on insights and data they have gathered and makes predictions about the impact and adoption of the technologies they review. According to the 2018 Gartner Hype Cycle, AR is five to ten years away from being a mass adopted technology. With these insights in mind it is important to know where AR has come from and where it could potentially be heading.

History

While Tom Caudell and David Mizell are credited with coining the term augmented reality in 1990, the history of AR dates back much further (Carmigniani et al., 2011). Ivan Sutherland was a pioneer in the world of computer science, virtual reality, and augmented reality and was even referred to as the "father of computer graphics" (Earnshaw, 2014). Sutherland, a graduate of MIT and professor of electrical engineering who taught at both the University of Utah and Harvard, is thought to have created the first AR technology when he and his colleagues built the first head-mounted display. The display nicknamed the "Sword of Damocles" had transparent lenses that could display computer-generated graphics and also included head tracking (Schmalstieg & Hollerer, 2016). In the beginning, much of the development of AR technologies was undertaken by the military and specifically utilized for military aviation (Bulearca & Tamarjan, 2010).

In 1997, Ronald Azuma, one of the early AR researchers, provided what has become the most commonly cited definition of AR when he wrote that "AR allows the user to see the real

world with virtual objects superimposed or composited with the real world. Therefore, AR supplements reality, rather than completely replacing it" (p. 356). Azuma also said that AR should not be limited to a certain technology or grouping of technologies but instead, any system that has three characteristics specific to AR interactions can be considered AR. The three characteristics that he found to be indicative of an AR activation were:

1. Combines real and virtual.
2. Is interactive in real-time.
3. Is registered in three dimensions (p. 356).

While the first two characteristics are seemingly straight forward, the third characteristics may require some explanation. What Azuma meant by "Is registered in three dimensions" is that the graphical output appears to mesh well with the physical world in which it is being displayed. For instance, if a watch is being digitally displayed in AR on a person's wrist, for it to be "registered in three dimensions" it would attach well to the person's wrist regardless of how they move or rotate it. If the AR watch was glitchy or did not stay attached to the person's wrist during movement, the person would then be taken out of the believability of the experience and the AR watch would no longer be considered to be "registered in three dimensions".

Modern advancements in the capacity of both computing power and computer graphical technology of current devices have led to the emergence of AR as a technology and have helped it reach the precipice of adoption (IDC, 2017). While AR is currently on course to be adopted by consumers, it is important to understand that the technology itself is not a monolith and is instead accessed through the use of multiple platforms. The following section will explore the types platforms used to access AR interactions.

Types of Visual AR Displays

Head-mounted Display AR

HMD AR displays are the oldest and most researched type of AR display (Schmalstieg & Hollerer, 2016). HMD use and research date back to Ivan Sutherland (1968) at the University of Utah and his "Sword of Damocles" headset.

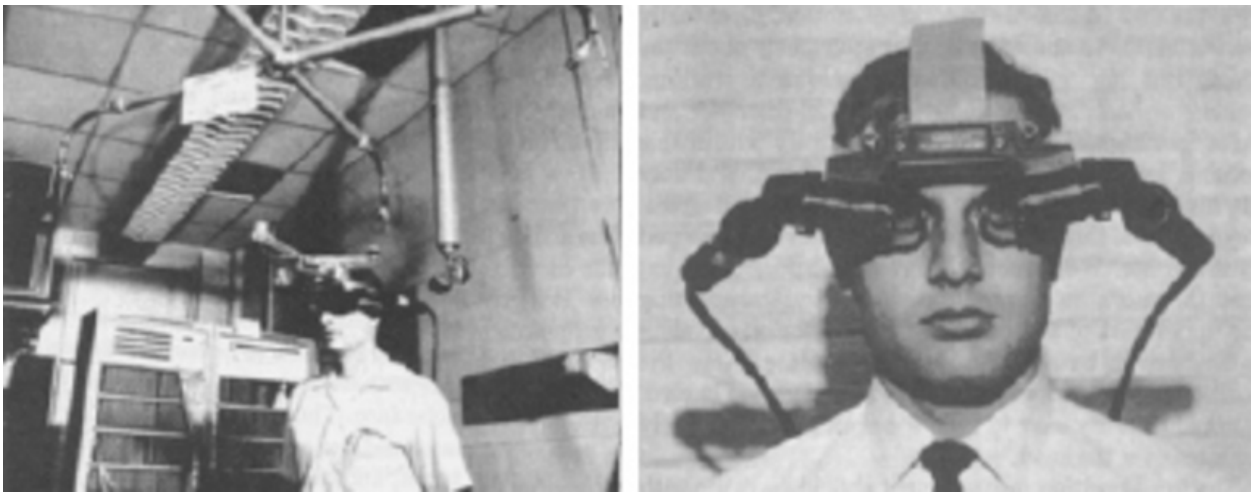


Figure 3. The Sword of Damocles (Sutherland, 1968).

During the 1970s and 1980s several researchers continued to investigate the development and potential uses of AR. In particular researchers Dan Sandin, Scott Fisher, and Myron Krueger researched the use of computer overlays and video during much of the 1970s and 1980s (Krueger, 1991). In the early 1990s, Tom Caudell and David Mizell developed a head-mounted display for Boeing that allowed workers to see a visual representation of where wiring bundles should go during the assembly of airplanes and other technologies (Carmigniani et al., 2011). In the late 1990's Feiner, MacIntyre, Hollerer, and Webster (1997) developed and tested their "touring machine" (see Figure 4). Their system provided navigation around the campus of Columbia University. Their navigation was accomplished by using a head-mounted display

coupled with GPS to overlay navigational graphics that were powered by a computer in a backpack unit.

Figure 4. Touring Machine (Feiner et al., 1997).

Rolland and Hua (2005) reported that during the 2000s AR head-mounted displays improved in multiple. First, they became smaller and lighter. Second, the resolution and image quality displayed improved greatly during this time period. However, Rolland and Hua (2005) found that although improvements had been made, the systems available during that time did not do a good job of merging the digital and physical worlds. During the mid to late 2000's many manufacturers quit producing head-mounted displays as there was not much of a market for them (Kiyokawa, 2007). Many of these original AR headsets were large, heavy, and not visually appealing and serve to illustrate a design challenge that HMD's still face today. That is, users want HMD's to be comfortable, fashionable, and unobtrusive (Carmigniani et al., 2011).

Google Glass attempted to address these challenges by developing compact smart glasses in 2013 that used digital information to enhance the user's physical environment (Rauschnabel, Brem, & Ivens, 2015). However, due to high prices, limited functionality and poor design Google Glass could not find its footing in the market and their production was discontinued in

2015 (Garcia, 2019). Magic Leap and Hololens are the latest and most established AR HMD's currently being produced, used and tested in industry. While some experts believe HMD's like Magic Leap and Hololens may one day replace desktop computers and laptops in our work environments, there are a number of challenges that AR HMD's must address before they become ubiquitous office devices (Azuma, 2016). Perhaps the biggest challenge HMD's face in regards to user adoption is the presence of other types of AR that seem to be less intrusive and more readily available.

Projector-based AR

Projector-based AR systems are generally not as portable as other AR technologies because they are dependent upon a projector to display them on an object or space (Bimber, 2004). While not as popular as some of the other types of AR displays, projected-based AR activations have found their niche in settings that portability is not the most essential aspect of the interaction. For instance, projector-based AR has been utilized for medical training, museum display interactions, and architectural AR illustrations (Haller, Billinghurst, & Thomas, 2007).

Smartphone AR

One of the main reasons behind the meteoric rise of AR is that it is now a featured capability that comes standard in the vast majority of smartphones. Many smartphones are not only capable of utilizing AR, but they are also being specifically constructed with AR use in mind (Boland, 2017). In fact, Apple developed ARKit for its devices in September of 2017 while Google issued its competitor ARCore that was specifically built for Android devices in February of 2018 (Blum, 2018). With the release of these AR technologies, it is estimated that by 2020 there will be around 4.2 billion AR compatible smartphones owned by potential consumers (Boland, 2017). The portability and almost universal ownership of smartphones make them an

exemplary platform on which to experience AR interactions. In fact, Haller et al. (2007) refer to smartphones as "an ideal platform for augmented reality" (p. 91). Due to the fact that AR and smartphones seem to be such an ideal match, the majority of sport uses of AR to date have been smartphone based. The Minnesota Vikings and San Francisco 49ers have utilized smartphone-based AR to augment their gameday programs and souvenir cups with videos of player interviews and highlights. Soccer team Manchester City FC utilized an app to provide augmented player interviews, match highlights, and player selfies. The Sacramento Kings of the NBA used smartphone-based AR to unveil their new jerseys and allowed fans to take virtual pictures with their players. These are just a few of the examples of how smartphone-based AR is being used in sport. While smartphone based uses of AR seem to be the most common way sport has implemented AR use, other uses of AR are beginning to gain momentum.

Broadcast AR

Broadcast AR is used mostly in a complimentary manner to the broadcast to allow the viewer to better comprehend the information that is being disseminated (Han & Farin, 2007). That is to say that broadcast AR is often used to enhance broadcast content rather than produce its own content. Broadcast AR has proven to be quite effective at enhancing broadcasts. In fact, staff members from a British Broadcasting Corporation news broadcast utilizing this type of AR found that it made interactions "more powerful and meaningful in relation to the editorial context and enhanced both the presenter and viewer experiences" (Woolard, et al., 2003, p. 295).

Augmented Reality in Marketing

While AR may not yet have reached the point of mass adoption, the market for the technology is expected to grow exponentially in the coming years. The market for AR technology is expected to grow from 11.14 Billion USD in 2018 to 60.55 Billion USD by 2023

(Markets and Markets, 2018). Recently, some of the biggest names in technology have invested in developing their own AR technologies including Microsoft, Facebook, Apple, Google and Amazon (Bradshaw, 2017). In fact, Facebook's CEO Mark Zuckerberg believes so strongly in the potential impact of AR that he took to his own personal Facebook page to write "We believe this kind of immersive, augmented reality will become a part of daily life for billions of people" (Winfrey, 2016, para. 9). The expected rise of the technology in combination with its unique interactive abilities positions it to be a valuable technology for marketing contexts.

According to Javornik (2014), the majority of the AR interactions being employed in marketing fall into three main categories. Those categories are customer service, product management, and advertising/promotion. Goebert and Greenhalgh (2020) researched these three classifications of AR in a sport context. Specifically, they studied AR prototypes of arena wayfinding (customer service), in-game player tracking (product management), and an augmented game program (advertising/promotion). Their findings indicated that when implementing AR activations in sport, it is important to focus on how visually appealing those interactions are to consumers. They also suggest that at this time AR activations in sport should focus on supplementing and not interfering with the main sport product.

Customer service applications of AR have included uses such as product instructional materials assistance, augmented product information, augmented directions, and other uses to assist and inform a user of a product. Customer service activations of AR in sport have included augmented representations of a stadium (Valich, 2018), augmented team apparel catalogues, and augmented sport equipment catalogues (Stahel, 2018).

When AR has been used for product management it has been by allowing users to virtually interact with products like augmented jewelry try on, augmented makeup try on, and

augmented clothing try on. Product management uses of AR in sport have included virtually attached face paint (Rettig, 2017), player tracking (Wyshynski, 2019), and team apparel virtual try-on (Szymczyk, 2015).

At the time of this writing, the most utilized of the three categories that AR can be used in marketing is advertising/promotion. This use of AR includes interactions like product gamification, interactive shopping displays, and augmented marketing and promotional materials. Advertising and promotional uses of AR in sport have included interactive signage within sport venues (Ogus, 2019b), augmented gameday programs (Stahel, 2018), and augmented game souvenir items (Stahel, 2018).

Computer science and technology development are the areas in which AR has been most extensively studied (Carmigniani et al., 2011). However, there have been studies of AR in the marketing literature. Some of the research in the marketing context has focused on the use of AR in retail marketing (Javornik, 2014). Companies like IKEA, Nike, and Amazon have all utilized AR to advertise their products in augmented retail applications (Palmer, 2018). These applications have been used to place digital representations of items such as furniture and clothing that are being considered for purchase into the physical environments in which they might be used.

Augmented reality try-ons have also been studied extensively as a way to market products like jewelry, makeup, and clothing. Javornik, Rogers, Moutinho, and Freeman (2016) found that as the quality of the AR try on, in this case, makeup, increases so too do the consumers' intention to use the application and product. Other studies have bolstered this claim by finding that an AR portrayal of products establishes very strong experiential value and greater

patronage intentions for the brand that is being depicted (Beck & Crie, 2018; Huang & Hsu Liu, 2014).

Yaoyuneyong, Foster, Johnson, and Johnson (2016) researched consumer preferences in printed advertisements. The researchers created three advertisements for the same company in three different formats. One advertisement was a traditional print format, one was a quick response (QR) code enabled print format, and one was an AR-enabled print format advertisement. The traditional print advertisement included all relevant information for the business being advertised including address, email address, and phone number. The QR enabled advertisement included the name of the company, logo, a heading for contact information on the advertisement followed by QR codes that linked the participant to the relevant information. The AR-enabled advertisement only had the name of the company and their logo and the logo was the trigger image that enabled the AR portion of the advertisement to virtually display all of the relevant information. The researchers found that a larger percentage of participants said that they preferred the traditional advertisement (47.4%) over the QR advertisement (11.8%) and AR advertisement (40.8%). Interestingly, even as a larger percentage of participants said they preferred the traditional advertisement over the AR advertisement, the AR advertisement elicited higher ad appeal, memorability, informativeness, and ad success compared to the QR advertisement. The authors suggested that advertisements might be best served by including vital information in a printed form and then layering AR activations over that printed advertisement. In this way consumers who are not technologically savvy can have the pertinent information without needing to utilize technology to find it and consumers that are more technologically savvy can interact with the advertisement further via AR.

Other studies have looked at AR as an e-commerce virtual try-on tool. Yim, Chu, and Sauer (2017) specifically researched AR as an e-commerce option compared to a conventional e-commerce website. The two studies they conducted, one of which was mixed-methods, looked at AR versions of sunglasses and watches. The participants used webcams on a computer that projected augmented virtual products onto their person. This study specifically investigated whether interactivity and vividness led to a consumer feeling immersion which would ultimately lead to a positive attitude towards the AR products. For the purpose of their study the researchers defined interactivity as the ability of the technology to enhance the ability of the user to be involved with it. Vividness refers to the realistic appearance or quality of the created content. Participants were randomly assigned to either the AR condition or the website condition. The website and AR both had the exact same products and descriptions. The computer version displayed a traditional website format with pictures of the items and written descriptions laid out on a scrollable webpage. The website allowed participants to click and view multiple pictures of the products taken from various angles. However, the AR condition allowed the participants to visualize the items as if they were actually wearing them. The results showed that interactivity and vividness significantly influenced media usefulness and enjoyment when mediated by immersion. The AR condition also provoked higher novelty, immersion, enjoyment and usefulness scores. The AR condition also had more positive attitudes toward product purchase intention than the website condition. This study identifies vividness and interactivity as key factors in the adoption of technology that set AR apart from traditional website e-commerce. It is important to investigate these factors further in future AR e-commerce research.

Additional studies have found that AR can be disseminated effectively in a variety of marketing contexts including advertising (Hopp & Gangadharbatla, 2016), retail settings (Dacko, 2017; Huang & Liao, 2015), purchase intention (Hilken, de Ruyter, Chylinski, Mahr, & Keeling, 2017; Oh, Fiore, & Jeoung, 2007), tourism (Chung, Han, & Joun, 2015), and experiential marketing (Beck & Crie, 2018; Huang & Hsu Liu, 2014). Finally, Hilken, Keeling, de Ruyter, Mahr, and Chylinski (2019) found that AR could be used by companies or organizations to prompt positive behavioral intentions from consumers.

Augmented Reality in Sport Marketing

Though AR has been studied in general marketing contexts, it is almost completely academically unexplored when specifically considering its uses in sport marketing. The vast majority of the AR studies conducted in the sport literature are aimed at the development and uses of AR in-game tracking and training. For instance, Lee, Ahn, Hwang, and Kim (2011) tested a prototype of an AR technology for tracking baseball players. This system would track players in the field, identify them, and overlay statistical information on each player in real-time. The authors concluded that their system would be best suited for tracking baseball players as positional locations in baseball are more static and are easier for the technology to recognize than other sports in which players continually intermingle during gameplay. Jang, Ko, Lee, and Kim (2018) built on the previous studies regarding player tracking uses of AR in sport by testing two different ways in which to track players in sport competition. They analyzed marker-based, and markerless tracking methods for AR athlete tracking. They found that marker-based tracking in which a small tracking device that is embedded in the equipment of an athlete is tracked was the most reliable way in which to track athletes and attach augmented statistical data. In fact, they

found that markerless tracking had an 82% accuracy percentage and marker-based tracking had a 96% accuracy percentage in the recognition rate of moving athletes in a sporting context.

While several studies look at AR in a sport context, only one was able to be found in the literature that focused on AR as a tool for sport marketing. Rogers, Strudler, Decker, and Grazulis (2017), examined AR as a way to enhance the viewing experiences of sport spectators. This study had fans look up statistical and personal information about athletes during a game that they were viewing. Fans looked up information via printed game programs, web search through a smartphone, or an AR interaction through AR-enabled glasses. The authors found that spectators did not enjoy sports more while viewing broadcasts enhanced with AR. However, these findings provide a further impetus to study AR in sport marketing as the technology the researchers used in this study, Google Glass, is a failed technology that is no longer being manufactured or sold by Google thus making it hard to generalize their findings to other AR technology such as smartphone AR activations. The authors did find that participants experienced the most autonomy using their smartphones to search the web. Participants also found the smartphone to be the most helpful way to locate information while performing the task for the study. That finding is important as many of the AR interactions being produced in sport marketing contexts are smartphone activations.

AR has been used in many ways in sport marketing including but not limited to: AR venue gamification, enhanced photography, AR-enabled game day programs, AR-enabled souvenirs, and AR-enabled merchandise catalogs (Stahel, 2018). To date, AR has been utilized by a number of sport entities including the NFL, PGA, NBA, MLB, Nike, and NASCAR as a portion of their marketing strategies (Neil, 2018).

Broadcast Media in Sport

Sport fans have exhibited a desire to imbibe mass amounts of information about their favorite sport, team, or player. This is not a newly developed characteristic of sport consumers. As a matter of fact, soon after the Civil War ended, newspapers began to provide detailed statistics and descriptions of baseball games, boxing matches and horse races (Bryant & Holt, 2006). This early sport coverage helped to turn athletes into sport celebrities and in turn, caused sport fans to desire to consume as much information as they could about their favorite players. It was around this time that sports journalist Henry Chadwick created the statistical measures of batting average and earned run average which he reported in his other creation, the box score (McChesney, 1989). Newspapers were the first source of sports information for sport consumers and have remained a strong source of data for sport fans that exhibit information-seeking tendencies.

In the 1920s and 1930s radios became more affordable and began to gain a foothold in the American home (McChesney, 1989). One of the reasons radios became a main form of sport media consumption during that time was the radio's unique ability to broadcast details of an athletic event in real-time (Bryant & Holt, 2006). While newspaper readers may have to wait until the next day or even longer to find out the results of an athletic event, radio allowed listeners to hear the action as it happened. The dominance of radio as the main source of information for sport consumers would not last long, television was on the way. While the first televised sports broadcast occurred in the 1930's it was not until the 1950s and 1960's that television was considered the main source of sports broadcast information (Bryant & Holt, 2006). The creation of the Entertainment and Sports Programming Network (ESPN) in 1979 ramped up information-seeking television activity even more than had previously been seen

(Wood & Benigni, 2006). With the creation of 24-hour networks and hundreds of shows dedicated to sports, television has turned into an information seekers paradise. Unlike viewers of other televised content sport television viewers "search for content with intent and intentionally choose to watch sporting events" (Otto, Metz, & Ensmenger, 2011).

McChesney (1989) provides a detailed account of sport media coverage and the consumer response to different types of media specifically focusing on sport including magazines, newspapers, radio, and television. While print mediums had their place, it was clear from the start, that broadcasting and sport were a natural pairing. The first radio broadcasts of sport took place in the early 1900s (McChesney, 1989) and were well received. However, television as a medium was found to be particularly well suited to broadcast sport to the consumer en masse. Neal-Lunsford (1992) went so far as to say that the television set and sport had a symbiotic development and grew together thus reflecting a very similar adoption curve. Consumer adoption studies focused on televised sport date back to the 1970s when Buscombe (1975) examined British soccer on television and Real (1975) released a study on the Super Bowl in the Journal of Communication. CBS was the first to telecast an entire NFL season in 1956 despite their chairman thinking that it would not be received well and could potentially be a financial liability. The 1956 NFL season and the broadcasting agreement between CBS and the NFL were both considered victories that propelled sport broadcasting into the mainstream and helped it develop into the multi-billion dollar industry that it has become (Murray, 1998).

From its humble beginnings, broadcast media has grown precipitously and become an enormous driver of the sport economy. With values expected to grow to $23.8 billion by 2022, media rights have become a key source of revenue to sport leagues and teams (Gallagher, 2018). In fact, in 2017, media rights surpassed gate revenues to become the largest source of revenue in

sport (Gallagher, 2018). Clearly sport and television are a powerful partnership. Further, with the rise of on-demand viewing and cord cutting broadcasters (e.g. Netflix, Amazon Prime Video, Hulu, Disney Plus, etc.) sport remains one of the last bastions of appointment viewing in real-time (Rowe, 2018). Due to the draw of having a large number of real-time viewers, advertisers find sport especially attractive. Rowe (2018) says that sport media events are so powerful, they produce a an almost magnetic attraction for advertiser dollars. In fact, Hutchins, Meese, and Podkalicka (2015) refer to sport as "the most valuable form of content in the global media marketplace" (p. 66). Considering the history, value, and the relatively rapid progression of technology in sport media it is important to be aware of what the next generation of sport media technology will potentially entail.

AR in Sport Broadcast Media

The academic literature that focuses on the use of AR in sport broadcast media has been compiled primarily from a technology development point of view and not from a marketing or consumer focused perspective. The following section details some of the major forms of AR in sport broadcasting (FoxTrax, Chromakeyer, Hawk-Eye, K-Zone) and how they have been studied and implemented to this point.

FoxTrax

While the highly sophisticated AR graphics featured in recent sport broadcasts are a relatively new phenomenon, AR in other forms has been utilized in sport broadcasting for quite some time. FoxTrax was a system that was developed in part by Fox Sports to track pucks during hockey games broadcast on their stations (Cavallaro, 1997). Researchers and engineers at Fox equipped the pucks used for their game broadcasts with infrared (IR) emitters. They then positioned IR detecting cameras around the arena in which the game would be played. Those

cameras tracked the movement of the puck and relayed that information in real-time to 12 computers connected to the Fox broadcast cameras that then rendered a graphical overlay on the puck that made it appear to have a blue glow in order to make it easier for viewers to follow the movement of the puck.

Chromakeyer

Another example of the use of AR-enhanced sport broadcasts is a technology called chromakeyer that is utilized by American football broadcasts of college and professional games. Chromakeyer is programmed to detect the color of the surfaces that games are being played on and allows graphics to appear to be painted onto that playing surface (Thomas, 2011). Some of the main uses of the chromakeyer technology in American football are the yellow first-down line, data overlay graphics, and telestration (FOOTBALL, 2019). These technologies were originally produced by Sportvision but are now produced by SportsMedia Technology (SMT) after they acquired Sportvision in 2016 (ABOUT, 2019).

Hawk-Eye

Hawk-Eye a system that uses multiple cameras to track and predict where a ball will be located in the field of play at any given time is utilized in multiple sports including tennis, snooker, and cricket (Fowler, 2013). This technology is not only used as part of the broadcast of these sports, but it is also used as an officiating technology. In cricket, Hawk-Eye is part of an official's decision review system for close calls. The technology tracks the flight, velocity, and bounce of the ball in order to track exactly where the ball is at any given time during competition. Similarly, Hawk-Eye is used in tennis for broadcast enhancement and official line decisions. In tennis, the line judge is responsible for making a call on whether or not a ball lands in or out of bounds. If a player questions that call by the line judge, they are able to issue a

challenge to that call. That is where Hawk-Eye plays its most prominent role in tennis. Once a call is challenged, the Hawk-Eye technology determines whether the ball landed in or out of bounds. Hawk-Eye tracks the trajectory, speed, and location of the ball in order to state where it would have landed given all of the information collected. Interestingly, the replays produced by Hawk-Eye are not video replays but instead are 3D augmented images generated by the technology (Fowler, 2013).

K-Zone

Another technology utilized in sport broadcasting, K-Zone was first used in the summer of 2001 by Sunday Night Baseball a program on ESPN (Gueziec, 2002). K-Zone is a camera-based system that generates sophisticated computer created images to display a virtual strike zone within the stadium setting during the game broadcast. K-Zone tracks the angle, speed, flight, and location of the ball to augment the broadcast with a digitally created overlay that allows the viewer to see where the pitch was located when it crossed the plate. K-Zone is now used routinely during real-time broadcasts of Major League Baseball games. Andre Gueziec (2002) of Triangle Software, praised K-Zone calling it "a sophisticated and reliable system that has proven commercially viable and a valuable enhancement for sports fans" (p. 43).

Figure 5. ESPN's K-Zone (Moutinho, 2013).

Sport Programming Integration

In addition to the uses of AR in sport media that have been academically investigated, there are many examples of AR being used in sport media that have not yet been researched. On November 5th, 2018, the ESPN television show Around the Horn unveiled their new studio that was enhanced to feature AR graphics throughout the show (Hofheimer, 2018). The show utilizes AR in many of their graphics and animations, allowing guest panelists to appear as though they are in the same room with the host. At the time of their implementation of AR into their program, ESPN claimed that Around the Horn was "the first U.S. domestic program to fully integrate augmented reality into its entire 30-minute presentation" (Hofheimer, 2018, para. 2).

Recently, Second Spectrum, a company that uses artificial intelligence to enhance sports broadcasts with AR graphics, partnered with both the Los Angeles Clippers and ESPN to bring the technology to the National Basketball Association (Ogus, 2019a). For the Clippers, Second Spectrum created a program called CourtVision that enhanced their broadcasts with AR graphics. This program was only available to a handful of fans in the Los Angeles area that signed up for the service and had purchased a certain sports broadcast package.

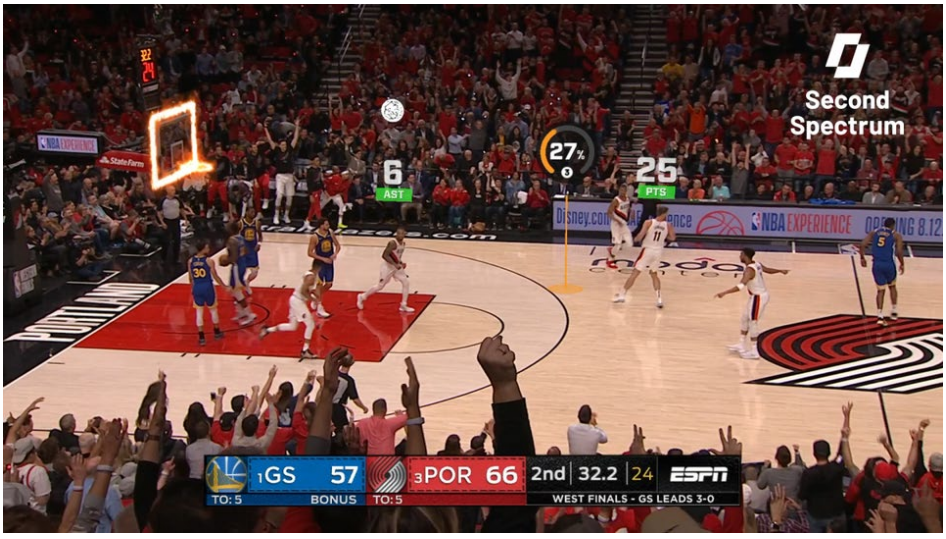


Figure 6. Second Spectrum "Full Court Press" (Ogus, 2019a).

ESPN called their partnership with Second Spectrum “Full Court Press”. Full Court Press debuted in select games throughout the 2019 NBA playoffs. This technology allowed viewers that used the ESPN app or watched on ESPN3 to view the game in multiple AR modes. Coach Mode was intended for fans that wanted an analytical breakdown of the game, it allowed viewers to see real-time AR graphics that showed the X’s and O’s of the game and indicated players shooting percentages from different locations on the court. Mascot Mode was intended to be a more entertaining use of AR that mimicked the appearance of a video game. For example, in Mascot Mode, AR graphics would depict special overlays such as fire if a player made a lot of shots or AR graphics of bricks if a player missed a shot badly. Second Spectrum CEO Rajiv Maheswaran believes AR integration is the future of sport viewership saying “We think everyone will watch sports this way. There will be a day when you look back and say, I can’t imagine we all used to watch the same thing at the same time. That seems silly” (Bishop & Soper, 2018, para. 10).

In February 2019, CBS utilized a multicamera AR broadcast to enhance the opening sequence of Super Bowl Llll (Mack, 2019). This marked the first time that multicamera AR had been used during a Super Bowl broadcast. The broadcast also featured six cameras specifically designed with AR capabilities that enable them to track AR graphics during gameplay. The broadcast used AR before kickoff, at halftime, and at specific points during the game. In the past, only two-dimensional graphics had been utilized. However, broadcast AR technology allowed the 2019 Super Bowl broadcast to feature graphics that appeared to be on the field and in the stadium. These graphics seemed to emerge from the field and when hovering above the playing surface including realistic shadowing in order to make it appear to be part of the stadium environment. This coordinated focus on integrating AR into the Super Bowl resulted in what

CBS vice president of remote technical productions described as a way to experience AR "in a more theatrical manner" (Mack, 2019, para. 10).

Figure 7. Super Bowl Llll Opening Graphics (SMT, 2019).

The most recent NHL All-Star game-used AR technology to track their players and the puck in order to overlay statistical information on their broadcast of the game (Wyshynski, 2019). Tracking sensors were placed in the puck and in the shoulder pads of each of the all-star game participants. The system used to track the players and the puck uses 14 antennas placed in the venue and is incredibly accurate. The player tracking sensors are monitored by the system 200 times a second and the puck tracking sensors are monitored 2,000 times a second (Wyshynski, 2019). During the all-star game the broadcast displayed multiple statistics and data points with AR overlays including player name, player speed, distance to the puck, and time on the ice amongst other things. Although this AR system saw a limited rollout that was focused only on the all-star game, ESPN NHL writer Greg Wyshynski (2019) believes it will be used extensively in the near future saying "by next season, it'll be the new normal" (para. 4).

In late 2018, NASCAR unveiled a new studio in Charlotte North Carolina designed to enhance graphics technology and AR used during races and shows (Steele, 2018). NASCAR partnered with Unreal Engine and Epic Games, the creators of the video game hit Fortnite, to

create what they refer to as a virtual studio. NASCAR utilizes the AR graphics to put up to 10 virtual race cars in the studio for shows. Analysts can also pull up and interact with 3D AR models of racetracks to discuss race recaps and in-race strategies. Zac Fields, who oversees Fox Sports' Graphic Technology and Integration department, believes what NASCAR is doing with their AR-enabled studio is just the beginning "the level of realism that you can achieve opens the doors to so much more" (Steele, 2018, para. 5).

Figure 8. NASCAR's Virtual Studio (Steele, 2018).

One common theme that connects the NASCAR AR studio and each of the aforementioned AR interactions in sport media is that they were all developed and implemented with one audience in mind, the sport consumer.

Theoretical Framework

Considering the recommendation of Karg et al. (2019) that sport managers should customize products to address the needs of media-dominant consumers, it is important to investigate products such as AR that can create customized viewing experiences. With that recommendation in mind, this research implements the ELM framework in order to gain a better

understanding of sport consumers attitudes, WOM intentions, and intentions to view AR-enhanced broadcasts.

Elaboration Likelihood Model

In order to gain a better understanding of the views of sport consumers in regards to their perceptions of AR technology in sport broadcasting, this study will utilize the Elaboration Likelihood Model (ELM). The ELM was first posited by Richard E. Petty and John Cacioppo in 1981 (Kitchen, Kerr, Schultz, McColl, & Pals, 2014). The ELM focuses on how marketing stimuli impact cognitive activity and affect changes in attitude (Schumann et al., 2012). The model has been used extensively in the marketing and advertising literature focusing mainly on attitudinal change (Pasadeos, Phelps, & Edison, 2008). The model considers how a source message influences attitudes through persuasion (Petty et al., 2017). The ELM framework has been utilized and validated in a multitude of different fields of study. This framework is so widely used in consumer behavior literature that Kitchen et al. (2014) states that it is "one of the most influential theories in marketing communication research" (p. 2036).

The ELM is particularly focused on the processes a consumer uses to consider a message. Petty and Cacioppo (1983) suggested that attitudes can be formed with either high or low degrees of cognitive effort. The theory focuses on how participant elaboration impacts persuasion and attitude (Petty et al., 2017). Thus, the ELM as a framework is based on the premise that there are two main routes to persuasion. These two routes of persuasion represent the amount of cognitive effort an individual must use to fully understand a message that is being conveyed. The ELM suggests that central route processing occurs when elaboration likelihood is high and peripheral route processing occurs when elaboration likelihood is low (Kitchen et. al, 2014). That is to say that when a message requires understanding of the subject and knowledge

of important points central route processing is used and when the message requires little effort or little previous knowledge to understand the subject, peripheral route processing is used (Kitchen et. al, 2014). One of the unique things about the ELM is that it allows for variables to impact the persuasion of participants differently depending on the type of elaboration process that participant utilizes (Petty & Cacioppo, 1990). ELM suggests that attitude and behavioral intention changes among participants can be initiated by two routes of influence that are utilized differently based on the amount of contemplative elaboration that is required of the participants (Petty & Cacioppo, 1986).

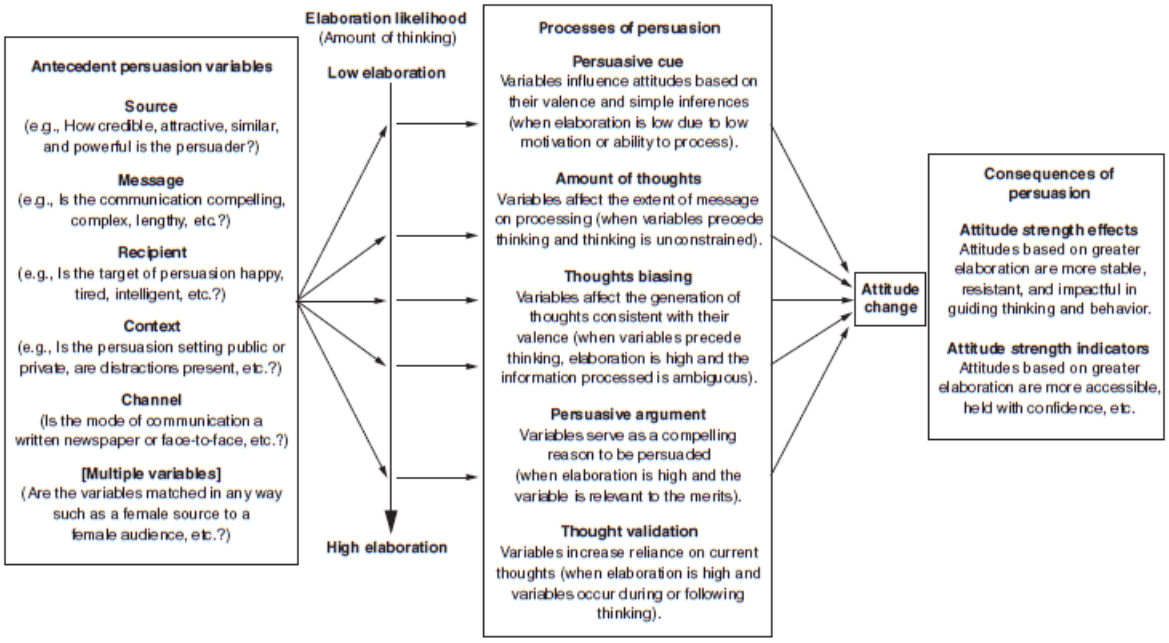


Figure 9. Schematic depiction of the processes of the Elaboration Likelihood Model of Persuasion (Petty et al., 2017).

Central Route Processing

The ELM suggests that central route processing leads to attitude formation through extensive thinking about the message that is being presented (Haugtvedt & Petty, 1989). The central route focuses on the cognitive or utilitarian features of the stimulus that is presented.

Also, of note, individuals that are highly involved with the stimulus being presented are more likely to process their attitudes towards that stimulus through the central route (Petty & Cacioppo, 1983). Mauroner, Le, and Best (2016) summed up central route processing by claiming that if the receiver of the message being presented cares about the subject of that message or is informed about the subject of the message, then they will form attitudes towards that message via central route processing. When it comes to the viewing of sport broadcasts, Parker and Fink (2008) based on their study and the findings of Petty and Cacioppo (1983) state that the central route is frequently used by viewers who are highly involved with the subject they are viewing and often leads to strong attitude and opinion outcomes.

Peripheral Route Processing

According to the ELM, peripheral route processing requires very little cognitive effort and is instead reliant on peripheral cues to for attitudes towards a message that is being presented (Petty & Cacioppo, 1983). Individuals that have a low amount of involvement with the stimulus presented are more likely to process their attitudes towards that stimulus through the peripheral route (Petty & Cacioppo, 1983). The peripheral route is most often utilized to form attitudes towards a product message when an individual is not as familiar with the subject matter and is reacting mostly to the hedonic nature of the message (Mauroner et al., 2016). When studying the topic of sport broadcasting it is important to consider the claims of Parker and Fink (2008) who state that viewers who are less involved with the subject they are viewing often utilize peripheral route processing resulting in attitude and opinion outcomes that are influenced by contextual cues.

Personal Relevance/Involvement

Angst and Agarwal (2009) reviewed multiple studies that implemented the ELM and concluded that there are two main classes of persuasion determinants that act as covariates when it comes to working with the ELM. The two classes Angst and Agarwal (2009) identified are "those reflecting some aspect of the message such as argument quality, message length, and source credibility, and those capturing various aspects of the message recipient, such as issue involvement, motivation, personal relevance, and prior expertise" (p. 342). The current study would be classified in the second of Angst and Agarwal's two classifications by studying the aspect of the message recipient, specifically the personal issue involvement of the recipient.

Petty and Cacioppo (1986) emphasize the importance of motivational variables when deciphering whether participants are utilizing peripheral or central route processing. They mention several variables that other researchers have used but indicate that one type of variable stands out amongst the rest. When discussing variables that can indicate whether a participant is utilizing the peripheral or central route they say "Perhaps the most important variable in this regard is the personal relevance of the message" (p. 144). Another term that Petty and Cacioppo (1986) use interchangeably with personal relevance is personal involvement. The ELM postulates that as the personal relevance of the message or messenger increases, so too does the motivation of consumers to thoroughly process the message and details of the message being presented. That is to say that consumers with higher personal involvement with a certain topic will be motivated to engage that topic based on the cognitive merits of the message and process that message through the central route. Authors utilizing the ELM in the sport literature have used an involvement variable to determine whether participants used the central route or peripheral route for the purposes of their study. Parker and Fink (2008) used female sport

involvement as a covariate in their study to determine what route of processing their participants utilized. Similarly, Shreffler (2014) used team identification as the variable the author studied to indicate which route or processing their participants utilized. Following the lead of these two studies, the current study will employ a basketball involvement variable to suggest which route of processing participants are most likely employing. Due to the fact that the creators of ELM classify involvement as the most important variable in determining the use of either the central or peripheral route of processing by consumers (Petty & Cacioppo, 1986) and the use of involvement variables in sport-focused ELM studies by Parker and Fink (2008) and Shreffler (2014) this study will utilize involvement as a variable to understand the impact of the ELM.

ELM Applied to AR and Emerging Technology

Angst and Agarwal (2009) utilized the ELM to study the adoption of electronic health records. The authors found that participants that felt involved with the issue of electronic health records and arguments that were positive in regards to electronic health record led to more favorable attitudes towards those type of health records. They also found that the resulting positive attitude towards electronic health records was positively associated with intention to adopt the use of electronic health records.

Bhattacherjee and Sanford (2006) investigated the process of information technology (IT) acceptance by employing the ELM. Specifically, the researchers studied the acceptance of a document management system in the Ukraine. What the authors found is that both the peripheral and central route processes are viable for influencing a user's acceptance of IT. The authors also found that job relevance had a positive moderating influence on both central and peripheral route processing. Similar to previous studies, the authors found that just because participants may be influenced by different processing routes, it does not necessarily mean that their attitude and

behavioral intention outcomes will be different from each other (Bhattacherjee & Sanford, 2006). Thus, outcomes can be the same for peripheral route and central route processors even though they used different processing methods to reach those outcomes.

Due to the fact that there is not an extensive amount of research into consumer behavior and AR, the ELM has not been widely used in the literature focusing on AR. Mauroner et al. (2016) stated that research into AR is especially difficult because of the lack of theoretical frameworks and models to specifically research the topic. Although the authors did not utilize the ELM for their study, they cited the ELM as a framework that can be effectively used to research AR interactions. Mocanu (2012) wrote a review of AR and consumer behavior. Although the author did not conduct an experiment, he did have some suggestions in regards to how researchers should investigate AR and consumer behavior in the future. In his review Mocanu (2012) specifically addressed researching AR utilizing the ELM. His hypothesis was that AR interactions that added intellectual or utilitarian information about the product they are representing would be processed via central route processing while AR interactions that are intended to entertain or create an experience would not require deep thinking and thus utilize peripheral route processing.

ELM Applied to Sport Management

The ELM has not been extensively used in the sport management discipline. However, some research in the field has been conducted through the lens of the ELM. Parker and Fink (2008) utilized the ELM to investigate the role of sport commentator framing on sport broadcast viewer attitudes. In their study, one group was the control and the other two groups were given either positive or negative game commentary while they viewed a WNBA game. Participants were then given a questionnaire with items that measured their attitudes towards female athletes

with involvement with women's sports as a covariate. The authors found that involvement explained a large portion of the variance, a finding that supported previous ELM research about the formation of attitudes (Parker & Fink, 2008). Involvement and positive attitudes towards the WNBA broadcast were positively related and lack of involvement and negative attitudes towards the broadcast were related. They also found that the positive or negative commentator framing alone did not impact the attitudes of participants towards women's sports. Finally, the authors indicated that the involvement of a participant and the gender of the participant were better predictors of the attitudes towards women's sports that the broadcaster commentary.

Park, Turner, and Pastore (2008) used the ELM in order to investigate how empathetic tendency impacts the processing of public service announcements that were intended to attract volunteers for the Special Olympics. The researchers found that participants that scored high in empathetic tendency and participants that scored low in empathetic tendency both used the central route to process the information put forth by the public service announcements. Similar to Parker and Fink (2008) the authors found that involvement significantly influenced the processing of the message for participants that scored low in empathetic tendency.

Shreffler (2014) applied the ELM in her study focused on how electronic word of mouth (eWOM) impacts the attitudes and behaviors of sport fans. The author indicated that team identification can be used to determine the elaboration likelihood of sport consumers. Those with high team identification would likely utilize central route processing while participants with low team identification would likely utilize peripheral route processing. Specifically, the author studied how eWOM impacted the attitudes of Chicago Bears fans in regards to reviews given for a hypothetical Chicago Bears themed bar. The findings of this study indicated that high quality reviews significantly impacted the behavioral intentions of fans that indicated high team

identification. This finding was important for sport research using the ELM because it showed that eWOM could impact behavioral intentions through central route processing. Also, of note, highly identified fans also showed positively significant attitudes towards the message when positive eWOM was involved. In line with similar findings in ELM studies, fans who are highly identified and informed will utilize central route processing when encountering messaging that is favorable to the organization that they are highly identified with.

Chapter Three: Methodology

The purpose of this study was to investigate consumer attitudes, WOM intentions, and intentions to re-view AR enhanced sport broadcasts. In particular, this study investigated the relationship of the traditional broadcast, AR enhanced coach mode activation, and AR enhanced mascot mode activation and the ensuing attitudes and behavioral intentions of consumers. This study employed quantitative measures to examine the research questions proposed. The methodology section is comprised of four main parts: (1) study sample, (2) instrumentation, (3) study design, and (4) study analysis. The study sample section details the targeted participant population, the sample design and the sample sizes necessary for practical and statistical significance. The section of the methodology dedicated to instrumentation discusses the scales and variables chosen for the study. The instrumentation section also discusses how the scales have previously been used and their validity and reliability. Next, the study design section reviews the design of the study and the reasoning behind how the procedures of the study have been constructed. Lastly, the study analysis section covers the statistical analyses that were conducted in order to address the research questions and hypotheses and the results of those analyses.

Study Sample

Target Population and Sample Design

Qualtrics panel recruitment services were used for this study. Boas, Christenson, and Glick (2018) compared online sample acquisition services including MTurk, Qualtrics, and Facebook and found that Qualtrics was the most consistent with the United States national population in terms of the demographics of age, education, income, race, and ethnicity.

The target population represented in this study is sport broadcast viewers. As previously discussed, sport broadcast viewers are unique in their viewing and consumption behaviors (Gantz et al., 2006). Due to the uniqueness of the target population, it is important to attempt to ensure that the population is represented in the study. Screening questions are recommended when utilizing an online sample in order to eliminate respondents that may just be participating in the study for payment rather than inherent interest in the topic (Downs, Holbrook, Sheng, & Cranor, 2010). An open call was placed via Qualtrics and the following screening questions were used to attempt to ensure the proper sample was contacted: 1. Do you enjoy watching sports? 2. How many sport broadcasts do you watch per year? (0, 1-5, 5 or more) 3. Please identify the NBA team (Chicago Bears, Chicago Blackhawks, Chicago Bulls, Chicago Cubs). Finally, the following attention check was utilized within the survey instrument: Please select *somewhat agree* for this item. If a respondent answered "no" to the first question, "0" to the second question or any other answer other than "Chicago Bulls" to the third question, they were thanked for their participation and not included as part of the sample for the remainder of the study. Similarly, if participants failed the attention check, they were thanked for their participation and not included as part of the sample for this study.

Sample Size

Sample size was determined based upon the statistical analyses that were used to address the research questions. A power analysis was conducted using Stata Version 15. The command used in Stata to estimate a sample based on desired power is *power oneway*. The *power oneway* command runs a power analysis for ANOVA models. An example of how *power oneway* is run and the resulting suggested sample size, in Stata is below:

```
. power oneway, ngroups(3) delta(.1(.05).4)

Estimated sample size for one-way ANOVA
F test for group effect
Ho: delta = 0  versus  Ha: delta != 0
```

alpha	power	N	N_per_group	delta	N_g	Var_m	Var_e
.05	.8	969	323	.1	3	.01	1
.05	.8	432	144	.15	3	.0225	1
.05	.8	246	82	.2	3	.04	1
.05	.8	159	53	.25	3	.0625	1
.05	.8	111	37	.3	3	.09	1
.05	.8	84	28	.35	3	.1225	1
.05	.8	66	22	.4	3	.16	1

The *power oneway* formula the power analysis assumes 80% power. The *ngroups(3)* command represents the three groups being studied (traditional broadcast, AR-coach mode, AR-mascot mode). For ANOVA the effect size statistic that is used is Cohen's f. The thresholds for Cohen's f are .1 (small), .25 (medium), and .4 (large). According to the power analysis, to detect the smallest size of .1 the analysis suggests 969 participants, to detect a medium effect of .25 the analysis suggests 159 participants, and to detect a large effect, 66 participants are suggested. With the addition of a covariate the research would be well powered with 50 per group for 150 total participants (M. Broda, personal communication, February 3, 2020).

Procedures

The study utilized an experimental design. Once approval was granted by the Institutional Review Board (IRB) of Virginia Commonwealth University (VCU) data collection took place in May of 2020. Prior to collecting participant responses, the questionnaire was piloted with university students at a Mid-Atlantic university.

The video interactions and survey were created in Qualtrics survey software. When participants of the study opened the questionnaire, they were immediately taken to a consent form. The form detailed that the participants had the right to end their participation in the study at any point, information regarding how the answers they provide in the study would be used,

information about the risks and benefits of participation, and the contact information of the researcher and researcher's advisor. Participants were not allowed to continue the study until they had reviewed the information and given their consent to be involved in the study. All data collected in this survey was stored in Qualtrics.com in a password protected webpage.

Once a participant had given their informed consent, they were taken to a page and were asked to answer prompts based on the scales for sport involvement. Following the lead of Parker and Fink (2008), the groups will complete a questionnaire assessing their involvement with basketball prior to viewing the broadcast. The scale used to measure involvement is the scale created by Shank and Beasley (1998) to measure whether fans are "high involvement" fans or "low involvement" fans. This scale was modified to fit the basketball context. Upon completion of the involvement scale, participants advanced to a page that explained that they were about to view a clip of an NBA game and then be asked questions focusing on their perception of what they were about to view. The participants were then randomized to one of three groups and either shown a traditional clip, mascot mode clip, or coach mode clip of an NBA game between the Los Angeles Clippers and the Denver Nuggets. The clip features gameplay from the third quarter of a regular season NBA game. After viewing the clip, the participants were asked to evaluate their perceptions of what they just witnessed on the HED/UT, WOM and re-viewing intention scales. After the participants have completed the survey they were thanked for their time and participation and the survey was concluded. Only participants who completed the entire survey were compensated and only responses from participants that completed the entire survey were utilized for this study.

Instrumentation

After interacting with the stimuli, the respondents were directed to complete a questionnaire. All measurement items used in this study were modified scales used in previous studies. The scales were modified to fit the focus of this study. The survey utilized in this study was composed of four scales and a total of twenty-four items. The items in the survey came from the following scales Shank and Beasley's (1998) sport involvement scale (8 items), Voss et al.'s (2003) Hedonic/Utilitarian Attitudes scale (10 items), Sartore-Baldwin and Walker's (2011) WOM scale (3 items) and Lee et al.'s (2016) Re-viewing Intention scale (3 items). Demographic information (6 items) including age, level of education, ethnicity, gender, level of income, and zip code was also collected as part of the questionnaire.

Sport Involvement

This study used a scale for sport involvement from Shank and Beasley (1998). Sport involvement is a participant trait that measures the degree to which a participant finds a certain sport important. The scale was made up of eight items measured on a seven-point semantic differential scale that included the following prompt and responses: To me basketball is (unimportant/important, irrelevant/relevant, boring/exciting, interesting/uninteresting, valuable/worthless, appealing/unappealing, useless/useful, not needed/needed). The authors specifically intended their scale to be used to measure sport consumers' involvement in a sport which makes it an appropriate scale for the current study. They also found that highly involved sport fans had a greater understanding of the sport and an easier time understanding the information put forth in media than low involvement participants.

HED-UT

Voss et al. (2003) developed a scale intended to measure the hedonic and utilitarian attitudes of consumers (HED/UT). Through testing and re-testing Voss et al. (2003) narrowed the adjective pairs used in their scale down to five adjectives to measure hedonic attitudes and five adjectives to measure utilitarian attitudes. In total, the HED/UT has ten pairs of adjectives measured on a seven-point semantic differential scale. The utilitarian attitudes of consumers were measured with the following prompt and responses: Indicate your perceptions of the broadcast you just viewed (ineffective/effective, unhelpful/helpful, not functional/functional, unnecessary/necessary, impractical/practical). The hedonic attitudes of consumers were measured with the following prompt and responses: Indicate your perceptions of the broadcast you just viewed (not fun/fun, dull/exciting, not delightful/delightful, not thrilling/thrilling, unenjoyable/enjoyable). The coefficient alpha estimates reported by Voss et al. (2003) for the HED/UT were =.95 (.95) for the hedonic portion and = .95 (.92) for the utilitarian portion. Voss et al. (2003) viewed utilitarian attitudes of consumers as focused on the functional use of a product and cognitively based. They viewed hedonic attitudes of consumers as more emotional, experiential, and affective.

Word of Mouth (WOM)

The current study also included the outcome variable word of mouth (WOM) that utilizes three items to measure the likelihood that participants will speak favorably about the product or interaction they have witnessed. This factor was adapted for the basketball context from Sartore-Baldwin and Walker's (2011) study that focused on NASCAR consumers. The WOM scale demonstrated satisfactory reliability with a Cronbach's alpha of 0.85 in Sartore-Baldwin and Walker's (2011) study. The current study used a modified version of this scale that consisted of

three items that are measured on a seven-point Likert-type scale (1=strongly disagree, 7= strongly agree). The wording of the items is as follows: *I will speak favorably of the broadcast technology used, I will encourage others to view broadcasts with the same type of visual elements*, and *I will encourage others to generally support the type of broadcast I just viewed.*

Re-viewing Intention

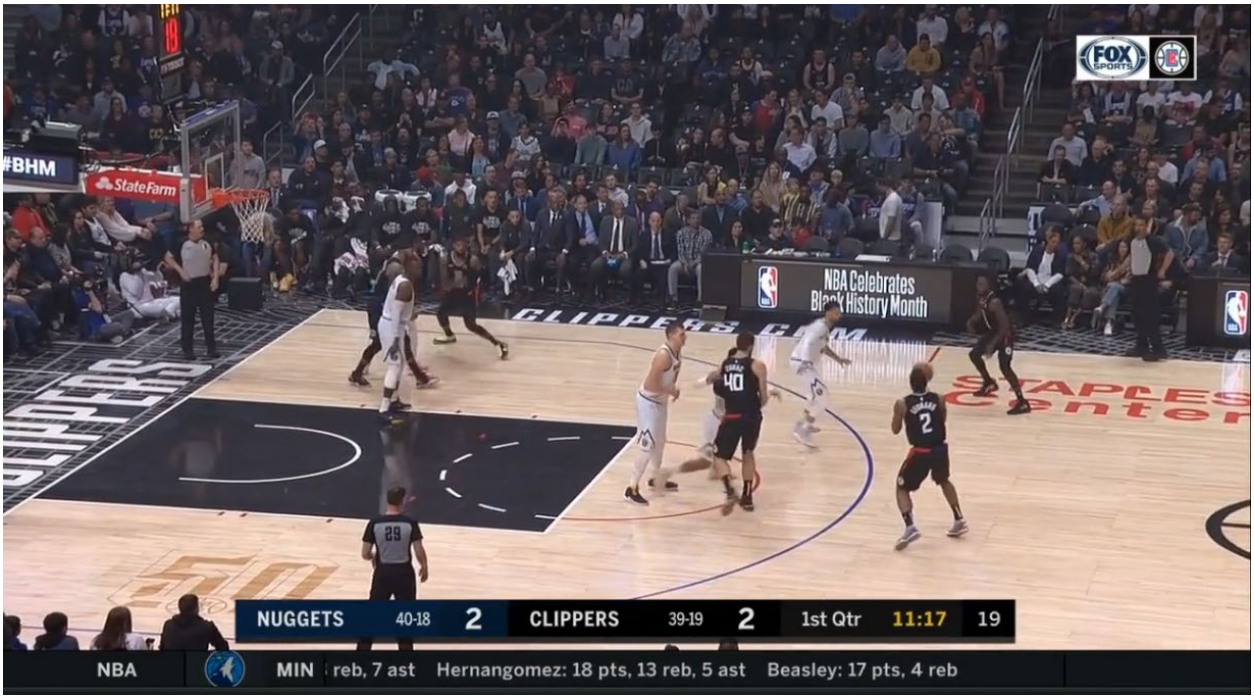
Lee et al. (2016) translated and adapted a re-viewing intention scale that was used by Jun, Kim, and Shin (2011). Jun et al. (2011), measured the intentions of European soccer fans to re-view the type of broadcast they had experienced in the study. However, that scale only existed in Korean. Thankfully, Lee et al. (2016) translated the scale into English and modified it to use it in their study of the role of sport commentators in broadcast re-viewing intention. Lee et al. (2016) reported a reliability coefficient for this scale as .90 and discriminant validity was confirmed based on an AVE score of .75. This scale is intended to measure a participant's intention to watch a program. This measure predicts whether or not a viewer will watch another broadcast of a sporting-event under similar circumstances to the one they had experienced in the study (Lee et al., 2016). The current study used a modified version of this scale that consisted of three items that are measured on a seven-point Likert-type scale (1=strongly disagree, 7= strongly agree). The wording of the items is as follows: *I am willing to watch another sporting event broadcast with similar visual elements, I will watch another sporting event that has similar graphics, and I will recommend this type of sport viewing experience to others.*

Control/Demographic Variables

Demographic variables were collected for this study in an effort to identify the characteristics of the participants that responded to the survey. The demographic variables collected include age, level of education (Less than high school, High school graduate, Some

college but no degree, Associate degree in college (2-year), Bachelor's degree in college (4-year), Master's degree, Doctoral degree, Professional degree (JD, MD), ethnicity (White/Caucasian, Black or African American, American Indian or Alaska Native, Hispanic or Latino, Asian, Native Hawaiian or Pacific Islander, Other) gender (Male, Female, Non-binary), level of income (Less than $10,000, $10,000 to $19,999, $20,000 to $29,999, $30,000 to $39,999, $40,000 to $49,999, $50,000 to $59,999, $60,000 to $69,999 $70,000 to $79,999, $80,000 to $89,999, $90,000 to $99,999, $100,000 to $149,999, $150,000 or more), and zip code.

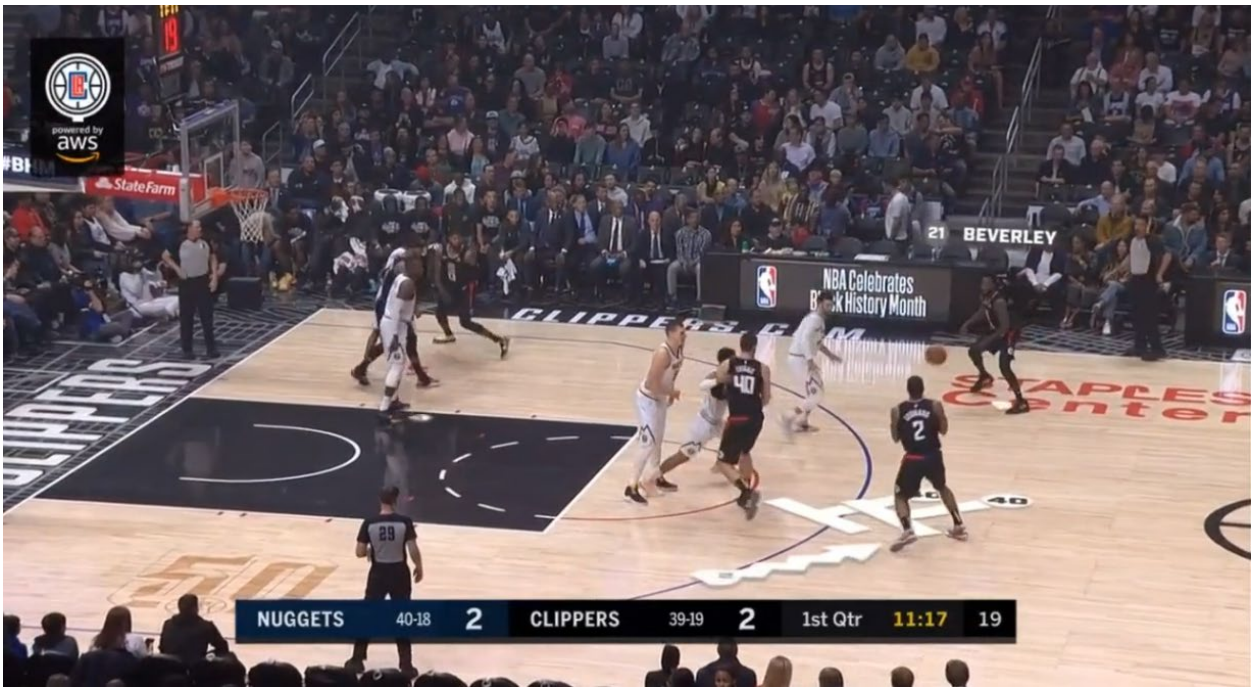
Traditional Broadcast



Participants in this study were randomized to receive one of three different broadcasts of the same game. According to Field (2013), randomization helps to keep unsystematic variation low. Field (2013) also states that randomization is an important way to remove other potential sources of systematic variation, allowing researchers to attribute systematic variation in their studies to the independent variable manipulation in the study. The broadcasts differed by the

visual elements that were present. The traditional broadcast includes a play-by-play broadcaster and color commentator accompanying a visual broadcast of the on-court action without the addition of AR-enhanced graphics. The traditional clips and AR-enhanced clips feature the same gameplay from the same game and audio components.

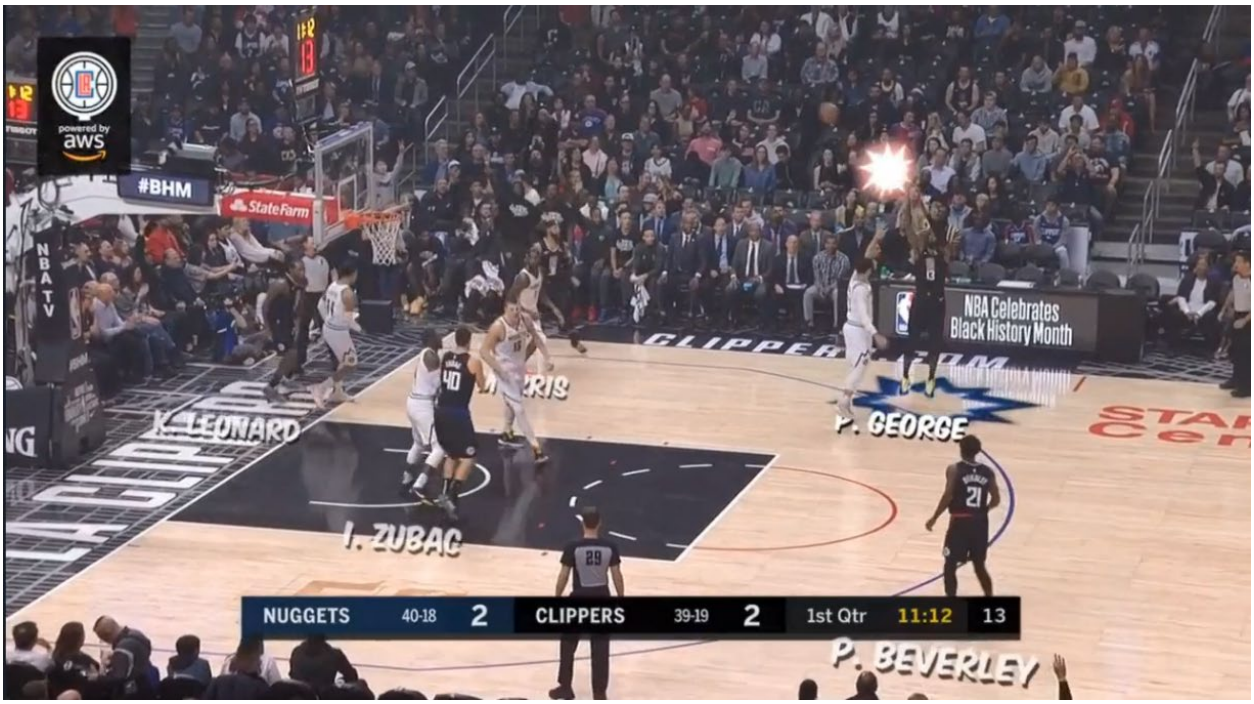
Coach Mode Enhanced Broadcast



One of the AR enhanced broadcasts utilized for this study is the Coach mode broadcast. Simmons-Winter (2019) in her article for ESPN about these AR enhanced broadcasts defined Coach mode as "a heavy X's and O's analytical presentation of the game, featuring on-court diagrams of the live action" (para 7). This broadcast mode diagrams the plays and movements of the players and the ball during live gameplay. It is intended to simulate the appearance of plays a coach would traditionally diagram for players and the coaching staff. Players with the ball are also identified with their name and number that appears to hover above them during possession of the ball. Statistics are calculated and displayed via AR graphics above a player when they make a play that results in a statistical outcome (points, rebounds, fouls, assist, block, steal, etc.).

Kevin O'Connor (2018) a sports writer covering the NBA for The Ringer noted that coach mode is for the fan that wants to really understand what is happening in the game saying: "Coach mode has visualizations of off-ball screens and pick-and-rolls, among other offensive actions, as well as how a team defended a pick-and-roll and whether a player is open based on their distance from a defender" (para. 10). Second Spectrum CEO Rajiv Maheswaran took it a step further proclaiming that the goal of coach mode is to "dump the brain of a coach" into the broadcast (O'Connor, 2018, para. 10).

Mascot Mode Enhanced Broadcast



The other AR enhanced broadcast being utilized for this study is the Mascot mode broadcast. Simmons-Winter (2019) described this version of AR enhancement as "a fun, entertaining presentation featuring special graphic treatments, including a fire graphic on the basket when a team goes on a scoring run, a 3D on-screen brick if a player misses badly, and more" (para. 8). This AR-enhanced mode strongly resembles a video game or video game broadcasts on the popular video game platform Twitch (O'Connor, 2018). This mode not only

utilizes different graphics than the coach mode, it also utilizes AR graphics more often than the coach mode. While coach mode graphics provide informative data (play diagrams), the mascot version of the broadcast often features graphics that seem to be intended for visual entertainment alone (starburst symbol on shot release, lightning strikes, net catching fire, clapping hands, foam fingers). The names of players are also displayed differently than the coach mode version. In the coach mode, player names appear in a minimalist style while the mascot mode player names appear with a rotating starburst symbol below the player in a manner similar to basketball video games. Kevin O'Connor (2018) once again gives his take on mascot mode saying: "It's cute, and a bit gimmicky. But I can see the appeal for adult fans who want a unique, late-night viewing experience. It's like watching a game with a Snapchat filter on" (para. 11).

Study Analysis

Descriptive Results

In order to allow for a more comprehensive understanding of the participants and findings of this study, descriptive results were reported. To measure the internal consistency and reliability of the instrument that was used in the study, Cronbach's alpha was calculated. Cronbach's alpha is one of the most flexible and commonly used reliability estimates in academic research (Brown, 2002). In addition, based on the recommendation of Lunenburg and Irby (2008) standard deviation and mean scores were reported for each of the conditions.

MANCOVA

To investigate whether there is a relationship among the outcome variables of re-viewing intention, WOM, HED Attitudes, and UT Attitudes, a multivariate analysis of covariance (MANCOVA) was performed. Specifically, a MANCOVA was conducted to address the following research question:

RQ1) Is there a significant difference across all four outcomes simultaneously while controlling for sport involvement?

One of the advantages of conducting a MANCOVA is that is allows a researcher to investigate more than one outcome variable at a time and understand the impact of an independent variable on multiple dependent variables while adjusting for a continuous covariate (Field, 2013). A MANCOVA can be utilized to understand group differences and decrease the chances of a type 1 error occurring. Type 1 error occurs when a researcher believes there is a genuine effect in the population, when there is not a genuine effect (Field, 2013). The MANCOVA was conducted to determine the overall main effect of the independent variables on the combined outcome variables (Field, 2013).

ANCOVA

There are generally two reasons to include covariates in an ANOVA and run an analysis of covariance (ANCOVA). They are an to attempt to reduce the within group error and to eliminate an unmeasured variable that could confound the results (Field, 2013). ANCOVA adds a covariate to the ANOVA model which then tests the difference between groups after adjusting for the covariate (Field, 2013).

If there is a difference between groups found as a result of running a MANCOVA, it is common practice to run a separate ANCOVA to investigate differences for each outcome variable individually (Field, 2013). Running subsequent ANCOVA's after a MANCOVA allow a researcher to look at the dependent variables as "independent entities, not as a linear combination" (Field, 2013, p. 644). Specifically, individual ANCOVA's were conducted to address the following research questions:

RQ2) Is there a significant difference in re-viewing intention by broadcast type while controlling for sport involvement?

RQ3) Is there a significant difference in WOM by broadcast type while controlling for sport involvement?

RQ4) Is there a significant difference in UT attitudes by broadcast type while controlling for sport involvement?

RQ5) Is there a significant difference in HED attitudes by broadcast type while controlling for sport involvement?

Exploratory Moderator Analysis

The MANCOVA and ANCOVA's utilized in this study serve to provide an understanding of the experimental effect of the manipulation of the study. Based on the ELM tenet of personal involvement as defined by Petty and Cacioppo (1986) that highly involved participants process information differently than less highly involved participants, some final exploratory moderator analysis will be conducted. Sometimes a moderator analysis is called a moderated multiple regression because it is a regression with an interaction term (Aguinis, 2004). The purpose of the moderator analysis in this study is to understand if the relationships between sport involvement and the outcome variables are moderated by broadcast type.

RQ6) Does the relationship between the level of sport involvement and the outcome variables differ based on broadcast type?

ANCOVA and MANCOVA Diagnostics

The assumptions of ANCOVA tests are independence, normality, homogeneity of variance, independence of the covariate, and homogeneity of regression slopes (Field, 2013). The assumptions of MANCOVA tests are independence, random sampling, multivariate

normality, and the homogeneity of the dispersion of variance and covariance matrices (Field, 2013). Independence of the observations is accomplished by using a between-subjects design with random assignment to each of the treatment groups. In order to see if the variables had a normal distribution, a normal probability plot was then created and visual inspection of the data was conducted. In order to assess the homogeneity of variance, Box's M test will be conducted. The test has been shown to be highly sensitive and when M is not significant indicates that a researcher accepts the null hypothesis that there is no difference in the groups (Garson, 2012). To test the homogeneity of regression slopes, parallelism tests will be conducted. If the results of the test indicate that the interaction effect is not significant, then the homogeneity of regression assumption is met (Garson, 2012).

Chapter Four: Findings

The purpose of this study was to investigate consumer attitudes, WOM intentions, and intentions to re-view AR enhanced sport broadcasts. In particular, this study investigated the relationship of the traditional broadcast, AR enhanced coach mode activation and AR enhanced mascot mode activation and the ensuing attitudes and behavioral intentions of consumers. This study employed quantitative measures to examine the research questions proposed. Participants were recruited via Qualtrics. One MANCOVA, four ANCOVA's and moderator analyses were utilized to conduct the analysis of the data.

Preliminary Analysis

IBM SPSS 26 and Stata 15.1 statistical software packages were used to analyze the data collected for this study. Variables were created by generating scale scores for each of the variable groups (sport involvement, hedonic attitude, utilitarian attitude, word of mouth, and re-viewing intention). The scale scores were standardized to get *z* scores for the factors.

Measurement Reliability

For this study, internal consistency and the reliability of the measures used were evaluated via Cronbach's alpha. Sport Involvement was made up of eight items ($\alpha = .94$), hedonic attitude was made up of five items ($\alpha = .96$), and utilitarian attitude was made up of five items ($\alpha = .93$). The outcome variables word of mouth ($\alpha = .94$) and re-viewing intention ($\alpha = .94$) were each made up of three variables. Each of the measures used in the study were well above the suggested level of .70 that is considered by Acock (2016) to be a good level for internal consistency.

Assumptions of ANCOVA and MANCOVA

When assessing the assumptions of the ANCOVA's that were performed, independence, normality, homogeneity of variance, independence of the covariate and the homogeneity of the regression slopes were all evaluated. Similarly, the assumptions for the MANCOVA that was run were evaluated by testing for independence, random sampling, multivariate normality, and the homogeneity of the dispersion of variance and covariance matrices (Field, 2013). Independence of the observations for this study was solidified via the design of the study by utilizing a between-subjects design that included random assignment to the treatment groups (Lamb, 2003). With linear models it is important to test the assumptions of linearity, normally-distributed errors, homoscedasticity, no outliers, and no multicollinearity. To test those assumptions that coincide with linear models both visual inspection and statistical testing were conducted. Visual inspection was conducted by evaluating normal probability plots, histograms of standardized residuals, and residual plots (Garson, 2012). Statistical inspection was conducted by using a combination of Box's M test, Breusch-Pagan/Cook-Weisburg, Shapiro-Wilk, Cook's Distance, Variance Inflation Factor (VIF), Ramsey's RESET test, and Levene's Test of Equality of Variance (Garson, 2012). Pearson's *r* correlations are available below in Table 1.

Table 1 Pearson's *r* bivariate Correlation Coefficients

	(1)	(2)	(3)	(4)	(5)
Sport Involvement (1)	-				
Utilitarian Attitude (2)	0.50	-			
Hedonic Attitude (3)	0.52	0.87	-		
Reviewing Intention (4)	0.35	0.80	0.80	-	
Word of Mouth (5)	0.36	0.80	0.76	0.94	-

Research Question One MANCOVA Assumptions.

Assumption testing for research question one was conducted using SPSS 26. Appendix C includes the majority of the visual and statistical tests conducted to test the assumptions of this research question. Five multivariate outliers were detected by running a Mahalanobis Distance test. The five outliers were removed from the study as they violated the maximum critical value allowed by Mahalanobis Distance for multivariate outliers (Pallant, 2013). The results of the Kolmogorov-Smirnov test for multivariate normality had a significant result indicating that there was a violation of the assumption of normality. The histograms of each of the variables visually confirmed that the assumption of multivariate normality had been violated. The assumption of linearity of the data was not violated. Homogeneity of variance-covariance was assessed by running a custom MANCOVA. The Box's M plot conducted for this custom MANCOVA was significant indicating that for the interpretation of this research question it would be necessary to utilize Pillai's Trace (Tabachnick, Fidell, & Ullman, 2007). In order to confirm the homogeneity of variance-covariance, the Pillai's Trace for the custom MANCOVA would need to be non-significant and it was at .763 meeting the assumption of homogeneity of variance-covariance. In order to correct for the violated MANCOVA assumptions, it is recommended that the results of the MANCOVA be interpreted by using the Pillai's Trace output (Teo, 2013).

Research Question Two ANCOVA Assumptions.

Assumption testing for research question two was conducted using Stata 15.1. Appendix D includes the majority of the visual and statistical tests conducted to test the assumptions of this research question. The Breusch-Pagan/Cook-Weisberg test was significant indicating a potential for the data to be heteroskedastic. Upon visual review of the residual-versus-fitted plot (rvfplot) there did not appear to be a lot of systematic variation. The Ramsey RESET test was not

significant which indicates that the assumption of linearity has not been violated. Normality of residuals appeared to be an area of concern via visual inspection of the histogram of residuals. Likewise, the normal probability plot showed some variation from the normal line. The Shapiro-Wilk test was found to be significant which indicates that the assumption of normality has been violated. The Cook's distance test for outliers was conducted and no outliers above 1 were identified, thus no outliers were removed from this data set (Cook & Weisberg, 1982). The VIF test indicated that there was no evidence of multicollinearity.

Research Question Three ANCOVA Assumptions.

Assumption testing for research question three was conducted using Stata 15.1. Appendix E includes the majority of the visual and statistical tests conducted to test the assumptions of this research question. The Breusch-Pagan/Cook-Weisberg test was significant indicating a potential for the data to be heteroskedastic. Upon visual review of the residual-versus-fitted plot (rvfplot) there did appear to be some systematic variation. The Ramsey RESET test was not significant which indicates that the assumption of linearity has not been violated. Normality of residuals appeared to be an area of concern via visual inspection of the histogram of residuals. The normal probability plot showed variation from the normal line. The Shapiro-Wilk test was found to be significant which indicates that the assumption of normality has been violated. The Cook's distance test for outliers was conducted and no outliers above 1 were identified, thus no additional outliers were removed from this data set (Cook & Weisberg, 1982). The VIF test indicated that there was no evidence of multicollinearity.

Research Question Four ANCOVA Assumptions.

Assumption testing for research question four was conducted using Stata 15.1. Appendix F includes some of the visual and statistical tests conducted to test the assumptions of this

research question. The Breusch-Pagan/Cook-Weisberg test was significant indicating a potential for the data to be heteroskedastic. Upon visual review of the residual-versus-fitted plot (rvfplot) there did appear to be some systematic variation. The Ramsey RESET test was not significant which indicates that the assumption of linearity has not been violated. Normality of residuals appeared to be good via visual inspection of the histogram of residuals. However, the normal probability plot showed some variation from the normal line and the Shapiro-Wilk test was found to be significant which indicates that the assumption of normality has been violated. The Cook's distance test for outliers was conducted and no outliers above 1 were identified, thus no additional outliers were removed from this data set (Cook & Weisberg, 1982). The VIF test indicated that there was no evidence of multicollinearity.

Research Question Five ANCOVA Assumptions.

Assumption testing for research question five was conducted using Stata 15.1. Appendix G includes the majority of the visual and statistical tests conducted to test the assumptions of this research question. The Breusch-Pagan/Cook-Weisberg test was significant indicating a potential for the data to be heteroskedastic. In line with that finding, the visual review of the residual-versus-fitted plot (rvfplot) did appear to show some systematic variation at the top of the graph. The Ramsey RESET test was not significant which indicates that the assumption of linearity has not been violated. Normality of residuals appeared to be an area of concern via visual inspection of the histogram of residuals. Likewise, the normal probability plot showed some variation from the normal line. The Shapiro-Wilk test was significant which indicates that the assumption of normality has been violated. The Cook's distance test for outliers was conducted and no outliers above 1 were identified, thus no further outliers were removed from this data set (Cook & Weisberg, 1982). The VIF test indicated that there was no evidence of multicollinearity.

Bootstrap Analysis

Due to the violation of assumptions that occurred in research questions two through five, bootstrap analysis was conducted in an effort to account for those issues. Bootstrap analysis was used on each of the ANCOVA's representing research questions two through five. Efron and Tibshirani (1993) suggest bootstrapping to deal with violations of assumptions in linear models as it treats the data as a population from which it takes multiple samples. For this study 1,000 bootstrap samples were replicated in order to meet the threshold suggested to produce strong confidence intervals (Efron & Tibshirani, 1993). The results of the ANCOVA models were not significantly changed by the bootstrapping method which indicates that the original outcomes of the ANCOVA's can be confidently reported. Confidence intervals produced by bootstrapping are available in Table 5.

Demographics

A total of 217 participants completed the survey housed on Qualtrics.com. Five participants were removed as multivariate outliers resulting in a final total of 212 usable responses. Participants in the study were mostly male (59.9%) and Caucasian (74.1%). The average age of participants was 40.8 years old which is in line with the average age of 42 for viewers of regular season NBA broadcasts as reported by the most recent data from the Radio and Television Business report (RBR-TVBR, 2017). Participants were randomly assigned to one of three broadcasts types resulting in 72 (33.9%) participants viewing the traditional broadcast, 68 (32.1%) participants viewing the coach mode broadcast, and 72 (33.9%) participants viewing the mascot mode broadcast. Complete demographics are available in Table 2 and simple descriptives by each group are available in Table 3.

Table 2

Sample Demographics (N = 212)

Gender	*n*	%	Education	*n*	%
Female	84	39.6	Less than High School	2	.9
Male	127	59.9	High School	30	14.2
Non-binary	1	.5	Some College	40	18.9
			Associate Degree	26	12.3
			Bachelor's Degree	63	29.7
			Master's Degree	41	19.3
			Doctoral Degree	4	1.9
			Professional Degree (e.g., J.D.)	6	2.8
Race	*n*	%	Income	*n*	%
Asian or Pacific Islander	18	8.5	Under $25,000	26	12.3
Black	18	8.5	$25,000-$50,000	46	21.7
Hispanic	14	6.6	$50,000-$75,000	44	20.8
Native American	3	1.4	$75,000-$100,000	26	12.3
Other	2	.9	$100,000-$125,000	21	9.9
White	157	74.1	$125,000-$150,000	17	8.0
			$150,000-$175,000	13	6.1
			$175,000-$200,000	7	3.3
			$200,000 or more	12	5.7
Age			Broadcast Type	*n*	%
Median	39		Traditional	72	33.9
Mean	40.8		Coach Mode	68	32.1
Standard Deviation	17.51		Mascot Mode	72	33.9
Range	18-82				

Table 3.

Means and Standard Deviations

	Broadcast Types					
	Traditional (*n*=72)		Coach Mode (*n*=68)		Mascot Mode (*n*=72)	
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*
Sport Involvement	5.64	1.38	5.42	1.24	5.70	1.33
Reviewing Intention	5.88	0.88	5.51	1.33	4.99	1.75
Word of Mouth	5.70	0.98	5.38	1.35	4.92	1.78
Utilitarian Attitude	5.81	1.08	5.53	1.15	5.18	1.56
Hedonic Attitude	5.94	1.21	5.56	1.17	5.35	1.63

Note. *M* = Mean. *SD* = Standard Deviation.

Research Question One

One multivariate analysis of covariance (MANCOVA) was conducted to determine if there is a significant difference based on broadcast type across all four outcome variables (WOM, re-viewing intention, utilitarian attitudes and hedonic attitudes) simultaneously while controlling for sport involvement. A multivariate general linear model was run in SPSS by entering the four dependent variables, with broadcast type as a fixed factor and sport involvement as a covariate. The results indicate that there was a statistically significant difference between the broadcast types on the combined dependent variables after controlling for sport involvement, $F(8, 426) = 2.498$, $p < .05$, Pillai's Trace = .090, partial $\eta^2 = .045$. This result indicates that there is a statistically significant adjusted mean difference between broadcast type when considering the combined outcome variables after adjusting for sport involvement (Pituch & Stevens, 2015). One of the limitations of a one-way MANCOVA is that while it indicates an overall difference, it does not give information on the difference in groups when it comes to each outcome variable. There are several ways to follow up significant MANCOVA results including running individual ANCOVA's for the dependent variables included in the MANCOVA model (Field, 2013; Nevill, Stewart, Olds, & Holder, 2006; Fitzgerald, Matson, & Barker, 2011). The MANCOVA was run to explore the data collectively and the four ANCOVA's were run in order to better understand the individual differences for each of the specific outcome variables in this study.

Research Question Two

A One-way ANCOVA was conducted to determine if there was a significant difference by broadcast type on re-viewing intention while controlling for sport involvement. Results of the ANCOVA indicated that there is a significant effect of broadcast type on re-viewing intention

after controlling for sport involvement, $F(2, 208) = 9.47$, $p < .001$, $\eta^2 = .13$. According to Cohen's (1988) guidelines, $\eta^2 = .13$ represents a large effect size. The adjusted-R^2 for this test indicates that the model explains 18% of the variance in re-viewing intention. A margins plot (in Appendix D) was calculated for the results of this model that visually displays the difference by broadcast type. Due to the significant result of the ANCOVA, post hoc tests were conducted in an attempt to see which of the groups differ. The results of the Bonferroni correction post hoc test indicate that there is a significant difference in re-viewing intention between the traditional and mascot modes ($p < .001$) and the coach and mascot modes ($p = .012$). In both cases re-viewing intention was lower for the mascot mode broadcast.

Research Question Three

A One-way ANCOVA was conducted to determine if there was a significant difference by broadcast type on WOM while controlling for sport involvement. Results of the ANCOVA indicated that there is a significant effect of broadcast type on WOM after controlling for sport involvement, $F(2, 208) = 7.28$, $p < .001$, $\eta^2 = .13$. According to Cohen's (1988) guidelines, $\eta^2 = .13$ represents a large effect size. The adjusted-R^2 for this test indicates that the model explains 17% of the variance in WOM. A margins plot (in Appendix E) was calculated for the results of this model that visually displays the difference by broadcast type. Due to the significant result of the ANCOVA, post hoc tests were conducted to see which of the groups differ. The results of the Bonferroni correction post hoc test indicate that there is a significant difference in WOM between the traditional and mascot modes ($p = .001$) and the coach and mascot modes ($p = .029$). In both cases WOM was lower for the mascot mode broadcast. There was no significant difference found between the traditional and coach modes.

Research Question Four

A One-way ANCOVA was conducted to determine if there was a significant difference by broadcast type on utilitarian attitude while controlling for sport involvement. Results of the ANCOVA indicated that there is a significant effect of broadcast type on utilitarian attitude after controlling for sport involvement, $F(2, 208) = 7.09$, $p = .001$, $\eta^2 = .26$. According to Cohen's (1988) guidelines, $\eta^2 = .26$ represents a large effect size. The adjusted-R^2 for this test indicates that the model explains right around 29% of the variance in utilitarian attitude. A margins plot (in Appendix F) was calculated for the results of this model that visually displays the difference by broadcast type. Due to the significant result of the ANCOVA, post hoc tests were conducted to see which of the groups differ. The results of the Bonferroni correction post hoc test indicate that there is a significant difference in utilitarian attitude between the traditional and mascot modes ($p = .001$) and the coach and mascot modes ($p = .027$). In both cases utilitarian attitude was lower for the mascot mode broadcast.

Research Question Five

A One-way ANCOVA was conducted to determine if there was a significant difference by broadcast type on hedonic attitude while controlling for sport involvement. Results of the ANCOVA indicated that there is a significant effect of broadcast type on hedonic attitude after controlling for sport involvement, $F(2, 208) = 5.32$, $p < .01$, $\eta^2 = .27$. According to Cohen's (1988) guidelines, $\eta^2 = .27$ represents a large effect size. The adjusted-R^2 for this test indicates that the model explains 29% of the variance in hedonic attitude. A margins plot (in Appendix G) was calculated for the results of this model that visually displays the difference by broadcast type. Due to the significant result of the ANCOVA, post hoc tests were conducted to see which of the groups differ. The results of the Bonferroni correction post hoc test indicate that there is a

significant difference in hedonic attitude between the traditional and mascot modes (p = .004). Hedonic attitude was lower for the mascot mode broadcast. The coach mode broadcast did not significantly differ from either the mascot mode or traditional broadcast.

Research Question Six

To further understand the relationships between the variables in this study, exploratory research was also conducted. While the previous research questions detailed the outcomes by broadcast type, they did not give differences by sport involvement level. Specifically, the exploratory portion of this study is focused on discovering if broadcast type functions differently by level of sport involvement. To explore this question, four moderator analyses were conducted, one for each of the outcome variables in the study. A significant interaction would indicate that the relationship between the outcome variable and sport involvement differed by type of broadcast. Following the guidance of McClelland, Lynch, Irwin, Spiller, and Fitzsimons (2015) no median split was conducted. McClelland et al., (2015) found no benefits to utilizing median splits and instead found that they increase Type II errors through the loss of statistical power. Sport involvement for each broadcast type was visually represented in a plot with intervals of three (1-4-7) to help to visualize low to high sport involvement.

Re-viewing Intention. The results of the moderator analysis for level of sport involvement as a moderator for the relationship between broadcast type and re-viewing intention explained 19.52% of the variance, $F(5, 206) = 11.23$, $p < .001$. The interaction between broadcast type and sport involvement level was not found to be statistically significant [B=.1494, 95% C.I. (-.0055, .4146), p= .0587]. The interaction is not significant for any of the broadcast types: Traditional and Coach t = -0.23, p = .817 or Traditional and Mascot t = 1.94, p = .053. Although not statistically significant, there is more visually evident separation in the margins plot (Appendix

H) in re-viewing intention in low sport involvement fans than in high involvement fans. The margins plot visualizes that as sport involvement increases, re-viewing intention also increases across all broadcast types.

Word of Mouth. The results of the moderator analysis for level of sport involvement as a moderator for the relationship between broadcast type and WOM explained 17.93% of the variance, $F(5, 206) = 10.22$, $p < .001$. The interaction between broadcast type and sport involvement level was not found to be statistically significant [B=.1372, 95% C.I. (-.0219, .2964), p= .0906]. The interaction is not significant for any of the broadcast types: Traditional and Coach $t = 0.09$, $p = .932$ or Traditional and Mascot $t = 1.73$, $p = .086$. Although not statistically significant, there is more visually evident separation in the margins plot (Appendix H) in WOM in low sport involvement fans than in high involvement fans. The margins plot visualizes that as sport involvement increases, WOM also increases across all broadcast types.

Utilitarian Attitude. The results of the moderator analysis for level of sport involvement as a moderator for the relationship between broadcast type and utilitarian attitude explain 28.94% of the variance, $F(5, 206) = 18.18$, $p < .001$. The interaction between broadcast type and sport involvement level was not found to be statistically significant [B=.0686, 95% C.I. (-.0663, .2035), p= .3170]. The interaction is not significant for any of the broadcast types: Traditional and Coach $t = -0.62$, $p = .533$ or Traditional and Mascot $t = 1.04$, $p = .298$. Although not statistically significant, there is more visually evident separation in the margins plot (Appendix H) in utilitarian attitude in low sport involvement fans than in high involvement fans. The margins plot visualizes that as sport involvement increases, utilitarian attitudes also increase across all broadcast types.

Hedonic Attitude. The results of the moderator analysis for level of sport involvement as a moderator for the relationship between broadcast type and re-viewing intention explain 29.25% of the variance, $F(5, 206) = 18.45$, $p < .001$. The interaction between broadcast type and sport involvement level was not found to be statistically significant [B=.0735, 95% C.I. (-.0671, .2142), p= .3040]. The interaction is not significant for any of the broadcast types: Traditional and Coach $t = -0.48$, $p = .632$ or Traditional and Mascot $t = 1.05$, $p = .293$. Although not statistically significant, there is more visually evident separation in the margins plot (Appendix H) in hedonic attitude in low sport involvement fans than in high involvement fans. The margins plot visualizes that as sport involvement increases, re-viewing intention also increases across all broadcast types.

Table 4

Descriptive Statistics

Scaled Variables	*M*	*SD*	Range
Sport Involvement	5.59	1.32	1-7
Re-viewing Intention	5.46	1.41	1-7
Word of Mouth	5.33	1.44	1-7
Utilitarian Attitudes	5.51	1.31	1-7
Hedonic Attitudes	5.62	1.37	1-7

Note. $N = 212$. *M* = mean. *SD* = standard deviation. Sport Involvement, Re-viewing Intention, Word of Mouth, Utilitarian Attitudes, and Hedonic Attitudes were all measured on 7-point scales. Sport Involvement had eight items, Word of Mouth had three items, Re-viewing Intention had three items, Utilitarian Attitudes had five items and hedonic attitudes had five items.

Table 5.

ANCOVA Models Predicting Re-viewing Intention, Word of Mouth, Utilitarian Attitude, and Hedonic Attitude

			Broadcast Types							
	Overall Model		Traditional*		Coach Mode			Mascot Mode		
Measure	R^2	*F(2, 208)*	*M*	*SD*	*M*	*SD*	95% CI	*M*	*SD*	95% CI
Re-viewing Intention	0.18**	9.47	5.88	0.88	5.51	1.33	[-0.63, 0.07]	4.99	1.75	[-1.34, -0.47]
Word of Mouth	0.17**	7.28	0.46* 5.70 5.70*	0.98	5.38	1.35	[-0.59, 0.13]	0.39* 4.92 *	1.78	[-1.25, -0.37]
Utilitarian Attitude	0.29**	7.09	5.81	1.08	5.53	1.15	[-0.50, 0.15]	5.18	1.56	[-1.04, -0.30]
Hedonic Attitude	0.29*	5.32	5.94	1.21	5.56	1.17	[-0.60, 0.08]	5.35	1.63	[-1.02, -0.23]

Note. $n = 212$. All ANCOVA's used bootstrap analysis with 1,000 sample replacements. *$p < .01$, $p^{**} < .001$. R^2 = Adjusted R-squared. *M* = Mean. *SD* = Standard Deviation. CI = Confidence Intervals. *Traditional does not have a CI as it is the comparison from which the other CI's are created.

Chapter Five: Conclusions and Future Considerations

Sport media rights are the largest source of revenue in the sport industry and the market is expected to grow to $23.8 billion by 2022 (Gallagher, 2018). Sport also has a highly loyal consumer base and the largest group of television viewers for any genre that choose to view their product in real time (Paul & Weinbach, 2015). However, even with a loyal consumer base, sport cannot remain stagnant as it is not immune to the challenges posed by generational viewing preferences, cord cutting, and the increasing number of viewing modalities (Turner & Shilbury, 2010). In order to address these challenges, the PwC (2018) North American sports outlook report calls for media rights holders to become more creative in how they produce and disseminate broadcasts. One of the most important questions for sport organizations and media rights holders is how to properly allocate their resources to produce content that provides the most impact to their current viewers and hopefully serves to attract new viewers (Karg et al., 2019).

One recent medium that sport has begun to incorporate into broadcasts is AR. AR has been utilized in a number of ways in sport broadcasting from studio tv analysis to live game broadcasts (O'Connor, 2018). Recently, Second Spectrum, a company partially owned by Clippers Owner and former Microsoft CEO Steve Ballmer, has developed a broadcast AR technology called Court Vision that can place AR graphics into basketball broadcasts in real-time. The Court Vision AR broadcast is the technology that was utilized in the current study. ESPN president James Pitaro is on the record as stating that he believes AR will be a fixture in future sport broadcasts (Sharma, 2019). Still, Pitaro cautions that broadcasters should be thoughtful when implementing AR into sport broadcasts as there has not been enough data collected on the topic and many questions about consumer perception of this technology remain

(Sharma, 2019). To that end, the purpose of this study was to examine consumer intentions and attitudes towards AR enhanced sport broadcasts. Additionally, this study also utilized exploratory methods to attempt to better understand how level of sport involvement impacted the attitudes and intentions of participants based on broadcast type. The final chapter of this dissertation will discuss the findings of this study and the potential implications for future research. The manuscript will conclude with a discussion that encompasses the theoretical and practical implications of the study for sport management academics and practitioners.

Research Question One considered whether there would be broadcast type effects on attitudes and intentions after controlling for involvement. The MANCOVA result indicated that the overall model was significant and there was indeed a significant difference across all four outcome variables simultaneously with a significant covariate of sport involvement. This finding suggests that there is a significant difference in participants attitudes and intentions towards the traditional broadcast, coach mode broadcast, and mascot mode broadcast.

This finding is in line with what Parker and Fink (2008) found when they utilized a MANCOVA and the ELM to investigate the role of sport commentator framing on viewer attitudes. Similar to the current study, Parker and Fink (2008) also used an involvement variable as a covariate in their study. Another similar finding is that much like the current study, their involvement covariate had a large effect size according to Cohen (1988). Parker and Fink (2008) found that their study supported previous research utilizing the ELM by exploring how involvement impacts attitude formation. After their significant MANCOVA results Parker and Fink (2008) followed up their findings with individual univariate tests. Following their lead and the recommendation of Pituch and Stevens (2015), to further pursue a significant MANCOVA result with multiple univariate ANCOVA's further investigation was conducted (RQ2-RQ5) and

will be discussed in the coming pages. These ANCOVA's were conducted to discover if the adjusted means differ not only for the dependent variables as a whole, but for each of the dependent variables individually.

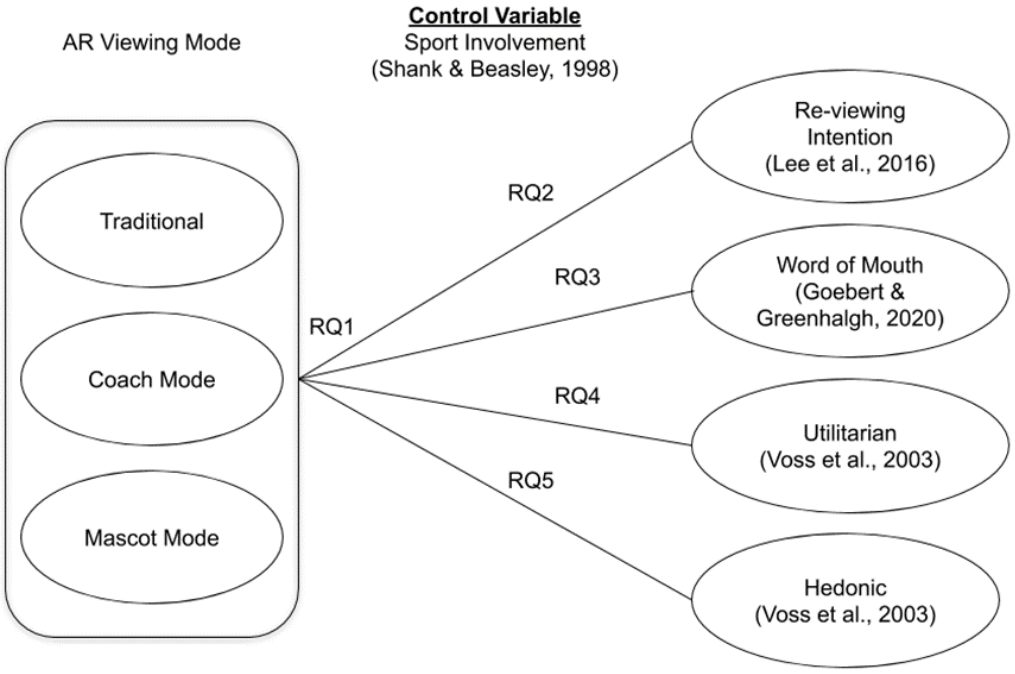


Figure 13. Hypothesized model of sport consumer intentions and attitudes towards AR enhanced broadcasts.

Re-viewing Intention

Broadcast type was shown to have a statistically significant impact on differences in re-viewing intention for the participants in this study when controlling for sport involvement. Lee et al. (2016) produced the English version of the re-viewing intention scale to predict whether or not a viewer will watch a broadcast with similar characteristics to one that they experienced in their study. The current study found that there was a significant difference in participants re-viewing intention based on the type of broadcast they viewed. This finding is similar to the

finding of Lee et al. (2016) who found that their participants displayed a significant difference in terms of re-viewing intention based on the type of broadcast commentary they experienced. The commentary manipulation utilized by Lee et al. (2016) can be compared to the visual broadcast manipulation utilized for the current study.

Further investigation into re-viewing intention differences based on broadcast type revealed that not all of the broadcast types were statistically significantly different in terms of re-viewing intention. While the traditional broadcast and coach mode broadcast were not statistically different, the participants in the traditional mode group still indicated higher mean scores than the participants in the coach mode group. The one broadcast type that was statistically significantly different than the others in terms of re-viewing intention was the mascot mode video. The difference between traditional broadcast and mascot mode were significant ($p < .001$) and the difference between the coach and mascot mode broadcast were significant ($p = .012$) and can be clearly seen in Figure 14 below.

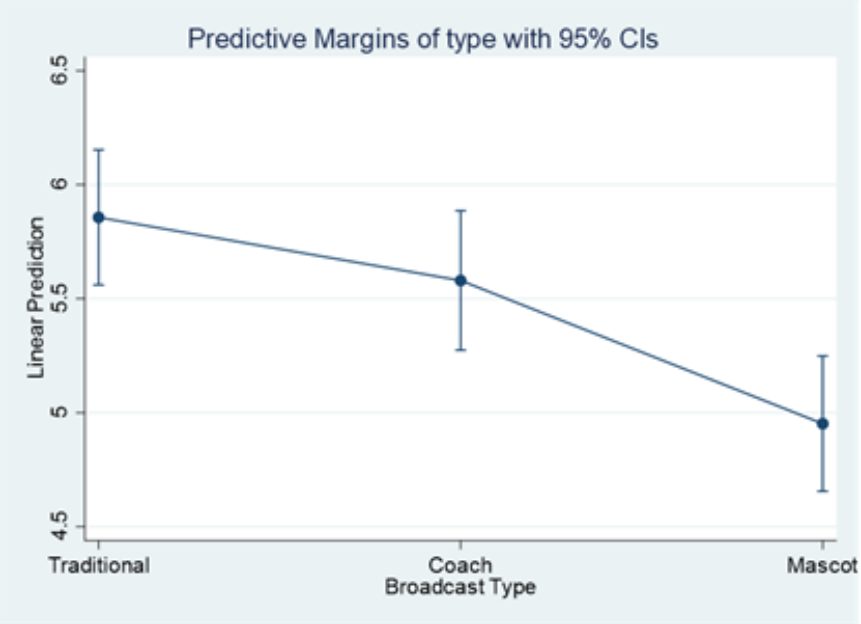


Figure 14. Margins plot for ANCOVA results of re-viewing intention.

It makes sense that the mean scores for re-viewing intention for the traditional broadcast intervention are high. If you are a sport consumer who has viewed basketball games in this format previously, there is generally no reason why you would choose not to re-view it in this format considering there are not widely known alternatives available. While not significantly different, the re-viewing intention mean for the coach mode (5.51) was lower than that of the traditional mode (5.88). The significant differences for re-viewing intention both involved the mascot mode (4.99) as it was significantly lower than both the traditional and coach mode.

The fact that the traditional broadcast scored higher on re-viewing intention than the coach and mascot modes should come as no surprise according to American media educator and author Jib Fowles. Fowles (1992) in his book *Why Viewers Watch* states that there is a reason most television shows are formulaic and that reason is many television viewers want to view something that is familiar and when given the option, will re-watch the familiar show over the unexpected. This finding has also been identified in sport broadcasting. Tainsky and McEvoy (2012) wrote about television broadcast demand and found that familiarity is especially important aspect of broadcasts for fans.

While the re-viewing intention means for the coach and mascot mode broadcasts are lower than those of the traditional broadcast, they are higher than the means reported by Goebert and Greenhalgh (2020) for similar AR technology use in sport. Goebert and Greenhalgh (2020) in their study of AR activations in sport reported an outcome variable called intention to use. This outcome variable is comparable to the re-viewing intention outcome in the current study. One type of AR that Goebert and Greenhalgh (2020) investigated was an in-game player tracking activation similar to what is used by the broadcasts utilized in the current study. The activation tracked players and updated their statistics via AR overlay much like the coach and mascot mode

in the current study. For that activation, their participants reported a mean score for intention to use of 4.19. When compared to the mean scores of participants in that AR in sport study, the scores for re-viewing intention in the current study appear promising.

Word of Mouth

Broadcast type was shown to have a statistically significant impact on differences in word of mouth for the participants in this study when controlling for sport involvement. Word of mouth is a valuable consumer behavior to understand as it can be used to make reliable predictions about future consumer behavior (Zhang et al., 2010). The current study found that there was a significant difference in participants word of mouth based on the type of broadcast.

Further investigation into WOM differences based on broadcast type revealed that not all of the broadcast types were statistically significantly different. The traditional broadcast and coach mode broadcast were not statistically different. The participants in the traditional mode group still indicated higher mean scores than the participants in the coach mode group but it was not statistically different. Mascot mode again was statistically significantly different than the others in terms of WOM. The difference between traditional broadcast and mascot mode were significant ($p = .001$) and the difference between coach and mascot mode broadcast were significant ($p= .029$). The mean WOM score for the traditional broadcast (5.70), coach mode (5.38) and mascot mode (4.92) are depicted in the chart below.

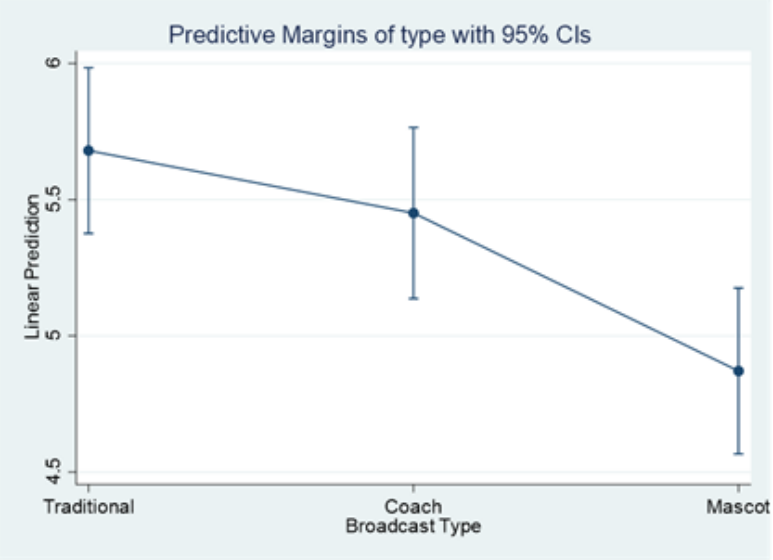


Figure 15. Margins plot for ANCOVA results of WOM

One possibility for the higher scores for WOM for the traditional mode than the coach or mascot mode is the role that familiarity may play for consumers. Sundaram and Webster (1999) highlighted the importance of familiarity for brands when it came to WOM. The authors noted that familiar brands enjoy a competitive advantage in the marketplace. They also found that familiar brands often have an advantage with consumer WOM intentions over unfamiliar brands. This finding could be directly related to the outcomes witnessed in the current study. The traditional broadcast is definitely the most familiar of the three broadcasts and that familiarity could have had an impact on the WOM scores.

Goebert and Greenhalgh (2020) in a study that included three types of AR activations reported an overall WOM mean score for their sample of 4.31. They reported a mean WOM score for their player tracking activation of 4.36. The two AR-enhanced broadcasts utilized in the current study reported mean scores of 5.38 (coach) and 4.92 (mascot). While lower than the mean WOM scores for the traditional broadcast, both of these mean scores are higher than the mean scores reported by Goebert and Greenhalgh (2020) for WOM for the AR activations utilized in their study. Goebert and Greenhalgh (2020) addressed the mean score for WOM in

their study saying “Considering sport-based AR activations are likely still in an infantile state, these findings are encouraging” (p. 9). With that in mind it is encouraging to see such high mean scores for both of the AR-enhanced broadcasts in the current study.

Utilitarian Attitudes

Broadcast type was shown to have a statistically significant impact on differences in utilitarian attitudes for the participants in this study when controlling for sport involvement. Utilitarian attitudes are important to understand as they are cognitively oriented and focused on the consumers attitudes towards the functional properties of a product (Voss et al., 2003). Gantz (1981) highlighted the importance of consumers utilitarian attitudes by listing “to learn” as one of the four dimensions of why consumers view sport on television. This desire “to learn” would directly relate the central route processing of consumers as put forth by the ELM. The current study found that there was a significant difference in participants utilitarian attitudes based on the type of broadcast. While the current study considered attitudes as an outcome based on visual differences in sport broadcasts, Parker and Fink (2008) considered attitudes as an outcome based on auditory differences in sport broadcasts. Though the manipulations were different, both the Parker and Fink study and the current study found that altered broadcast characteristics resulted in significantly different attitudes of their participants.

Further investigation into utilitarian attitude differences based on broadcast type revealed that not all of the broadcast types were statistically significantly different. The traditional broadcast and coach mode broadcast were not statistically different. The participants in the traditional mode group still indicated higher mean scores than the participants in the coach mode group but it was not statistically different. Mascot mode again was statistically significantly different than the others in utilitarian attitudes. The difference between traditional broadcast and

mascot mode were significant (p = .001) and the difference between coach and mascot mode broadcast were significant (p = .027). The mean utilitarian attitude scores for the traditional broadcast (5.81), coach mode (5.53) and mascot mode (5.18) are depicted in the chart below.

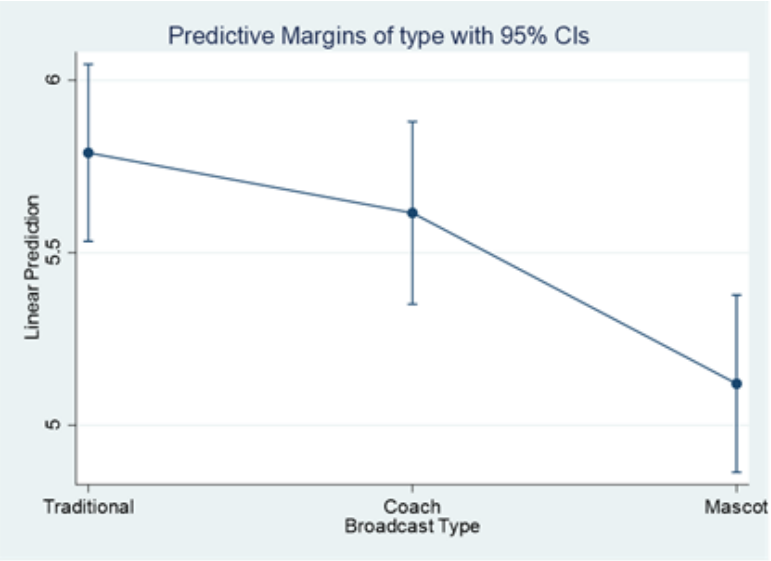


Figure 16. Margins plot for ANCOVA results of utilitarian attitudes

The traditional broadcast may have been significantly different than mascot mode based on the fact that the traditional broadcast is a straight-forward no-frills presentation of the game. The straightforward presentation of the game broadcast might be the most utilitarian way that it can be presented, no distracting graphics, no enhancements, just the game itself. In terms of the differences between the coach and mascot modes, Javornik (2014) in her review of AR applications noted that the majority of AR applications are utilitarian in nature, hedonic in nature, or a combination of the two. Goebert and Greenhalgh (2020) suggested that a player tracking use of AR would most likely fit into the utilitarian and hedonic combination grouping.

Rese, Baier, Geyer-Schulz, and Schreiber (2017) stated that for AR interactions to elicit the strongest possible utilitarian attitudes they should be practical, helpful, and useful. It is possible that participants in the study displayed significantly more positive utilitarian attitudes towards the coach mode than mascot mode because it fulfilled the call to be practical, helpful,

and useful better than the coach mode could. The coach mode is intended to allow viewers a look inside the mind of a coach to see the plays diagrammed as they unfold in real-time. The mascot mode featured more superfluous graphics (fishing boat, flashbulbs, holograms) that may not have provided the utilitarian value comparable to the game strategy aspects of the coach mode. Though the scores for the AR-enhanced broadcasts were not as high as the traditional broadcast scores, they were still fairly high. This is important as Rese et al. (2017), found that for AR activations, utilitarian attitudes are a statistically significant predictor of whether or not a consumer will deem an AR interaction useful.

Hedonic Attitudes

Broadcast type was shown to have a statistically significant impact on differences in hedonic attitudes for the participants in this study when controlling for sport involvement. Hedonic enjoyment and the attitudes that it produces are integral to a positive sport viewing experience for sport media consumers (Raney, 2006). Hedonic attitudes from watching a sport broadcast are a result of how a consumer interacts with the media stimuli that is presented (Nabi & Oliver, 2009). The current study found that there was a significant difference in participants hedonic attitudes based on the type of broadcast.

Further investigation into hedonic attitude differences based on broadcast type revealed that not all of the broadcast types were statistically significantly different. The traditional broadcast and coach mode broadcast were not statistically different. The participants in the traditional mode group still indicated higher mean scores than the participants in the coach mode group but it was not statistically different. Similarly, the coach mode and mascot mode were not statistically different although the mean score for the coach mode was higher than that of the mascot mode. The traditional broadcast and mascot mode were found to be significantly

different with regard to hedonic attitude (p = .004). The mean hedonic attitude scores for the traditional broadcast (5.94), coach mode (5.56) and mascot mode (5.35) are depicted in the chart below.

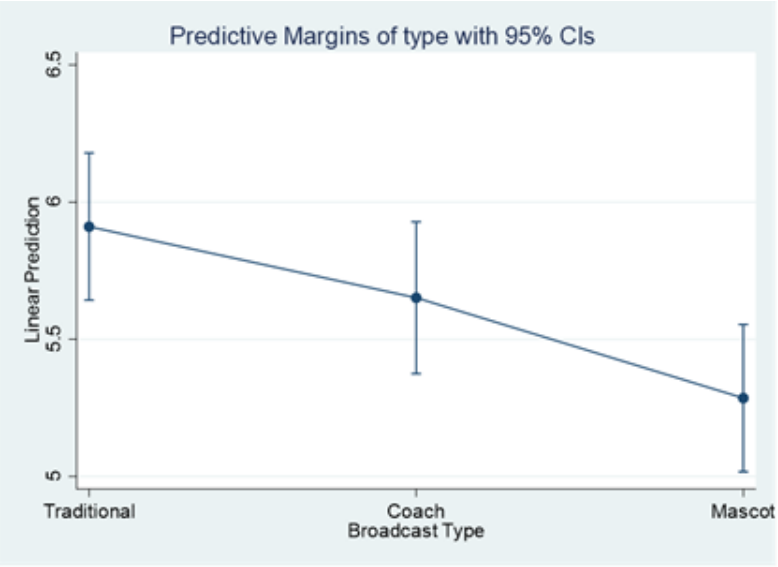


Figure 17. Margins plot for ANCOVA results of hedonic attitudes

The traditional broadcast no doubt fits the mold of a hedonic viewing experience all on its own (Hirschman & Holbrook, 1982). Just the fact that the broadcast is a professional basketball game makes it likely that viewers will find hedonic viewing enjoyment from the game itself. In fact the traditional broadcast had all the necessary characteristics of a hedonic viewing endeavor based on the level of skill displayed (Gantz & Lewis, 2014), providing a feeling of escape (Raney, 2006), game action (Mahony & Moorman, 2000), strategy, and pageantry (Gau & James, 2013).

Although statistically different, the traditional broadcast and mascot mode both had relatively high mean scores for hedonic attitude indicating that they were both well received. The difference between the traditional and mascot mode broadcasts may again be due in part to familiarity. The mascot mode was clearly a larger aesthetic departure from the traditional broadcast than the coach mode was and that may account for it falling flat with how some of the

participants and their hedonic attitudes towards it. Although not as high as the traditional broadcast scores, it is important to note that the mean scores for hedonic attitude for the AR-enhanced broadcast were relatively high. Hall (2015) found that hedonic attitudes towards sports broadcasts are known to positively impact the viewer's appreciation of that broadcast. Similarly, Rese et al. (2017), found that for AR activations, hedonic attitudes are a statistically significant predictor of a consumer's perception of an activation's usefulness.

Broadcast Type

There are undoubtedly multiple factors to discuss in terms of the differences by broadcast type. Considering that media rights revenue is so critical to sport organizations and sport media rights holders, it is important to carefully consider how the core product (the broadcast) is presented. While there has been a lack of studies specifically focused on the visual elements presented in sport broadcasts, there have been several studies that have considered other elements central to the presentation of a sports broadcast. These studies have focused on sport commentators and verbal framing of the action taking place in a sport broadcast (Lee et al., 2016; Parker & Fink, 2008; Weiller & Higgs, 1999). The results of these studies and the current one clearly indicates that characteristics of the broadcast can have a significant impact on the attitudes and intentions of the viewer.

Traditional

The traditional broadcast was intended to be somewhat of a control group for this study. The traditional broadcast is the conventional broadcast offered by sport media rights holders with play-by-play and color commentary but no AR-enhanced graphics. Participants in the traditional broadcast group demonstrated high mean scores on each of the outcome variables: re-viewing intention (5.88), word of mouth (5.70), utilitarian attitude (5.81) and hedonic attitude (5.94). In

fact, these scores are the highest mean scores of any of the broadcast types for any of the outcome variables.

The traditional broadcast though different from the coach mode broadcast was found to be significantly different than the mascot mode on each of the outcome variables. It is clear there is a difference between the mascot and traditional broadcasts, and it is also clear that the traditional broadcast is the preferred broadcast type.

It is possible the participants in the study showed a preference towards the traditional broadcast mode due to familiarity. As noted previously, Sundaram and Webster (1999) found that familiar brands have an inherent advantage in the marketplace. Similarly, Boyle (2009) stated that familiarity is an important characteristic of sport broadcasting when it comes to obtaining and maintaining an audience. This need for familiarity could have factored into the results of this study and the fact that the more familiar broadcast type had higher mean scores.

The argument for the impact of familiarity on consumer opinions could also be strengthened by what is known as the historical framing in the presentation of the games. According to Sullivan (1991) consumers often rely upon framing to dramatize a sports broadcast and inform the viewer (Sullivan, 1991). Comisky, Bryant, and Zillmann (1977), and Bryant, Comisky, and Zillmann (1981) found that framing is evident in sport broadcasts and that consumers come to know and expect certain aspects of framing within the production of a broadcast (i.e., replays, graphic packages and close up views of the action). It is likely that if the AR-enhanced viewing modes, especially the mascot mode, manipulated the framing of the game in too drastic of a way that viewers may not react as well to it as they do to the traditionally framed broadcast.

Coach Mode

The coach mode broadcast diagrams the plays and movements of the players and the ball during live gameplay. It also updates statistics such as points and rebounds in real-time. It is intended to simulate the appearance of plays a coach would traditionally diagram for players and the coaching staff. Participants in the coach mode group demonstrated high mean scores on each of the outcome variables: re-viewing intention (5.51), word of mouth (5.38), utilitarian attitude (5.53) and hedonic attitude (5.56). These scores were lower than the mean scores from the traditional broadcast but higher than the mean scores for the mascot mode broadcast.

The scores for coach mode on the ANCOVA models were not significantly different from the traditional broadcast scores. This non-significant finding is an important one for sport broadcast rights holders. The fact that viewers were not significantly less likely to re-view, discuss, and have positive attitudes towards coach mode compared to traditional mode is promising. To have coach mode viewers indicate outcomes comparable to traditional mode which is the ubiquitous form of viewing that has the advantage of familiarity is that much more impressive. The consistency in scores between coach mode and traditional mode indicate that viewers are willing to embrace coach mode in much the same way they do the traditional broadcast.

The coach mode scores were significantly different than those of the mascot mode broadcast for re-viewing invention, WOM, and utilitarian attitude. While the reported mean was higher for coach mode than mascot mode for hedonic attitude, it was not found to be significantly higher. The high reported outcome means and fact that the results on three of the outcomes were significantly higher than those of the mascot mode broadcast indicate that although they are both AR-enhanced the coach mode broadcast was better received by the

participants of the study. Coach mode's two highest outcome scores were utilitarian and hedonic attitudes. This is an important finding. Wenner (1998) stated that information seeking is a key motivation for fans to consume content. He noted that information seeking although cognitively driven can serve to enhance utilitarian and hedonic attitudes. It is likely that the coach mode play diagram and statistical graphics met the information seeking desire of some of the participants resulting in strong scores for each of the outcome variables.

Mascot Mode

The mascot mode broadcast was an AR-enhanced broadcast intended to provide a fun or entertaining viewing experience (Simmons-Winter, 2019). This broadcast type features over the top graphics that are designed to resemble the presentation of a video game (O'Connor, 2018). Participants in the mascot mode group demonstrated high mean scores on each of the outcome variables: re-viewing intention (4.99), word of mouth (4.92), utilitarian attitude (5.18) and hedonic attitude (5.35). However, these scores represent the lowest mean scores of any of the broadcast types for any of the outcome variables in this study. Goebert and Greenhalgh (2020) suggest that AR is better suited as a compliment to the core sport product and not a replacement. It is possible that due to the amount and type of AR graphics in the mascot mode that for some participants it distracted from the core product rather than enhancing it.

One important fact to remember is that Mascot Mode may not inherently be the best fit for the demographics of this study. Mascot mode was intended to replicate the appearance of a video game and appeal to an audience that is interested in gaming like those on Twitch. Twitch is a live-streaming website similar in some ways to YouTube but focused on gaming. NBA commissioner Adam Silver himself said in an interview that he would like NBA broadcasts to look more like Twitch (Kafka, 2017). If the Twitch generation is the target of Mascot mode,

then it is important to be mindful of how the age of our sample compares to age of the average Twitch user. Our mean and median ages for participants were 41.22 and 40 respectively. According to MuchNeeded.com (2020) 71% of Twitch users are millennials or younger with an average age of 21 for active users. This average age indicates that Twitch represents an audience on average that is much younger than the population of our study. Perhaps this audience would be more accepting of the video game like quality of the Mascot mode broadcast than older participants.

To investigate the hypothesis that younger viewers would have a more favorable view of the mascot mode broadcast than older viewers, a regression analysis was conducted by broadcast type. A regression was run for each of the broadcast types and each of the outcome variables by age. Only two of the analyses' outcomes indicated a significant relationship. Both significant findings were within the mascot mode population. The simple linear regression that was calculated to predict re-viewing intention based on age was significant ($F(1, 70) = 4.02$, $p < .05$). The mascot mode participants predicted and centered re-viewing intention score is equal to 5.016 increasing by .023 for every one-year decrease in participant age. The simple linear regression that was calculated to predict hedonic attitude based on age was significant ($F(1, 70) = 4.11$, $p < .05$). The mascot mode participants predicted and centered hedonic attitude score is equal to 5.367 increasing by .021 for every one-year decrease in participant age. These findings indicate that the intended audience of the mascot mode, younger participants, report significantly higher scores for the mascot mode broadcast for re-viewing intention and hedonic attitude than older participants.

Sport Involvement and ELM

The sport involvement mean score for the study population at first glance appears to be rather high (5.55). This is likely due to the screening questions that sought to ensure that participants were familiar with sport broadcasts and consumers of sport broadcasts. The relatively high sport involvement scores of the population situate it nicely for a study of sport broadcasting as Funk and James (2004) and Karg et al. (2019) found that media-dominant consumers often have higher levels of sport involvement than event-dominant consumers.

Jang et al. (2014) studied how an individual's involvement with sports impacts how they process information. They found that lower involved participants were less likely to process rich detailed information than their more highly involved counterparts. They found that even if a message is detailed the consumer may not process the information carefully if they are not highly involved. This finding coincides with what the ELM espouses in terms of how involvement effects whether individuals use the central or peripheral route for processing. Lower involved consumers are expected to utilize the peripheral route for processing information and higher involved consumers are expected to utilize the central route for processing information that is presented. In line with the findings of Jang et al., (2014) the current study found that higher involved individuals displayed higher mean scores for attitudes and intentions related to the outcome variables across all broadcast types. Further, as levels of involvement decrease, so to do mean scores related to the outcome variables.

At low levels of sport involvement, there appears to be a distinct difference in the outcome variables between the mascot mode and the other modes. Specifically, the mascot mode scores are lower on each of the outcome variables than either of the other modes. Interestingly as sport involvement increases, the difference in the outcome scores by broadcast

types decreases, becoming essentially nonexistent. While these findings were not statistically significant, they seem to indicate that the central route processing method that is known to be utilized by highly involved participants is being utilized and highly involved participants are finding similar value to each of the broadcast modes in the study. The peripheral route processing of lower involved participants clearly seems to value the traditional and coach mode more than the mascot mode though all three broadcast modes have lower outcome means for lower involved participants than their highly involved counterparts. The visible gap in the outcome means by broadcast type narrows as sport involvement increases. Based on the ELM literature, it seems likely that the highly involved participants in the current study by accessing central route processing were able to better comprehend what the AR enhanced broadcasts were displaying and appreciate the details of the interaction as evidenced by their higher mean scores on each of the outcome variables across broadcast types.

The fact that lower involved participants had lower mean scores on each of the outcome variables is consistent with the finding that lower involved participants utilize peripheral route processing. It also makes sense that lower involved participants had higher mean scores for the traditional broadcast than either of the AR-enhanced versions. Peripheral route processing involves lower levels of cognitive processing and due to the fact that the traditional broadcast is the standard type of broadcast participants are used to seeing it would require less cognitive processing to understand, resulting in a higher likelihood for favorable responses for low involvement participants. Additionally, Lien (2001) conducted a review of how the ELM has been used in consumer research and noted that in low involved consumers, repetition or familiarity can enhance attitudes and provoke positive judgments of content without higher order elaboration taking place. Jang et al. (2014) similarly found that participants in their study of

sport advertising used less-cognitive processing and were less likely to process highly detailed material as they were unlikely to make a cognitive effort to process the extra information. The AR-enhanced broadcasts presented a great deal more information and detail than the traditional broadcast and no doubt required more cognitive effort to appreciate all of the elements than the traditional broadcast would. For this reason, it makes perfect sense that highly involved participants indicated higher mean scores for those broadcast types than the lower involved participants.

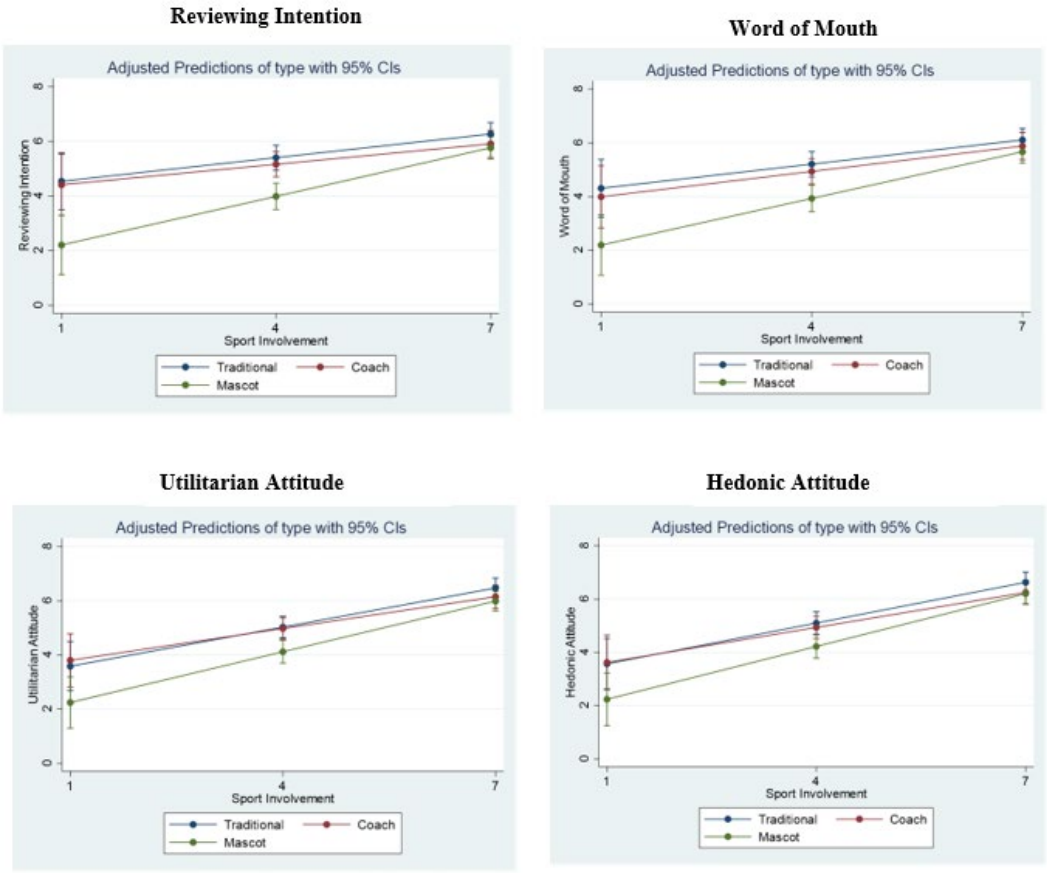


Figure 18. Visual outputs for moderator analysis by sport involvement

Theoretical Implications

Perhaps one of the most impactful findings of this study is that there was a significant difference found across all four outcome variables by broadcast type while controlling for sport

involvement. It was plausible, considering each of the broadcasts featured the same snippet of game action, that results of the study by broadcast type would not be significantly different. However, there was a significant difference by broadcast type. Based on the attitude and intention scores, this significant result indicates that the AR-enhancement can significantly change the experience of viewing an NBA broadcast. While in this instance, the AR scores were lower than the traditional broadcast score, this finding indicates the potential that the AR-enhancements have to change the viewing experience. With careful design and consideration based on research findings and consumer feedback, the AR-enhanced broadcasts could significantly improve the sport viewing experience.

The study aimed to understand the role of sport involvement in how different broadcasts were received and utilized the ELM to do so. Involvement has been identified as a key predictor of the type of processing that is likely to occur via the ELM (Petty & Cacioppo, 1990). In sport and tourism, multiple authors have noted the importance of involvement in the decision-making process of consumers by utilizing the ELM (McGehee, Yoon, & Cárdenas, 2003; Park et al., 2008; Samuelsen & Olson, 2010). Jang et al. (2014) found that lower involved sport fans are less likely to have favorable views towards highly detailed information due to the amount of effort it would take to process the detailed message. The results of the current study confirms the importance of involvement and adds to the ELM literature in sport as it shows that higher involved participants indicated higher scores on each of the outcome variables and lower involved participants indicated lower scores on each of the outcome variables utilized in the study. This finding reflects the findings of the previous studies and indicates that higher involved participants are processing the information presented in the broadcasts via the central route and lower involved participants are processing the inform via the peripheral route.

Results of this study also shed new light on how different types of AR-enhancements might be received differently. The coach mode broadcast had higher mean scores in all of the outcomes than the mascot mode broadcast. The coach mode scores were also significantly higher than the mascot mode on re-viewing-intention, WOM, and utilitarian attitudes. The significant difference shows that although both broadcasts were AR-enhanced, apparently not all AR-enhancements are equally received. This result indicates that most likely the differences were not due to novelty as both the mascot and coach mode were novel viewing experiences. Instead, the content of the enhancements must be the differentiating factor in the significant difference in outcomes. This finding serves as a call for further research to compare and contrast the underlying differences in types of broadcast AR-enhancements.

To date there has been a dearth of research into the use of AR in the sport context. This study can add to the literature and start a new branch of that literature into AR use in sport broadcasting. While several studies have taken into account the impact of a commentator and their commentary on consumer attitudes toward sport broadcasts, none to this point have investigated the impact of enhanced graphics or visuals. This study is the first of its kind and can serve to guide future research into AR-enhanced broadcasts. Some of those future research ideas and considerations are discussed in the following section.

Practical Implications

This study provides valuable practical insights for sport properties and sport broadcast rights holders. The NBA clearly believes that enhanced broadcasts have the potential to change the future of sports broadcasting as evidenced by commissioner Adam Silver declaring: “No one understands the intersection of sports media and technology better than Steve Ballmer, and every team will benefit from the pioneering work that he and Second Spectrum are doing to enhance

the game experience." (O'Connor, 2018, para. 15). Now, they just need the insights into what consumers think about the technology in order to make it the best viewing experience possible. This study can provide some of those insights in the form of intentions and attitudes towards the product.

The fact that the AR-enhanced broadcasts had lower scores across each of the outcome variables than the traditional broadcast serves to underscore the notion that the AR-enhancements are still very much a work in progress. With that in mind, it is important to recall the concerns of ESPN president James Pitaro who said

> We do not believe AR or VR is a fad. We want to be very careful in this space in that we don't want to address one problem and create another. We don't have enough data yet to tell us we should have more virtual graphics than we currently have as a part of our primary ESPN broadcast (Sharma, 2019, para. 13).

It is not all that unusual for emerging technology to undergo some growing pains upon implementation, several technologies integrated into sports broadcasts were not initially well received. Hawk-Eye, K-Zone, the virtual first down line and broadcast telestration were initially met with some skepticism and resistance from viewers (Gage, 2013; Squadron, 2013; O'Connell, 2015). However, the encouraging news is that those technologies have not only become accepted parts of sport broadcasting, they have become staples in the broadcasting of their specific sport. It seems that their acceptance was due in large part to consistent exposure. While these other technologies have had the luxury of being integrated into national broadcasts, up until now, Courtvision has only been available to Fox Sports viewers that live in Los Angeles and has only been utilized nationally in three broadcasts (Schoenfeld, 2020). It is possible that the main impetus for AR enhanced broadcasts to become more well received is greater exposure.

Being able to understand the re-viewing intentions of consumers is a valuable resource for sport broadcast rights holders. As of March 2020, prior to the NBA being suspended due to Covid-19 concerns, broadcast viewership across all of the NBA partner networks was down 12% from the 2019 season (Schoenfeld, 2020). While not alone in viewership decline, this is clearly an area of concern for the NBA. Greenhalgh, Dwyer, and Biggio (2014) by interviewing high ranking officials in a professional sport organization found that organizations are in competition for the attention of fans. One of the suggestions of Greenhalgh et al. (2014) was to implement new technologies to capture the attention of fans. It is possible the implementation of new broadcast technologies such as AR could help the NBA in their competition for the attention of fans.

This study and future ones like it can provide practical information to the NBA and their broadcast partners focused on the younger generation they are currently targeting and struggling to reach. Adam Silver summed up the challenge of reaching a younger demographic saying "From 2010 to 2018, among 18- to 34-year-olds, and that's our core audience. Their viewership on pay TV is down almost 50 percent" (Lawlor, 2019, para. 7). Perhaps the finding in this study that younger viewers have significantly higher re-viewing intention scores for mascot mode could help to create a strategy centered around enhanced broadcasts that could help to reach this valuable age group.

The results of this study can provide information about consumer attitudes and intentions towards the technology and serve as a guide to rights holders considering the implementation of this type of technology. NBA senior coordinating producer Tim Corrigan admitted that they need more information and that this iteration of the Second Spectrum technology is still in the fact collecting stage "You've got to take some chances and really put something out there to

learn and fine tune" adding he felt optimistic about the future of the technology "This is, again, just scratching the surface" (Feldman, 2019, para. 15). There is good reason to be optimistic about this technology, the participants in the coach and mascot mode groups reported their mean scores to be well above the midpoint of the seven-point scale that was used to measure these factors. Considering the nascent nature of this broadcast technology, such a positive reception is an encouraging finding.

Among the most impactful findings for rights holders to consider is the fact that the coach mode broadcast showed results comparable to that of the traditional broadcast. This finding can be used to guide the design and implementation of future iterations of AR-enhanced broadcasts. Additionally, AR-enhanced broadcasts may not be the magic bullet to reach new fans. This finding is based on the fact that lower involved fans indicated that they were not as receptive to AR-enhanced broadcasts as their highly involved counterparts were. With that in mind, sports broadcast rights holders cannot plan to just roll out AR graphics and receive a big influx of new viewers. The implementation of AR graphics must be carefully considered and tailored towards the audience broadcasters are attempting to reach. The results of this study could be used to supplement the fact collection that is in the process of being conducted by the NBA and provide them with consumer intention and attitude information.

Future Considerations

It may be valuable to conduct a study strictly focused on the younger demographic that media rights holders have been struggling to reach. Especially considering that the NBA itself has expressed concerns about how to reach this younger audience. Adam Silver discussed the challenge the NBA has had reaching this younger audience saying that they are "competing against an infinitesimal number of opportunities for people to do other things with their time"

adding that young viewers “don’t even subscribe to pay TV anymore” (Feldman, 2019, para. 3). Given that this demographic is such a focus of the NBA, it would be wise to tailor a study towards understanding the preferences, attitudes and intentions of younger viewers in regard to AR-enhanced broadcasts.

Further research should be conducted to investigate consumer preferences towards AR-enhanced broadcasts. A quasi experimental pre-test post-test design could be utilized to understand within group consumer preferences. This research could be setup to allow participants to experience both the traditional broadcast and AR-enhanced broadcast in randomized order and report their attitudes and intentions after each viewing experience. Finally, a preference question could be included to force a choice between the two broadcasts to better understand which type of broadcast is preferred after consumers had experienced both. The findings of this type of study could be compared to the results of the current study to see if there is a consistency of outcomes when a participant experiences only one type of broadcast (current study) or experiences each type of broadcast.

Another future direction is to explore technology adoption behaviors and intentions towards the AR broadcast technology. Goebert and Greenhalgh (2020) utilized the technology readiness and acceptance model (TRAM) to investigate consumers adoption intentions towards in sport venue AR activations. This type of research should be extended to include an adoption study into the use of AR in sport broadcasting. There are also a number of AR focused adoption studies that can be used to guide investigation into the adoption of AR in the sport broadcasting context (Haugstvedt & Krogstie, 2012; Rese, Schreiber, & Baier, 2014; Huang & Liao, 2015).

Future iterations of the Courtvision AR enhanced broadcast from Second Spectrum will feature the ability for users to change broadcast feeds in real-time (Schoenfeld, 2020). If a

viewer wants to watch coach mode for the first quarter, mascot mode for the second quarter, traditional mode for the third quarter or even toggle back and forth at will, they will have that capability. Once this technology is available, researchers should utilize it to study how participants perceive the AR broadcast when they can actively control what is being seen and when. This ability to dictate what is being viewed would bring a level of consumer interactivity and control to sport broadcasting that has never before been seen and could have an impact on consumer perceptions.

As the AR broadcast technology continues to evolve and possibly be utilized in more sports further studies should be conducted to understand if attitudes and intentions differ by sport type. The study could be limited towards fans of the particular sport being studied in order to understand the opinions of the most likely viewers. Demographics including age race and gender also differ by sport and could result in varied attitudes and intentions towards AR technology in broadcasting based on the specific fan demographics of that sport.

There is potential for future versions of AR enhanced broadcasts to feature sponsored graphics and AR interactions (Schoenfeld, 2020). This concept warrants future study focused on sponsorship, specifically sponsor recall and retention. A study could be designed in a similar fashion to the current study to evaluated sponsor recall and retention from a traditional broadcast and sponsor recall and retention from a broadcast with sponsored AR graphics and interactions. Findings from that study could be used to inform both the prospective sponsor and the media rights holders in regards to the value and impact of sponsored AR graphics and interactions.

To better understand what participants are seeing and experiencing it would be wise to try to understand the physiological responses of participants and not just their surveyed opinions. With that in mind, future researchers could incorporate galvanic skin response (GSR) and eye-

tracking software into their study. Eye-tracking software is a technology that allows researchers to measure a participant's attention to visual cues and stimuli (Wedel & Pieters, 2008; Ferguson & Mohan, 2019). The eye-tracking software can be used to study attention and recall and allow researchers to understand what draws the focus and attention of consumers. GSR can be used to measure emotional and cognitive stress or arousal in real-time through sweat observed in the hand (Westerink, Van Den Broek, Schut, Van Herk, & Tuinenbreijer, 2008). This physiological data will be able to inform researchers more clearly as to what respondents are experiencing during a study rather than just self-reported data alone.

Conclusion

It was the goal of the current study to explore consumer attitudes and intentions towards AR enhanced sport broadcasts. The current study did so by investigating the attitudes and intentions of consumers by broadcast type while controlling for sport involvement. The outcome factors of re-viewing intention, WOM, utilitarian attitude, and hedonic attitude were found to significantly differ by broadcast type. The participants in this study indicated a preference for the traditional broadcast type over either of the AR-enhanced broadcasts and the coach mode broadcast over the mascot mode broadcast. The results of this study provide guidance for sport media rights holders planning to incorporate AR graphics into their broadcasts.

Due to the fact that traditional broadcasts scored significantly higher than the mascot mode broadcasts on each of the outcome variables, sport broadcast partners should be mindful about the amount of augmentation they utilize in their broadcasts. The coach mode broadcast was a bit more muted in terms of AR graphics than the mascot mode and fared better than the mascot mode with the participants of this study. This may indicate that AR-enhancements

should be incorporated into broadcasts gradually in order for viewers to gain a familiarity with the graphics and not be overwhelmed by a deluge of visual stimuli. There does seem to be some promise in the use of AR-enhanced broadcasts to reach younger viewers. However, this finding should be further investigated.

The technology featured in this study seems destined to become a part of the viewing future for NBA broadcasts. Second Spectrum has an exclusive contract to supply the NBA with player-tracking statistics, AR graphics, and analytics (Schoenfeld, 2020). There are also plans in the works to implement the Courtvision technology throughout the league when the current broadcast rights deals expire (Schoenfeld, 2020) Research into AR broadcast technology has an important future as it can help to guide what types of interactions will be utilized. According to NBA commissioner Adam Silver sport broadcasting is currently on the verge of technology fueled breakthrough "If you think about how our games are going to look five years from now, my belief is it will be dramatically different" (Feldman, 2019, para. 3). It seems clear that the time to investigate the future of sport broadcasting is now.

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Appendix A

Re-viewing Intention

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree

1. I am willing to watch another sporting event broadcast with similar visual elements.
2. I will recommend this type of sport viewing experience to others.
3. I will watch another sporting event broadcast that has similar graphics.

Word of Mouth

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Mildly Disagree	Neither Agree nor Disagree	Mildly Agree	Agree	Strongly Agree

1. I will speak favorably of the broadcast technology used.
2. I will encourage others to view broadcasts with the same type of visual elements.
3. I will encourage others to generally support the type of broadcast I just viewed.

Appendix B

Sport Involvement

To me, the game of basketball is:

	1	2	3	4	5	6	7	
boring	❍	❍	❍	❍	❍	❍	❍	**exciting**
interesting	❍	❍	❍	❍	❍	❍	❍	**uninteresting**
valuable	❍	❍	❍	❍	❍	❍	❍	**worthless**
appealing	❍	❍	❍	❍	❍	❍	❍	**unappealing**
useless	❍	❍	❍	❍	❍	❍	❍	**useful**
not needed	❍	❍	❍	❍	❍	❍	❍	**needed**
irrelevant	❍	❍	❍	❍	❍	❍	❍	**relevant**
important	❍	❍	❍	❍	❍	❍	❍	**unimportant**

Hedonic and Utilitarian Attitudes

Please indicate your perceptions about the broadcast you just viewed.

	1	2	3	4	5	6	7	
ineffective	❍	❍	❍	❍	❍	❍	❍	**effective**
unhelpful	❍	❍	❍	❍	❍	❍	❍	**helpful**
not functional	❍	❍	❍	❍	❍	❍	❍	**functional**
unnecessary	❍	❍	❍	❍	❍	❍	❍	**necessary**
impractical	❍	❍	❍	❍	❍	❍	❍	**practical**
not fun	❍	❍	❍	❍	❍	❍	❍	**fun**
dull	❍	❍	❍	❍	❍	❍	❍	**exciting**
not delightful	❍	❍	❍	❍	❍	❍	❍	**delightful**
not thrilling	❍	❍	❍	❍	❍	❍	❍	**thrilling**
unenjoyable	❍	❍	❍	❍	❍	❍	❍	**enjoyable**

Appendix C

MANCOVA Diagnostic Tests

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Sport ID	.142	212	.000	.903	212	.000
Utilitarian Attitudes	.127	212	.000	.911	212	.000
Hedonic Attitudes	.156	212	.000	.880	212	.000
Reviewing Intention	.143	212	.000	.876	212	.000
Word of Mouth	.132	212	.000	.903	212	.000

a. Lilliefors Significance Correction

Kolmogorov-Smirnov Normality

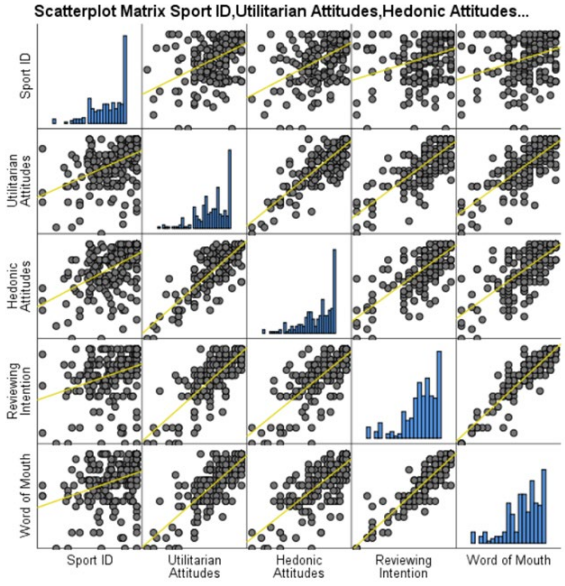
Box's Test of Equality of Covariance Matrices[a]

Box's M	78.551
F	3.822
df1	20
df2	164002.925
Sig.	.000

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept + type + bball + type * bball

Box's M Test



Scatterplot Matrix and Histograms

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
type * bball	Pillai's Trace	.024	.622	8.000	418.000	.759	.012
	Wilks' Lambda	.977	.620[b]	8.000	416.000	.761	.012
	Hotelling's Trace	.024	.617	8.000	414.000	.763	.012
	Roy's Largest Root	.016	.855[c]	4.000	209.000	.492	.016

Tests of Between-Subjects Effects

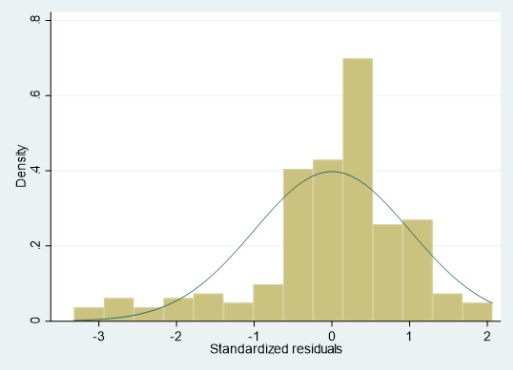
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
type * bball	Utilitarian Attitudes	.227	2	.113	.086	.918	.001
	Hedonic Attitudes	1.011	2	.505	.376	.687	.004
	Reviewing Intention	1.080	2	.540	.303	.739	.003
	Word of Mouth	2.062	2	1.031	.574	.564	.005

Homogeneity of Variances and Covariances

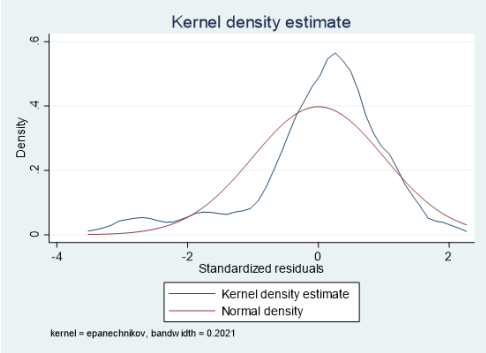
Appendix D

Visual ANCOVA Outputs for Re-viewing Intention

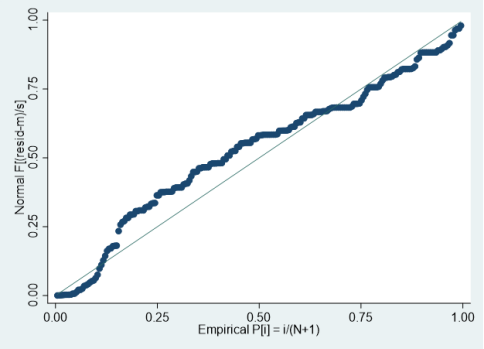
Normality of Residuals



Histogram for distribution of residuals

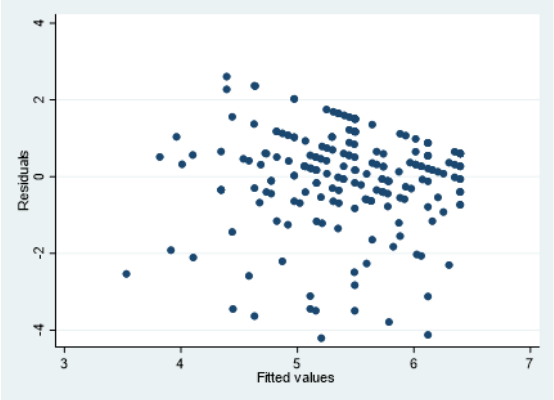


Kernel density plot



Normal probability plot

Homoscedasticity and Linearity

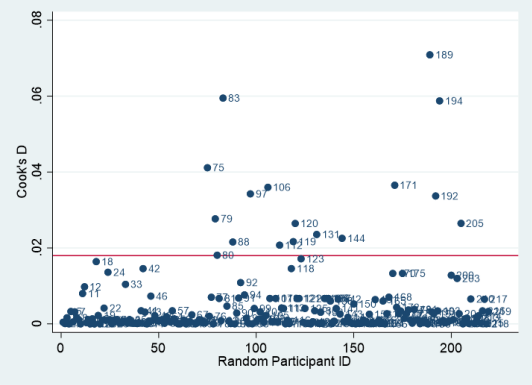


rvf plot

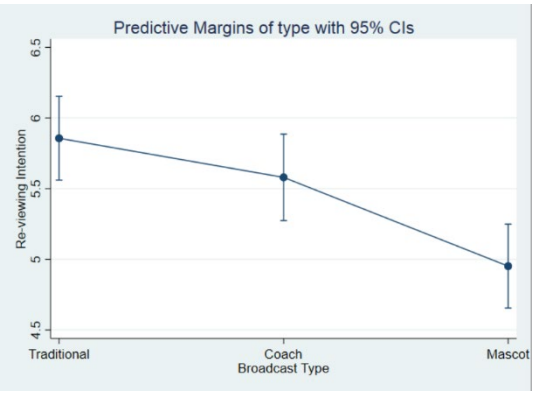
Multicollinearity (estat vif)

Variable	VIF	1/VIF
type		
2	1.33	0.753697
3	1.32	0.756817
bball	1.01	0.991638
Mean VIF	1.22	

Test for Outliers



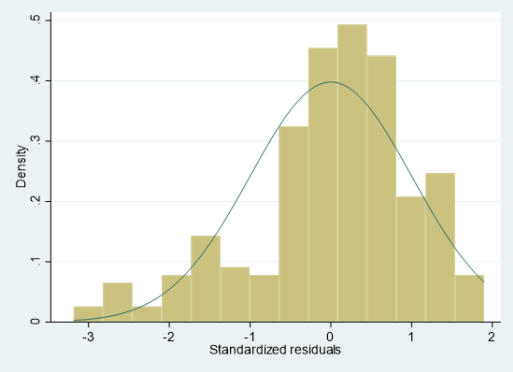
Margins Plot for ANCOVA



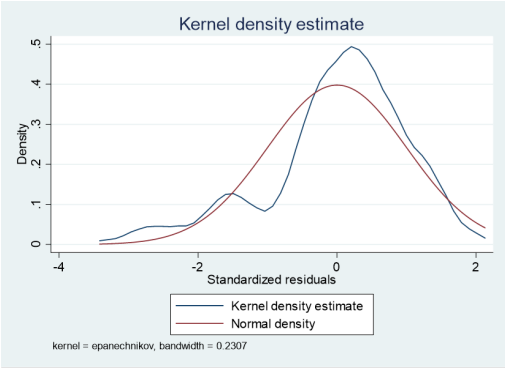
Appendix E

Visual ANCOVA Outputs for Word of Mouth (WOM)

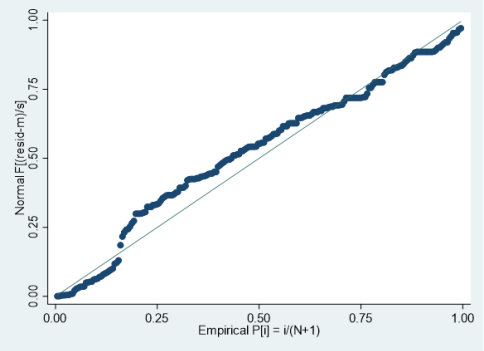
Normality of Residuals



Histogram for distribution of residuals

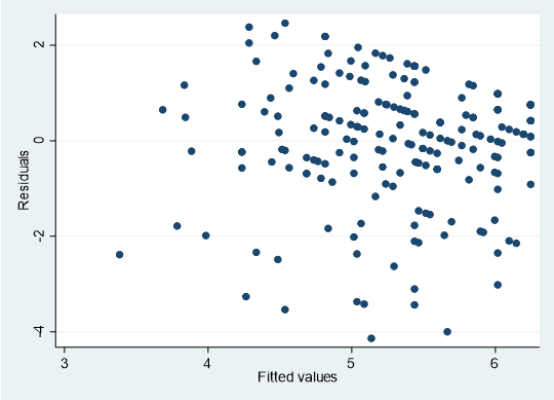


Kernel density plot



Normal probability plot

Homoscedasticity and Linearity

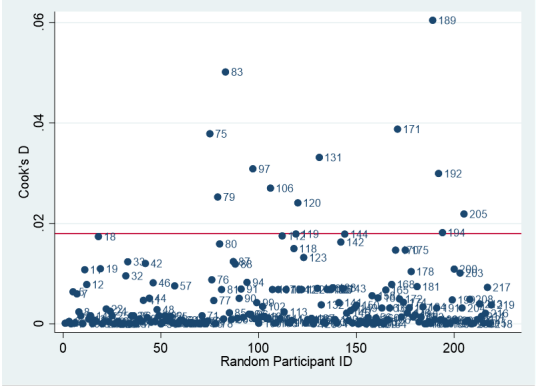


rvf plot

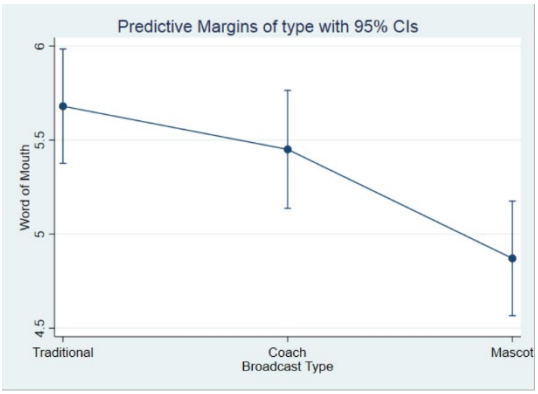
Multicollinearity (estat vif)

Variable	VIF	1/VIF
type		
2	1.33	0.753697
3	1.32	0.756817
bball	1.01	0.991638
Mean VIF	1.22	

Test for Outliers



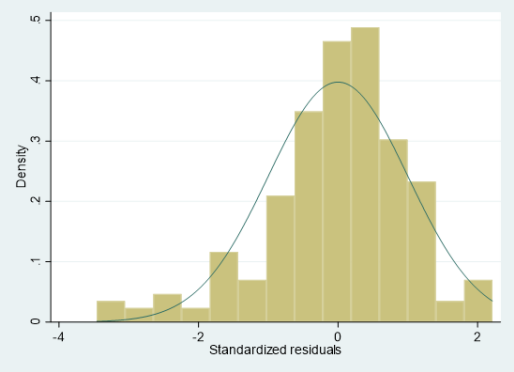
Margins Plot for ANCOVA



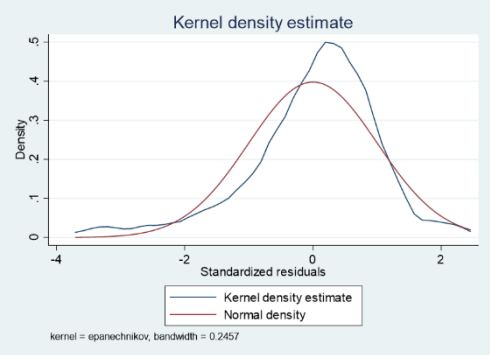
Appendix F

Visual ANCOVA Outputs for Utilitarian Attitudes

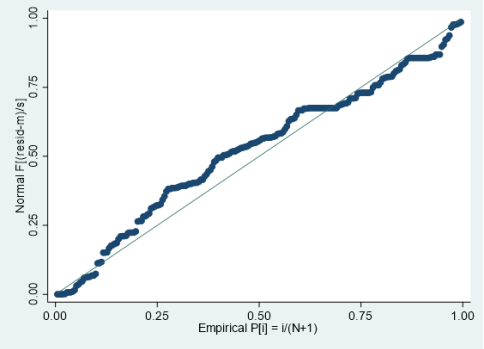
Normality of Residuals



Histogram for distribution of residuals

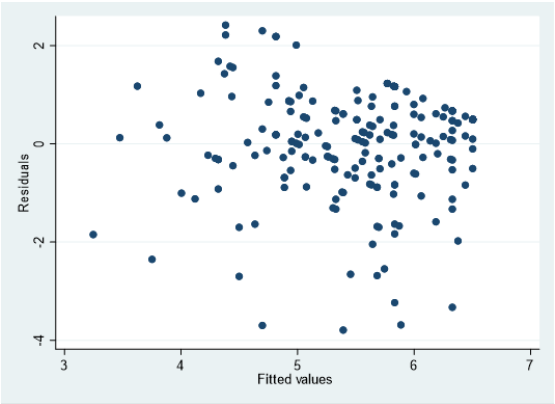


Kernel density plot



Normal probability plot

Homoscedasticity and Linearity



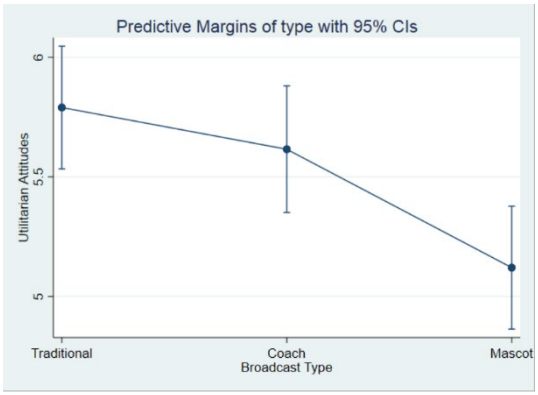
rvf plot

Multicollinearity (estat vif)

Variable	VIF	1/VIF
type		
2	1.33	0.753697
3	1.32	0.756817
bball	1.01	0.991638
Mean VIF	1.22	

Test for Outliers

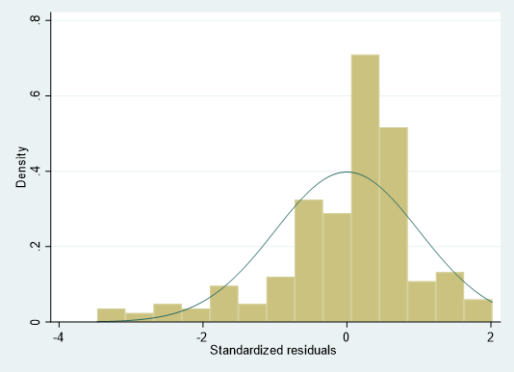
Margins Plot for ANCOVA



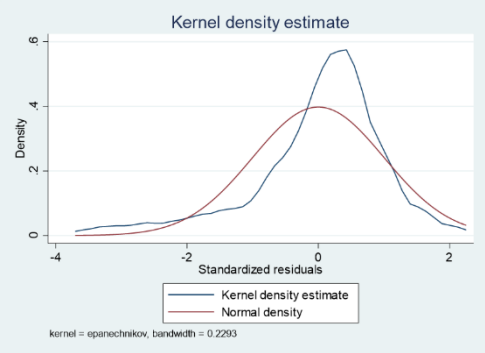
Appendix G

Visual ANCOVA Outputs for Hedonic Attitudes

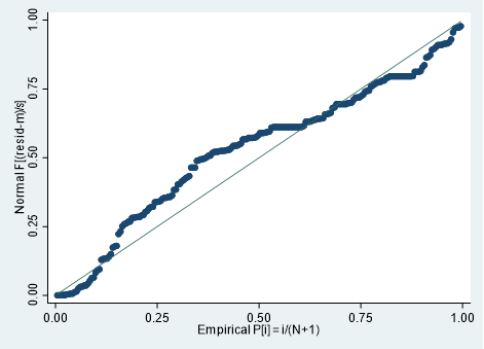
Normality of Residuals



Histogram for distribution of residuals

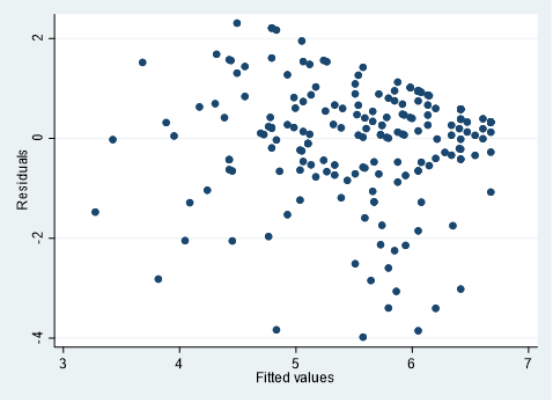


Kernel density plot



Normal probability plot

Homoscedasticity and Linearity

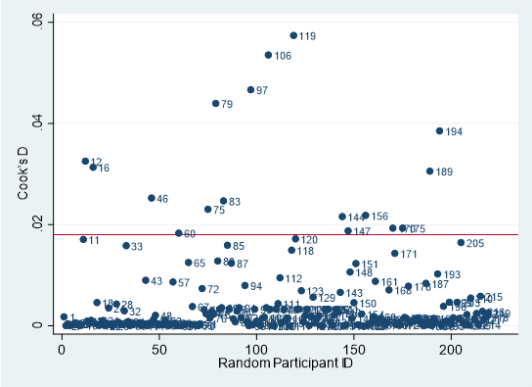


rvf plot

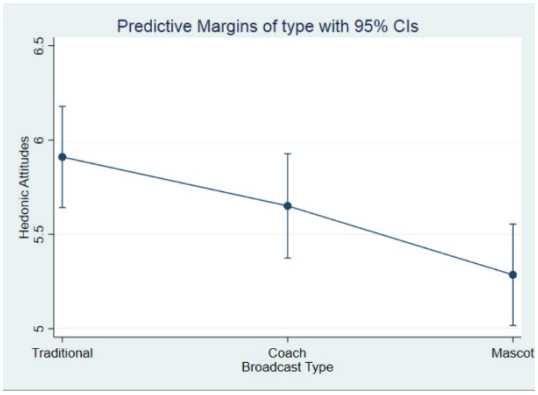
Multicollinearity (estat vif)

Variable	VIF	1/VIF
type		
2	1.33	0.753697
3	1.32	0.756817
bball	1.01	0.991638
Mean VIF	1.22	

Test for Outliers



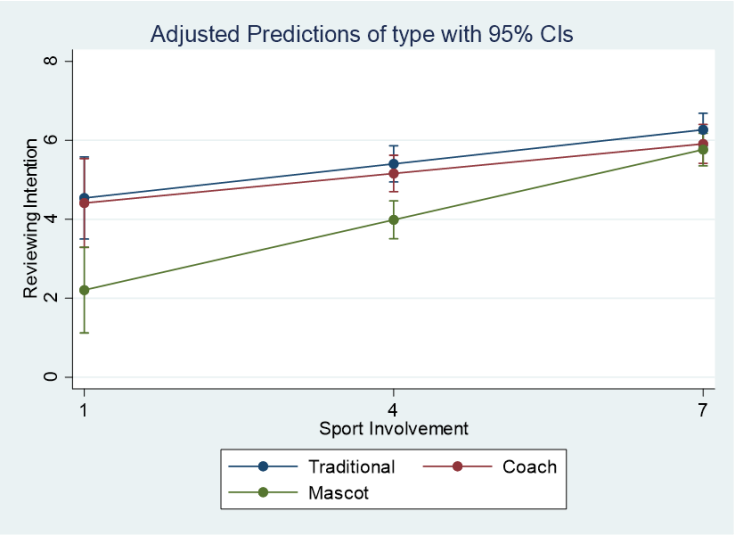
Margins Plot for ANCOVA



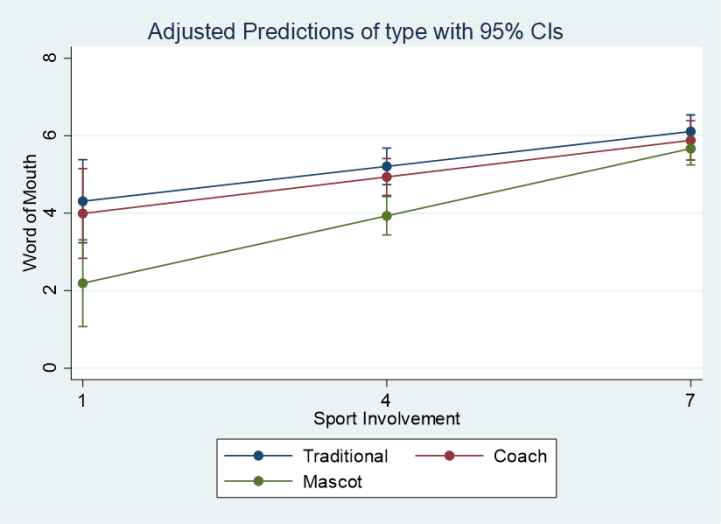
Appendix H

Visual Outputs for Moderator Analysis

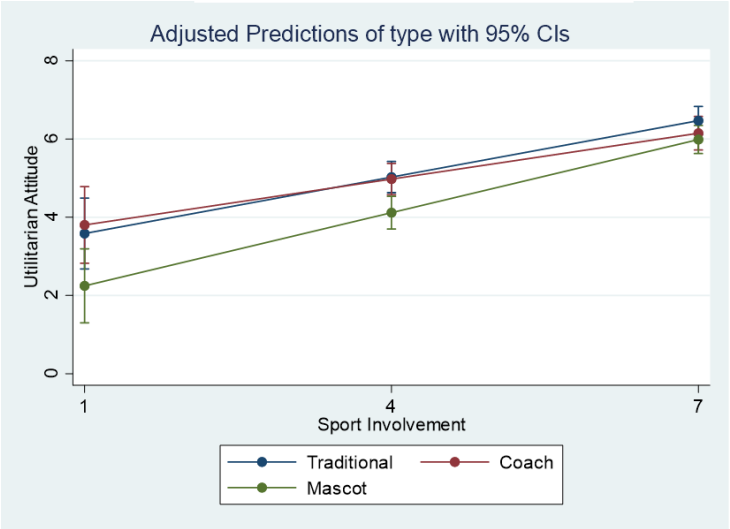
Reviewing Intention



Word of Mouth



Utilitarian Attitude



Hedonic Attitude