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KEVIN BLAKE
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INSTANT REPLAY OFFICIALS' SOCIOCULTURAL EXPERIENCES: A QUALITATIVE GROUNDED THEORY STUDY

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF COMMUNICATION

BY THE COMMITTEE CONSISTING OF

Dr. Lindsey Meeks, Chair

Dr. Pat Meirick

Dr. Gregg Garn

Dr. Ryan Bisel

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Dedication

Dedicated to my son, Ian Conrad Blake.

Acknowledgement

The Department of Communication is a special place, and I have directly benefited from the academic commitment and collegiality of its faculty, staff and fellow students. I am blessed to have profited from a wealth of gifted professors, Dr. Ryan Bisel, Dr. Gregg Garn, Dr. Patrick Meirick, and Dr. Lindsey Meeks, in particular as my chair, provided instruction and counsel during a most formative period in my career.

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Abstract

Instant replay is used to interpret specific rules infraction, a scoring play, a reversal of possession, the ejection of a player, or adjust a particular amount of clock time for an event within particular sporting events. This dissertation examines the communicative process of officials that oversee and are directly involved in making decisions within instant replay. It approaches this subject by looking at the social, communicative, and technological environments, while using the Grounded Theory Method (GTM) to assist with establishing theory for the communication and decision-making process of officials. The process can have political, cultural, social and economic connotations depending on the context in which officials utilize it, or circumstances surrounding a particular violation. This project also traces the conceptual and cultural history of instant replay as phenomena that developed in and around spectatorship of sports. The dissertation concludes by describing the specifics of Dynamic Professionalization along with the process of decision making insofar as providing clear guidelines regarding decision-making and technological integration within competitive sports.

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Chapter 1: Introduction

The extension of extant theory and the development of new theory can occur when studying unconventional contexts and samples for a field of inquiry focused on social phenomena in organizational settings (Bamberger & Pratt, 2010). When social phenomena constitute unconventional contexts and samples for a field of inquiry, the grounded theory method (GTM) is warranted due to the insufficiency of extant theory for guiding data collection data analysis (Suddaby, 2006). Though the outcomes of instant replay decision making in sports outcomes have been the focus of systematic inquiry, the communication context in which these decisions are made has not. Seminal theories of communication (e.g., Habermas's theory of communicative action) do not account for the unique characteristics of instant replay decision-making communications in sports: real-time communications amongst two or more officials with imperfect information for informing decisions in response to unpredictable contingencies, some for which there is little or no precedent and little or no structure (specifically, formalized rules) to guide these decisions. Nor do applied theories of sports officials' decision making, e.g., Klein's (1998) recognition-primed decision-making framework, directly apply insofar that these do not address the interprofessional communications amongst two or more sports officials required for instant replay-informed decisions in sports. Accordingly, the context and sample of instant replay and instant replay officials, respectively, are unconventional enough to warrant a grounded theory investigation of the communications phenomenon. Further, as discussed later, the increasing technological integration with the profession of officiating, and how it interacts with other stakeholders, merits additional theorization and how such development could be applied to other professionalization contexts.

The remainder of this chapter is organized as follows. The next section provides the background to instant replay officiating in sports. Next, there is a presentation of the constrained nature of instant replay communications and decision making and, moreover, the dearth of theory for the study of instant replay communications and decision making and other contexts and samples with similar characteristics. This overview leads to a discussion of the purpose of the study. The penultimate section describes the knowledge gap this study addresses for communication literature and the literature on officiating sports and then concludes with a summary of the chapter.

Background of Study

On September 7, 1968, instant replay was used for the first time in a National Football League (NFL) regular-season game. The contest pitted the defending Super Bowl Champions, the Chicago Bears, against the Cleveland Browns (Dudko, 2013). The league's use of instant replay was called into action on only the third play of the game. Cleveland safety Al Gross recovered possession in the Chicago end zone after a bad snap from center Jay Hilgenberg. The officials on the field said, “maybe,” and the man in the booth said “yes” (Thomas, 1987). One of the more famous examples occurred in November 1989. Replay provided the decisive factor in another instalment of the classic NFL rivalry between the Chicago Bears and Green Bay Packers. The Packers' winning touchdown, a connection between quarterback Don Majkowski and wideout Sterling Sharpe on 4th down, sparked the controversy. The Bears, along with likely most of the people watching the live action, believed Majkowski stepped across the line of scrimmage before firing the pass. That initial ruling was going to give Chicago a victory. Then instant replay provided the information necessary to reverse the call, giving the Packers the touchdown and a crucial win. The meeting was later dubbed “the instant replay game.” In many

ways, this game-deciding call showed the best and the worst of instant replay in the NFL, at the time. It provided the spontaneity that contributes to the emotional impact of the game, bringing some joy while bringing others bitterness or anger (Dudko, 2013).

Instant replay and the subsequent rules that govern the officiating of numerous professional and collegiate sporting activities, serve a variety of purposes including providing fairness within the field of competition, safety of the players, and accurate coordination of game regulations when infractions are committed. While it is understood that announcers, sports fans, and athletes mostly approve of using instant replay to get rulings correct (Young, 2019), less attention has been given to how instant replay may affect referees and officials. Primarily, the system usually shows officials getting the judgment calls correctly. Therefore, the system may be viewed as a tool for instruction and a confidence builder when it supports the original call on the field. Additionally, replay assists officials in knowing that if they made a mistake, replay provides an opportunity to correct the call. No official wants to miss a call, specifically during a crucial moment in a game. Officials make it a point that they wish for all plays to be called as it transpires on the field of play, so instant replay helps make it more likely that these calls are made correctly (Young, 2019). The media sometimes spends time focusing on calls made correctly but usually more attention is paid to those calls which are overturned or perceived as egregious, because these “deviant acts” are more interesting to discuss with the general viewing audience (Young, 2019). This heavy-handed focus on incorrect calls can create tension between officials and the viewing public.

In addition to maintaining the technical infrastructure and officiating guidelines, instant replay and the officials that administer its rules often serve ideological and/or symbolic purposes. Instant replay is used to interpret a specific rules infraction, a scoring play, a reversal of

possession, the ejection of a player, or adjust a particular amount of clock time for an event. The process can have political, social, economic, and other connotations depending on the context in which officials use it, or circumstances surrounding a particular violation. For example, as the world of sports betting continues to rise in popularity, the economic consequences of officiating can lead to losses and gains for betters alike, as well as lead to questions about the integrity of sports (Vrentas, 2024). As other institutions and conferences continue to construct and re-modify regulations, which demand an increase in the use of instant replay, public perceptions of constructive utilization are experiencing more conflicts and confusion, increasing additional resources, whether it be technology or personnel. Examples range from the trickle-down effect of rules from professional sports, such as the NFL, to the college program's debate on whether the use of replay for every competitive sporting event, regardless of the need to streamline rulings, is completely necessary. Furthermore, when we consider instant replay as messages, we can ask things like what does it mean for replay to now be an integral part of the game, how is it being used to exploit or dictate the flow of game competition, how is replay affecting the relationship of officials on the field and those in the replay booth, and what are the cultural ramifications it will have in the coming years due to dependency on the system?

In communication terms, instant replay also helps determine individual and collective identities and their associated cultures. Because our reactions to replay are a reflection of how we see our loyalties, beliefs, desires, fears, ambitions, and so on in relation to our favored teams or sports in general, replay can also connect to how we see ourselves. As such, it is salient that we should study instant replay and its social and cultural implications.

Scholars in communication, sports history, performance expectation, sports psychology, consumer behavior, legal studies, spectator temporalities, media studies, and other disciplines

have discussed officiating, instant replay, the aspect of time and the direct or indirect effects on culture. Media researcher Garry Whannel (1992) discusses in his book, “Fields in Vision: Television Sports and Cultural Transformation”, not only the transformation of time but additionally what he termed as “special fragmentations” of sporting events, which he claims is crafted by television producers when the use of various camera angles and levels of zoom are employed (Whannel, 1992). Margaret Morse (1983) studied the difference between the fan’s sporting experience at the stadium and that of the television viewer. She states the use of replay and multiple cameras induces a form of temporal alteration and compression of space. Morse (1983) continues that instant replay performs as a “descriptive repetition,” which forces the audience to shift from simply watching the event to an active method of engagement (p. 376). In Fink’s (2016) philosophical discussions concerning “Play as Symbols”, he makes a clear case that play has been neglected as a topic and perceived as trivial. He insists on its fundamental nature and its parallel importance to other issues: “Play has an extraordinary status in its being and existential basic phenomenon, just as primordial as mortality, work, love and struggle” (p. 70). He suggests that it has tended to be devalued or minimized by the traditional mimesis as imitation or copy. Fink (2016) thus thinks about play from multiple perspectives, from the play of children to the play of the world, which he characterizes as “a game without a player” (p. 206). In his studies, Fink appears to draw out a much larger question that he claims has been forgotten or disoriented by previous approaches. He is interested in the phenomena of which the concept of play is worldly, the situation of individuals being in the world and participating in a community at a specific time.

Hence, the relevance of accurate officiating within the discussion of fair play is crucial. The outcome of poor judgment can be detrimental to the integrity of the aspect of play and in a

sense, sports within a community. Conversely, past news articles and research have traditionally focused their studies on historical significance and personal rhetoric associated with officiating and specifically instant replay (e.g., Vannatta, 2013) but have not closely examined the communicative or cultural context of replay officials themselves, which make them a unique component for research in communication. To rectify this missing focus on officials and their communicative and cultural context, this dissertation focuses on instant replay officials who directly oversee college football games primarily for the Big Twelve Conference, and the subsequent operating system of instant replay as the primary unit of analysis by employing the theoretical perspective, Grounded Theory (GT). This might explain further the larger cultural concerns pertaining to truth and fairness in conjunction with the cultural obsession with vision and perception, and how these intersect for professionals like officials.

Statement of the Problem

The problem that motivated this study is twofold, one practical and the other theoretical. The practical problem begets the theoretical problem, and vice versa. Practically, instant replay decision making in sports can be controversial, and as a result has been likened to the appeals process in legal cases (Oldfather & Fernholz, 2009; Siegel, 2024). Like the appeals process in legal cases, the instant replay process in sports is the interpretation of evidence regarding whether or not a rule has been violated (Oldfather & Fernholz, 2009; Siegel, 2024). But the instant replay process is structurally unlike the appeals process in legal cases. Unlike the appeals process in legal cases, the instant replay process in sports does not entail a temporally lengthy process that can facilitate the re-review of all evidence, the discovery of new evidence and the review thereof, and revisiting past interpretations of both evidence and law to the end of convincing a jury or judge to decide in favor of one party over the other (Oldfather & Fernholz,

2009). In contrast, the instant replay process is sports is real-time and based on the collaborative interpretation of a singular piece of video evidence, typically by two or more referees (Benitez et al., 2019; Oldfather & Fernholz, 2009). The practical problem of the instant replay process is that the interpretation of the evidence and the communications that this implies amongst two or more referees does not enjoy a structure that ensures that an instant replay decision is allotted all the time and evidence necessary to yield a just outcome (Benitez et al., 2019; Scanlon et al., 2022). In cases when more time and more pieces of evidence (e.g., different videos from different perspectives, angles) are allowed for instant replay communications and decision making, the consumers become unhappy with the slowed pace of the game, the disruption of the game, and become ultimately less satisfied with spectator sports as a consumer product (Scanlon et al., 2022; Winand et al., 2021).

It is the underlying premise of this study that to address the problematic aspects of the instant replay process in sports, which is inherently a communications process (Perry et al., 2019), one must go beyond analogizing the process to evidence-based decision making in other arenas, such as law. To address the problematic aspects of communication during the instant replay process highlighted in the analogizing literature on instant replay – e.g., limited time, limited evidence, contingencies for which there are not directly applicable rules (Berman, 2011; Kilbert, 2017) – one must develop a granular understanding of the process, to identify features of the process that may be manipulated to mitigate its problematic aspects. Indeed, this is the purpose of theory in the study of social phenomena, including but not limited to the communications phenomenon of the instant replay decision making process (Craig, 1999; Littlejohn et al., 2021; Turner, 2007).

The explicit premise of this study was that no theory or framework exists for a valid empirical characterization of instant replay decision making in sports as a communication process. The fundamental characteristics of real-time decision making in any and all scenarios, including even scenarios for which there are no codified guidelines for the systematic interpretation of information or evidence, are not included in extant communication and decision-making theories and frameworks. The recognition-primed decision model has been used to address sports referee decision making on the field, but it does not account for the collaborative interpretation of evidence and also the rules of the game when an initial decision is called into question (Klein, 1998). Put another way, the communication process of instant replay decision-making is fundamentally more argumentative (in the formal sense) than is on-the-field refereeing (Nazarovets & Carboch, 2024). Were it not, instant replay decision making would not be so frequently likened to the appeals process in legal cases (Berman, 2011). As for communication theories per se, Habermas's (1984) theory of communicative action addresses the argumentative and collaborative nature of the communications that constitute instant replay decision making in sports but presumes perfect information and rational actors. While officials may be rational actors, they are often gifted with less-than-perfect information, in addition to the temporal constraints mentioned above. If one of the purposes of theory is to inform the development of data collection instruments for the study of social phenomena, and it is (see DeVellis, 2017; Maxwell, 2013), then the development of theory rooted in observation of the social phenomenon is requisite (Charmaz, 2014), as is the case for the study of the communication phenomenon that is instant replay decision making.

The purpose of this study was to develop a theory of instant replay decision-making communications via the grounded theory method (GTM) of analysis of the transcripts of semi-

structured interviews with a purposive sample of instant replay officials. The population for the purposive sampling were instant replay officials with the National Collegiate Athletics Association (NCAA), with a special focus on the Big 12 Conference, though other conferences were included as well due to the career trajectories of some of the study participants. Through GTM, these participants' experiences were used to assemble fragmented, existing concepts and practices associated with *Dynamic Professionalization* into a cohesive theory that helps give shape and form to officials' lived experiences. These fragmented concepts, and their applications in research, will be discussed in depth later.

Relationship of Literature to this Study

Grounded theory is a research method primarily structured for the generation of a theory (Glaser & Strauss, 1967), which is "grounded" in data that has been systematically collected and analyzed (Strauss & Corbin, 1994). This indicates that in the execution of the methodology the researcher is not focused on testing an existing hypothesis, based on previous frameworks, but rather constructs a new theory produced from empirical data collected in the field. The proper use of the Grounded Theory Methodology is to discover such things as social relationships, interactions and specific behaviors within groups (Crooks, 2001). Grounded theory has previously been used in many fields of study over the last fifty years and is effective in explaining phenomena ranging from the study of software development processes (Coleman & O'Connor, 2007), to research on relational identity in intercultural relationships (Lee, 2006), to studies on alcohol consumption (Pettigrew, 2002). It is widely used in healthcare research and specifically in the field of nursing (Coyne & Cowley, 2006). As opposed to other communication theories, GTM is not interested in one particular outcome or goal. Rather, it attempts to provide an area for as many perspectives to arise as possible, thus allowing scholars to acquire a

complete view of the phenomenon under study. Due to the subjective disposition of hermeneutics, scholars in mainstream communication research tend to perceive this approach as lacking reliability and validity. Such concerns will be addressed later in Chapter 3.

Considering the lack of substantial research pertaining to instant replay officials' relationships and the cultural construct of communication within officiating groups, grounded theory is well suited as an attempt to bridge a gap between theory and empirical research by providing guidelines that enable the construction of a theory, or theories related to complex social processes from collected raw data (Glaser & Strauss, 1967). This is relevant because it may afford a clearer perspective of what is happening within the communicative officiating process. A theory of the group dynamics grounded in the direct experience of officials working on an event, and others intimately involved in some aspect, might provoke a theory based on the actual perspectives of officials involved in the process. Such a theory would provide coherence and consistency in further research regarding what officials think and do during a game, and how these cognitive and behavioral actions impact their professional identity, others' perceptions of their professional identity, and the integrity of the sport.

Besides the lack of communicative research related to replay officials and the cultural context of replay itself, there are other purposes for conducting this research. First, I expect to gain valuable insight into the nature of human and group communicative behavior, such as learning how replay officials identify who they are and what roles they actually see themselves playing while officiating a game. Second, because instant replay is so extensively used, specifically in collegiate and professional sporting events, the process plays a significant role in defining space, unity, and time for humans to the point that these become salient traits for study. For example, Kramer and Ikeda (2001) discussed the complexity of Japanese clocks, and the

relevance time has on civilizations and the impact on human behavior. The semiotic product of the clock was dissociated time. Time is born of fragmentations which occurs with varying degrees of human perception and precision. Dissociated mechanical time assisted to create the belief in an independent measurable world (Mumford, 1934). The world becomes rational, meaning scheduled and fragmented in a sense of scheduled understanding. While theory attempts to transcend time, to explain in a single contingent moment, method takes snapshots and freezes time in perpetuity. No other measure is so pervasive, and no other scale is so universally embraced as clock time (Kramer & Ikeda, 2001). Many media critics (Arlen, 1976; Gitlin, 1986; Postman, 2005) for instance, stated that the decline in TV audience viewers was due to delays in programming due to its slow pace. Hence, instant replay has been introduced to reinvigorate interest in sports programming and fan engagement, suggesting it is a meaningful area of research for many disciplines.

Third, this research also has prospective benefits to the broader athletic community, other individuals, teams, organizations, academic, professional and sport agencies. These entities, and the benefits of this work, need to become more conversant with communication principles. Officials in team sports are responsible for interpreting and enforcing specific rules of the sport from a neutral point of view. They all have to consider several sources of information and make up their mind to maintain fair play and protect the safety of the players (Bar-Eli et al., 2011; MacMahon et al., 2014). In football, an official's decision might have significant impact on the outcome of the game, so the performance of the official can have consequences for players, college organizations, fans, and other stakeholders (Spitz et al., 2018). In the context of officiating, the distinction between perception and judgement has important implications for the nature of the errors they are making and how to learn to correct them (Spitz et al., 2018). In turn,

it would be beneficial for all stakeholders involved that the experience and previous knowledge from replay officials would garner insight and guidance for future referees and training programs.

Summary

In this dissertation, I found suggestive evidence from current and historical data that illustrates the communicative underlying structure of instant replay officials and its cultural significance. To situate this evidence, the chapters proceed as follows. First, I provide a recent literature review on popular concepts related to instant replay, including communication concepts, rulings, time, space, culture, vision, and perception rhetoric, all of which extend across various academic disciplines. It is in this chapter that I review what has been done regarding the concepts of Dynamic Professionalization. Next, I review the methodology of the dissertation and provide a detailed justification for using grounded theory to conduct a systematic analysis of instant replay officials and their perception of a cultural phenomenon. In the fourth chapter, I present my findings and how they relate to cultivating a theory for Dynamic Professionalization. Then I present the conclusions and implications of this analysis, as well as potential applications of Dynamic Professionalization in chapter five.

Chapter 2: Review of Literature

The initial issue of communication research within instant replay officiating is that instant replay is usually not the object under analysis, but rather, it is perceived as a series of characteristics of some other statistical artifact scholars are studying. Most of the research or articles about instant replay and officiating emanate from various perspectives that explain the process within divergent theories that analysts, reporters, or scholars support. These perspectives leave out or dismiss the concerns or perspective of the individual participating in an officiating role. The concerns of officials, as well as those individuals who are intimately involved with some aspect of the officiating community, are often not the focus of study, which has contributed to various definitions of and confusion concerning instant replay and the identities of those involved. So as to provide background on what work has been done and thus distinguish it from the focus of this dissertation, I review this prior work in this chapter.

Communication and the Profession of Sports Officiating

Different processes, standards, and pathways for learning characterize professionalization in general and require communication amongst leading professionals (Aljassar et al., 2023). In the context of sports officiating, there has been an increased focus on professionalization (Schulz et al., 2024). Programs that have been designed to ensure that amateur officiants have access to knowledge and resources have been established. Furthermore, there has been an increase in certification, training programs, and career pathways that can increase the credibility and legitimacy of the field as a whole, as well as for individuals working in youth or mature leagues (Thorpe & Dumont, 2022). In the same context, these programs can provide improved ability for officiants to navigate the various career pathways available while gaining the necessary skills,

training, and certification needed to ultimately achieve a level of best practices that align with the governing bodies of the designated sport and industry (Aljassar et al., 2023).

The sports industry has also faced the influence of technological integration and advancements, which is the key focus of this study and is discussed at length throughout the remaining sections of the literature review. However, when exploring technological influence, it is important to conceptualize the role of instant replay and VAR, or video assistant referee, which has led to changes in traditional decision-making and has also ultimately changed the way in which efficiency must adapt to changes in the game (Aljassar et al., 2023). Other technological influences include the integration of wearable tech and online platforms. For example, some programs and industries offer wearable tech that allows them to track their physical performance or to improve, through AI, the way in which decision-making is effectually aligned with best practices and standards (Thorpe & Dumont, 2022; Tingle & Armenteros, 2019). Online platforms are now more readily available to improve long-term training decision-making and to collaborate with other officiants to ensure continued professionalization (O'Brien & O'Keefe, 2022; Tamir & Bar-Eli, 2021). Together, these technological influences serve as a key method for potentially improving the field but also have specific challenges, which can be associated, specifically, with both pushback from referees as well as concern from the public regarding the quality and effectiveness of the technology (Calandrillo & Davison, 2017; Vanatta, 2011).

Cultural and societal shifts have led to increasing scrutiny and criticism from sports fans, as well as other officiants, who often face increased stress from the constant visibility of their professional decisions, which has been further exasperated with technology, as discussed above, which can reduce their ability to make effective decisions (McSweeney & Millington, 2021).

Kjærsgaard (2024) argued referees find themselves in an "inverse panopticon," in which spectators can evaluate their decisions (p. 11). Furthermore, as there is a high level of transparency needed in decision-making, while the technology is considered helpful by some referees, it is also considered a challenge by others as they are constantly facing criticism amongst social media and other platforms (Cipriano, 2024). It is in this context that the need for a framework with which to develop understanding of these varying shifts and the way in which they influence and enact upon officiants' ability to complete their roles and make decisions transparently and effectively becomes clear (Lewis & Bell, 2024; Ong et al., 2024).

Researchers recognize that professionalization amongst officiating requires further integration of techniques and tools to emphasize the importance of the human role while considering the technological role, and supporting human officiators in achieving appropriate and fair rulings. O'Brien and Rynne (2021) conducted a comprehensive review regarding the debates concerning high-performance officiating, professionalization, and authentic approaches to officiating sports, which require substantial and quick responses to sports events. The researchers emphasized that officiants, as a practice, have lacked a standardized professionalization that integrates their perspectives with technology, and conclude that extant scholarship "has tended to be framed by the 'seen but not heard' view of officialdom whereby they are considered to be rather benign rule-appliers" instead of focusing on officiating as a "complex and fundamentally human activity" (O'Brien & Ryanne, 2021, p. 1110).

While professionalization is evident to an extent within officiating settings, the lack of integration of standardization from the outsiders' point of view means that the profession is seen as fallible or relying on techniques that are not standardized. According to Panzo et al. (2024) and O'Brien and Rynne (2021), improving professionalization through improved standardization

that recognizes the value of technology while emphasizing the best practices and standards of officiating could create a more comprehensive and nuanced approach to officiating that overcomes some of the barriers currently experienced within the sports setting. Researchers, thus, emphasize the importance of professionalization within officiating while acknowledging the importance and nuanced concept of both officiators' perceptions and their need to gain a valued place in the sports context (Lewis & Bell, 2024; Ong et al., 2024).

The integration of technology in officiating can introduce new types of communication and decision making on the part of sports officials (Lewis & Bell, 2024; Ong et al., 2024). Ong et al. (2024) explored the visualization engineering practices used for improving on-field training for NFL officiators. Using a technological review, the researchers focused on the various factors that play a role in the accuracy of officiating, which include visual acuity, appropriate visual field, and ocular reflexes of the officiator. Ong et al. (2024) argued that technology could allow for a better-optimized understanding of training practices, which could be used to effectively improve human officiators' ability to respond and to make split decisions, which are required for NFL game officiating. Using 2D and 3D environments, Ong et al. (2024) argued that technology could be used for officiating best practices, and the development of standard approaches to meet the needs of training officiators to improve the practice overall.

Lewis and Bell (2024) also examine cognitive theories and explore the professionalization of officiating in the NFL. A cognitive theory framework was used to review a sample of 486 NFL penalty calls specific to violence, such as unnecessary roughness or roughing the pastor, from 2009 to 2019. The researchers identified that officials were often reliant on using instant replay to indicate the violent penalties and justify the potential prevention of violence. However, the lack of education amongst viewers and players regarding these standards

for identifying violent penalty calls, as well as some individuals who would view the instant replay and feel that the efficiency calls were incorrect, leads to tension amongst the players and viewers. Both Lewis and Bell (2024) and Ong et al. (2024) indicated that the integration of technology must be done so in a way that is clear to all parties and to ensure that efficient decisions are aligned with the best practices and approaches, and to prevent the tension that may arise between stakeholders when general unawareness of appropriate rulings and decisions are present.

Dynamic Professionalization

Despite the value of clearly articulating to various stakeholders about technological integration, many industries struggle to adapt appropriately. As a result, a dynamic professionalization theory would provide context regarding the ways in which practitioners should consider how to effectively meet these standardization needs of profession such as officiating, while considering the updates required for best practices based upon changing and evolving factors within and across industries. In this section, further information regarding dynamic professionalization is provided to help show how various studies have engaged with this concept, yet in fragmented ways. Specifically, additional information regarding officiating, technology integration, and changes are provided, which, when considered within the context of dynamic professionalization, contextualize the ways in which best practices must be appropriately changed and updated to consider the evolving nature of technology and standardization across fields such as officiating.

Research shows that the variation in individual identity and physiological factors of officiators must be taken into consideration for a genuinely dynamic professionalization approach within the industry. Zvosec et al. (2023) evaluated social identity and sports officiating

culture with a focus on professionalization within the industry. In-depth, structured interviews were conducted across 30 high school varsity basketball officiators to review key social identities and perceptions of professionalization within the field. According to the participants, social identity plays a key role in standardization and professionalization insofar as welcoming new identities, both based on gender and racial identities, and producing quality via the practices established throughout the industry-wide standards. Skirbekk (2025) indicated that the use of technology also varies based on individual and gender-specific officiating and refereeing programs. Using a case study focusing on VAR training across Norwegian elite referees from 2022, the researchers indicated that the implementation of technology, such as VAR, requires differential approaches to both the general management of the game as well as adherence to best practices (Skirbekk, 2025). According to the researchers, there are gender differences in terms of assessing tension and negotiation, which may lead to a need to understand further the complex interactions between the way in which female and male officiators work effectively and create in-game cohesion.

In terms of physiology, Moreno-Perez et al. (2022) evaluated how match congestion, such as when officials need to officiate more games closer together, relates to officials' health and performance. Specifically, they explored the physical performance of football referees to better understand professional demands, as well as to offer ideas on improving standardized practices amongst governing bodies to improve professionalization. According to Moreno-Perez et al. (2022), the variation in biological identity can play eight key roles in the specific physiological toll that an average day of officiating may take on an individual. As a result, the researchers suggested that improving the standardization practices in officiating may require integrating data effectively that considers referees' identities and specific physiological needs.

MacDonald et al. (2023) also assessed physiological variations to understand how various individual characteristics can influence the ability to manage games effectively. MacDonald et al. (2023) identified that factors such as exercise participation and lack of strengthening of cardiovascular health have led to variations in game negotiation and the effectiveness of officiating. Researchers argued for an improved approach to standardizing heart health as a prominent factor of officiating (McDonald et al., 2023).

Continuing this thread, Ibáñez et al. (2024) explore external and internal loads specific to basketball referees and assess potential systems that can support the way in which the physiological load is managed during games. According to the researchers, there is a lack of consideration for the variation in the loads that each referee has to manage, which is required to improve standards and best practices. According to Ibáñez et al. (2024), the ability to address this issue is integral to supporting better outcomes specific to best practices and standards. Yang and Kwak (2024) similarly documented physiological and psychological factors specific to officiators at an amateur level and identified, through focus groups and interviews with 23 participants, that there is a need to improve the way in which individualistic characteristics influence the psychological and physiological cognition of amateur efficiency. Collectively, these studies indicate the importance of considering approaches to best practices and standards that support the variations in physiological, cognitive, and physical loads necessary to achieve officiating successfully and in accordance with standardization.

Professionalization also requires effective adaptation to changes, which include technology integration within the industry at such a dynamic level (O'Brien & O'Keefe, 2022; Tamir & Bar-Eli, 2021). O'Brien and O'Keefe (2022) explore technological integration within sports officiating and explore an ecological approach to the professionalization approaches

within the officiating industry. When an ecological approach is taken to study the development that emphasizes the interrelationship of different developmental processes, especially with technology, this enables officials to deliver more precise analyses and engaging content. Furthermore, replay officials may be readily able to apply strategies, practices and concepts to support learning and transfer of learning to others in their profession. Still, the understanding of how technology changes professionalization standards in practice has yet to be fully explored. Tamir and Bar-Eli (2021) also recommended the integration of professionalization that considers technologies used within the officiating field, specifically to more effectively consider how sports have evolved morally with the infusion of technology and the way in which these practices are used effectively with officiators. The question that is proposed is, just because we have the technology to review the judgement call of games, does that impose a moral or ethical obligation on the administration of college sports to utilize that technology? The answer is yes, after all, technology can assist and measure aspects of the replay stoppage process for the officiating crew while providing valuable feedback. Researchers thus, indicate the importance of considering technology as a key adapter within the industry and including it from a dynamic professionalization viewpoint

Implementation processes, flexibility, and adaptability, through the lens of technological integration within officiating, have been a key consideration within the literature for the past five to ten years (O'Brien & O'Keefe, 2022; Reed et al., 2018). O'Brien and O'Keefe (2022 provided an updated understanding of technological integration, decision-making, and how these methods can be best integrated within governing bodies for best practices. According to the researchers, there is a need to fully understand the way in which technology has changed both judgment and perception while considering and adapting effectively to these changes for a flexible integration

that meets the needs of others. Reed et al. (2018) indicated a need to understand how the integration of AI and machine learning technologies will be implemented in a sports analyst context. By design, AI systems perform decision-making on behalf of the human user. In the study, an alternative might be to enable users to decide where to pause and watch the replay until they came to a decision that seemed relevant and wrote down their thoughts for further review. Based on these studies, it is apparent that technological integration questions have remained an academic focus of the profession for some time but have yet to be extended to a formal theory of the profession.

In addition to physiological and technological considerations, research has also explored how group dynamics affect professional performance. A lack of satisfaction or cohesion amongst officiators can ultimately lead to adverse reactions in the officiating industry (Avugos et al., 2021; Hancock et al., 2024). Hancock et al. (2024) provided a more recent exploration, assessing satisfaction, performance, and support. Their work demonstrated that there was a positive relationship between the factors of satisfaction, performance, and cohesion. According to the researchers, improving the approaches that create group cohesion may be one factor that improves professionalization and adherence to best practices. Avugos et al. (2021) considered sports officiating to understand key contributors to differences, officiating, and communication style within a flexible approach to governing bodies' approaches to providing standards and best practices. According to Avugos et al. (2021), their comprehensive review indicated that interactions, game management, expertise, and group variance play a centralized role in the way in which officiators employ best practices for officiating. As a result, attention or lack of communication between governing bodies can further create disparities in the way in which management approaches are integrated, thus further challenging professionalization. The

literature shows that the need to adhere effectively to these efficient standards is integral to creating cohesion amongst officiators and leading to better game performance and officiating standards.

Frameworks, Not Theories. Other research has tried to bring these various influences together to better understand officiates' experiences, though they propose frameworks instead of formal theories. Antonie (2022) documented various phases in refereeing to understand the practices that some individuals must undergo to achieve levels of elite status. Using interviews with five Romanian top league referees, Antonie (2022) put forth a five-step model based on Super's career development theory from 1953. According to the findings, each stage is representative of various processes of training and experience levels. The stages were exploration, implementation, consolidation, stabilization, and maintenance. Stage one includes taking the referee course and working in grassroots football. A major deterrent to advancement in this stage is the hostility of fans, which aligns with the previous discussion of the profession needing to better understand the impact of their stakeholders. Stage two is focused on advancing to refereeing regional leagues and is based on passing physical and theoretical tests administered by the county referee committee. Consolidation is when referees start to acknowledge the importance of their role and start to develop personal styles. Stabilization is when referees work at the national level and there are more team management processes to ensure that no errors occur within these high stakes matches. Maintenance is the highest level, when "there is nothing more to learn" (p. 1681). The levels of stabilization and maintenance, with "nothing more to learn", run counter to the idea of dynamic professionalization and how continuous advancements in technology and rule changes, for example, require viewing professionalization as a dynamic and continual process. As such, Antonie's conceptualization is insufficient.

Hoffmann et al. (2024) proposed the game management framework for sports refereeing. According to the researchers, the decision-making processes, administration processes, and game management competency of the officiants play a central role in cohesion and success. Their framework stipulated four concepts for considering game management: (1) officials' knowledge of the game and rules, (2) officials' physical ability and the physical demands during gameplay, (3) contextual judgement, which is the application of rules to specific moments in the game, and (4) clear and effective communication with players, coaches, and spectators to prevent misunderstandings and ensure these stakeholders continue to have confidence in the officials. This framework, while helpful for understanding how officials can create better game management and self-presentations, has its shortcomings. While it does recognize that changes in rules, for example, need to be considered to ensure proper game management, it does not discuss instant replay officials specifically; rather, it focuses on on-field referees and *excludes* video assistant referees. Further, it does not discuss the integration of technology, nor how technology alters decision-making or the profession. As discussed previously, and in more depth below, technological advancement and integration are at the heart of instant replay and how it has affected officials, their professions, and their position within sports. As such, any framework or theory about instant replay officials need to address the role of technology.

Historical Development of Instant Replay

Instant replay in competitive sports is a complex and at times an argumentative subject. Electronic decision-making ability to review plays and video content has transformed how individuals view events, and influences how sporting events are analyzed, coached, monitored, chronicled, and even officiated. Subic et al. (2008) stated in their book, "The Impact of Technology on Sports," that the "transfer and integration of knowledge from a wide range of

disciplines and industries has generated a rapid technological change in sports in modern times" (p. 5). Technological advancements tend to make sports more accessible, engaging, and enjoyable for the avid consumer (Whannel, 1992). Additionally, this translates to an increased challenge for officiating crews and representatives, whose responsibility is to administer these games to make the event accurate, just, and competitive.

Broadcasting news and sporting networks around the world frequently use the ability of instant replay to alter the way sporting events are perceived and, in a sense, the way they are packaged and distributed to the viewing audience. This ability to interrupt and manipulate the continuity or flow of a "live" event has influenced audiences' temporal experiences of an event to the point that it provides a mandate for a desired consumable media product, replay. Currently, fans have come to not only expect but demand that content be available for review in a high-definition format for close officiating replay calls in various sporting disciplines such as European Soccer, or to analyze a particular baseball pitcher's throw, or whether a wide receiver has their foot inbounds or not, without getting off the couch. It has affected all aspects of the sporting world, but it has not always been this way. To examine the influence of instant replay, I briefly consider the historical and systematic conditions which first propagated its rapid adoption into broadcast television.

One of the first broadcasters to use a form of replay was George Retzlaff, in 1955, when he presented a rapid processing technology from kinescope recordings to produce key moments of games on the program "Hockey Night in Canada" (CBC, 2003). While such film acquisition systems were standard in the 1950s, for archiving purposes, they were expensive and difficult to operate due to the time needed for film processing. The introduction of magnetic recording tape technologies by such companies as Ampex, and their subsequent adoption, provided the

widespread proliferation of a medium and equipment with which the capacity to perform the instant replay process could be made possible.

One of the first airing of a time-delayed program came on November 30, 1956, when CBS broadcasted a West Coast delay program of "Douglas Edwards and the News" (Leslie, 2010). By using videotape recorders in each time zone, the episode was time-delayed (Verna, 2008). This was due to the expenses demanded by live broadcasting which restricted the operation of stations and restricted their availability to limited time allotments across time zones. Many years later in 1963, the Army-Navy game, which fell on December 7th, became a monumental event not only because of its association with the anniversary of Pearl Harbor, but due to the tragedy that had transpired just a few weeks prior.

The Army game in 1963 is best known as a somber occasion that was delayed by fourteen days and served as an opportunity to reunite and heal the nation in the wake of the assassination of President John F. Kennedy, which took place on November 22nd (Gola, 2013). Overlooked at the time, due to the gravity of national events and the eagerness of the American people to mourn the loss of a president, was an innovation that would forever change the way television is perceived. The creator of this innovation was a 29-year-old director from Philadelphia who had been working for CBS Sports for only a few years; his name was Tony Verna (Verna, 2008).

During the early 1960s when magnetic tape recorders were first produced, they were originally designed so it was difficult, if not impossible, for content to be immediately played back to the viewing audience at home. But as good fortune would have it, a few engineers at various television networks had been toying with the idea of changing that along with an opportunity to test it. Two days after the Kennedy assassination, Jack Ruby, a local underworld

figure in the Dallas area, shot and killed Lee Harvey Oswald, the man initially arrested for killing President Kennedy, on live television (Gola, 2013). NBC was the only news outlet at the time to have the replay readily available. Still, it could hardly be considered instant since it took the in-house technicians about nine minutes for the first tape to be broadcast publicly. Two minutes after NBC presented its replay of the Oswald assassination, CBS showed its version but lacked the soundtrack due to tracking problems (Verna, 2008). This was one of the first instances of utilizing replay, within the aspect of recorders, for the general public with the current technology that was in use.

Common in the day, a significant issue with available recorders and tape was locating the precise moment on the magnetic tape where the replay should begin; the machines during this period could not be accurately cued. When a machine began to replay a tape, it would show seven to ten seconds of static and video noise, known as "video hash," before a recognizable image would appear. However, it was impossible to know at precisely which point in the action this would occur (Verna, 2008). This caused a major obstacle, one that seemed impossible at the time to resolve quickly.

According to Verna's book, "Instant Replay: The day that changed sports forever," he and the production crew overcame this hindrance by devising an ingenious apparatus that would deploy a series of audio tones or cues, which were laid down on a corresponding audio track as video content was being recorded live. These cues allowed Verna to locate the moment that a play on the tape was about to begin. It was a particularly tricky maneuver since most of the machines available to the CBS network would only play back videos recorded on the original device. This maneuver was due to the manufacturer's mechanical configuration of the high-speed rotation head assemblies.

In short, the first recordings were not interchangeable, so the timing was crucial when deploying the record/playback sequence. The audio cue solution that provided the sequencing had come to Verna through his previous experiences of working with his production staff at the 1960 Rome Olympics (Barbash, 2015). Verna had systematically utilized the second audio track, on the magnetic tape, which is generally not heard by the viewing audience as a way of conveying suggestions or comments to the director back in New York on specific highlight video footage that was shipped for Jim McKay's recap show of the games. Using a 440Hz cycle burst of audio, similar to when radio stations first began in the 1920s and networks performed time checks for their affiliate partners before the start of the day's broadcasting, Verna would insert a tone, then playback the tone's changing pitch as it was tightening to its original sound as the tape was being recorded across the heads of the machine.

Kay identified where the tones should be placed so the production crew and he would have a systematic way of relating the cues to the game being played in progress (Erskine, 2015). By first isolating the quarterback, since the action of play originates from that particular position due to the football snap from the center player, Verna would mark the offensive team's movements with the tones. One tone would be transmitted to the tape recording when they huddled, then two tones transmitted when the quarterback approached the line of scrimmage. When the production crew played the tape back, the sequential tones that had been recorded would be played back at the same consistent speed as the video. By doing this, it provided an audible "cue" where the crew could locate the exact location on the videotape of the play to be broadcast.

The videotape itself, along with the tape recorders and playback units, could have been better as they were prone to malfunctioning periodically. For the purpose of the game, CBS

provided previously recorded broadcast tape, which was 3M's original number 179, priced at 300 dollars a unit, an expensive item for that time (Leslie, 2010), so it was reluctantly furnished to the production crew. Along with multiple razor-spliced edits and video dropouts, the tape contained historical episodes of "I Love Lucy" and several DUZ soap commercials (Verna, 2008). To make matters even more complicated, when the tape was played back it appeared that the recording heads were only sometimes making complete contact with the magnetic tape surface so images of previously recorded material would randomly appear intermixed with what was recorded from the game. The crew would later affectionately call the tape "Lucy Leader." (Verna, 2008, p. 13). Verna tried to get the system to work about a dozen times, but something would always go wrong. As mentioned, either the recording heads would present a "venetian blind effect," which is common when the alignment of the playback head is incorrect or there is debris on the tape, or the machine would change speed erratically due to the vacuum tubes consuming too much electricity thus burning them out. These various setbacks would not discourage the production crew, so they continued throughout the game, hoping a replay opportunity would present itself so they could highlight their new technology, which eventually they did.

With a few minutes left in the fourth quarter and Army trailing behind Navy 21-7, it appeared that Navy would be triumphant, and the industrial debut of instant replay would have to wait till another day (Barbash, 2015). As fate would have it, the Army did not give up and began a fifty-two-yard drive that put them into scoring position. Army's quarterback, Rollie Stichweh, faked a handoff to his tailback, then carried the ball through a running lane off his tackle's block, referred to in football as "off-tackling," and scored the touchdown himself. The play was captured on tape, which was immediately rewound and played back in the network production

truck. Verna began listening carefully to when the inserted audio tones synced. He then watched patiently for ten seconds as the clean video focused on his black-and-white television monitor.

The crew knew this might be their last opportunity to make the system work effectively, for all of the pieces began to fall into place correctly, so they punched it up and broadcasted the play live to the viewing audience. Verna shouted to his television commentator, Lindsey Nelson, "this is it!" and the instant replay system was born (Verna, 2008). When the clear monochrome replay of Army's touchdown hit the black-and-white screens of television sets across the nation, the video recording was indistinguishable from live television because the signal played at the same speed and appeared identical to a live broadcast feed. This is why when it was initially aired, Nelson famously yelled "This is not live! Ladies and Gentlemen, Army did not score again" (Barbash, 2015). Ultimately after the replay, the Navy was saved by the clock. The game ended at the Navy two-yard line when Stichweh could not get the last play off on the fourth down. Out of timeouts, he was waiting for the on-field officials to stop the clock, but the clock had already run its course. The game was over, and the final score was Navy 21, Army 15 (Gola, 2013).

As mentioned, the first industrial videotape recording machines that Tony Verna used to construct a reliable replay system were hardly dependable due to their delicate engineering and design. The Ampex Model VR-1000 was one of the first production recorders for on-air recordings. Priced at $45,000 each, the Columbia Broadcasting System (CBS) was one of the networks to receive a prototype and it went on the air on November 30, 1956, with the first-ever, nationwide, tape-delay broadcast. As mentioned, they showed "Douglas Edwards with the News" from CBS Television City in Hollywood, California (Leslie, 2010). The VR-1000 had been the brainchild of a special six-member project team at Ampex charged with the task of

engineering the final design; they were Charles Ginsburg, Charles Anderson, Alex Maxey, Shelby Henderson, Fred Pfost, and Ray Dolby, who would go on to be the founder of his world-famous Dolby Laboratories (Leslie, 2010). Mr. Ginsburg and Mr. Anderson were instrumental in refining the concept of using a high-speed rotating internal drum head mounted at a right angle to the tape.

The purpose being the drum would have four equally spaced heads mounted on its outer edge which would record video transversely across the width of the tape as the tape moves forward at 15ips (inches per second). The drum exterior would provide the best utilization of the tape surface so the most significant amount of magnetic data could be transferred. The 2-inch quadruplex video is the first practical and commercially successful analog recording videotape format (Leslie, 2010). The format revolutionized broadcast television operations and television production since the only recording medium available to the industry was film, which was cost prohibitive and took time to process. Additionally, Mr. Ginsburg and Mr. Anderson developed a unique "shoe" design that cupped the tape so that the rotating heads would contact the tape over the entire width of the sweep with equal pressure, in conjunction with a particular self-enclosed vacuum system to secure the tape in the shoe (Leslie, 2010).

For the internal electronics that controlled the amplifying and switching of the outputs from the rotating four-head assembly, a decision had to be made whether to use amplitude or frequency modulation. At first amplitude modulation was considered but such a method would require an elaborate device called an AGC or "automatic gain control" system to eliminate a "venetian blind" effect when the tape was being played back (Leslie, 2010). Finally, it was decided, by both gentlemen, that a vestigial sideband frequency modulator would be the best solution due to size and, in addition, would be able to achieve an uninterrupted video signal. One

bit of humor did occur, though when it was presented initially to the Ampex Board of Directors in 1956. The developers were so absorbed with designing the inter-workings of the video mechanism unit and subsequent housing components that they had completely overlooked the need for audio playback. When they debuted the device for the first time, one of the executive directors said, “Where’s the sound?” (Leslie, 2010).

A few days later, one of the group members went to the executive audio engineering department at Ampex and borrowed the circuitry from an Ampex Model 350 audio tape machine, one of Ampex’s most popular reel-to-reel recording devices at the time and configured a playback head which uses the audio recording along the exterior edge of the magnetic tape. Later in the design, it was decided to officially use the opposing edge as a control track which facilitated the sync of audio, video, and timecoding.

That day in December, the groundwork for instant replay had been laid, but it was still in its infancy and far from universal adoption. As can be postulated, instant replay was an expensive production design. In 1966, the Pacific 8 college football conference voted to eliminate television devices, which enabled football coaches to view instant replays on the field (Ganguli, 2013). The majority of colleges in various national conferences voted to do away with the apparatus due to the excessive expense of establishing the system and criticized that it might provide a competitive advantage to those institutions which could afford implementation. The cost and vetoes of the systems did not stop coaches from across the country wondering if instant replay would be adopted to improve the game since so many close calls on the field in the past had been controversial. One example came in 1966 when Florida defeated rival Florida State University (FSU) in a game with a controversial ending. Officials on the field ruled that an FSU receiver was out of bounds when he caught what has been the winning touchdown. FSU coach

Bill Peterson said, “With all the electronic devices that we currently have in football, why don’t we have a videotape or something like that to help officials?” (Allen, 2010). The television industry during the late 1960s encouraged the use of magnetic tape technologies, resulting in widespread implementation at various network affiliates.

A Shift to Viewer Control

By allowing the user to control recording and playback function ability, the VCR introduced the potential to time-shift by enabling the viewer to dictate how, when and where they so choose to watch content. Videotape replay was unique because its re-mediated media recording. While the technology is designed to be imperceptible “so that prerecorded programs were indistinguishable from live content for viewing audiences” (Ceruzzi, 2003, p. 16), video replay suggests that live programming is malleable and susceptible to transformation. Essentially, a recorded video began by shifting the flow of programming over time, and then as standardized utilization and technology grew, recordings moved the flow of images. This ability of direct perspectival control over recorded material allowed users to prompt or construct their replays and realities, which in turn brought about the familiarity and comfort of instant replay.

In later years, the appearance of digital devices such as TiVo, a personal digital video recorder developed by the TiVo Corporation based in San Carlos, California and introduced in 1999 (William, 2002), entirely changed the way the television audience viewed programming and thus gave them a greater degree of control over the replay. As early as 2004, the Big Ten Conference originally began using the TiVo system to assess instant replay for officiating errors they felt could be corrected. The information collected after the 2004 season was favorable since TiVo became the universally applied instant replay system for all the NCAA Division I schools for the next two years. Due to redundancy concerns, stacks of TiVo units constructed to run in

tandem, would be used by various conferences, even scheduling television production for specific games that usually would not be slated for broadcast, just so instant replay could be utilized (Zatz, 2007). Besides being mobile, light in weight, and readily configured in the field, the TiVo system had another robust specification that set it apart from other personal digital video recorders of the time, the remote control.

The TiVo remote control includes, even in their current model, an instant replay button, which will automatically "jump" the viewer back three seconds in their programming, allowing the individual the opportunity to view a segment in time continually (TiVo, 2012). Another feature is the time-tracking button on the remote, which allows programming to be slowed down to various speeds, depending on which mode is selected. These options quickly provided officials in the booth with the ability to locate certain plays via a tracking code, then substantially slow the content down to review specific details within the play. TiVo was an opportunistic device at a pivotal period in history and undoubtedly established a fundamental perspective shift in how officials in the booth and audiences at home perceived content through the use of instant replay. The capacity to actively and instantly rewind and replay portions of time and programming became both a familiar feature of the remote control and a requisite for any on-demand system currently in use.

While the TiVo system was the hallmark for the early adoption of instant replay, the introduction of high-definition television, accelerated performance computers with on-board central processing units or CPUs, and the reliability of solid-state storage drives (SSD) would eventually make antiquated analog solutions obsolete. One of the first fully integrated instant replay computer systems, other than the National Football League's proprietary component, was created by XOS Systems in Maitland, Florida (XOS, 2012). In 2005, the unit was initially

comprised of a bare computer chassis that housed two onboard processing graphic cards, input modules, an internal drive with four hours of storage depending on the compression rate, and a UPS or uninterruptable power supply.

The system was fundamental in its original design and function but far outpaced the TiVo rack units previously in service at other replay booths. While the TiVo systems were limited in capacity and functional ability, the XOS Company presented one of the first high-definition instant replay systems to the Southeastern Conference (SEC), which eventually would be embraced by other national conferences within the next two seasons (FCC 10-201). A vital component of the XOS system had two distinct parts: the existing system and the fiber transmission infrastructure pathway to support it. The system is comprised of two television monitors, a touchscreen for entering game statistics, a peripheral clicker for marking replays, and a primary server that housed eight terabytes of storage that equated to five hours of uncompressed HD-SDI. HD-SDI is a high-definition signal standard that provides a data rate of 1.5 Gbps (Gigabytes per second), an industry broadcast grade for all networks that support a high-definition interface.

During the latter part of 2010, when XOS Systems was debuting their high-definition solution, another prominent software company was slowly breaking into the market to deliver an instant replay array explicitly designed for NCAA football; the company was DVSport. The DVSport HD Instant Replay System began in 2006 when it was the standardized array for the Big Ten Conference, one of the first to embrace instant replay fully (Everhart, 2007). With the addition of the Mountain West in 2007, the Mid-American and the Pac-12 conferences in 2010, and finally adopted by the CFL (Canadian Football League), officials could now make replays quickly and more consistent, so it was no surprise that DVSport became the system of choice for

the majority of conference officials around the nation. Founded in 2002 and based in Pittsburgh, Pennsylvania, DVSport's primary specialty is digital video acquisition, editing, analysis, distribution, and replay software specifically designed for the sports industry. The DVSport HD Instant Replay System, currently in use, comprises three monitors, one of which is a special touch monitor for quickly entering statistics.

This fully integrated replay system offered officials the tools to conduct reviews efficiently by providing video controls and the ability to switch between various angles of play as well as specific timing capabilities built into the replay system that mimicked a game clock to assist officials with errors (Everhart, 2007). Even though DVSport continues to be the industry standard in developing innovative instant replay solutions for not only football but all disciples of competitive sports on the collegiate and professional levels, it is crucial to carefully examine the impact that instant replay has had on replay officials that supervise the proceedings of these events along with the collective temporal perceptions, duration, and understanding of the game itself.

Academic Research on Instant Replay

Moving beyond the technical feat of instant replay, there is a relatively sparse academic discussion of replay and its effects. Of this small sliver of research, officials' perspectives are even more rare. In this section I review what work there is on instant replay. Some literature examines less relevant variables, such as amount of time for possessions throughout a game and statistical relevance (Sidhu, 2011), the utilization of a preferred software system over another (Engström, et al., 2010; Liberati, et al., 2009), the impact of a specific injury on a particular player or team (Reider, 2007). Other research that is more germane to this dissertation and to providing a holistic view can be broken down into three areas: viewer perceptions of instant

replay and technology in officiating; legal approaches to officiating and instant replay; discussions of whether and how instant replay and technological adoption is helpful to officiating.

Various studies have examined viewers' perceptions of instant replay. In Cummins and Hahn's (2013) article, "How Instant Replay and Violence Impact the Enjoyment of Sports", they discuss how there is a lack of empirical research concerning the impact of instant replay about the televising of athletic events and the relationship between instant replay, perceived violence and the viewer response to both dull and exciting game play. The findings suggest that game replays impact perceived violence such that viewing dull play followed by a replay increased perceived violence, whereas the opposite was true for exciting play (Cummins & Hahn, 2013). As such, replay can affect viewers' perceptions of gameplay but there is no mention of officials' perceptions. Kim et al. (2023) evaluated spectators' performance expectations of officiators concerning technology integration. Kim et al. (2023) developed a new scale, Performance Expectancy of Officiating Technology (PEOT), with four dimensions, including enjoyability, convenience of the review, fair judgment, and efficient game operation. Kim et al. (2023) found a direct effect such that high PEOT resulted in more favorable attitudes toward the sports event and increased intention to watch. In particular, fair judgement and convenience of the review were the strongest predictors of PEOT. This work shows that spectators' attitudes and behaviors are influenced by a more streamlined and fair integration of technology into officiating, reifying previous discussion of the need for greater standardization and professionalization with the dynamic influx of technology in the field.

Discussions and research articles in legal journals dissect the accuracy of instant replay due to the fundamental tension between sports and the law and its ramifications concerning

fairness (Szczerban, 2007). These particular areas of study focus mainly on the importance of "indisputable evidence" and how it is defined within the legal lexicon and the threshold that should be met to qualify as a formidable decision when ruling on a play. The general consensus within the research is that all aspects of the replay process should be approached from a legal evaluation of the de novo standard, or "from the beginning," without prejudice or previously referenced material (Calandrillo & Davison, 2017). Legal analyses focus on objective truths from objective observers. However, individuals are not merely objective observers without motives and emotions in the officiating community. As I discussed in my prior literature review, examining instant replay and officials' professionalization requires studying cultural, social, and temporal conditions. As such, I aim to take a more expansive approach when studying this phenomenon and anchoring the analysis in officials' lived experiences.

Much of the scholarship on instant replay focuses on whether it is considered helpful, though this work is not always from the officials' point of view. Kjærsgaard (2024) conducted a review of technology integration, focusing on technology-assisted officiating, specific to binary referee situations, where the outcome of the call is either a yes or no, such as either a foul occurred, or it did not. Kjærsgaard (2024) argued that criticism, specific toward ball tracking devices, is "unjustified" and states that such devices can make certain types of sports fairer. He notes that officials are not perfect, and that "technological aids make it possible for competing teams to be held to the same standards of enforcement by officials, to a higher degree than is the case in the non-technologically supported game" (p. 11). It is worth noting, however, that his work does not draw upon officials' lived experiences with technological integration.

Pizzera et al. (2022) examined the effectiveness of match officials and referees, specifically within the contexts of referee education and professionalization. The researchers had

109 qualified football referees review 48 short videos. According to Pizzera et al. (2022), decision accuracy was rated at 65.69%. Accordingly, the researchers indicated a significant difference between the officiators' perspectives in terms of accuracy and different replay conditions, such as the number of viewings, the use of playback speed and alternate visual perspectives. For Pizzera et al. (2022), a need exists for better integrating technology usage from a standardized format to improve officiators' use of the technology and to reduce their likelihood of having differential perceptions based upon a lack of standardized approaches.

Hemanathan et al. (2024) examined virtual umpiring and ball tracking systems, exploring the integration of image processing units based on AI decision-making and processing for cricket machines. The researchers showed that the integration of AI can improve and enhance accuracy, as well as allow for officiators to have improved transparency regarding officiating decisions. Hemanathan et al. (2024) emphasized that integration of such processes must include the officiators' perspectives, should be used as a tool to support practices, and should not be a purely replaceable integration.

Benz et al. (2024) examined home advantage in American football, focusing on officiating programs, standardizations, and decision-making and problem-solving. According to Benz et al. (2024), across two decades of data, the NFL and the NCAA have identified home advantages in American football. However, within the NFL, this advantage is declining but remains steady at high school levels. The argument is that the improvement of instant replay and the standardization of officiating have been effective in reducing home advantage for the NFL. However, it is unclear whether these same models could be implemented at high school levels to overcome amateur football home advantages and ensure equal playing equality within football.

When studies do consider officials' points of view, perspectives on technology are not as positive. Scanlon et al. (2022) also explored the integration of technology, with consideration of technology perception, such as video assistant referee, by officiators for the 2019-2020 season. According to officiants, the integration of technology has made football feel less authentic. It has also led to a decline in officiators' abilities to remain effectively aligned with officiating practices while also including technology usage. According to Scanlon et al. (2022), while the integration of technology and replay has benefits, it is unclear how this can be integrated in a manner that supports the sports fans' perspectives as well as the needs of officiators. The relative dearth of research based on officials' lived experiences undergirds the design of this dissertation and the goal of using GTM to provide a more nuanced, situated understanding of instant replay officials and their dynamic profession.

Temporal Aspects and Practices of Instant Replay

Before concluding this chapter with a review of the research questions, it is important to take a step back and assess broader temporal aspects of instant replay and their impact on perceptions of time and decision making. Though mechanical time can, in a sense, be speeded up or run backward, like the hands of a clock or the images of a moving picture, organic time moves in only one direction (Mumford, 1934). Fully conceptualizing this postmodern statement makes the allure of time manipulation so fascinating and magical; one's ability to view images over and over to the point of changing the viewer's perspective while overriding the fundamental aspect of linear time. This capability to transform, recall and design an event and lock it away or preserve it could produce a collective memory. At least in the development of replay, what remains consistent is an overwhelming professed belief or attainment in the telos of error correction, attained through repetition and periodic feedback loops. "Feedback loops can flow not only

within the subject but also between the subject and environment" (Hayles, 1999, p. 71). Feedback methods of recorded or collective replay are now accessible and non-constrained, and in some cases can alter the events taking place, which has ultimately migrated into the realm of control and time coordination while enhancing the effect of instantaneous communication.

Kramer (1992) discussed the challenges to biases found within new experiences. A "challenge" means something that changes us but also includes messages that reinforce our prior understandings, leaving us not the same but with stronger convictions. Gebser (1985) mentions that throughout history, certain consciousness structures have come into being as mutations that possess a certain anatomy or construct in which the human consciousness is embedded. Throughout the ages, these consciousness structures have repeatedly awoken, thus coming closer to solidifying the clarity of true consciousness (Gebser, 1985). Instant replay functions, as mentioned, in a temporal manner, as a repetition of the subject, thus further enhancing the program itself. By repeating sequences of images or programming, sometimes in succession, the replay can divulge information that was previously unknown or hidden, strengthening or solidifying the viewer's consciousness.

Understanding the practices of immediate replay is the result of its historical association with network broadcasting and sports programming. Using collegiate football as an example, the construct of instant replay of sports exhibits two independent judgments. One is reflective judgments, in which replay is represented as a freeze-frame, slow-motion technique that is usually presented to aesthetically enhance the broadcast presentation package in addition to creating promotional montages that are incorporated into the programming (Morse, 1983). Researchers Margaret Morse, whose area of study revolves around interactive media, and John

Fiske, an established media scholar in the field of semiotics, have extensively discussed the aspects of replay and the implied observation of home viewers.

Fiske (2011) states that "the frequent repetition of the same play in slow motion marks the game on television from the outset as no longer occurring in a world subject to the laws of the ordinary linear and unidirectional time" (p. 15). Morse commented on other temporal aspects of gameplay that alter our perceptions of time, be it active or passive in nature. Morse mentioned the often-ignored aesthetic conversation of sports commentary, the use of replay and play-by-play descriptions during "dead-time," when no team performance is occurring on the field of play, and thus commentary has a set function for the viewing audience. Morse (1983) noted, "the commentator does possess a hermeneutic function in using instant replay to judge individual performances, evaluating it as well as setting it in statistical and biographical perspective" (p. 392). As mentioned, the practices of the individual, or in this case the commentator, to see and hear through the function of replay comes to establish the possibilities for the development of observational objectivity.

The second approach of replay is the pragmatic process of making determinant judgments based on what are considered observable empirical facts. This utilization appears to be the most salient in the arbitration process. Video instant replay, as a practical device, has become a preferred mode of decisive action. As a result, the official still has more agency or insight here to make decisions. It is further demonstrating in prevalent use of replay in the officiating the game, primarily when indisputable video evidence (IVE) is used to govern a decision. The instant replay process operates under the fundamental assumption that the ruling on the field is called correct. The replay official may reverse the ruling, on the field, if and only if indisputable video evidence is available and it convinces the replay booth official beyond all doubt that the original

ruling was incorrect. When the review takes place, it means that the official must be assured by empirical physical video evidence through one or more video replays provided to the replay monitors while reviewing the call. Without overwhelming video evidence, the replay official must allow the ruling to stand (NCAA, 2013).

Vannatta (2013) investigates the method of the official and the use of technology assessment during the replay process, which includes slow-motion and frame-by-frame analysis for the search of evidence and accuracy when reviewing a particular gameplay. Still, nothing is mentioned or addressed in the data about the holistic, personal perspective of the official during these procedures. In his findings, he mentions that using a static analysis can "disrupt the normality of perception such that it yields problematic evidence" and recommends a specific analysis which would be better suited for judging events, such as replay (Vannatta, 2013, p. 155). Mulvin (2012) is an excellent example of the technological, social, political, and economic community of instant replay, which contains a host of valuable information pertaining to its historical significance. Still, it does not address the official's assessment in the booth nor the chronological background to which led to indoctrination within the community of replay.

Although each collegiate conference has slight variations in protocols and guidelines, what is classified as being "reviewable" has grown exponentially over the years since its conception. Currently, replay reviews, according to manuals on officiating, are as follows: scoring plays, pass plays, including whether a pass is caught or incomplete, thrown forward or backward, deflected, thrown after the passer has passed the line of scrimmage, fumbles and other loose balls, forward progress and the spot of the football, clock adjustments depending on certain circumstances, the number of players on the field and targeting. Though the rules that dictate whether a replay official can insert themselves into a judgement call are clear, replay is not

permitted for calls pertaining to personal fouls such as “unsportsmanlike conduct” or “pass interference” but on occasion, replay is utilized to identify players, in situations when a fight begins on the field and punishment for both teams have to be administered. In each of these cases, rules, personnel, and research rely on varying degrees of what counts as determinable action.

Being able to clearly understand the factors that go into these provable actions from those that oversee the process, along with the communicative, comprehensive, and decisive strategies of replay officials, in a heuristic manner would be insightful. Since the means and procedure is not precisely one-dimensional but tends to be multidimensional in their execution by officials in the booth, it would be advantageous to seek a theory that would clearly explain the process. While replay’s historical beginnings are steeped in standardized rules and technological origins, its practice, personal perspective, cultural impact, and philosophy are now prevalent in our everyday lives, which should cause us to ponder our own definition and comprehension of replay, as well as previous studies.

To assist in the development of a dynamic professionalization theory and explore instant replay officials’ experiences with professional identity and professionalization, technological integration, communicative practices with fellow officials and other stakeholders, and more, I pose the following research questions:

RQ1: What are the communication dynamics and norms for instant replay officials during instant replay decisions?

RQ2: How and to what extent has technological integration affected instant replay officials’ decision-making practices and professional identity?

RQ3: In what ways are instant replay officials' professionalization processes dynamic and evolving?

Chapter 3: Methodology

In this study, the researcher aimed to have a more comprehensive understanding of theoretical propositions in the qualitative analysis of interview transcripts of the professional experiences of instant replay officials who directly oversee college football games. The proposed Grounded Theory Method study aimed to explore these perceptions and use them effectively to contribute to a grounded model and a series of theoretical propositions that could benefit future researchers and practitioners. Furthermore, the idealization of this process can lead to a cohesive theory of dynamic professionalization and refinement specific to replay officials who directly oversee college football games and interact with technology as part of the new and evolving element of the field and industry as a whole.

Chapter 3 contains the key design and methodology components that framed this study. First, the methodology, qualitative, as well as the chosen design, a grounded theory approach, is defined and justified. Following this, a review of the development of the theory and a discussion of the participant sampling process are provided. The researcher's positionality is also discussed, and strategies to reduce biases are considered. The study procedures are delineated with a discussion of data analysis steps and how these were applied within the study. Additionally, further information specific to the validation strategy of the study is provided. The approach discussed in Chapter 3 provides a clear overview of the method of data collection and analysis, which guided this study and produced the findings discussed in Chapter 4.

Grounded Theory Method

The Grounded Theory Method (GTM) is an appropriate methodology to study instant replay officials because it will generate a theory that accounts for how the decision-making process is executed through the specific experiences of officials. GTM studies social patterns and

procedures, which Bryant and Charmaz (2010) explain as "unfolding temporal sequences that may have identifiable markers with clear beginnings and endings and benchmarks in between" (p. 10). GTM is optimal "when the study of social interactions or experiences aims to explain a process, not to test or verify an existing theory" (Lingard et al., 2008, p. 337).

GTM echoed the research atmosphere in 1960s sociology as this method was an alternative way to avoid highly abstract sociology and accelerated as a part of the growth in qualitative analysis (Goulding, 1998). The most crucial purpose, as well as the nature, of GTM, is to avoid the opportunistic use of theories (Glaser & Strauss, 1967). Since developed by Glaser and Strauss in 1967, GTM has been widely used in sociology, health studies, management, communication, and so forth. However, as previously mentioned, the method has evolved from the original over time (Charmaz, 2006). Since then, GTM has embraced the position that "phenomena are not as static but as continually changing in response to evolving conditions" (Strauss & Corbin, 1994, p. 5). In turn, not all concepts about this phenomenon have been identified or defined, nor have the relationships between the various concepts been defined or conceptually clarified (Strauss & Corbin, 1994).

GTM has specific procedures and processes; the development of data collection is controlled by the emerging theory, which reflects the inductive nature of the method and does not allow preconceived ideas by the researcher. This strict inductive tradition has been negated by methodological variations. Strauss and Corbin (1994) reject the existence of a pre-existing reality "out there"; extant theories and literature having to do with the data-grounded categories and their properties could be appropriated in information collection and the analysis of data. As Charmaz (2006) addresses, the classes, which are products of data collection and analysis, can also emerge from the researcher's own theoretical knowledge and experience, which would be

relevant in this case due to my own experiences with the instant replay population. Specifically, I have been directly associated with and employed as a replay technician for the last seventeen years. I oversee training requirements for the officials' working games and conference policy. This access gives me the ability, insight, and expertise to oversee and study the officiating process and the officials themselves. I will elaborate on my positionality later, but it is important to note this here as Charmaz's constructivist position of GTM stresses the interactive relationship between researchers and participants. Data collection and analysis are interconnected; GTM stresses that analysis is necessary from the beginning of the research because the initial analysis should signal a direction for future data collection. The interactive interpretation directs the subsequent process of data collection, and this process becomes a significant source of categorization and theory generation.

GTM requires a great deal of engagement on the part of the researcher. Part of the process is to explore the self as it relates to the subject of interest and one's own experiences. The point of the methodology is to allow participants to provide their own data that will drive the emergence of the theory; researchers need to make a concentrated effort to put aside their preconceptions and assumptions and take a stance of openness when sampling data (Glaser, 2001, 2003, 2004; Simmons, 2010). Sampling in GTM is not a random-based process but a transparent directional process for the development of theory, as emphasized by Glaser and Strauss (1967). Sampling is a more commonly used term in the quantitative research method. In this research practice, the term participants are often used, making more meaningful as a unit of analysis. As detailed later, I recruited participants to find represented categories in the collection of officials.

By implementing grounded theory, I listened to and documented the opinions and personal ideological experiences of instant replay officials expressed in their narrative, providing a social and cultural process that underlies their perspective. A grounded theory derived from an official's direct experiences might explain the intrinsic system of the instant replay decision-making process and the usage of technology and how it impacts the game. As mentioned, such a theory may provide coherence and consistency in further research regarding what officials are thinking and doing when reviewing a specific play, which would add to the current literature.

Recruitment and Population

The participants in the study were recruited based on their eligibility and willingness to voluntarily commit their time to an interview with the researcher. Recruitment heavily relied upon working through my personal networks given my professional connections to the profession. Participants for this study were asked to adhere to inclusion criteria to ensure they could accurately provide information specific to the study, as such this dissertation took a purposive or purposeful approach to sampling. Yin (2011) defines purposeful sampling as "the selection of participants or sources of data to be used in a study, based on their anticipated richness and relevance of information in relation to the study's research questions" (p. 311). The inclusion criteria included individuals who served as a replay official and had a minimum of two or more years of experience. Due to the rules and regulations of instant replay, that have changed and expanded over the years, it is critical that replay officials have a deep comprehension of regulations and previous experience on the field in the capacity of a football official. In turn, two years or more is required before taking an official position as a replay official. Given this requirement, I wanted to ensure that my participants also had qualifying experience with the profession. During recruitment, I asked participants about these eligibility criteria verbally, and

those who responded *yes* were offered the opportunity to be included in the study. Snowballing, which is a sampling technique, was used to assist the researcher and applied in identifying other potential subjects for the study. I made use of currently requested research participants to recruit additional members that would provide quality insights and be interested in participating in the study, which was approved under the Institutional Review Board (IRB). IRB clearance was granted for this study, so protocol was approved and followed under this circumstance in which a community, in this case a group of officials within the instant replay association, was contacted and agreed to the study.

Participants who were interested in being included in the study were provided an informed consent form, which they completed via e-mail and DocuSign and sent back to me for records keeping. I saved all informed consent forms on a USB, encrypted and password protected drive. The interested participants were then provided an opportunity to be within the study, and a time was arranged that was amicable for both the researcher and the participant to complete a semi-structured interview over the phone. Participants were also made aware, during recruitment and in the consent form, that the interview would be recorded but that all responses would be protected with a participant identifier to ensure confidentiality.

Participant Professional Characteristics

As a means of contextualizing the participant pool from the larger population, some details regarding the available statistics of college football referees in the United States are provided. Of note, it is difficult to obtain a precise or accurate number regarding the number of college football referees, due to a lack of centralized officiating centers at differing collegiate levels and conferences. However, some data from official organizations can be helpful. For example, the National Association of Sports Officials (NASO) identified that there are over

35,000 umpires, assigners, judges, and referees across sports in the United States as of 2023. Based on a survey in 2023, the vast majority of officiates in football at the major college level (approx. 1800) are white men (82.9%), followed by Black men (9.9%), then Hispanic/Latino men (3.6%) and white women (2.4%). The profession is overwhelmingly male, which is reflected in the pool of participants in Table 1 (Bley, 2020; NASO, 2023).

Interviews were conducted until data saturation occurred (Guest et al., 2006). The final population gathered consisted of 13 individuals. Data collection involved 13 semi-structured interviews with participants to garner their perceptions. For confidentiality, all participant names were replaced with alphanumeric identifiers, such as *Participant 1 (P1)*. Table 1 provides an overview of each participant, their alphanumeric identifiers, and their associated credentials.

Table 1. ***Participant Professional Characteristics.***

Participant Identifier	Credentials and Gender
P1	Replay Official, Big 12, 4 years of experience, male
P2	Replay Official, Big 12, 5 years of experience, male
P3	Replay Official, WAC, 4 years of experience, male
P4	Replay Official, Big 12, 5 years of experience, male
P5	Replay Official, Big 12, 3 years of experience, male
P6	Replay Official, WAC, 6 years of experience, male
P7	Replay Official, Big 12, 7 years of experience, male
P8	Replay Official, Big 12, 5 years of experience, male
P9	Replay Official, Sun Belt, 4 years of experience, male
P10	Replay Official, Big 12, 5 years of experience, male
P11	Replay Official, Big 12, 8 years of experience, male
P12	Replay Official, Big 12, 7 years of experience, male
P13	Replay Official, Big 12, 5 years of experience, male

Participants provided their unique perceptions in response to a series of ten interview questions supplied by the researcher. Per the recommendations of qualitative methodologists, probing and follow-up questions were employed, as needed, to gain clarity and foster thick descriptions from participants to meet data saturation purposes.

Researcher Positionality

As the researcher, I serve as the key instrumentation for my study (Renjith et al., 2021). I must also recognize the way in which my personal experiences and professional interactions have shaped my understanding of the topic at hand and could potentially introduce bias into the findings (Flemming & Noyes, 2021). As an individual, I have been deeply ingrained in grassroots sports through my years of experience. I have also been a professed lover of sports of varying kinds throughout my lifetime. My love for the sport is based not only on the competitive nature but also to the building and bond development procedures that occur when individuals play sports and watch sports together. Throughout my lifetime, I have also witnessed changes in officiating. I have myself seen calls on TV or in person, which I have found to be unfavorable or lacked adherence to standards as I know them.

The integration of technology is relatively new within my lifetime, but it has shown potential for positively changing the sport. While effective changes, I believe, are necessary, there are also challenges that I have seen both in my time playing and watching sports, as well as in communicating with friends who serve as officiants and referees from various sports. Based on these understandings, I do have potential biases that could have been reflected in my interpretations. Specifically, I think that the relationship between players and efficiency has been incredibly stressful and has produced higher tension in the past years than in the previous 20-30 years. I believe that some tension does seem to arise from technology, in which it is either

unclear how it is being appropriately implemented or if technology has helped with effective calls.

Based on these experiences and opinions, I did find that I have a potential bias in terms of my perception of technology. I think technology can be useful, but it also appears to have significant challenges. When personally considering aspects of integrated Artificial Intelligence (AI) into replay systems, it does present the potential to reduce human error, empowers officials to make more accurate decisions and overall promotes fairness on the field of play, but (AI) has unforeseen pitfalls of slowing the game down and the risk of bias due to removing in my option is the most critical part, the human element. As a result, I attempted to mitigate my bias through the study using a reflective journal. A reflective journal serves as a space in which a researcher can document and consider their own biases in a safe space that is separate from analysis and results (Maxwell, 2021). In this reflective journal, I documented key themes regarding my own experiences as well as biases, which I have discussed above. I used the reflective journal as a model in which I could consider my biases without inflicting these upon the data analysis results.

In addition, I also provided a model for mitigating my own bias, which included a clear method of data analysis. I intend to show complete transparency and association of codes, categories, and themes throughout the findings, using data analysis procedures described in Chapter 3 and coinciding with participant quotes. I believe that these methods effectively mitigated my bias and ethnically base the findings in the participant's reflections rather than my own opinions or perceptions.

Study Procedures

Semi-structured interviews were employed for the data collection purposes of the study. Concerning research procedures, I employed interviews, which are widely used in GTM

sampling (Reed et al., 1996). This study does not simply aim to find a simple correlation between certain aspects of personalities, experiences, and the cultural and professional impact of replay officiating. Rather, it seeks to investigate what is happening within instant replay from the perspective of the official.

Interview Instrumentation

The instrumentation asked a series of questions organized by life experience, technology, and social and personal relationships. Other questions pertain to further complexities in which instant replay officials utilize communication to execute their decision-making procedure and how it is reflected in their culture and identities. The use of open-ended questions was used to comprehend this complexity. See Appendix A for a complete list of questions. The interview process was delineated by a series of key steps, which involved an introduction, the core set of questions and necessary follow-up questions, and conclusion. I followed this method for each interview to ensure a clear and well-defined model for data collection.

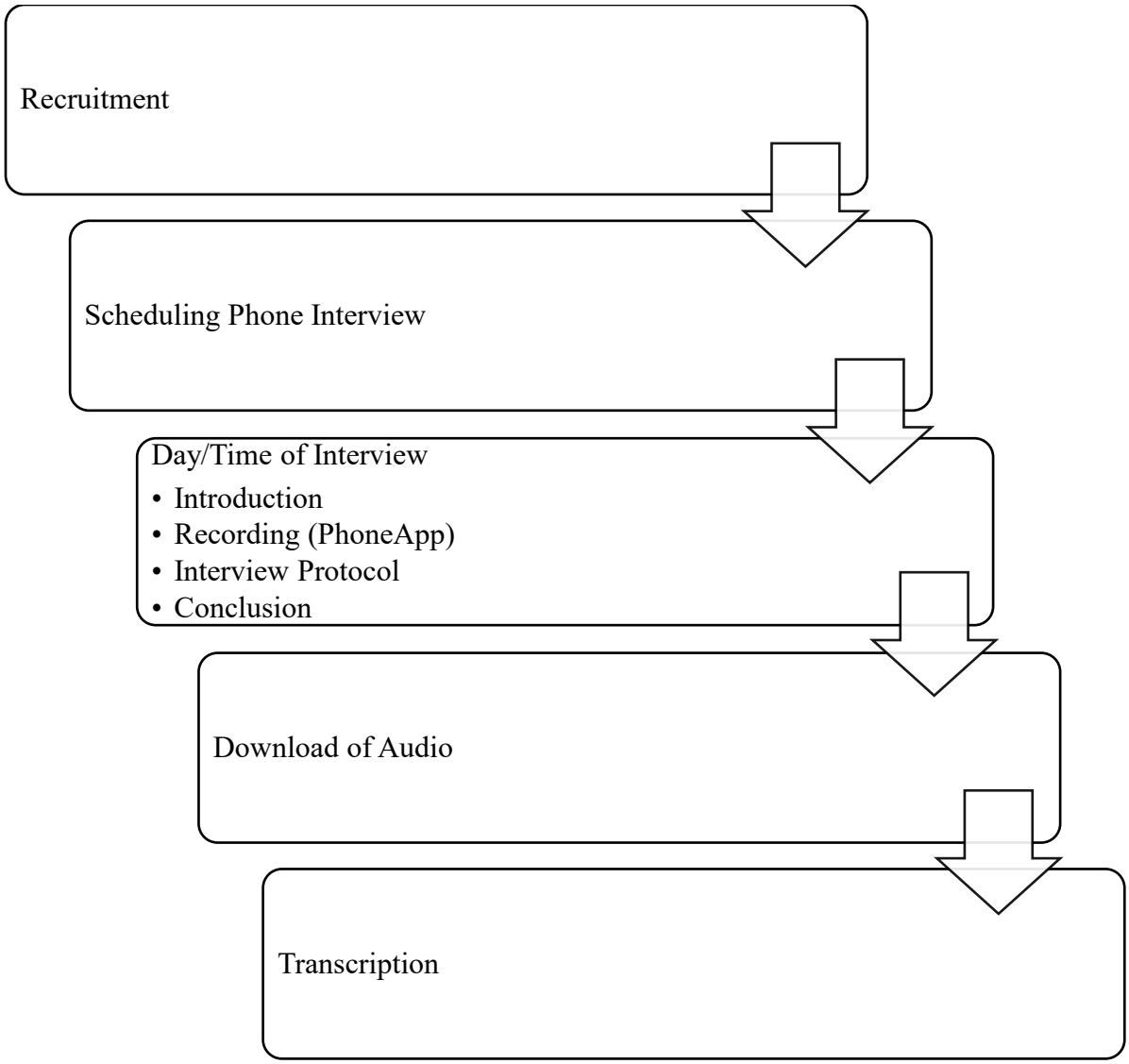
The first six questions explore the individual's life experiences regarding officiating and the first-time experiencing officiating in an official capacity. The second component asks about technology, exploring currently used software, responsibilities, training, regulations, and experience level. Finally, questions are provided regarding social and personal experiences, such as closeness to other officiating crews, decision-making processes, professional advice, and the validity, justice, and truth of instant replay. Each of these questions is contained in Appendix A, and provides a clearer model in which to provide questions to participants to ensure a standardized method of semi-structured interviews, which would contribute useful and rich data for data analysis and development of theoretical propositions specific to the GTM.

Interview Process

During the interviews, prior to initiating the interview questions, I also gathered basic demographic information from the participants. The demographic information obtained includes their credentialing and gender. As noted in the discussion of participant characteristics, the sample was all male participants, which is due, in part, to the overwhelmingly male nature of the profession. As will be noted in Chapter 5, more work is needed in terms of gender diversity and inclusion to provide a more comprehensive understanding of instant replay officials' experiences. Figure 1 provides an overview of the data collection process chosen for the semi-structured interviews.

Figure 1

Semi-Structured Interviews



Based on a series of one-on-one telephone interviews, I conducted discussions with a total of thirteen officials, with at least two years of replay experience, who are employed by the Big Twelve Conference and the College Football Officiating (CFO). Additional officials were also included from the Western Athletic Conference (WAC) and Sun Belt conference. I was well positioned to conduct these interviews, within these college football conferences, due to my previous knowledge of the rules and my association with the interviewees. The shared knowledge of specific language and technical jargon, as well as mutual professional experiences, helped engender trust between me and the interviewees.

The interviews were semi-structured and included questions regarding the profession, perceptions of replay, communication technology, and queries regarding everyday communication and social networks within the conference organization. The interview transcripts were on average 13.1 pages with a range of 12-14 pages. The length of the interview was on average 42.1 minutes, with a range of 38-43 minutes. The interviews were conducted from March 2024 to August 2024.

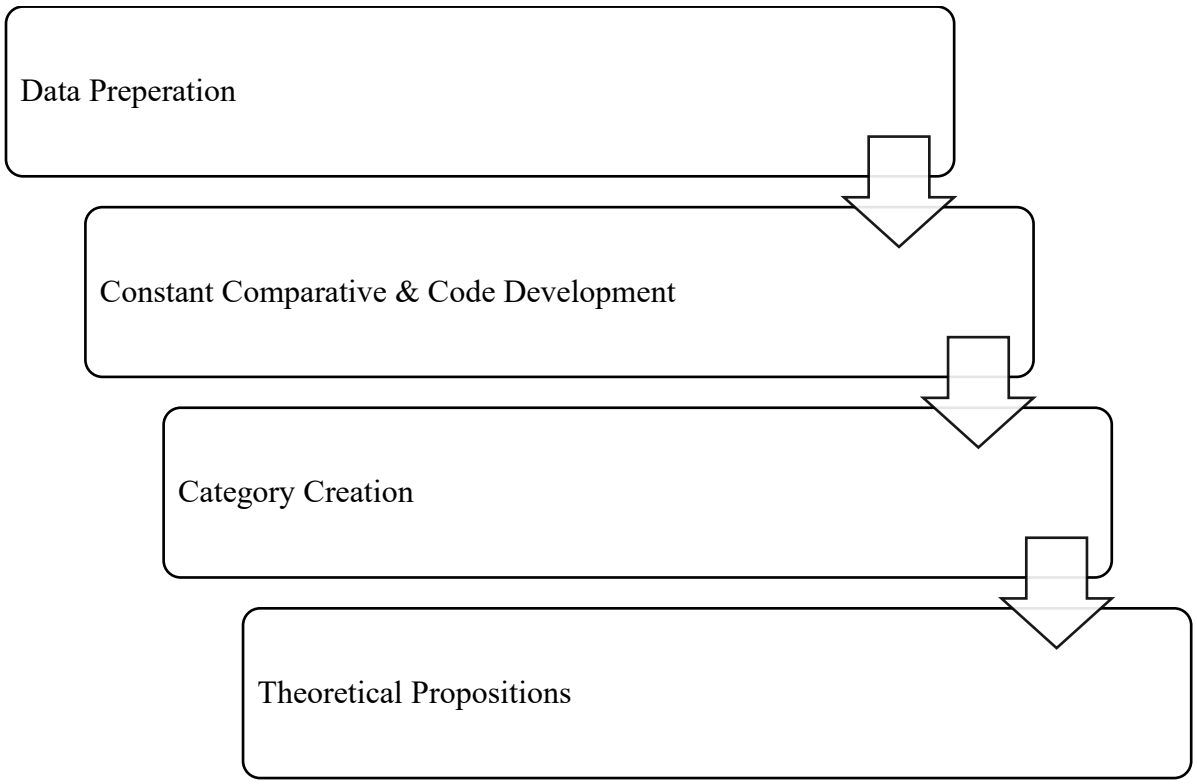
After the interviews were completed, I thanked each of the participants for their time and ended the phone call and recording. After these phone call recordings had ended, I downloaded the phone call, transcribed the interviews using AI generation means, and used NVivo software for data analysis. The participant's reflections were saved with alphanumeric identifiers, such as P1 or P2, to protect the individual's confidentiality. After all interviews were completed, I provided an overview of participant characteristics, including their credentialing and gender. After each of these steps was completed, I saved all of the transcripts on a password-protected and encrypted USB drive. Following each of these steps, I moved to data analysis procedures, which is discussed in detail in the following section.

Data Analysis

Data analysis, which occurs simultaneously with data collection, guides the next step and "leads to the discovery of the relevant questions in the data" (Simmons & Gregory, 2003, p. 25). Data collection for this research was controlled and "directed to relevance and workability" (Glaser, 1978, p. 76). Figure 2 shows an overview of the data analysis methods employed. The subsequent narrative reviews the key steps undertaken for data analysis following the outline provided in Figure 2.

Figure 2

Data Analysis



Preparation

The first step of data analysis includes preparation. Preparation included downloading the transcripts directly and reviewing them multiple times to assess for any grammatical or transcription errors (Simmons & Gregory, 2003). As transcriptions are derivative from AI-based programs, it is necessary to ensure all of the reflections coincide appropriately with participants' actual responses (Maxwell, 2021). If at any point I was unclear on whether a response varied from the actual recording, I compared and contrasted these to ensure the most accurate transcription. I completed this process multiple times to ensure accuracy. I also checked for any grammatical or syntax errors, which could be corrected without changing the essence of the participant's responses.

Constant Comparative and Initial Codes

After the data preparation phases were complete, I moved to the second phase of identifying initial codes, utilizing the constant comparative method (Thompson Burdine et al., 2021). For this process, I ensured that I was deeply familiar with the transcripts by reading and rereading each of them. I also focused on memo writing to ensure a thorough development of the codes and categories (phase 3) and to ensure that I noted where individual thoughts and interpretations were notable and could be potentially important to the development of initial codes. The initial codes consisted of repeating phrases and words and are considered the foundational step of GTM (Charmaz, 2006), which identifies the associated repeating phrase, associates this with a participant quote, and provides a frequency count, which delineates the total number of times the code was identified across all interviews.

Categories

After the development of the initial codes, I moved into the identification of constructing categories. Constructing categories consisted of a combination of initial codes based on similarity and conceptual topic (Charmaz, 2006). These initial codes should be combined to represent density and desaturation, which in this study represented a minimum of two codes within each category. A category development phase is integral to the identification of themes, as they represent larger blocks of information and topics and essentially delineate the emergent themes.

Theoretical Propositions

After the development of categories, I moved into the theoretical propositions as part of the GTM method. This involves theoretical propositions that are associated with the categories and show, based on pattern analysis, key emergent themes based on participants' reflections

(Charmaz, 2006). The final step includes ensuring a clear delineation of each of these methods via tables, carefully demonstrating each code associated with participants' quotes, and providing definitions.

Report Production

The final step also includes conducting a report, which includes reviewing and detailing the theoretical propositions with descriptors, accurately phrased titles and participant quotes (Charmaz, 2006). The final report, in the context of this study, is located in Chapter 4, which includes all of the data analysis and findings. Additionally, in Chapter 5, I present the recommendations and implications based on these findings, providing a thorough and rich overview of the data and implications for future researchers.

Validation Strategies

The validation methods following Creswell (2007) included methods of peer review, an audit-trail, and a comparison with prior literature. For the process of peer review, the final codes, categories, and themes were reviewed by a professional colleague who is associated with football replay officiating to assess the validity of the findings and identify any areas that appeared unclear. The method of an audit trail shows a detailed review of the method employed for data procedures, which are presented throughout Chapter 3 and Chapter 4. In addition, in Chapter 5, I connect the findings with previous scholarship and the limitations of the study are also discussed to provide opportunities for transferability by other researchers.

Questions to officiating replay members remained open-ended and non-leading, so that the focus stays on their direct experiences. The constant comparative method was used for this study since it is the approach of GTM to code and analyze data simultaneously to generate theory more systematically than other qualitative approaches (Glaser & Strauss, 1967). With GTM, it must explain what is happening in the phenomenon of interest. In this case, the perspectives and

communicative processes of instant replay officials. It must be relevant to what is happening, past, present, and future. Hence, this approach manifests the characteristics of how replay and officiating impact not only our understanding of officiating but the culture that surrounds it. The theory must be relevant in that it must be meaningful and "allows core problems and processes to emerge" (Glaser, 1978, p. 5). Understanding the complexities of the various antecedents might provide additional perspectives or theories on the game and the identities of officials.

Credibility

The validation strategies also followed the key constructs of trustworthiness, including credibility, dependability, confirmability, and transferability. Firstly, credibility refers to how individual researchers ensure that the research findings are presented as transparent and reliable (Maxwell, 2021). For this purpose, I ensure that all findings follow the key methods discussed here in Chapter 3. I also delineated a clear and transparent method of data analysis, which is not only discussed in Chapter 3 but reiterated in Chapter 4 through tables, narratives, and participants' quotes. The final theoretical propositions can be directly associated with the data analysis procedures and replicated by researchers if so desired. Furthermore, the participant characteristics are detailed for future researchers' replication and examination if desired.

Dependability

The second method entails dependability, which shows consistent and reliable results over time and across varying contexts. The dependability of this study was based on the effectiveness of the methods employed and the way in which these were in line with prior recommendations (Flemming & Noyes, 2021). In Chapter 3, the research methods employed focused specifically on prior recommendations for the GTM method and were grounded in empirical literature connected to GTM methodologies. Furthermore, the limitations of these

anthologies are further explored in Chapter 5 to show factors that could be further expanded in terms of dependability by future researchers.

Transferability

The third method entails transferability, which references the ability of the research findings to be applicable or transferable to other settings or research contexts (Maxwell, 2021). The GTM method is not inherently transferable to national or international contexts, dependent upon the sample size. As a sample, because the study is small, the factors taken to ensure transferability and provide further replicability by other researchers included the audit trail, consistent with the factors discussed here in Chapter 3, as well as the description. A thick description can best be defined as detailing participant quotes alongside research findings, ingraining the findings within the participant reflections, and delineating how the data analysis findings were produced. In a later chapter I discuss how the findings from this analysis could be applicable to other contexts.

Confirmability

The final construct of trustworthiness includes confirmability. Confirmability refers to the ways in which future researchers could replicate the study, if desired, and delineate similar findings or expand upon the research study (Renjith et al., 2021). The methods used to address this factor include a clear search strategy for the review of literature, clearly delineated and aligned purpose, problem, and research questions, as well as clear methods of data collection and analysis. The methods detailed throughout Chapters 3 and 4 should be ideally sufficient for researchers to replicate the desired study and to identify if the findings are confirmable in a differing research context or study.

Summary

In Chapter 3, the design methodology approach was discussed. The development and underpinning definitions of grounded theory methodology were reviewed extensively to provide a key understanding of why the method was chosen and how it applies to the study. The participants' professional characteristics were discussed to provide an overview of the ways in which confidentiality was protected, and recruitment occurred. Researcher positionality and methods of mitigating bias were discussed. Finally, the procedures studied were overviewed, including data collection and data analysis. Methods of validation strategies, including audit trails, as well as ethical considerations, were discussed. In the following chapter, Chapter 4, the research findings are presented and discussed.

Chapter 4: Data Analysis and Findings

The purpose of this study was to refine a set of theoretical propositions from the qualitative analysis of interview transcripts regarding the sociocultural and professional experiences of instant replay officials who directly oversee college football games. Accordingly, the transcripts from the interviews were analyzed using the Grounded Theory Method (Charmaz, 2006). GTM was appropriate given the uniqueness of the communication's context of instant replay decision-making. The overarching result was the creation of a theory of dynamic professionalization. The fundamental premise of the theory is that when sustaining technologies are implemented to inform collaborative decision-making amongst members of the same profession, professionalization innovation may occur when the decision-making context is just-in-time and zero-sum (e.g., instant replay decision-making during an NCAA football game).To further explain, a zero-sum decision, in replay, refers to a decision making situation where a replay stoppage call has a zero net effect on the overall outcome of the game. Neither team during the stoppage decision has an advantage over the other because there is neither a net gain or loss in the broader context of the game. *Sustaining technologies* are intended to improve the traditional core function of members of the same profession (Christensen, 2006).[1] *Dynamic professionalization* is defined as collaborative decision-making amongst two or more members of the same profession making unprecedented decisions (for the profession) just in time, without the profession first having achieved consensus via traditional processes (i.e., off-the-job, at professional society meetings, conferences). *Just-in-time decision-making* occurs contemporaneously with the interpretation of real-time information (Womack et al., 1990). *Zero-*

[1] In contrast, disruptive technologies fundamentally alter the traditional core function of members of a profession (Christensen, 2006).

sum decision-making refers to situations where the gain or loss of resources is precisely balanced by the losses or gains of other participants (Von Neumann & Morgenstern, 1944).

This chapter is organized as follows. First, the analytic findings are presented. The presentation of the findings begins with a presentation of the coding, then proceeds to a presentation of the categorization of the codes, and then proceeds to theory refinement (Charmaz, 2006). Explicit discussion of the theory of professionalization innovation is reserved for after the explication of the mechanics of the analytics but before Chapter 5. Discussion of the implications of dynamic professionalization theory for future research and practice is reserved for Chapter 5.

Grounded Theory Method, Step 1: Coding and Memo-Writing

The first step is familiarization and code development. Codes are fundamental to the GTM (Charmaz, 2006). Memo-writing was also a key component of GTM. A Grounded Theory Method encourages memo-writing to consider the development of the codes, categories, and themes. Throughout the data analysis procedures, memo-writing was employed to record individual thoughts and interpretations as they arose (Charmaz, 2006). In tandem with memo writing, the researcher also conducted familiarization processes before developing the initial codes. The familiarization processes included the review of each textual document, for a minimum of two iterations, to fully embed the researcher with the interview transcripts.

Each code in this study frames the foundation of the data analysis procedure. Each code was derived from repeating phrases, words, or sentences found across the transcripts from the thirteen interviews conducted for this study. Per the recommendations of Charmaz (2006), the coding must be accompanied by memo-writing regarding conceptual similarity amongst codes, which is fundamental to the category construction and theory refinement steps of GTM (see the

next two subsections of this chapter section, respectively). For this study, two iterations of coding development were conducted. The researcher reviewed each transcript, labeled the phrases with an associated name, and then repeated this process across all transcripts. For each code, a tally of the participant count (the total number of participants contributing to the code) and frequency count (the total number of times the code was identified across all interviews) was tabulated and recorded.

Twenty codes were identified based on the participant interviews. For example, the code *public education replay rules* provided context to the participant's understanding of how public education plays a role in the replay rules, standards, and procedures. P6 stated, “We're there to help monitor; we're out there to help in the decision process if we think you're going the wrong direction.” Participants' clarifications and experiences provided throughout the interviews revealed codes that discussed the official’s role in upholding the integrity of the game, the importance and interplay of technology, and the experiences of real-time decision-making, training, and skill development. Table 2 provides the developed codes identified during the coding phase of GTM. The participant counts (the total number of participants that contributed to a code) and the frequency count (the total number of times the code was mentioned) are discussed in Table 2.

Table 2. *Code Development, Direct Quotes, and Example Quotations.*

Codes	Direct quotation	Participant count	Frequency count
Direct Communication with the ROC[2]	"They're going to be on the program feed. They're going to get those replays quick, and…that's what Richard might tell me, look at your far, look at your far handheld, look at replay a." – P1	11	35
	"Every call we make gets reviewed by the ROC in real-time, ensuring we're on the same page." – P2		
	"Well, I'm sitting; I'm just talking for replay now because for replay, don't talk about the on-field officials. Just observe." – P3		
	"The RO is very involved in the game and probably has almost as much power as the white hat[3]." – P7		
Video Angle Requests	"Interacting with producers and trying to get them to send you specific angles or videos." – P6	10	42
	"Gene might be talking out loud about what he's thinking on something, and the Command Center may not be up to that point yet." – P7		
	"I always had a concern that...they would stumble across, oh, look at this great angle." – P4		
	"I often request specific angles to get a clear view of the play, ensuring our decisions are as accurate as possible." – P2		
Adapting to New Replay Technology	"Adapting to the new replay system was challenging at first, but it's become an invaluable tool for our team." – P2	9	30
	"No, I think it helps. I must be honest with you. I think the new technology helps and maybe the		

[2] ROC stands for replay operations center.
[3] "White hat" indicates the crew chief and leader of the officiating crew.

Codes	Direct quotation	Participant count	Frequency count
	authority that Gene has and me be just a little bit more genius." – P7		
	"In the latter years, as DV[4] sport matured...I felt better because I could see everything that was out there." – P4		
	"You know, that got better with time because more cameras were involved." – P6		
Coping Mechanisms for In-Game Pressure/ Existence of Pressure	"I would say listening more than talking would be some good advice, staying calm." – P7	6	15
	"I focus on the process, not the pressure, reminding myself to stay calm and make the best decision with the information available." – P2		
	"I never felt any undue pressure or extra pressure." – P6		
	"I never felt pressure from anyone to make a call that I did not support." – P4		
Peer Review and In-game Pressure	"I show T[5]; T, this is why I ruled this way, this is what, this is what I've done, and why I looked at you, look over here, I'm trying to teach him." – P1	8	20
	"We became consistent across the conference and making decisions because you always had at least three people involved." – P6		
	"You know, it's same go, it's all these people that I've…got to know over the years and we swap stories." – P3		
	"Post-game feedback sessions are crucial. We review every decision to learn and improve for the next game." – P2		

[4] DV references a pseudonym for a personal identifier of the software system.
[5] T references a colleague whose name was redacted to maintain confidentially.

Codes	Direct quotation	Participant count	Frequency count
Professional Ethics and Integrity	“Maintaining integrity is non-negotiable. Every decision is made with fairness and accuracy at the forefront." – P2	9	26
	"I've...never had anybody sway me one way or the other in making a call from the replay booth that I felt like did not have the video evidence to support it." – P4		
	"Deep, deep commitment to being successful and being accurate and correct in what they do." – P6		
Impact of Replay on Game Integrity	"I think we're bringing more credibility to the game.”– P1	8	26
	"They don't have any tolerance for errors in replay because we've got all the equipment." – P5		
	"And I think what replay has done is it's just in. Hopefully, even when it goes against them, I hope the coaches understand they can no longer say." – P2		
	"I think that made it more consistent in our decisions." – P6		
	"Because you can find the video evidence where there is the replay." – P5	10	32
Interactions Between On-Field and Replay Officials	"No, no, I think it's more he's talking about the booth, whereas I'm given as the communicators, I'm given play to play." – P7		
	"You always had at least three people involved in that." – P6		
	"The Replay Operations Center said they like it. I mean, they tell me they like it, you know, like, like one of my reversals, from the booth. The time was Okay. Richard," – P1		
Fan and Media Perceptions	"They, they could care less about what we do. You screwed my team while you're on the take, you're all this kind of stuff." – P1	7	27

Codes	Direct quotation	Participant count	Frequency count
	"A lot of the fans and even coaches and players don't understand just the angle of the camera." – P6		
	"You have years of experience on the field, and then you come up there, and some people embrace it, and some people expect us to." – P2		
	"For the most part, I think fans, I don't know if they know all the technology, they probably don't." – P3		
Personal Motivations for Officiating	"You know, I like to think sometimes you know you just have a part in that process…[motivating]." – P4	6	23
	"But at the same time, that's the whole allure of why we play games, and that's why we do what we do, to unfold the human experience, in my opinion." – P7		
	"The people that get into officiating have a passion for whatever sport." – P6		
Real-time Decision Validation	"Okay, but I'll respect him if he does. You know if, if we get a different angle that I didn't see, then that's my bad." – P1	4	10
	"And nobody, I'll be the first to tell a guy on the field. Nobody is questioning your effort or what you saw at the time, but you can't beat the fact that I can look at it 20 times and 10 second frame by frame." – P2		
	"It's becoming just common kind of human nature now that there's always that eye in the sky." – P7		
Communication Protocol under Pressure	"And it's like, no, no, no, no, we're doing down distance line to gain. We're doing penalties, we're doing all these metrics to stay on top of what's going on and to watch for any kind of situation." – P7	5	13
	"And then I ask a lot of questions, you guys ask a lot of questions." – P5		

Codes	Direct quotation	Participant count	Frequency count
	"Um, there's other people that are like, okay, if it happens, it happens, we're ready to rock and roll, and we'll make a call, we'll make the call, and we'll move on." – P2		
	"The only time we interacted was if we felt like the game should be stopped." – P6		
Training and Skill Development	"The only way you learn the personality of football is you work it." – P2	5	15
	"The people that get involved in this and stay in it, especially move to a higher level, they have a deep commitment to being successful." – P6		
	"If you don't want to be a replay official, if that's not your career path, then don't be a communicator." – P5		
	"And then we would set up labs [for training], you know, how it is, you know, it's just like you guys do." – P3		
Historical Comparisons of Replay Impact	"When it first started, there were only ten places you could review, scoring plays and bounce out of bounce, that kind of stuff. Now, it has evolved, and it's not, Kevin, it's not going to get any easier." – P1	3	7
	"It's like my feeling is, and I mean this is just my agenda, which is between you and me. I just, I would, I would rather put the human element back into the game." – P7		
Integration of Replay in Officiating Culture	"I think it's just important that, from a research perspective, that people understand not only the history of what's going on with replay but where we're going with replay." – P7	3	10
Challenges with Multi-angle Review	"One of the things is that you don't have a feel for what's happening in real-time on the field." – P6	5	11
	"Cut from the program feed to an end zone feed as the kids cross in the goal line, and we never see him drop the ball right." – P5		

Codes	Direct quotation	Participant count	Frequency count
	"I would get rid of confirmed from the officials in the Replay Operations Center, and I would only go with reversed or stands for the final decision." – P7		
Feedback from Coaches and Teams	"I think they support replay if there's a mistake made or, you know, something's wrong." – P7	5	13
	"We're out there to help monitor, we're out there to help in the decision process if we think you're going the wrong direction." – P6		
	"Okay, but I'll respect him if he does. You know, if we get a different angle that I didn't see, then that's my bad." – P1		
	"You, you, you, call me and if I can't freak out and answer it, then I will have an answer within 24 hours." – P3		
Public Education on Replay Rules	"We're there to help monitor. We're out there to help in the decision process if we think you're going the wrong direction." – P6	3	7
Technological Reliability and Limitations	"So, this flag should have been picked up now, although to all communication, we easily correct that error." – P5	5	18
	"The remotes[6] were always a few seconds; they usually could even be up to 3 s[econd] delay." – P6		
	"Oh, that's a big one, you know it's, it's a big one because it's evolving so much. There's so much detail with them." – P1		
	"Um, you know, obviously live instantaneous to me at the stadium, which shows up on my replay monitor with the Command Center, sees is three or 4 s[econds] later." – P4		

[6] Remotes in reference to those in video production delays and development presenting footage to the audience

Codes	Direct quotation	Participant count	Frequency count
Official's Role in Upholding Game Integrity	"You know they're going to send you the shots. You know, they're going to take it right. That's why they're there, and that's why I'm there too. Exactly, exactly how do you think people, or fans, if we're going to call them that." – P1 "We're out there to help monitor, we're out there to help in the decision process if we think you're going the wrong direction." – P6	8	25

Grounded Theory Method, Step 2: Constructing Categories

Building on the data analysis in the previous step, the researcher combined codes of similar topics or conceptual contexts into categories (Charmaz, 2006). As a guiding decision rule, each category contained a minimum of two codes to ensure data saturation of each category due to conceptual similarity. Table 3 represents the final categories identified through the third data analysis step. In this step, the combined codes represent a singular category. A total of six categories were identified in the category development phase. For example, the *professional development and integrity* category was created by combining *training and skill development* codes*, peer review and feedback sessions, and professional ethics and integrity*. The category provides learning, skill enhancement, ethical adherence, and professional identity oversight. The developed categories represent the foundational elements of the emergent themes, which will be discussed in the next section.

Table 3. *Development of Codes into Categories.*

Category	Final codes	Definition	Participant count	Frequency count
	Adapting to New Replay Technology	This category encapsulates how the	13	101

Category	Final codes	Definition	Participant count	Frequency count
Technology-induced adaptations	Challenges with Multi-angle Review Technological Reliability and Limitations Video Angle Requests	deployment and evolution of replay technologies shape and redefine the processes and criteria for officiating sports, emphasizing the mediated nature of decision accuracy and the reliance on technological tools for judgment.		
Just-in-time collaboration	Direct Communication with the ROC Interactions Between On-Field and Replay Officials Communication Protocol under Pressure Real-time Decision Validation	This category focuses on the structured and spontaneous interactions that facilitate collective decision-making among officials, highlighting the importance of shared understandings and coordinated efforts in achieving accurate and fair game outcomes.	13	90
Perpetual professionalization	Training and Skill Development Peer Review and Feedback Sessions Professional Ethics and Integrity Official's Role in Upholding Game Integrity	This category represents the ongoing journey of learning, skill enhancement, and ethical adherence that officials undertake to maintain and elevate the standards of sports officiating, underpinning their professional identity and commitment to the sport.	13	86
Intra-professional culture focus	Coping Mechanisms for In-Game Pressure	This category encompasses the individual and collective	13	75

Category	Final codes	Definition	Participant count	Frequency count
	Integration of Replay in Officiating Culture Personal Motivations for Officiating	experiences that contribute to the resilience, motivation, and cultural cohesion among officials, including coping with pressure, fostering a sense of belonging, and aligning with the cultural norms of the officiating community.		
Broader impacts	Impact of Replay on Game Integrity Public Education on Replay Rules	This category addresses the broader implications and societal interactions with replay technology, including its influence on the integrity of the game, the educational efforts regarding its use, and its reflection on the external factors that shape the operational and cultural environment of replay officiating.	13	53
Perpetual monitoring and evaluation	Feedback Mechanism from Coaches and Teams Historical Comparisons of Replay Impact	This category refers to the continuous observation and assessment of officials' decisions by officials. This ongoing scrutiny involves analyzing the actions and rulings of instant replay officials to ensure that they adhere to the rules and standards of the game.	13	82

Grounded Theory Method, Step 3: Theory Refinement

Per Charmaz and Belgrave (2019), each category that has been previously developed is then combined into theoretical propositions using pattern analysis. Each proposition was

designed for this study by combining categories based on likeness and conceptual value. Each is presented in Table 4. Each proposition is discussed alongside definitions and associated participant quotes in the proceeding section.

Table 4. *Theoretical Propositions.*

Theoretical proposition	Categories	Participant count	Frequency count
Sustaining technologies can present unprecedented contingencies during intra-professional decision-making	Technology-induced adaptations	59	187
	Perpetual professionalization		
Unprecedented contingencies during intra-professional decision-making can require dynamic professionalization	Just in time collaboration	52	165
	Intra-professional culture focus		
Dynamic professionalization elicits stakeholders' ex-pos [game] evaluation and real-time monitoring of the broader impacts of sustaining technologies	Broader impacts	23	53
	Perpetual monitoring and evaluation		

Theoretical Proposition 1: Sustaining technologies can present unprecedented contingencies during intra-professional decision-making. The first proposition provides context to the nuanced interdependence between adopting advanced technologies in officiating and the enduring commitment to upholding ethical standards and professional growth. It underscores the idea that while technology fundamentally transforms the decision-making landscape, it simultaneously necessitates a reinforced dedication to integrity, highlighting the evolving nature of officiating as a technologically driven and ethically grounded profession.

Participants' experiences encapsulated how the deployment and evolution of replay technologies shape and redefine the processes and criteria for making officiating decisions in sports, emphasizing the mediated nature of decision accuracy and the reliance on technological tools for judgment. In response to considering new replay technology, P2 stated, “Adapting to the new replay system was challenging initially, but it's become an invaluable tool for our team." And P7 said: "No, I think it helps. I must be honest with you. I think the new technology helps, and maybe Gene's authority and me will be just a little more genius." P4 also agreed that “in the latter years, as DV[7] sport matured...I felt better because I could see everything out there.” P6 felt “That [replay] got better with time because more cameras were involved." The application of new technology appears to be a useful tool for officiating.

Regarding the usefulness of multi-angle review, P4, drawing from their prior military experience, stated, "One of the things in Iraq you don't have a feel is for what's happening in real-time on the field." P5 also agreed that the technology can be helpful to “Cut from the program feed to an end zone feed as the kids cross in the goal line, and we never see him drop the ball right.” Even with greater vantages points and video information, there was a call for evolving processes or procedures to ensure a better alignment between technology and officiating. For example, P7 recommended potential changes, such as improving the application of re-play terminology with updated technological supports: "I would get rid of ‘confirmed,’ and I would only go with ‘reversed’ or ‘stands’" as the official calls. This statement indicates that during a game stoppage time might be saved if officials did not have to address, for the field officials, if the play is a confirmation on the field and spend valuable time addressing whether it

[7] DV references a pseudonym for a personal identifier of the software system.

is salient for reversal. The inclusion of the instant replay is considered both useful and a challenge depending on the context for the officiant.

Regarding technological reliability and limitations, P5 stated, “So this flag should have been picked up now, although to all communication, we easily correct that error.” P5 is referencing that when there is a flag on the play, but it shouldn’t have been thrown due to a mistaken call. Replay officials are in place to provide support for the officials on the field when certain calls are made. P5 also lamented the delays due to having to coordinate communication with remote crews (“roomies”): "The roomies were always a few seconds [behind,] they usually could even be up to 3 s[second] delay." P1 also felt that changes can be challenging: "Oh that's a big one, you know it's, it's a big one because it's evolving so much there's so much detail” and P4 noted, "obviously live instantaneous to me at the stadium, which shows up on my replay monitor with the Command Center, sees is three or four s[econds] later." Remote games or what are referred to as “roomies” are games from major networks, whether it be ESPN, FOX, etc., that are produced in another location, so this causes a delay in the latency of the video signal getting to either the Replay Operating Center (ROC) or the replay officials, themselves. The limitations of technology, which are often manifested as delays between crews, can be one factor that requires consideration when evaluating the effectiveness of officiants.

Participants also discussed the official’s role in upholding game integrity, which also included discussing how officials contribute to game integrity and how their actions are perceived by others. P1 said:

> You know the on-site network truck or production site, for the game, is going to send you the shots. You know, they're going to make it right. That's why they're there along with the television producer, and that's why I'm there too. Exactly how do you think people, or

fans, if we're going to call them correctly if the officials in the booth don't get the video angles necessary to make the correct call…

P6 stated, "We're out there to help monitor. We're out there to help in the decision process if we think you're going the wrong direction." Further, P1 said: "I-I-I think we're bringing more credibility to the game. I do think that you know most of you know," and P13 noted: "They don't have any tolerance for errors in the replay, because we've got all the equipment." Others noted how replay technology has reduced coach pushback on calls, such as when P2 said: "I hope the coaches understand they can no longer have the final say Hopefully, even when it goes against them, I hope the coaches understand they can no longer say." Additionally, coaches understand that the benefits of having home advantage is declining in American football due to improvements in instant replay and the officiating standards have been effective in adoption (Benz et al. 2024). Instant replay may be a useful tool for supporting integrity for officiants, and participants emphasized that integrity is ultimately a vital component of replay, not replaced or mutually exclusive from technological skills.

Participants also discussed the ongoing journey of learning, skill enhancement, and ethical adherence that officials undertake to maintain and elevate the standards of sports officiating, underpinning their professional identity and commitment to the sport. P2 reflected on the importance of skill development: "The only way you learn the personality of football is you work it." P6 said, "The people that get involved in this and stay in it, especially move to a higher level, have a deep commitment to success." In considering the role of feedback and interaction in fostering professional development, P1 stated, "I show T, T, this is why I ruled this way, this is what, this is what I've done, and why I looked at you, look over here, I'm trying to teach him," and P8 felt that "We became consistent across the conference and making decisions because you

always had at least three people involved." P12 also stated about feedback conferences: “It's all these people that I've got, you know, got to know over the years, and we swap stories.” P1 emphasized that “post-game feedback sessions are crucial. We review every decision to learn and improve for the next game." Continual learning and feedback, both formal and informal, are a vital component of skill development for officiants. As mentioned previously, the importance of having a connection with sport, mentors, associates, serving as gatekeepers to the officiating group as it relates to sport communication motivates and provides closeness and likelihood of officiating persistence (Zvosec et al. 2023). Continual learning, supported in part by sustaining technologies, aids intra-professional decision-making and professionalization. It is imperative that all officials who work collectively within these events and know each other as professional associates, share their experiences and provide feedback to each other for other events so as to improve performance and quality.

Theoretical Proposition 2: Unprecedented contingencies during intra-professional decision-making can require dynamic professionalization. At the heart of this proposition is recognizing how effective communication is a cornerstone for building a unified and resilient officiating community. Their work demonstrates that there is a positive relationship between the factors of satisfaction, performance, and cohesion. According to the researchers, improving the approaches that create group cohesion may be one factor that improves professionalization and adherence to best practices (Avugos et al. 2021). It emphasizes the dual role of communication as a tool for enhancing operational collaboration and fostering psychological strength and unity among officials, thereby supporting their ability to navigate challenges and maintain a cohesive professional identity.

Participants focused on the structured and spontaneous interactions facilitating collective decision-making among officials, highlighting the importance of shared understandings, and coordinated efforts in achieving accurate and fair game outcomes. Regarding direct communication with the ROC, P1 stated, “They will be on the program feed. They're going to get those replays quick, and that's what R.L. might tell me: [redacted], look at far handheld, look at [the] replay.” P2 said, “Every call we make gets reviewed by the ROC in real-time, ensuring we're on the same page." P7 agreed, "The RO is very involved in the game and probably has almost as much power as the white hat."[8] Decision-making requires continuous involvement, feedback, and communication with other leaders to ensure support and success amongst officiants.

When considering communication protocols under pressure, P7 talked about the variety of factors involved in the decision-making process: "And it's like, no, no, no, no, we're doing down distance line to gain. We're doing penalties, we're doing all these metrics to stay on top of what's going on and to watch for any kind of situation." Even in the heat of the moment, officials seek clarification to maintain their professionalism, as noted by P5: "And then I ask a lot of questions. You guys ask a lot of questions." Despite the high intake of information, officials’ decision-making protocols help keep a brisk pace, as noted by P2: "Um, there are other people that are like, okay, if it happens, it happens, we're ready to rock and roll, and we'll make a call, we'll make the call, and we'll move on." The responses to various situations, regardless of how unique, are contingently planned by officiants, which creates a supportive and well-rounded team in the face of unexpected outcomes.

[8] “White hat” indicates the crew chief and leader of the officiating crew.

Reflecting on real-time decision validation, P12 felt that "Okay, but I'll respect him if he does, you know if we get a different angle that I didn't see, then that's my bad," while P2 stated that:

> And nobody, I'll be the first to tell a guy on the field. Nobody is questioning your effort or what you saw at the time, but you can't beat the fact that I can look at it 20 times and 10 seconds frame by frame…

Participants also reflected on individual and collective experiences that contribute to the resilience, motivation, and cultural cohesion among officials, including coping with pressure, fostering a sense of belonging, and aligning with the cultural norms of the officiating community. In the discussion of coping mechanisms, P10 emphasized that "I would say listening more than talking would be some good advice, staying calm," and P2 agreed, "I focus on the process, not the pressure, reminding myself to stay calm and make the best decision with the information available." P1 said:

> And then you have to be very, very calm and, and, you know, and I always, when we have TV time out, I told, I show T, T, this is why I ruled this way, this is what, this is what I've done, and why I looked at you, look over here, I'm trying to teach him…

The ability to cope with pressure appears to be a central factor in the success and coordination of feedback and decision-making amongst officiants.

Personal motivations for entering or staying in the profession and others' perceptions of the replay official's role sometimes conflict, but a shared love of sports is a key element of the profession. P4 said, "You know, I like to think sometimes you know you just have a part in that." In referencing the importance of officiating, P7 stated: "But at the same time, that's the whole allure of why we play games, and that's why we do what we do, to unfold the human experience,

in my opinion.” P6 agreed that culture ties officiants together: “The people that get into officiating have a passion for whatever sport." When reviewing fan and media perceptions, P1, in referencing the difficulty in communicating that passion to fans, stated, "They [fans] could care less about what we do. ‘You screwed my team while you're on the take...’" P6 agreed about the complexity of relationships with fans: "A lot of the fans and even coaches and players don't understand just the angle of the camera." The passion that officiants share with each other is integral to their continued efficacy of the field; however, the team's fan bases often fail to understand both the decision-making process and the shared passion with the fans. Managing this love of the game, mutual respect for each other, and high-pressure situations that require communication with the officiating team on the field and remote entities, requires both an adherence to protocols to streamline communicative processes as well as a fluidity to handle whatever arises.

Theoretical Proposition 3: Dynamic professionalization elicits stakeholders' ex-post game evaluation and real-time monitoring of the broader impacts of sustaining technologies. The third proposition explores the dynamic relationship between the officiating community and the broader societal context, focusing on how external perceptions and engagement impact the internal culture and officiating practices. It delves into the feedback loop between public perceptions of replay technology, the educational outreach by the officiating community, and the influence of societal engagement on the evolution of officiating practices, highlighting the interplay between external influences and internal cultural adaptation. In discussing the impact of replay on game integrity, P1 stated, “I think we're bringing more credibility to the game. I do think that you know most of you know,” and P5 felt that "Fans and stakeholders don't have any tolerance for errors in the replay, because we've got all the

equipment." P2 emphasized, "And I think what replay has done is it's just in. Hopefully, even when it goes against them, I hope the coaches understand they can no longer say." While P6 felt, “I think that made it more consistent in our decisions,” and P5 agreed, "Because you can find the video evidence where there is replay." The ability to employ replay is considered one factor that improves the profession by supporting elevated levels of accountability, which may affect how external members, like coaches, interact with or perceive officials.

While considering public education on replay rules, P6 stated, "We're there to help monitor. We're out there to help decide if we think you're going in the wrong direction." And P7 stated, "We're looking at every play. We're looking at every play." When discussing feedback mechanisms, P7 argued that "I think they support replay if there's a mistake made or, you know, something's wrong." According to P3, "You call me and if I can't freaking answer it, I will have an answer within 24 hours.”

In reviewing historical comparisons on replay impact, P1 felt that: “When it started, there were only ten places to review, score plays and bounce out of bounce. Now, it has evolved, and it's not, Kevin, it's not going to get any easier.” Due to the advancement of technology and the increased number of rules, within replay, it is making the process more complicated. It is up the officiating community to educate fans and the public when these modifications take place. P7 also felt that the motivation and personal experiences for play are key: "It's like my feeling is, and I mean this is just my agenda, and this is between you and me. I just, I would, I would rather, put the human element back into the game and that professional experience trumps technology." The findings indicated that public education may play a crucial role in supporting the relationship between the fans, the officiants, and the technological application in sports. The stakeholder communities, such as officiants, players, and fans, can potentially work together

more effectively when guided by an improved education on instant replay, decision-making, and officiant procedures on the field.

Towards a Theory of Dynamic Professionalization

The data analysis process, from collected interviews, yielded an emerging theory, which reflected the inductive nature of the method and did not allow preconceived ideas to bias the results. Therefore, using an interactive interpretative process a significant source of categorization and theory generation was established. The data was collected from 13 currently employed officials who work for the Big Twelve Conference and the College Football Officiating (CFO) and who officiate from the WAC and Sun Belt conferences. This sample participated in one-on-one interviews, responding to the interview questions.

These three propositions established the complexities in which instant replay officials utilize communication to execute their decision-making procedure and how it is reflected in their culture and identities. Thus, these themes were defined based on the findings and expressed as a substantive theory with related concepts from the established, cohesive themes. The theoretical propositions elicited from the qualitative analysis collectively point towards professionalization as a process that may occur as professionals actively engage in their profession—both when they are “on the job” and “off the job.” Figure 3 depicts the themes presented in the previous section relationally as a cyclical process.

Figure 3

The Dynamic Professionalization Process



Dynamic professionalization entails collaborative decision-making, by members of the same profession when they are actively and in real-time engaged in their shared profession, about a contingency for which there is no precedent and, therefore, no explicit guideline or norm for professional decision-making. In the context of instant replay decision-making, new contingencies are elicited by new information or data provided by sustaining technologies that have yet to inform intra-professional decision-making. These new contingencies do not have to be punctuated by the slew of collaborative decisions made by two or more professionals while on the job. The decisions informed by the new contingency, though zero-sum, can still be relatively

unimportant vis-à-vis other decisions that are not unprecedented. For example, a new camera angle not used before to inform ball placement after a two-yard run on first down can constitute dynamic professionalization, whereas the use of an older camera angle regarding the validity of a last-second, game-winning touchdown would not. This older angle has already been condoned or normalized within the decision-making process and thus does not insert any novelty to the officials or their procedures. That said, the process of dynamic professionalization can be implicit or explicit and occurs during consequential and inconsequential decision-making scenarios. The "dynamic" component of professionalization innovation is collaborative decision-making amongst members of the same profession for which the formal process of consensus amongst professionals convening off-the-job has not yet occurred. Dynamic professionalization occurs when new information is used for intra-professional, collaborative decision-making in zero-sum, just-in-time decision-making scenarios. External stakeholders concerned with the broader impacts of dynamic professionalization may evaluate the sustaining technology, the new information it provides, the decision makers who are members of the same decision, and the intra-professional decision-making process.

Summary

The purpose of this dissertation was to conduct a study of instant replay officials who directly oversee college football games and the subsequent operating system of instant replay as the primary unit of analysis. The researcher intended to identify what transpired within the communication and decision-making process and how it impacted their professional perspectives and cultural perceptions. Data collection involved 13 semi-structured interviews with participants to garner their perceptions. The procedures employed for data analysis followed grounded theory analysis. The data analysis procedures revealed three theoretical propositions

for a new theory of dynamic professionalization. The following chapter, Chapter 5, presents the findings' implications. Based on the themes, the recommendations are presented alongside theoretical and empirical literature.

Chapter 5: Conclusion

This research aimed to examine instant replay officials whose responsibilities directly oversee college football games for the Big Twelve Conference, WAC, Sun Belt, College Football Officiating (CFO), and the subsequent operating system of instant replay as the primary unit of analysis. This examination was guided by GTM for the grounded development of a preliminary theory of dynamic professionalization. The outcome from the data collected and analyzed explained professional and cultural concerns about truth and fairness in conjunction with the cultural obsession with vision and perception.

Chapter 5 discusses the findings from the data analysis explained in Chapter 4. In Chapter 4, I shared how I developed the theoretical propositions through codes and category formation while establishing the overall theory grounded on the phenomenon researched. Chapter 5 demonstrates the association between the findings, propositions, and comparable literature previously reviewed. The implications of these results are discussed, and my recommendations for both practice and future research are included in Chapter 5.

Research Questions and Implications

The grounded theory method consequently provided context for identifying the communication and decision-making process and its impact on sports officiants' professional perspectives and cultural perceptions. Next, I compare the findings to extant literature to determine if past research supports the results of this study, as well as connect relevant literature and findings to the research questions.

The first research question aimed to understand the communication dynamics and norms for instant replay officials while engaging in collaborative decision-making. The sparse literature associated with RQ1 emphasized the dual role of communication as a tool for enhancing

operational collaboration and fostering psychological strength and cultural unity among officials, thereby supporting their ability to navigate challenges and maintain a cohesive professional identity (Barbash, 2015). This focus was built on the premise that society recognizes how effective communication is a cornerstone for building a unified and resilient officiating community. Findings related to this RQ included factors associated with provable actions from those who oversee the process, along with the communicative, comprehensive, and decisive strategies of replay officials, in a heuristic manner that would be insightful (Sidhu, 2011; Venkatesh et al., 2003). The categories that helped address RQ1—communication and collaboration and psychological and cultural dynamics—encompassed the individual and collective experiences that contribute to the resilience, motivation, and cultural cohesion among officials, including coping with pressure, fostering a sense of belonging, and aligning with the cultural norms of the officiating community.

The initial issue of communication research within instant replay officiating is that the instant replay official is usually not the object under analysis, but rather, it is perceived as a series of characteristics of some other statistical artifact of a scholar's study (Calandrillo & Davison, 2017; Vannatta, 2013). This feeds into the notion that personal motivations for officiating were attributed to instant replay's technological, social, political, and economic community, which contains valuable information about its historical significance. Still, it does not address the official's assessment in the booth nor the chronological background, which led to socialization within the community of replay (Mulvin, 2012).

Researchers also considered the universal process through communication that simultaneously happens between person to person, persons within specific groups, a person officiating an event, a person sitting in a stadium, or a person watching an event on television at

home (Cummins & Hahn, 2013; Subic et al., 2008). Officiating communications were noted as a context for the cultural, social, and temporal conditions that stipulate insight into understanding (Mulvin, 2012; Verna, 2008). Further, literature relevant to the historical significance of instant replay and officiating was examined to consider cultural cohesion (Cummins & Hahn, 2013; Friedberg, 2004), with scholars like Hancock et al. (2024) finding connections between officials' satisfaction, performance, and sense of cohesion. Hoffman et al. (2024) did incorporate communication within their game management framework, noting that clear communication with players, coaches, and spectators can prevent misunderstandings and ensure these stakeholders have confidence in the officials. As such, there is alignment between this study's findings and others through a recognition that communication is core to the profession's maintenance and outward presentation.

Much of the literature devoted to cultural cohesion was associated not with communication but with the history of programming, television, and broadcasting and discussions of creating collective memories (Ceruzzi, 2003; Kramer, 1992). Ceruzzi (2003) found that video replay suggested live programming was malleable and susceptible to transformation and thus impacted cultural cohesion based on its communicative abilities. Mumford (1934) explained that the allure of time manipulation was first thought of as being magical, one's ability to view images over and over to the point of changing the viewer's perspective while overriding the fundamental aspect of linear time. This capability to transform, recall, and design an event and lock it away or preserve it could produce a collective memory. The collective memory may change substantially from the live experience due to the manipulation of time and the general tendency to experience a deterioration in the clarity of memories in the human brain. Gebser (1985) found that throughout history, the public

considered consciousness structure mutations. Additionally, Gebser had the foresight to anticipate the basic insight of the modern sciences of complexity, namely that most real-world events, including interactive sports, and communicative norms, especially those involving human behavior, constantly derive from intricate and a rich network of interaction, which would explain communication dynamics of officials. Gebser (1985) further stated that the belief in a construct, in which the human consciousness was embedded, solidified the clarity of true consciousness when determining its impact on the means for communicating sporting events. In this reflection, the perceptions of individuals vary according to their own lived experience, which, in regard to the thematic findings, show that sporting and officiating are varied and unique to their own experiences.

The second research question focused on how technological integration affected instant replay officials' decision making and professional identity. The findings discussed technology and decision-making adapting to new replay technology, challenges with multi-angle review, technological reliability and limitations, and video angle requests. Professionalization requires effective adaptation to changes, which include technology integration within the industry at such a dynamic level (O'Brien & O'Keefe, 2022; Tamir & Bar-Eli, 2021). O'Brien and O'Keefe (2022) explore technological integration within sports officiating and explore an ecological approach to the professionalization approaches within the officiating industry. These findings encapsulate how the deployment and evolution of replay technologies shape and redefine the processes and criteria for officiating sports, emphasizing the mediated nature of decision accuracy and the reliance on technological tools for judgment. Professional development, integrity training, and skill development, peer review and feedback sessions, professional ethics and integrity, and the official's role in upholding game integrity all represent learning, skill

enhancement, and ethical adherence that officials undertake to maintain and elevate the standards of sports officiating, underpinning their professional identity and commitment to the sport.

The literature aligning with the findings for RQ2 included Subic et al. (2008), who reported that the understanding and use of technologies for sports officiants provides a more powerful, accessible, engaging, and enjoyable means for sports fans. Adapting to new replay technology created the need for education on technological reliability and limitations, which also align with previous work (Cummins & Hahn, 2013; Verna, 2008). Such education was considered representative of the ongoing journey of learning, skill enhancement, and ethical adherence that officials undertake to maintain and elevate the standards of sports officiating.

However, Subic et al. (2008) also noted that the technological advancements used for sports reporting also increased challenges for officiating crews and representatives, whose responsibility was to administer these games to make the event accurate, just, and competitive. Some of the participants in this study noted that with technological advancements, “Now, it has evolved, and…it's not going to get any easier." Retzlaff had earlier accounted for such, establishing that the progression of technology, while providing a positive means for film acquisition and recording of sports play, produced significant problems and difficulties. Film acquisition systems, standard in the 1950s for archiving purposes, were found expensive and difficult to operate due to the time needed for film processing.

As technology advanced, so did research reports of a positive association with using such technology for sports reporting (Mulvin, 2012; Vannatta, 2013). Other work has also found positive associations. For example, Hemanathan et al. (2024) emphasized how AI-assistance can help improve the accuracy of officials’ calls, though stressed that technology should assist human officials, not replace them. Benz et al. (2024) also noted that the use of technology helped

remove home field advantages in the NFL. These associations aligned with several of the participants in this study who appreciated how technology helps improve their confidence in making sure they get the right call, and how this process of acceptance has been an evolution, with one participant noting, “Adapting to the new replay system was challenging at first, but it's become an invaluable tool for our team.”

However, there are negative associations in the data and in scholarship that emphasize the need for officials to better communicate technological uses to stakeholders. Reider (2007) and Hanson (2008) noted that viewers were concerned with the use of replay and how this would involve viewers’ perceptions of plays within a sporting event. The current study demonstrated that officiants' decision-making processes are collaborative and feedback-informed; however, a lack of education and understanding of the viewer's perceptions can lead to both disagreements and feelings of animosity towards officiants, as expressed by this study’s participants.

The consensus within the research is that all aspects of the replay process should be approached from a legal evaluation of the de novo standard without prejudice or previously referenced material (Calandrillo & Davison, 2017). The research noted that instant replay in competitive sports was a complex and argumentative subject. Electronic decision-making ability used to review plays and video content has transformed how individuals view events and influenced how sporting events are analyzed, coached, monitored, chronicled, and even officiated (Subic et al., 2008). The integration of technology has been an integral part of the game, ensuring that the right calls are made, even in the most critical moments. Its role, as addressed in RQ2 and the research, has enhanced the integrity of the sport by giving coaches, players, officials and fans the confidence that the game is being decided fairly and accurately. Direct perspectival control over recorded material allowed users to prompt or construct their

replays and realities, bringing about the familiarity and comfort of instant replay. The capacity to rewind and replay portions of time and programming through the remote control also represents a demand system that is effective for fans.

Feedback methods of recorded or collective replay are now accessible and non-constrained and, in some cases, can alter the events taking place, which has ultimately migrated into the realm of control and time coordination while enhancing the effect of instantaneous communication (Kramer, 1992). The ability to integrate an effective model that can improve communication and alter events via replay can be one model that can effectively improve the integration of technology with officiating, feedback, and communication.

Replay officiating has a historical construction that affects integrity and honesty in those officiating sporting events. Further, the connotations from the history of replay officiating were perceived by society as negligible and easily adjusted. Future research should focus on better educating the public about the rules that govern a more coordinated regulatory aspect, thus providing fairness within the field of competition, the safety of the players, and accurate coordination of game regulations when infractions are committed.

Dynamic Professionalization Theory

The final research question aimed to address how instant replay officials' professions are dynamic. While some of the previous discussion addresses this research question, a more direct answer to it is found in the development of the Dynamic Professionalization theory. In this section, I move beyond the theoretical propositions to provide concrete decision rules to bring more clarity to the theory and its potential application. This preliminary narrative of dynamic professionalization also implies a series of decision rules for relevant contexts and samples other than instant replay officiating in competitive sports. The decision rules were developed with the

aim of connecting the professionalization theory to the context of competitive sports, as guided by the themes identified by participants in this study. In this context, the aim was to ensure close alignment with the contexts of dynamic professionalization through decision rules that delineate how the applications were developed as well as the relationship with the findings of this study. These rules are as follows:

1. The decision-making must be collaborative.
2. The decision-making must be intra-professional.
3. The decision-making must be made by sustaining technology.
4. The decision-making must maintain technology "acceptance" amongst decision-makers.
5. The decision must be just-in-time.
6. The decision-making must be zero-sum.

The first two decision rules concern the persons making the decisions. First, decision-making must be collaborative for dynamic professionalization to (potentially) occur. Professionalization is inherently a collaborative activity based on the development of consensus. Therefore, a decision-making context that is not collaborative cannot be one wherein professional standard for decision-making is revisited, at least not in any meaningful way. Second, the decision-making context must be intra-professional. This criterion, on its face, seems duplicative with the first. However, decision-making can be collaborative even when one decision-maker is of a certain profession and the individuals with whom said decision-maker is collaborating are not. For example, various individuals could be brought together on a task force for decision-making regarding community planning and not be of the same profession, e.g., urban planners, city council members, citizen representatives. For professional norms and

expectations for decision-making to be revisited, at least two individuals must share the credentials and qualifications of the focal profession. Two people with different professional credentials will not elicit a visitation of professional norms and decision-making standards. Another example where professionalization within instant replay is used would be the decision-making process of the fourth down fumble rule. In a fourth down fumble situation in American football, if a team fumbles the ball and it's recovered by another player on the same team, the ball is spotted were the fumble occurred, not where it was recovered. However, if the ball is fumbled and recovered by a defensive player, they can advance the ball (NFL, 2024). Officials making the decision of where to spot the ball must work collectively in an intra-professional fashion to come to the final decision. Ultimately, all parties involved must come to a zero-sum in their conclusion. This example provides the very essence of what dynamic professionalization represents.

The third and fourth decision rules concern the nature of the technology used to inform decision-making. Third, decision-making must be informed by sustaining technology. Sustaining technology is intended to improve performance, be it decision-making or any other activity, individual or collaborative. If technology is not central to the performance of a profession's core activity, revisiting professional norms and expectations for behavior will likely not occur within this theory. Fourth, there must be "technology acceptance" (Davis et al., 1989) among same-profession professionals engaged in collaborative decision-making. If one party does not subscribe to sustaining technology as fundamental to the performance of decision-making, then professional norms and standards for decision-making likely will not occur at that moment. For example, if a field official scoffs at the notion of instant replay, then that person will not engage in the collaborative, intra-professional visitation of professional norms for decision-making.

The final two decision rules concern the type of decision being made. Fifth, the decision must be time-sensitive or just-in-time. If the decision can be delayed until traditional professionalization can occur, then dynamic professionalization will not happen. Sixth, the decision to be made must be a zero-sum decision. Zero-sum decision-making occurs when the gain or loss of resources of one party is precisely balanced by the losses or gains of other participants (Von Neumann & Morgenstern, 1944). If the decision is not zero-sum, then external evaluation and monitoring by stakeholders concerned with the broader impacts of dynamic professionalization will not occur. With fans and stakeholders, the aspect of replay is truth and verification of calls made on the field. If this does not occur, faith in the abilities of officiating will be questioned and under scrutiny. In essence, it is important to contextualize how zero-sum decision-making can influence stakeholders while also understanding the ultimate impact this may have on traditional professionalization.

Because the data analysis method for the current study was the GTM, the context and sample of the current study met all six criteria. In evaluating theory, the topic of scope is considered vital to developing a theoretical model. In this regard, Littlejohn et al. (2017) indicated that scope must remain contextual to the topic at hand but should also frame information that supports a larger conceptual topic across multiple fields. Table 5 characterizes other contexts and samples for intra-professional collaboration and how they align with the six decision rules.

Table 5. *Potential Decision-Making Contexts for the Application of Dynamic Professionalization Theory.*

Context	Collaborative	Intra-professional	Sustaining technology	Technology acceptance	Just-in-time	Zero-sum
Officiating competitive sports	X	X	X	X	X	X

Military combat operations		X	X	X	X	X
First responders	X	X	X	X	X	X
Playing competitive team sports	X	X			X	X
Emerging technology start-ups	X	X	X	X		

The first row refers to *officiating competitive sports*, which have been discussed throughout this dissertation. In officiating competitive sports, the process is intra-professional, collaborative, focused on sustaining and technological acceptance, as well as zero-sum and just-in-time. However, other fields in which the theory may be applicable do not always feature such factors as collaboration. For example, *military combat operations* are not, in essence, collaborative. The collaboration process focuses more on *inter*-professional communication between other leaders and followers, adhering to a top-down approach, due to confidentiality and security needs.

First responders, however, employ all key constructs of the theory, such as collaboration, via using all available resources, including technology, stakeholders, and organizations to support the in-the-moment needs of their patients. An additional contributor is *competitive team sports*. While competitive team sports do experience collaboration and inter-professional communication, technology in competitive team sports has been less commonly adopted. Technological adoption, such as gathering more real-time data through wearable devices, is still usually reviewed at later points to make decisions and thus does not result in just-in-time decision making. According to officials, the integration of technology has made football feel less

authentic. It has also led to a decline in officiators' abilities to remain effectively aligned with officiating practices while also including technology usage.(Scanlon et a., 2022) However, as technology continues to rise, the theory may prove applicable to this particular set due to the influence of technological adoption and diffusion. *Emerging technology startups* may also experience effective support from collaboration, specifically technology, but do not experience just-in-time zero-sum decision-making. However, the theory may still apply to the specific field in some regards due to the relatedness of the previously mentioned constructs.

The decision-making contexts included in Table 5 do not constitute an exhaustive list of potential candidate contexts for dynamic professionalization theory. Nor are the characterizations therein based on exhaustive reviews of literature and theory in the decision-making contexts. That said, they do offer a glimpse at the potential scope of the theory and, consequently, its heuristic value and utility. Furthermore, the theory provides useful context to the study's scope and a more generalized perspective, which Littlejohn et al. (2017) recommended as essential to theory construction and development. While the theory may not represent a comprehensive approach to professionalization, a central component is an application to the construct of professionalization, which is growing in technological adaptation and resource allocation for real-time decision-making.

The findings of the study may also prove applicable to extending the theory of professionalization theory insofar as providing clear guidelines regarding decision-making and technological integration within competitive sports. Replay officials are all highly trained professionals within their respective fields, that receive direct instructional exposure via the games they work and the various situations, or case-based decisions they make every week. These case studies provide a robust opportunity to not only learn individually, but to share their

direct experiences with other officials. By directly experiencing events, in a rapid decision-making situation that has never been presented, in a game situation, provides their own perception and interpretation for study. The dynamic professionalization theory illustrates key tenets regarding effective decision-making as well as collaboration and educational approaches designed to improve the standards of practice for those within a specific context or field (Davis et al., 1989; Littlejohn et al., 2017; Von Neumann & Morgenstern, 1944). In this setting, the findings of this study have demonstrated throughout the decision rules as well, and Table 5, shows various models for extending dynamic professionalization theory regarding competitive sports. By using the foundation of Dynamic Professionalization, future officials and subsequent rule revisions could benefit from reviewable data so as to not interrupt the flow of the game, execute accurate call percentages, and increase the experience for the viewing audience which adds to the overall integrity of the game. As mentioned, Artificial Intelligence (AI) is a useful tool, and like any tool that is manufactured, it had and individual that engineered it for a purpose, so it is paramount to not completely remove the human element from a game that benefits the human race As referenced, the findings of the study demonstrate the need for improving collaboration and intra- and inter-professional decision making as well as continuing a sustained method of technology integration that considers decision makers as well as just-in-time based approaches.

Limitations

The study was limited insofar as the information gained was self-reported by participants. This limitation indicates that the ability to understand the social phenomenon at hand is, in essence, limited to individual perspectives. The main feature is that the grounded theory must

arise inductively, and depending on participants' self-reports aided this approach. However, these lived experiences were captured during a single time and phase in the officials' careers. The grounded theory approach is constantly evolving and does not provide a single or static reference point of reference. The theory is moving towards a constructive design from its original ontology. However, as the aim was to understand information specific to these perspectives, while gathering information based on their own experiences, this limitation was considered necessary. Future researchers may consider addressing this limitation by employing quantitative research, guided by the dynamic professionalization theory, which can gather more measurable data to understand instant replay officials' social and cultural experiences over time and across different phases of their careers, especially as technology continues to progress.

Future research may also address one of the study's limitations inherent to the small sample size. A small sample size was deemed appropriate for the grounded theory approach but can limit transferability to larger or differing contexts. Additionally, the sample for this study was comprised of all male subjects. This is due to the majority of officials being men, but in the last few years this has changed, and more female officials are now participating in on-field and instant replay officiating roles in other regions. It is possible women may provide different perspectives regarding dynamic professionalization, especially if the male-dominant profession creates any issues for women in intra-professional collaborations and cohesion. As such, future researchers should consider the study topic with larger, more diverse sample sizes. Future work could also examine various sporting contexts. The dissertation focused on college football officiating, and sustaining technologies and their contributions to dynamic professionalism may vary in other sporting contexts. The purpose of this study was to generate a set of theoretical propositions from the qualitative analysis of interview transcripts regarding sociocultural

and professional experiences of instant replay officials who directly oversee college football games. This might provide additional insight and direction for future instant replay officials as the landscape of the pedagogical and decision-making process evolves.

The grounded theory approach may also be used in future explorations similar to this one by exploring concepts and tenants related to competitive sport and technologically integrated approaches. The grounded theory process provides key understanding regarding the integration of prior literature and the study participants' perceptions (Crooks, 2001; Pettigrew, 2002) to provide an effective model for improved technology integration and competitive sports settings. The grounded theory approach was integral in terms of providing new information that could provide theoretical propositions and recommendations for future research based on technology and perpetual professionalization in relationships to competitive sports as well as professional culture for officials. Future researchers could use a grounded method approach to extend dynamic professionalization and understand further topics elucidated by participants in this study.

Future Ideas

Three theoretical propositions were derived from the interviews conducted with participants for this study. As such, considering the implications of these findings in terms of future research is deemed appropriate. The first recommendation for future research is derived from the first theoretical position about adaptations for technology and perpetual professionalization. Research indicated broad variations in individuals' application and acceptance of technology; however, it was fundamental to informing decision-making. Further study could explore the interaction between technological adaptation and professionalization and other topics, extending beyond the social phenomenon of this study. Future researchers who

further explore professionalization through technological adaptation, using the theory proposed herein, may find useful considerations of how sociotechnical factors create unique interplays in enlarged decision-making processes. For example, while technological advancement and adaptation has been examined in journalism (e.g., Mari, 2022; Patnode, 2023), approaching this area of study via this theory could illuminate additional findings. Journalists working in war zones or conflict settings may engage in collaborative, intra-professional discussions about just-in-time technology use and ethical decisions about impromptu coverage.

The second recommendation for future research surrounds professional culture, which various participants reflected as uniquely interacting with the decision-making processes and individuals' perceptions towards technology. Using dynamic professionalization was considered integral to responding to unique situations quickly. However, further research may consider differing characteristics that may influence such dynamic professionalization, such as self-efficacy, individual personality factors, and the culture and the rules of differing sports arenas. Finally, researchers could explore the stakeholder's potential influence on game evaluation, feedback, and informal and formal training to support the instant replay officials. Perceptions in this study demonstrated the importance of understanding how stakeholders' influence can create differing challenges and support for officials. With such a lens, it is critical to consider how technological factors, stakeholders, and informal and formal mentoring may play a role in decision-making and feedback implementation.

Conclusion

Instant replay and the subsequent rules that govern the officiating of numerous professional and collegiate sporting activities, serve a variety of purposes including providing fairness within the field of competition, safety of the players, and accurate coordination of game regulations when infractions are committed. While it is understood that announcers, sports fans, and athletes mostly approve of using instant replay to get rulings correct (Young, 2019), less attention has been given to how instant replay may affect referees and officials. This dissertation took up this charge to better understand officials' perspectives on how technological integration has affected their communicative and decision-making processes, expectations of their profession, and perceptions of truth and fairness in sports culture, yielding the development of a new theory and a renewed appreciation for how professions such as officiating must adapt amidst a complex network of technological, regulatory, social, economic, and cultural influences.

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Appendix A

Instrumentation

Life Experience Questions

1. Where do you reside?
2. How old are you?
3. How many years you been involved in replay officiating?
4. Could you tell me why you decided to get into officiating?
5. What was your first experience with officiating?
6. What aspects of officiating do you like/dislike, please explain?

Technology Questions

1. What current software systems for instant replay do you utilize?
2. What other systems have you used before, be specific?
3. Give various examples of using the software in a replay stoppage?
4. During a stoppage does the group have enough information to process a stoppage call or not? If not, then explain?
5. What are the responsibilities when using the software?
6. Explain in detail the officials within the conference about the proficiencies in using the technology at your level?
7. Explain how the conference gives you training on the software.
8. What are the regulations to use the software in an accurate manner during a stoppage?
9. How many hours of training have you received from the conference?

Intra- and Inter-Professional Relationships and Decision-Making Questions

1. How close are you to those on the officiating crew?
2. Has the crew ever been pressured into making a call that was questionable, and if so please explain the situation?
3. What is the decision-making process when making a stoppage when others are in the replay booth?
4. Do you feel that the ROC (Replay Operations Center) provides insightful information during a game?
5. What professional advice would you give to a new official?
6. What would you change about the instant replay process if you had the ability to do so?

Professional and Cultural Authority and Impact Questions

1. Please explain the structure of instant replay in terms of maintaining authority on the field.
2. What do those around you see concerning power or equality?
3. Explain if you feel that people, fans and/or stakeholders, see the validity, justice or truth in instant replay.
4. What cultural impact to you feel that you or that instant replay is having? In other words, please explain in detail if instant replay is having an impact on society and culture, overall?