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Technology-Driven and Interactive Co-construction: New Trends in the Language Communication of Sport Studies in the Digital Age

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Abstract
This study aims to explore how technology drivers such as Artificial Intelligence Generated Content (AIGC), Big Data, and Virtual/Augmented Reality (VR/AR) are profoundly reshaping the paradigm of language communication in sport studies in the digital age, transforming the traditional one-way, elitist structure into a new mode characterized by discreteness, interaction, and empathy. The research finds that the changes at the symbolic level are reflected in the evolution of language toward multimodality, with data visualization (e.g., xG, VAR) becoming a core narrative. Furthermore, embodied communication, leveraging immersive technology, enables an in-situ experience , while the short video format contributes to the fragmentation and memeification of language. At the mechanism level, the communication logic shifts from broadcasting to dialogue; "bullet screen" (danmu) culture establishes an instantaneous communal frenzy based on the interaction ritual chain , and algorithmic recommendation intensifies the stratification of discourse into echo chambers. The integration of AIGC introduces a new paradigm of human-machine collaboration. At the subject level, discourse power tends toward decentralization : athletes construct first-person narratives via social media , and fan communities engage in semantic reconstruction of official texts through "textual poaching". However, the technological boom is accompanied by risks such as emotional polarization, cyber language violence, a post-truth dilemma caused by deepfakes, and the risk of technological alienation stemming from over-reliance on data. This paper emphasizes that the core of the digital age lies in technology enabling efficiency and interaction reshaping power , calling for the establishment of a humanistic communication perspective to seek balance between technological rationality and the humanistic spirit of sport.

Keywords
Sport Communication; Digital Technology; AIGC; Embodied Communication; Interaction Ritual Chain

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1 Introduction

With the deepening development of global informatization, digital technology has permeated all aspects of social life at an unprecedented speed and breadth, profoundly reshaping the field of sport. Cutting-edge technologies such as Artificial Intelligence Generated Content (AIGC), Big Data analytics, and Virtual/Augmented Reality (VR/AR) not only optimize the efficiency of sports information production but also subvert the traditional consumption landscape of sports information[1]. These technology-driven changes transform sport communication from merely a one-way delivery of information into a complex, multi-subject field of co-creation and interaction.

Sport language, as the core symbolic system for constructing the meaning and experience of sport , is undergoing a paradigm shift in its modes, structure, and effects of communication amidst the digital wave. In the traditional media era, sport language communication primarily exhibited characteristics of being "one-way, linear, and elitist"—exemplified by traditional sports news reports and professional commentary, where the information flow radiated from authoritative institutions to the public, and the audience was in a relatively passive receiving position. However, this communication structure is being completely broken in the digital age.

The core research question of this paper is: How exactly does digital technology transform the traditional "one-way, linear, and elitist" structure of sport language communication into a new one characterized by "discreteness, interaction, and empathy"? This transformation is more than just a change in the communication medium; it is a redefinition and reconstruction of the inherent meaning of sport. McLuhan's "the medium is the message" theory suggests that the technological medium itself, rather than its content, is the core shaper of social forms and human experience[2]. Therefore, the focus of this paper is on how the "medium" of technology—when the presentation of sport extends from the TV screen to immersive VR broadcasts, and from news articles to instantaneous community "bullet screens"—changes how core elements of sport, such as the body, competition, rules, and uncertainty, are defined, described, and understood.

This study aims to explore the inherent logic and external morphological changes in sport language communication, driven by digital technology, from an interdisciplinary perspective of sport studies and communication studies. This paper focuses on the empowerment of interaction and co-construction by technology: technology, as the infrastructure, activates the audience's embodied communication and emotional expression in sporting events, forming a communal frenzy and emotional resonance, exemplified by Randall Collins' "Interaction Ritual Chains"[3]. Simultaneously, drawing on Manuel Castells' "Network Society" theory, this study will explain how the production and consumption of sports information become decentralized, forming a multi-centered, multimodal, and discrete communication network[4].

The significance of this research lies in three aspects: First, it provides a theoretical analysis framework that goes beyond simple technological enumeration, utilizing media sociology theories to deeply analyze the profound impact of digital technology on sport language communication. Second, by analyzing the latest typical cases, such as AIGC applications in the 2024 Paris Olympics, virtual commentary in e-sports, and the "fandomization" of sports communities, it demonstrates the multimodal and emotional labor char-

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acteristics of digital age sport communication. Third, the research maintains a focus on the essence of sport, emphasizing how technology and human interaction co-construct new sporting experiences within the specific context of sports events, such as outcome uncertainty and physical confrontation. This avoids the pitfalls of "technological determinism" and thus deepens the understanding of the essence of sport in the digital communication era within Chinese core sport studies journals.

2 Symbolic Reconstruction—New Modalities of Sport Language Driven by Technology

Digital technology is not merely a pipeline for transmitting sports information; it is a powerful driver for the reconstruction of the sport symbolic system and language modalities. This section delves into how sport language, against the backdrop of the technological revolution, is evolving from traditional purely textual or vocal narratives into a new multimodal language ecology characterized by data, immersive experience, and fragmented symbols. This essentially answers the core question: "The communication medium has changed, what does the language look like?".

2.1 Data Visualization and Quantitative Narrative

In the digital age, data is no longer just a simple record or supplementary evidence of sports event results; it has become a data language with independent narrative capability. The deep integration of high-precision sensor technology and big data analytics allows the complex actions and tactical decisions on the sports field to be quantified and visualized in real-time. The core of this quantitative narrative is reflected in the linguification of technological judgments and the narrative power of advanced data : the application of "Hawkeye" and VAR (Video Assistant Referee) systems converts originally ambiguous human judgments into precise geometric data and visual trajectories, establishing a mainstream language authority that transcends the human eye. Simultaneously, advanced statistics such as xG (Expected Goals) in football and RPM (Real Plus-Minus) in basketball transform athlete performance into calculable probability and efficiency indicators. These form new professional narrative texts capable of a deeper, more logical "commentary" on the game, changing the traditional commentary mode that relied solely on experience and emotion. The rise of data language provides sports narratives with higher objectivity, precision, and universality, yet it also presents a challenge to traditional empirical understanding.

2.2 Immersive Technology and Embodied Language Experience

Immersive technologies such as VR/AR, holographic projection, and Metaverse sports are breaking the constraints of the two-dimensional screen, shifting sport language communication toward a new dimension that emphasizes "presence" and "embodied communication". Language is no longer just a passively heard description, but rather an interactive instruction and perceptual feedback tightly integrated with physical actions. In VR/AR viewing scenarios, the audience can move in virtual space and interact with virtual objects, where the expression and reception of language are deeply coupled with the body's sense of presence. The audience is no longer "watching" the game but "experiencing" it. Furthermore, taking the smart fitness mir-

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ror as an example, its core communication language is an instructional, feedback-oriented, and motivational embodied language. The virtual image of the coach interacts with the user's physical movements with high-frequency, precise real-time voice and action demonstrations. This language mode directly acts on the user's body, embodying the "performative" characteristic of language within a technological medium—i.e., language is action[5]. Immersive technology shifts language communication from symbolic reference to physical perception, requiring the communication language to be more intuitive, immediate, and environmentally adaptive.

2.3 Language Fragmentation and Memeification under the Logic of Short Videos

Short video platforms, represented by TikTok/Douyin, with their algorithm-driven, high-frequency stimulation communication logic, have reshaped the language ecology of sports commentary and critique. The length, structure, and rhythm of traditional sports narratives are thoroughly subverted, and language exhibits a marked tendency toward fragmentation and memeification. Complex tactical analysis is compressed into highly refined "golden phrases" or "memes" ("geng"), which possess strong replicability, contagiousness, and emotional arousal power. These memefied short phrases quickly spread within communities, becoming a jargon for rapid communal identity recognition. Simultaneously, short videos emphasize "visual intensity" and "emotional flashpoints," where sport language often appears as background sound, title, or bullet screen. Its function shifts from deep explanation to emotional rendering and visual guidance. This leads to the deep dissolution of sport language—the neglect of complex contexts and historical backgrounds—but also brings about breadth explosion—achieving mass participation by lowering the threshold of understanding. This fragmented and memefied language mode is an inevitable result of the acceleration of information[4] and emotional resonance[3] in the network society, profoundly influencing how the public remembers and understands sporting events.

3 Mechanism Transformation—The Interactive Logic from Broadcast to Dialogue

The most fundamental transformation in the digital age lies in the communication mechanism shifting from the traditional one-way "broadcast" model to a complex interactive logic centered on "dialogue" and "interactive co-construction". This section will focus on how technology reshapes the pathways and structure of sport language communication, addressing the question of "The communication path has changed, how do we communicate?" , emphasizing the technological empowerment of the interaction among people, content, and machines.

3.1 Bullet Screen Culture and "Accompanying" Text Production in Sports Events

The rise of real-time interactive technology, especially "bullet screen" (danmu) culture, has completely changed the relationship between the audience and sporting events. As a mechanism for accompanying text production, the bullet screen transforms the audience from passive information receivers in the traditional sense into subjects who simultaneously produce discourse with the game, commentators, and peers. In live

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sports broadcasts, the bullet screen forms a unique phenomenon of instantaneous communal frenzy : the audience's real-time expressions of emotion, professional comments, or even playful mockery collectively construct a "second scene" distinct from the official commentary. This unofficial, decentralized interpretation system challenges the authority of traditional commentators. Furthermore, the immediacy and group synchronicity of the bullet screen provide a superb digital-age example of Randall Collins' "Interaction Ritual Chains" theory[3]: thousands of viewers simultaneously emitting the same cheers or regrets on the same screen, forming a high degree of collective emotional resonance and a shared focus of attention, which is essentially a digitized collective frenzy ritual. Moreover, the audience converts their emotions, knowledge, and judgments during the viewing process into visible text via the bullet screen, reflecting the audience's characteristic of engaging in emotional labor on digital media—investing emotional resources to maintain community interaction and enhance the viewing experience.

3.2 Algorithmic Recommendation and Stratified Discourse Resonance

Algorithmic technology, as the core mechanism of content distribution, profoundly influences the communication pathways and community structure of sport language. The algorithm achieves precise content pushing by deeply profiling users' historical behavior and interest tags. This mechanism change brings two core consequences: First, within the "information cocoons" ("xinxi jianfang"), sport language exhibits a high degree of homogeneity. The algorithm tends to push sports content the user already likes (e.g., specific teams, athletes), leading users to be immersed in customized information streams. Jargon, "insider language," and emotional expressions within the stratum are constantly reinforced, forming powerful discourse resonance. Second, when the interpretations and emotional expressions of sporting events from different strata are isolated and reinforced by the algorithm, it easily leads to severe language barriers and cognitive opposition (e.g., "mutual conflict" between fans of different teams). This phenomenon confirms Castells' discussion on "identity" and "exclusion" in the network society, where the network enhances the self-identification of specific communities while exacerbating the estrangement between them.

3.3 AIGC Intervention and the New Paradigm of Human-Machine Collaboration

The intervention of technologies represented by AIGC (Artificial Intelligence Generated Content) is ushering sport language communication into a new paradigm of human-machine collaboration. AI is no longer merely a tool for communication but participates as a co-producer of language. Sports news writing robots (such as Tencent Dreamwriter) can instantly capture game result data and quickly generate structured news text, greatly enhancing the efficiency and speed of reporting. AI commentators (such as virtual digital humans) can output fluent, neutral commentary language based on real-time game data. However, in sport communication, while this algorithm-generated language boasts efficiency, objectivity, and accuracy, human emotional language (e.g., a commentator's passion, humor, on-the-spot reactions) still possesses irreplaceable core value. The future trend lies in human-machine collaboration: AI is responsible for the rapid production of data and neutral information, while human commentators focus on providing emotional depth, professional insight, and humanized interaction. This collaborative model is key to avoiding "technological determinism," emphasizing that technology is the driver, but human interaction and emotion are the core value of sport language communication.

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4 Subject Reshaping—The Game of Discourse Power in a Decentralized Trend

The profound impact of digital technology is not only reflected at the symbolic and mechanism levels but also in the complete reshaping of the subject structure of sport communication. As communication power decentralizes, the discourse power traditionally monopolized by elite media begins to disperse among multiple subjects, triggering a complex game of discourse power. This section aims to address the crucial question of "Who is speaking?" , focusing on the acquisition and exercise of discourse power by different subjects, such as professional media, individual athletes, and grassroots fan communities, under technological empowerment.

4.1 Role Transition and Language Style Adaptation of Professional Media Practitioners

In the traditional television media era, sports commentators and journalists were the gatekeepers of professional discourse power, and their language style emphasized seriousness, objectivity, and authority. However, in the digital age, this role has been significantly challenged by self-media and grassroots KOLs (Key Opinion Leaders). Professional media practitioners are forced to undergo a "re-adaptation" of their roles and language styles. Their communication strategy shifts from relying on the platform advantage of their institution to relying on personal emotional appeal, achieving a transition from authority to IP (Intellectual Property). Consequently, their language style is no longer strictly bound by traditional news norms but shifts toward personalization, emotionalization, and even entertainment. Excellent digital-age sports commentators often achieve emotional resonance and viewer stickiness by creating "golden phrases," enhancing on-the-spot reactions, and expressing personal emotional leanings. This transformation reflects the professional subject's proactive adjustment to adapt to the "interactive co-construction" logic of the network society.

4.2 Athlete Self-Presentation and Direct Communication Mechanisms

The popularization of social media provides sports stars with a channel to bypass traditional media intermediaries and communicate directly with the public, achieving a flattening of the communication subject structure. The discourse power of athletes has been unprecedentedly empowered. Athletes use platforms like Weibo and Instagram to post daily training routines, post-game thoughts, and even private life details, directly constructing their first-person narrative. This language, unfiltered by the media, possesses a high degree of authenticity and immediacy, profoundly changing the public's perception of their image, transitioning from a symbolized hero shaped by traditional media to a three-dimensional individual. However, the athlete's direct voice mechanism also triggers a game of discourse power. Tension arises between the athlete's self-statement and media reports when the athlete posts views that contradict media coverage. While this direct communication mechanism allows the public to get closer to the source of the sporting event, it also subjects the athlete to immense public pressure with every utterance, necessitating greater language risk management.

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4.3 Fan Community's Textual Poaching and Semantic Reconstruction

In the digital age, fan communities are no longer silent consumers but active text producers through technological tools. Their discourse power is primarily realized through "textual poaching" and "semantic reconstruction" of official texts[6]. Fans utilize short video editing software, image processing tools, and other technologies to "poach" officially released sports event clips and commentary audio, and then recreate them in the form of secondary creation videos, fan fiction, and memes. These textual products often carry subversive, entertaining, or emotional interpretations, sometimes even ironically deconstructing the official narrative. This act of semantic reconstruction, based on communal consensus, forms a powerful grassroots discourse field that can sometimes surpass the influence of official media. For instance, the popularization of a specific athlete's "meme" or "insider language" often originates not from official media but from the collective wisdom and high-frequency interaction of the fan community. This demonstrates the decentralization trend emphasized by Castells[4], where power shifts from institutional centers to network nodes in the network society.

5 Risks and Reflection—Ethical Scrutiny of Digital Sport Language Communication

5.1 Emotional Polarization and Cyber Language Violence

The interactive mechanisms of digital technology and the logic of algorithmic distribution, while amplifying emotional resonance in sports communities, also serve as a breeding ground for emotional polarization and cyber language violence. Sporting competition inherently possesses the opposition of winning and losing and a strong sense of identity. The real-time commenting and anonymity mechanisms of social media can easily escalate this oppositional emotion into irrational language attacks. Under stratified discourse resonance[4], language violence such as regional attacks and gender discrimination targeting referees, athletes, and even different regions or genders is rampant, harming the healthy ecology of sport communication. This language violence not only reflects the anonymous anomie of the internet sphere but is also exacerbated by algorithmic recommendation mechanisms that often prioritize pushing controversial, highly emotionally inflammatory content, further accelerating the speed and breadth of opposition and hate speech spread between communities.

5.2 Deepfakes and the "Post-Truth" Dilemma of Sports Truth

Deepfake technologies, represented by AI face-swapping and voice synthesis, pose an unprecedented challenge to the authenticity of sport communication. These technologies can generate highly realistic fake images and audio, which could be used to create fabricated statements by athletes, tamper with key game footage, or concoct breaking news. This plunges sports information communication into a post-truth dilemma : the public's trust in information is no longer based on the objectivity of facts but on emotion and belief. When the visual and auditory symbols of embodied communication can be easily forged, the chain of evidence and the principle of authenticity relied upon by traditional sport communication are thoroughly

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shaken. This represents a major ethical threat to the ontology of sport, which is centered on rules, objective facts, and outcome uncertainty.

5.3 Technological Alienation and the Hidden Concerns of Humanistic Spirit

Over-reliance on data and technological language for sports narrative may lead to the alienation of the humanistic spirit inherent in sport. Although data visualization and quantitative narratives (such as xG) enhance the precision of sports analysis, if competition is completely reduced to cold numbers and algorithmic models, it may weaken the perceptual values contained in the essence of sport —for instance, the athlete's spirit of struggle, the team's will to collaborate, persistence in adversity, and the human effort to transcend one's own limits. When AIGC attempts to replace human commentators, outputting completely objective language that lacks emotional fluctuation, the emotional investment and empathy required in the "Interaction Ritual Chains"[3] become difficult to achieve. The risk of this technological alienation is that it might push the process of sport mediatization[7] to an extreme, where the logic of the medium (efficiency, data) overrides the logic of sport itself (humanities, emotion) , ultimately causing sport language communication to lose its most fundamental value—connecting hearts and inspiring collective emotional meaning.

6 Conclusion

This study focuses on how the technology drivers of the digital age (AIGC, Big Data, VR/AR) profoundly reshape the symbolic, mechanism, and subject structures of sport language communication. Through theoretical analysis and observation of phenomena, this paper summarizes the two core trends of digital age sport language communication : technology empowers the efficiency and experience of communication, while interactive co-construction reshapes the structure of communication power.

At the symbolic level, sport language evolves from a single, homogeneous text/voice toward multimodality ; data visualization and memeification realize the quantification and fragmentation of the narrative, while embodied communication breaks through the constraints of two-dimensional space through immersive technology. At the mechanism level, the communication logic shifts from broadcasting to dialogue; "bullet screen" culture constructs a polyphonic frenzy in the style of the Interaction Ritual Chain, and algorithmic recommendation, while achieving precise distribution, leads to the stratification of discourse into echo chambers. At the subject level, traditional media authority is deconstructed ; the athlete's first-person narrative and fan community's textual poaching challenge the dominant discourse. However, the risks associated with this transformation—such as emotional polarization, the post-truth dilemma, and the technological alienation that may arise from over-reliance on technological language—pose challenges to the healthy development of sport communication. This further confirms Castells' complex assertion about the "Network Society": technology is both a force for liberation and a potential structure of control.

Looking ahead, the development trend of digital age sport language communication will no longer merely be technological upgrades but more importantly, the harmonious reconstruction of the relationship between humans and technology, and between humans and humans. This paper calls for the establishment of a "humanistic" digital sport communication perspective , the core essence of which is to seek a dynamic balance between technological rationality and the humanistic spirit.

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