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Disruption and Reconstruction: The Development of Visual Rhetoric in Data Journalism (Postprint)

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Abstract

【Purpose】To investigate the four visual rhetorical production modes of data journalism—temporal rhetorical mode, spatial rhetorical mode, interactive rhetorical mode, and technological rhetorical mode; to dissect the practical application dilemmas of data journalism; to summarize strategies for its future development; and to facilitate its innovative advancement.

【Method】 This study employs visual rhetoric theory to explore the four visual rhetorical production modes of data journalism, utilizes a progressive, layer-by-layer analytical approach, and incorporates case study methodology to analyze the four distinct modes, thereby identifying practical application dilemmas and proposing breakthrough strategies for real-world implementation.

【Results】 Analysis reveals that the practical application dilemmas of data journalism manifest as evasion of crucial issues in reporting methods, uniformity in content presentation, and pursuit of ostentatious novelty in chart design.

【Conclusion】The optimization strategies for future data journalism development are summarized as follows: emphasizing technical contemplation in visual form, achieving content innovation in visual content, and pursuing aesthetic regularity in visual rule creation.

Full Text

Preamble

ChinaXiv Cooperative Journal | Subversion and Reconstruction: A Study on the Development of Visual Rhetoric in Data Journalism (Guizhou Normal University, Guiyang, Guizhou 550000)

Abstract

This study aims to explore four visual rhetoric production modes in data journalism—temporal rhetoric mode, spatial rhetoric mode, interactive rhetoric mode, and technical rhetoric mode, analyze the practical application dilemmas of data journalism, summarize strategies for its future development, and facilitate innovative growth in the field. The methodology employs visual rhetoric theory to investigate these four modes, utilizing a progressive, step-by-step analytical approach integrated with case study methodology to dissect each mode, identify practical application dilemmas, and propose barrier-breaking strategies. The analysis reveals that data journalism' s practical dilemmas lie in evading crucial issues in reporting methods, presenting homogenized content, and pursuing novelty for its own sake in chart design. The study concludes that optimization strategies for data journalism' s future development should emphasize technological considerations in visual form, innovation in visual content, and pursuit of aesthetic principles in visual composition.

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Data journalism has currently subverted and reconstructed traditional news production models, becoming the most popular form of news reporting. Centered on specific news topics, data journalism comprehensively employs various visual symbols including text, images, and color to construct visual, three-dimensional, and multidimensional visual texts based on the relevance between topic content and corresponding data. Current data journalism production modes primarily rely on visual rhetoric for innovative creation. Visual rhetoric refers to the use of rhetorical methods to enhance the persuasiveness of visual texts, employing color, images, fonts, and visual layout to convey effective messages. Visual rhetoric represents the "internal perspective" of visual studies, emphasizing visual media texts, spatial texts, and event texts as rhetorical objects [1][2]. In the "visual era," the visualized reading method of data journalism has brought transformation to the news industry, consequently drawing attention from content producers to visual rhetoric theory. This paper, based on visual rhetoric theory, identifies four primary rhetorical modes in data journalism production.

1. Production Modes of Visual Rhetoric

Data journalism transmits news value through data, expanding news production through visual rhetoric, data storytelling, visualized texts, and interactive

extension. The perspective on visual rhetoric modes in this paper draws inspiration from Professor Liu Tao' s research on the application of "visual frameworks" in Western data journalism coverage of China-related reports [3]. Based on this, the author synthesizes rhetorical practices from both Chinese and Western data journalism to summarize the main rhetorical modes [4].

1.1 Temporal Rhetoric Mode

Temporal rhetoric emphasizes the aesthetic of order in timelines. It can achieve dual communication of aesthetic value and value transmission by selecting timely data and presenting it in an orderly fashion along a timeline, thereby enhancing audience cognition and preference for visualized text content. The adoption of timelines enables visualized narratives to display the causes, processes, and conclusions of news events within a specific period, deeply summarizing patterns. The rational use of color coordination aligns with audience viewing habits [5]. A visualized temporal flowchart can simplify complex and redundant news event information, deepening rational audience thinking. For instance, in Economic Daily's data journalism piece "Numbers Speak for 70 Years,"creators divided the timeline into X and Y axes: the X-axis presents the specific magnitude of China's total export commodity categories, while the Y-axis presents the timeline from 1980-2018 for these totals. Different time periods for export categories such as machinery and transport equipment, miscellaneous products, light textile products, and rubber/mineral products are distinguished using dark blue, light blue, and light yellow, enhancing readers' perceptual understanding of China' s total export commodity categories from 1980-2018 while eliminating redundant information. This achieves the intuitive effect of "a picture is worth a thousand words," visually reproducing China' s export commodity category totals over seven decades. Readers can also predict future development trends through direct data trajectories.

[Figure 1: see original paper] Screenshot of Economic Daily Data Journalism "Numbers Speak for Seventy Years: Foreign Trade"

1.2 Spatial Rhetoric Mode

Spatial rhetoric's advantage lies in integrating various data to endow charts with vivid visualized forms. Spatial rhetoric is primarily manifested in the frequent use of data maps, which can integrate scattered data points and differentiate various data types through color symbols, mathematical symbols, and graphic symbols to achieve spatial rhetorical meaning. The matching and arrangement among these symbols constitute the logic of visual rhetoric. For example, in Economic Daily' s data journalism "Numbers Speak for 70 Years: Major Projects," creators selected achievements in water transport, land transport, and air transport infrastructure to visually map China' s 立体 transportation hub network across more than 9.6 million square kilometers. In the specific case of "High-speed Railway Network," creators first used Chinese red color-coding to create a visual map with grand national imagery, connecting east, west, north, south,

and central China through transportation hub network symbols. The entire data journalism layout centered on China' s "rooster" map shape, occupying two-thirds of the page. Second, specific data such as 30,000 kilometers were supplemented in the data analysis to deepen reader understanding. Finally, digital comparison with other countries demonstrated China' s differences in major project construction, subtly constructing a national image in readers' minds.

1.3 Interactive Rhetoric Mode

Interactivity is primarily manifested in video-based data journalism, which mainly employs two methods: "screen scrolling" and "self-clicking." These methods enhance audience participation, imagination, and user stickiness while strengthening reading interest. Interactivity represents a differentiation point for competing in the same news track and constitutes another rhetorical mode that distinguishes data journalism. Interactive news communication transforms traditional news reception methods, using excellent visualized interactive delivery to implant the context, emotions, and values of news events into users' immersive experiences. In terms of value integration, interactive rhetoric embedded positive anti-pandemic concepts and emotional care into COVID-19 data journalism reporting. During the pandemic, data journalism also captured moving and historical moments. Through visualized processing of data visualization, it implanted the positive anti-pandemic spirit of "life first, national solidarity, self-sacrifice, respect for science, and shared destiny" into audiences [6]. Additionally, data journalism contributed significantly to real-time pandemic reporting. The award-winning work "The Long March" in the China News Award employed immersive interactive rhetoric, using interactive technology to help readers experience the arduous journey of revolutionary predecessors. In this thematic data journalism piece, creators designed videos and maps [7], immersing users in the process of reading the Long March through numbers. Through rhetorical composition of visual elements, it conveyed the nobility of Chinese soldiers' spirit and the greatness of the Long March spirit, successfully constructing a grand narrative theme of collective memory and a data journalism work symbolizing national spirit.

1.4 Technical Rhetoric Mode

Appropriate coordination between technology and design can make numbers "come alive" and "move." In the "Numbers Speak for 70 Years" data journalism visualization short video series, creators employed data graphics including line charts, tree maps, and bubble charts, utilizing data modeling and integrated multimedia production techniques to transform static numbers into dynamic videos, providing users with the most intuitive visual impact. The use of technical rhetoric is mainly manifested in the evolution from static to dynamic data, with technology providing support for data journalism visualization [8], enabling users to move from simply viewing news to deep reading, thoroughly understanding news event details, and creating a visualization bridge that derives multiple

forms of data journalism visualization and enriches audience visual experience. Technical rhetoric adoption is reflected in three dimensions: first, visualizing links between news events and same-layer data; second, linking news events to expand cases; and third, dynamic presentation for immersive reading [9]. Notably, the first-prize winner of the 30th China News Award for Media Convergence, the "Numbers Speak for 70 Years" data journalism visualization short video series, created a premium report from six dimensions: consumption, diet, major projects, digital economy, ecology, and foreign trade, showcasing the glorious achievements of the 70 years since the founding of the People' s Republic of China. This premium data visualization series was not a flashy pile of images but combined technology, aesthetics, design, and narrative to tell China' s growth story. It fully utilized data clues to find and analyze data, stringing data content into vivid, interesting stories displayed on a timeline. Upon clicking the video, dynamic data combined with graphics, color, and in-depth commentary elevated the presentation mode. This was made possible by the strong data technology team behind the data journalism. Chief creator Wang Lin shared: "The 'Numbers Speak for 70 Years' series unearthed massive amounts of data, effectively using nearly 100 datasets containing about 1,000 data groups. Then, supported by technology and supplemented by data timelines, it dynamically reflected development and changes in consumption, diet, and other fields through variation and comparison." For example, when displaying changes in people' s diets, linking different dimensions of data such as staple food proportions, main crop self-sufficiency rates, and per capita availability of meat, eggs, vegetables, and fish gave numbers vitality and relevance to people' s daily lives.

[Figure 2: see original paper] Screenshot of Economic Daily Data Journalism "Numbers Speak for Seventy Years: 'Food' Era Changes"

2. Application Dilemmas of Data Journalism

The transition from traditional journalism to data journalism demonstrates a spiral upward trend in news production models, yet data journalism' s application dilemmas are gradually becoming prominent, increasingly influenced by technical factors. Data journalism and digital technology complement each other, but excessive technology abuse leads to homogenized content presentation and novelty-chasing in chart design. Addressing the practical dilemmas brought by imbalanced technology use, the author elaborates from the following aspects.

2.1 Reporting Methods: Evading Crucial Issues

Procedural reporting methods in data journalism can easily lead data journalists to make subjective assumptions and evade crucial issues in content reporting, resulting in data journalism remaining at a superficial level of data analysis. Such reporting lacks depth, leaving readers knowing only "what happened" without understanding "why it happened." For instance, NetEase Data Reading' s piece "GDP Drops Out of Top Ten, But This City 反卷 First Place" examines Tianjin, which ranks outside the national top ten in GDP. Using data charts to

explain this "Northern Second City,"the creator presents a contrasting viewpoint in the 内卷 era: "Why keep struggling? Isn' t living a few more years better than anything?" This reporting method merely stays at the level of truthful, objective, and brief reproduction of events, satisfying only shallow reading for ordinary people and demonstrating insufficient news value.

2.2 Content Presentation: Homogenization

Data journalism' s presentation methods feature monotonous and homogenized visualized data charts, creating a dull and boring reading experience that causes audiences to lose interest and prevents information from reaching their cognitive level. The singularity of data chart presentation is manifested in the traditional and outdated "information chart + minimal text" approach, which generates aesthetic fatigue among the public. For example, NetEase Data Reading' s "The Explosive Popularity of New Oriental Live Streaming: Praise to Death or Lifeline?" reported on New Oriental' s stock market highlight moment on June 16, 2022, using the conventional minimal text + information chart method—a model too commonplace for audiences and already causing aesthetic fatigue. In summary, the homogenized presentation of data journalism lies in the lack of advanced information graphics (treemaps, heatmaps, word clouds, bubble charts, maps, etc.) and components (audio, video, files, web pages, timeline, dynamic text).

[Figure 3: see original paper] NetEase Data Reading "The Explosive Popularity of New Oriental Live Streaming: Praise to Death or Lifeline?"

2.3 Chart Design: Novelty for Novelty' s Sake

Overly novel and complicated visualized data charts create comprehension difficulties for audiences, leading to a comprehension gap and communication barriers in data journalism dissemination. As data journalism production teams' hardware and software improve, the "high-end" data chart presentation creates reading obstacles. For example, Caixin' s award-winning work "Penetrating Anbang' s Circular Capital Injection Truth" uses an "analogy model" to reproduce complex data journalism through charts, exposing how Anbang used insurance funds to cyclically amplify capital. This data journalism piece is difficult for ordinary viewers to comprehend, indicating that news producers have an imbalanced technology application, with overly technological graphic presentation creating a comprehension gap for the public.

[Figure 4: see original paper] Screenshot of Caixin' s "Penetrating Anbang' s Circular Capital Injection Truth"

3. Optimization Strategies for Data Journalism

In response to the application dilemmas in data journalism' s form and content, the author focuses on how to operate, design, and construct visual symbols in

form and content within the new media context. The author also attempts to apply Gestalt creative principles to propose optimization strategies for data journalism' s reproduction from three aspects: visual form, visual content, and visual principles.

3.1 Visual Form: Technological Considerations

In data journalism' s formal creation, it is necessary to present the beauty of data journalism: first, in terms of formal principles, emphasize smoothness and reject "coolness." Simple, fluid animations are more life-like than flashy effects. Data journalism motion effects should adopt a "minimalist" style consistent with color schemes. In detail settings, when the page scrolls to a data chart, the image should switch promptly, and the next page' s characters should gradually appear within the subsequent second, conforming to the human "visual persistence principle" to ensure audience attention focuses on key graphics and text, enhancing interaction between content and audience. Data journalism production should not blindly pursue technological "beauty" and become disconnected from the public. From technological beauty to content reflection, it requires rational technology use, grasping technology' s boundaries in journalism to avoid news distortion. Only through rational technology presentation of historical, realistic, and predictive news reporting can data journalism develop in the right direction. Data journalism visualization presents two categories: first, simply converting data into charts with low technical requirements, ranging from basic Excel to advanced BI tools, mainly including line charts, word clouds, simple charts, bar charts, pie charts, coordinate graphs, maps, and interactive dynamic charts [11]; second, visualizing data into vivid videos with high technical requirements, using 5G+AI audio-visual analysis, 3D animation, virtual characters, and virtual scenes combined with subtitles, symbols, audio, and video elements in cross-combinations. Simple charts do not create data comprehension gaps, while high-tech data journalism overly pursuing technological sophistication can create data divides, requiring attention to technology' s boundaries and scale. For example, Xinhua' s 5G Rich Media Laboratory' s 5G+AI audio-visual analysis data journalism "Resonance Moment" rationally employs high technology, using specific acoustic event detection technology to present data journalism. In the first part of the audio-visual analysis display, the statement "Life first, this is a cost that must be borne and is worth paying" received the highest applause energy value. The report won applause five times for COVID-19-related content. The final statement, "To unremittingly strive for building our country into a prosperous, strong, democratic, civilized, harmonious, and beautiful socialist modernized power and realizing the Chinese Dream of the great rejuvenation of the Chinese nation," won the longest applause at 16.8 seconds. The sustained applause represents not only approval and recognition but also expectation, demand, and urging. In the second part of the AI analysis display, the government work report' s second section from "absolutely no misappropriation allowed" to "governments at all levels must truly live tight" to "every penny must be used where it is most needed" won

three rounds of warm applause.

[Figure 5: see original paper] Screenshot of Xinhua 5G Rich Media Laboratory' s "5G+AI Audio-Visual Analysis Data Journalism: Resonance Moment"

3.2 Visual Content: Content Innovation

Data journalism should fully utilize "data" visualization to tell stories, grasping reasonable scales to provide audiences with good reading experiences. It should simultaneously learn from international frontier cases to maintain internationalized innovation. In data journalism' s content creation, it is necessary to fully adopt Gestalt creative principles and integrate international frontier interactive concepts, such as learning The Guardian' s crowdsourcing concept—an important production method for interaction between The Guardian and its audiences [10]. This involves releasing raw data publicly, providing open-source software, and disseminating production tutorials to encourage users to independently analyze data, interact, and conduct news narratives, ultimately feeding data back. This concept lies in journalists adopting reverse thinking, with media providing data and audiences producing independently. Another example is BBC' s user self-search concept, an interactive innovation that starts from user needs, providing databases for readers to conveniently search and share information. For instance, in BBC' s typical case "World of 7 Billion: Which Number Person Are You?" users input their birth date to discover their birth number among all people and can share this interesting program through social media, effectively using topics of public interest for timely and sufficient interaction.

3.3 Visual Principles: Aesthetic Laws

Data journalism's overly novel and complicated presentation creates imbalanced technology use proportions. Technology should serve content, not dominate it. To produce news works that the public enjoys, one cannot one-sidedly pursue technologically esoteric sophistication but must align with popular aesthetic tastes.

First, data journalism' s visual principle creation requires understanding the aesthetic composition laws of data journalism: (1) Color—the foundation of data journalism form matching; (2) Layout—the eternal theorem of form organization; (3) Harmony—rationally distributing "complex yet not chaotic" data; (4) White space— "between presence and absence" and "virtuality generating white space" ; (5) Focus—the visual theme of data journalism; (6) Curves—visual extension; (7) Timeline—ordering and "connecting" data charts.

Second, data journalism's visual principle creation requires understanding mainstream data journalism visualization categories. The article is divided into three logical levels: exploration of data journalism phenomenon-level production modes, research on problems behind phenomenon production, and optimization suggestion research addressing data journalism production issues. Using a step-by-step analytical method, the article explores data journalism' s

visual rhetoric production modes, analyzes its practical application dilemmas, and summarizes strategies for future development to facilitate innovative growth in data journalism. Furthermore, data journalism development should enhance multidimensional integration between visual form and content depth.

Note: Figure translations are in progress. See original paper for figures.

Source: ChinaXiv —Machine translation. Verify with original.