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Media Studies: From Historical Contributions to AI development and Its Application Usage

Abdelmounam Reggaz[1], **Nesrine Boutarous** [2]**& Abdallah Roubi**[3,*]

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Abstract: **Purpose:** This study investigates the bilateral relationship between Media and Communication Sciences and Artificial Intelligence (AI) across three main axes. The first axis summarizes the key historical contributions of media and communication models and theories to the development of machine science, leading up to what has been known since the 1950s as Artificial Intelligence. The second axis outlines the primary outcomes of the relationship between smart communication applications and scientific theories, specifically regarding the synthesis of communication thought and technology. The third axis summarizes the practical aspect, highlighting the correlational relationship mathematically. **Methodology:** The study adopted the descriptive-analytical approach, describing the outputs of a purposive sample of communication theories and models which preliminary sampling indicated were linked to AI indicators, alongside a theoretical presentation tracing their historical evolution and partial contributions to the cumulative scientific knowledge that led to this new communication paradigm. Mathematical correlations were then analyzed in the practical segment of the study, aligning with the flexibility of the survey method. **Results:** The analysis revealed that linguistics, followed by psychology, and then communication sciences are the fields that contributed most to the development of artificial intelligence, whereas communication sciences benefit primarily from its applications. Furthermore, correlations exist between various traditional theories and models and AI applications, as embodied by algorithms. **Conclusion:** The findings indicate that cumulativity is the most prominent characteristic defining the evolution of artificial intelligence, and that the research focus on simulating human intelligence has historically remained central to this development. **Recommendations:** Because human intelligence and human phenomena require an interdisciplinary framework for a comprehensive understanding, the study recommends conducting interdisciplinary research, particularly bridging mathematics, computer science, and humanities.

Keywords: Scientific Theory, Human Intelligence, Artificial Intelligence, Media Research, Intelligent Media Applications.

الدراسات الإعلامية: من الإسهام التاريخي في تطوير الذكاء الاصطناعي إلى استخدام تطبيقاته

عبد المنعم رقاز[1]، نسرين بوطاروس [2]، روبي عبدالله[3،*]

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الملخص: الهدف: تبحث الدراسة العلاقة الثنائية بين علوم الإعلام والاتصال والذكاء الاصطناعي، من خلال استعراض ثلاث محاور. حيث يلخص المحور الأول أهم الإسهامات التاريخية لنماذج ونظريات الإعلام والاتصال في تطوير علم الآلة، وصولا إلى ما عرف منذ الخمسينات بالذكاء الاصطناعي. بينما يتضمن المحور الثاني أبرز مخرجات العلاقة بين التطبيقات الاتصالية الذكية والنظريات العلمية خاصة على مستوى التوليف بين الفكر الاتصالي والتقنية، ويلخص المحور الثالث الجانب التطبيقي الذي تبرز فيه العلاقة الارتباطية رياضيا. **المنهجية:** اعتمدت الدراسة المنهج الوصفي التحليلي حيث تم وصف مخرجات عينة قصدية من نظريات ونماذج الاتصال التي بينت المعاينة الأولية ارتباطها بأحد مؤشرات الذكاء الاصطناعي مع عرض نظري وفق التطور التاريخي والمساهمات الجزئية في التراكمية العلمية المؤدية لهذا النموذج الاتصالي الجديد، ثم تحليل الارتباطات رياضيا في الجانب التطبيقي للدراسة وهو ما يتوافق مع مرونة المنهج المسحي. **النتائج:** تبين من خلال التحليل أن اللسانيات ثم علم النفس ثم علوم الاتصال هي أكثرد المجالات مساهمة في تطوير الذكاء الاصطناعي بينما تستفيد علوم الاتصال بالدرجة الأولى من تطبيقاته، حيث توجد ارتباطات بين مختلف النظريات والنماذج التقليدية مع تطبيقات الذكاء الاصطناعي تجسدها الخوارزميات. **الاستنتاجات:** تبين أن التراكمية هي أهم سمة طبعت تطور الذكاء الاصطناعي، وأن الانشغال البحثي القائم على محاكاة الذكاء البشري لم يفارق هذا التطور تاريخيا. **التوصيات:** ولأن الذكاء الإنساني والظواهر الإنسانية تحتاج إلى تحاقل علمي للإحاطة بجوانبها، توصي الدراسة بالأبحاث البينية خاصة بين الرياضيات والإعلام الآلي والعلوم الإنسانية.

الكلمات المفتاحية: النظرية العلمية، الذكاء الإنساني، الذكاء الاصطناعي، البحث الإعلامي، التطبيقات الاعلامية الذكية.

1 Laboratory of information and communication study mostaganem univercity (Algeria).
2 Laboratory of Media and Digital Media Studies (MESDIME) Oum El Bouaghi univercity (Algeria).
3 National Higher School of Computer Sciences (ESI), Oued-Smar, El-Harrach(Algeria).
* Corresponding author: a_roubi@esi.ds, orcid: https://orcid.org/0000-0003-3854-193X

1 كلية العلوم الإنسانية و الإجتماعية مستغانم، الجزائر.
2 كلية العلوم الإنسانية و الإجتماعية أم البواقي، الجزائر.
3 المدرسة الوطنية العليا للاعلام الالي، واد السمار، الحراش، الجزائر.
* الباحث المراسل: a_roubi@esi.ds

Introduction

The evolution of what has come to be known in media and scientific fields as Artificial Intelligence (AI) raises numerous questions, primarily aimed at understanding and analyzing its relationship with the cumulative knowledge of various sciences, with each science's contribution to its development, followed by the deployment and utilization of its technologies, among the most important sciences that have contributed to building this field, both epistemologically and technically, are mathematics, computer science, and other exact sciences, which is widely acknowledged.

However, the humanities and social sciences have also made significant contributions to this field, a fact often overlooked by many interested parties and specialists, while psychology contributed to analyzing and understanding the mechanisms of the human mind and decision-making processes, inspiring developers of intelligent machines, and linguistic sciences facilitated the processing and development of natural languages, which in turn inspired developers of intelligent machine languages (with the computer being their most important manifestation), philosophy further contributed by raising epistemological debates about the possibility of simulating human intelligence and embodying it through intelligent machines, as well as discussions about their humanization and ethics.

Not far from these fields of knowledge, media and communication studies, often encompassed by the above-mentioned sciences, have contributed to the development of the earliest manifestations of intelligent machines, their contributions in this domain continued, leading to the current form of what is known as artificial intelligence; while many researchers in media and communication sciences have narrowed this relationship to the intensive use of intelligent applications in media and communication fields.

This paper contrary to that view aims to emphasize the contributions of media and communication sciences to the development of artificial intelligence, particularly through their models and theories.

This is initiated by raising the following question: How have media and communication studies contributed to the development of artificial intelligence, and how have they benefited from it?

Several recent studies have attempted to establish the bidirectional relationship between media studies and artificial intelligence. (Sonni et al., 2024) conducted a bibliometric and content analysis of scientific work on AI in journalism, analyzing 331 articles from the Scopus database. Their findings reveal that interest in AI applications in journalism increased dramatically from 41 articles in 2019 to 122 articles in 2023, indicating growing scholarly attention to this relationship. (Chalikiopoulou et al., 2025) performed a scoping review on the role of generative AI in enhancing audience participation in journalism. They found that generative AI applications primarily serve to facilitate participation and engagement through personalization, accessibility, and interactive storytelling.

(Li et al., 2024) integrated Uses and Gratifications Theory with Social Cognitive Theory to understand user behavior in AI-enhanced social media. Their study found that perceived usability, reliability, and originality of GenAI, along with users' outcome expectations and satisfaction, significantly influence the intention to use AI-powered platforms. (Sichach, 2024) examined how AI applications, particularly recommender systems and large language models, reshape the agenda-setting process. The study found a

structural shift from traditional media institutions to algorithmic modes as primary agenda setters. (Zhong et al., 2025) investigated the Spiral of Silence phenomenon in large language model agents, finding that history and persona signals together produce strong majority dominance and replicate spiral of silence patterns in AI-mediated environments.

While these studies have significantly advanced our understanding of AI-media relationships, most have focused on how AI is applied to media activities rather than how media theories historically contributed to AI development. The present study addresses this gap by examining the cumulative theoretical contributions of communication models and theories to AI algorithms.

To address this question within a structured methodological framework, we present the following axes:

- The historical contribution of media and communication studies to the cumulative development of artificial intelligence.
- The use of artificial intelligence applications in communication and media activities.

Methodology and Tools

The study in its$ first axis, adopted a historical survey due to its importance in identifying the most significant references that address the bidirectional relationship between Ai and media and communication sciences. The documental analysis tool was specifically employed to serve qualitative analysis and achieve the intended objectives of this use, which is to reach the most important scientific documents that addressed this relationship in both fields, thereby understanding the nature of this relationship and transcending common hypotheses in some scientific fields about the emergence of artificial intelligence.

The adoption of this qualitative approach is justified from the researchers' perspective, considering the difficulty of conducting the study using quantitative methods Superficial knowledge among respondents and even some researchers about the interrelation between sciences often leads to superficial results since the respondent usually does not venture beyond their precise specialization.

Thus even distributing a questionnaire to a large number will not yield in-depth results regarding correlation between artificial intelligence and media sciences, with their branches and theories. Based on this, the researchers boldly chose the historical methodology combined with key tools, principally documental analysis and content analysis in the first axis.

Due to the abundance of these references the researchers limited themselves to citing them without presenting their contents within the study's main body. Practically scientific texts chronicling the relationship between artificial intelligence and media and communication sciences were reviewed and analyzed, including:

* Norbert Wiener's book titled Cybernetics and Control in the Animal and the Machine (Wiener, 1954): Analysis and critique of Wiener's ideas show that cybernetics and control science are the origin of intelligent systems.

* Shannon and Weaver's Mathematical Theory of Communication (Shannon & Weaver, 1949): Analysis revealed the relationship of communication models, particularly the mathematical model, measurement science, and precise sciences, in developing communication models over successive generations to their current state.

* Additionally, a review of Marshall McLuhan's Understanding Media (McLuhan, 1964),

* Armand Mattelart's History of Communication Theories (Mattelart, 2005),

* Assa Briggs' A Social History of Media (Briggs, 2002): From Gutenberg to the Internet, among others.

In the second axis adapt a survey methodology was used to describe the most significant communication theories and models that have contributed to artificial intelligence or benefited from it, followed by an attempt to determine the level of this contribution through analysis and critique of the intellectual structure of each theory or model in relation to AI applications.

The third axis focused on the applied aspects and carried out statistical analyses.

Selection Criteria for the AI Applications Sample

The 15 AI applications analyzed in the third axis were selected according to the following four criteria:
Relevance to Communication Elements: Each application must clearly serve one of the five core communication elements: Sender, Message, Medium, Audience, or Impact.
Documented Theoretical Link: Only applications with at least one peer-reviewed study (published between 2020 and 2025) linking them to a communication theory or model were included.
Industry Prominence: Applications were drawn from recognized rankings including Gartner Magic Quadrant, Forbes AI 50, and Statista's AI Applications reports to ensure market representativeness.
Functional Diversity: The sample intentionally includes diverse functions: content generation (e.g., ChatGPT, Canva AI), content recommendation (e.g., YouTube, TikTok), audience analytics (e.g., Hotjar, Sprout Social), and natural language processing (e.g., Grammarly, Google Translate).

The Historical Contribution of Media and Communication Studies to the Cumulative Development of Artificial Intelligence

Artificial Intelligence Concept

Artificial Intelligence (AI), as it is known in academic circles, refers to a collection of sciences and methods designed to replicate the ability to make predictions, recommendations, and decisions through machines, this capability impacts both real and virtual environments and is guided by a set of human-defined objectives.

AI is a method for programming a computer or robot to think in a way that simulates or approximates human intelligence. Consequently, the concept of AI is realized by understanding the mechanisms of the human brain and the requirements of human thought analyzing how people learn, make decisions and perform behaviors to solve problems. Thus, the goal of AI is to create machines that approach human intelligence: "understand, think, learn, and act like humans."

Despite AI applications relying on user data to learn, develop responses, and create content, most current AI applications based on analytical cognitive intelligence are weak and inferior to human intelligence, which draws upon emotional, social, and artistic creativity. However, some proponents of the evolutionary perspective believe that it will become closer to human intelligence in the coming decades (Bakpayev et al., 2022).

Researchers generally distinguish between three levels of the concept:

Narrow AI: At this level, the concept of AI focuses on a set of applications, techniques, and algorithms.

Broad AI (General AI): The definition at this level approaches AI as a system capable of

learning and acting intelligently across a wide range of data, associations, and commands.

Super AI: This level is aspirational, and its embodiment is still incomplete.

The definition of AI at this level methods it as a future system through which developers aim to apply AI in all fields and surpass human intelligence (Güngör, 2020).

Returning to the history of various sciences, Thomas Kuhn argues in his book The **Structure of Scientific Revolutions** that history produces crucial transformations in the way sciences exist today, which as he describes, captivate us, he emphasizes that the current form of sciences arises from scientific achievements that have already occurred, and that the task of the historian interested in the development of science is to identify the contributions of individuals who discovered each scientific truth, as well as to explain the errors that hindered the scientific accumulation of human inventions or prevented their progress (Kuhn & Hacking, 2012). Undoubtedly, AI, as a science rooted in the historical obsession with making machines think, did not emerge by chance, nor has it diverged from simulating human intelligence that has existed since time immemorial. Consequently, a cumulative nature has always accompanied its formative eras, shaping what it is today and what it will become in the future.

If we embrace the principle of cumulativity, which this paper advocates as a cornerstone in the development of artificial intelligence, then this principle largely refutes the opposing view that asserts AI emerged as a revolutionary invention all at once.

Therefore, in this section, we examine the historical contributions of media and communication sciences to the cumulativity of artificial intelligence.

While the relationship between media studies and artificial intelligence may seem distant on the surface, its roots extend deep into history; from the moment humans began to think about how to transmit and exchange information, media studies have been present to record, analyze, and interpret these developments up to the present era.

Therefore, this analytical effort respects the chronological progression leading to the development of artificial intelligence, viewing this science as cumulative and recognizing that it is illogical to assume it appeared suddenly.

Thus, the study seeks to demonstrate the contribution of the humanities, specifically media sciences, to the evolution of what is now known as artificial intelligence, through the fragmented role of models and theories within key paradigms.

Communication Models and the Formation of Intelligent Model Architectures

Discussing the contribution of media and communication sciences to Artificial Intelligence is impossible without reviewing the significant role of communication models in this field.

In communication studies, the model is defined as an attempt to illustrate the underlying relationships between the variables that make up a specific communication system, in a simplified and symbolic manner (Al-Ta'i, 2009).

The intelligent communication system's model has clarified its elements and identified its needs during human-machine interactions, Just as earlier models broke down the complex interactions of verbal, mass, and digital communication, this model employs a similar approach to simplify the interactions of intelligent or AI-enhanced communication.

Some models have simplified how humans communicate for AI developers, and also the

characteristics of how humans interact with intelligence that were later automated.

This has led to intelligent interaction models that are now widely recognized as a groundbreaking achievement, but differ from the actual, cumulative reality, The following are the most significant communication models that have historically contributed to the development of artificial intelligence:

Lasswell's Model: From Analyzing Communication Elements to Developing Recommendation Algorithms

One of the foundational contributions that media researchers might miss is the breakdown of the communication process into key five elements, this not only laid the groundwork for sub-disciplinary fields in media and communication sciences but also sparked the idea of matching content with the right audience through the right medium.

This is where algorithms for targeting and recommending media content to specific audience segments began to emerge, rooted in the relationship between the elements of the communication process.

Content Analysis and the Construction of Intelligent Systems for Language Understanding:

Not far from Lasswell's model, his methodological tool for analyzing the German propaganda helped reinforce the idea of suitable content for respective audiences. Consequently, content analysis, which Berelson considers a research technique aimed at the objective and systematic description of manifest communication content, involves extracting the meaning and characteristics of texts or messages, especially after the 1960s, it began to emphasize the contexts in which content is interpreted and was instrumental in developing the stages of analysis, including collection, categorization, quantification, and analysis (Laramée, 2009).

Furthermore, the growing demand for intelligence and intuition in understanding content meanings has strengthened its role as a key methodological tool. As a result, content analysis has played a part in refining the concept of gathering and categorizing content, which in turn has improved the operational principles of intelligent systems and applications that create media content based on specific categories of interest.

These applications include generating images, text, videos, and more.

One of the most recent studies that has linked content analysis to Ai is the study by Alem febri an All entitled: bibliometric and content analysis of the scientific work on Ai in journalism.

This study find based on data obtained from the Scopus Document Search, 331 articles In 2019, there were 41 articles published, while in 2023, the number of articles increased dramatically to 122 articles. This increase indicates that interest and research related to the application of Artificial Intelligence (AI) in the fields of journalism, news, and media are increasing every year (Sonni et al., 2024).

Among the most important communication models that focused on connecting humans with intelligent machines, we also find:

Claude Shannon and Warren Weaver's Model consists of: Sender ➞ Message ➞ Channel ➞ Receiver ➞ Noise.

This model posits a linear information flow from the sender to the receiver (Shannon & Weaver, 1949), It is one of the models that focuses most on the technica communication structure and investigates its physical and semantic problems and difficulties.

This characteristic makes it one of the most capable models for explaining the AI communication model, despite its omission of

feedback, However, the most important variable to examine according to this model is noise, particularly semantic noise, we can operationally define noise as the AI-enhanced communication system providing misleading, false, or unaccredited information.

Wilbur Schramm's model, during the development of communication models, alerted researchers to the issue of shared experience (Schramm, 1955), From our perspective, this idea paved the way for employing algorithms that cluster common symbols and interests, leading to the AI-enhanced communication model that simulates these interests in its interactions with the user.

Meanwhile, **David Berlo's model** introduced the concept of encoding and decoding (Berlo, 1960), which was pivotal in building expectations about current and future user interactions.

Information Processing Theory and the Construction of the Mathematical Model for Intelligent Machines

(Shannon & Weaver, 1949) communication model was rooted in research on telegraphs conducted before and during World War II, this theory soon spread to human sciences, laying a solid groundwork for media and communication studies (Winkin, 2001), They proposed a general communication system, focusing on the problem of accurately and approximately reproducing a message from one point to another (Mattelart, 2005).

This precise reproduction marked the initial exploration of a machine that could communicate with humans in a way comparable to human intelligence, as the theory suggests that communication is primarily an information processing operation done by humans (AlAbd Allah, 2006).

The mathematical theory of communication and cybernetics originated from early discussions about intelligent computers in the 1940s According to Mattelart, this theory marked the culmination of research that started with Russian mathematician Andrei Markov's work on symbolic sequences in literature and continued with the American researcher Ralph Hartley’s; proposal of the byte as a unit of information measurement. Then the British mathematician Alan Turing developed a diagram for a machine that could process information, building on the work of John von Neumann, who contributed to the creation of the largest calculating machine before the computer era.

The concept of cybernetics was also influenced by Norbert Wiener's research, which Norbert Wiener had attended, the theory's concepts eventually expanded to cover human sciences, including its postulates on human behavior and interactions, simplifying debates about applying cognitive sciences to the social sphere, Claude Shannon's research further evolved the mathematical theory, coinciding with the development of telegraph technologies.

Maybe his work at Bell Telephone Company marked a breakthrough in understanding how media messages travel and how to transmit them most effectively.

This theory offered a technical perspective on human communication, drawing on some ideas from Alan Turing's computer research, which ultimately led to the creation of the intelligent machine (Mighri, 2018).

Although this theory focused on information transfer operations through communication channels while defining the communication elements, this apparently simple division later contributed to the development of intelligent neural networks.

Symbolic Interactions and the Development of Intelligent Communication and Interaction Systems

Among the key contributions of the interpretive paradigm, often underappreciated by AI researchers, symbolic interactionism stands out as a major intellectual achievement that has shaped how intelligent communication applications interact.

Herbert Blumer suggests that symbolic interactionism is based on the idea that people act toward things based on the meanings they hold for those individuals.

These meanings are shaped by social interaction and are constantly being reinterpreted through communication, It's worth noting that these three key points closely mirror the ideas presented in Herbert Mead's book, **Mind, Self, and Society**.

This work captured researchers' attention regarding the characteristics that set human interactions apart from those of other beings. The most important of these are the use of language to create symbols and the use of the mind to interpret and construe them (Krippendorff, 1980), these characteristics greatly inspired language developers in AI systems.

Considering that the theory has historically contributed to the understanding of an important part of human interactions, which has inspired a significant portion of individual interactions with machines, and subsequently intelligent and augmented interactions, this contribution continues into the latest AI applications.

Symbolic interactionism paved the way for Natural Language Processing (NLP) systems and interaction algorithms that can anticipate potential interactions and mimic human-like conversations, much like smart chat apps such as ChatGPT and Meta AI, as well as social robots that respond to the context and meanings of human symbols.

These systems are continually improving, but they still can't match the flexibility and speed of human interactions.

Uses and Gratifications Theory and the Construction of Intelligent Algorithms for Gratifications

This theory is grounded in the idea of an active and interactive audience that supports the concept of negotiated reading, in other words, meanings and effects emerge from the interaction between texts and the roles played by audience members, as a result the final meaning of media content is tied to the audience's positive engagement with it, which is, in turn, connected to socio-cultural factors (Mattelart, 2005).

According to Mehana Feryal, the Uses and Gratifications theory focuses on how individuals selectively participate in the communication process, driven by their sociological needs.

This approach is a key part of the communication process and determines its effectiveness (AlAbd Allah, 2006), by shifting the communication model from effects to reception, this theory has led to a new understanding of fragmented audiences.

This understanding has prompted the development of algorithms that can identify user characteristics and needs through the following sequential logic: first, user activity data (clicks, dwell time, shares, and skips) is collected as behavioral indicators of underlying gratifications; second, these behavioral indicators are clustered into segments representing distinct need patterns (e.g., information-seeking, entertainment, social interaction, or self-expression); third, recommendation algorithms are trained to match content with each segment's predicted gratification profile. This three-step logic,

derived directly from the theory's core assumptions about selective and needs-driven media exposure, now operates in applications such as YouTube recommendations and the TikTok 'For You' page. As databases become more effective in communicating with intelligent applications, the theory stands out for its ability to link user activity with the most suitable content, ultimately enhancing communication effectiveness.

This theory has also contributed to what is known today as the principle of precise user targeting through the intelligent display of tailor-made content in numerous applications that simulate the needs of each individual user and seek to satisfy them through the most suitable content.

Among the recent studies that have examined the relationship between Ai and this theory the study by Li Hua Guan and all entitled ; Understanding User Behavior in Ai-Enhanced Social Media, Integrating Uses and Gratifications Theory, Social Cognitive Theory, and Perceived Coolness.

This study find that GenAI's perceived usability, reliability, and originality, along with users' outcome expectations and satisfaction, significantly influence the intention to use the platform and continue creating videos, this research enhances our understanding of user behavior regarding GenAI on social media by introducing perceived coolness as a key factor in adopting technology.

The insights offer valuable guidance for social media platforms in designing and implementing GenAI features to boost user engagement and satisfaction (Li et al., 2024).

Audience Studies and the Development of Recommendation Algorithms and Precise Targeting for User Segments

Research on audiences helped reinforce the idea of gathering and analyzing audience characteristics to meet their media needs, this is seen as the first step toward precise targeting algorithms for user segments in the age of AI applications.

The concept of collecting audience attributes and identifying the characteristics of their segments, which evolved in public opinion studies and marketing research, is the most important addition provided by studies concerned with the recipients of communication content in general.

This was clearly manifested in the development of AI application algorithms that identify user segments by collecting their attributes.

One of the most recent studies in this field is the study by Eleni Chalikiopoulou entitled; The Role of Generative AI in Enhancing Audience Participation in Journalism, A Scoping Review, it’s find that generative AI applications in journalism primarily serve to facilitate participation and engagement through personalization, accessibility and interactive storytelling. Lastly.

This study highlights the potential of generative AI to enhance audience participation in the information’s, underscoring the ethical and practical challenges it poses as well as existing research gaps, setting the stage for further research (Chalikiopoulou et al., 2025) .

Agenda Setting

Many Recent media studies confirm the relationship between Agenda Setting Theory and AI apps, among them the study by Moses Sichach titled : from mainstream media to algorithms, agenda setting in the age of artificial intelligenc (Sichach, 2024).

This study adopts a qualitative analytical approach based on theoretical review of the transformation of media systems in the Ai era.

It examines how AI Apps particularly recommender systems and large language models, reshape the agenda-setting process through

mechanisms such as content recommendation, search ranking, and trending algorithms.

The study find that a structural shift from traditional media institutions to algorithmic modes as primary agenda setters, where AI systems determine the salience of issues by prioritizing and amplifying specific topics.

The study concludes that AI does not merely mediate information, but actively constructs public agendas, contributing to phenomena such as polarization, misinformation, and reconfiguration of public opinion.

The Critical Perspective

Unlike the functionalist view, critical theories argue that communication media have served, and still serve, to help those in power maintain their dominance and control, advancing their own interests while harming those of users.

Assumptions about critical currents and schools, as well as their take on communication phenomena, play a crucial role in the development of Artificial Intelligence, especially in terms of its intellectual and ideological outcomes.

Critical theories have consistently offered alternative viewpoints to counter the dominance of technology, although they may seem unrelated to AI, they have helped raise important philosophical questions about who owns intelligent media and applications, as well as the control over users' communication environments.

As a result, this has raised a significant set of questions regarding: Who controls AI databases? What are the conditions for content generation? To what extent is this content neutral? What is the relationship between algorithmic guidance and ideology? And so forth.

These questions require thorough analysis and research into AI's infrastructure and its effects on individuals, as well as on different social classes of users, This analytical approach helps advance the development of AI for various communication systems.

Spiral of Silence Theory

This theory, developed by the German researcher Elisabeth Noelle-Neumann in 1974, posits that media, through their continuous intervention in the social environment suppress the plurality of opinions, Individuals within this environment harbor a fear of social isolation which subsequently compels them to adhere to the majority opinion, thereby seeking social consensus at the expense of their own perspectives.

This phenomenon drives individuals to seek information concerning the views of others, and The fear of isolation constitutes a fundamental aspect of understanding the spiral of silence for two primary reasons: firstly, it serves as a motivation for observing others, and secondly, it elucidates the implications of silence, and the choice to remain silent regarding issues within the shared opinion environment.

With media reinforcing the majority, the tendency to remain silent increases among those who dissent according to this concept, the silent minority opts for silence rather than confronting the dominant opinion and risking social isolation.

This hypothesis can be comprehended, as articulated by researcher Mohamed Abdel Hamid, based on two main pillars:

- Individuals in society ignore what they see themselves in favor of what the group sees, for fear of social isolation.

- Media amplify the prevailing opinion, causing opposing views to fade away, by constantly being present and offering similar content, media outlets broadcast news, spread propaganda, shape culture, and create public opinion trends on various issues (Regaz, 2022).

Applying the Spiral of Silence postulates to today's communication landscape, shaped by the growing use of AI and its constant influence

on public opinion, suggests that tools like ChatGPT have become key platforms for gathering information on public and contentious issues.

This increases the risk of algorithmic bias in presenting information that aligns with the dominant opinion or what appears to be the case.

Additionally, the idea of the dominant majority opinion has played a major role in the development of content generation algorithms.

These algorithms, by combining data, focus on expressing the views of the largest group of users in some cases, they even create a fake majority based on previous interactions, and this includes the phenomenon of silence mentioned in Neumann's theory, where users of smart apps show their disapproval in various ways, such as removing comments, unliking content, and avoiding controversial material.

Moreover, this theory posits that individuals harbor a fear of social isolation and are inclined to express themselves candidly only when they perceive themselves as representatives of the current or future majority.

This understanding has facilitated the development of algorithms designed to forecast prevailing opinions by navigating filtering bubbles within various popular and influential applications related to the opinion climate. These algorithms function by filtering divergent opinions and establishing a dominant trend, which may subsequently be adopted by a broader audience of general users.

This phenomenon initiates a more intricate escalation process than the traditional assumptions underlying the spiral of silence, wherein the AI enhanced majority opinion consolidates its influence, leading to the marginalization of minority viewpoints.

As a result, the authentic opinion climate may ultimately be subverted through precise and sophisticated mechanisms.

The Spiral of Silence theory elucidates the manner in which individual behavior at the micro-level, exemplified by interactions with intelligent applications regarded by the user as confidential under specific circumstances contributes to the macro-level formation of public opinion.

This process encompasses the collection of data and the formulation of predictions regarding opinions, trends, and inclinations. Furthermore, public opinion can be characterized as the prevailing sentiment that remains consistent with both the information available in databases and the guidance provided by intelligent algorithms.

As a result, the theory's postulates and hypotheses have significantly enhanced artificial intelligence tools, especially those related to analyzing public opinion among users of intelligent communication media. Additionally, they've enabled the creation of advanced systems for tracking digital silence within these media, using many features and behaviors that wouldn't have been possible without the evolution of intelligent algorithms.

Consequently, evaluating the role of AI in the opinion climate must link interaction with its applications and the algorithmically guided responses associated with them to individual perceptions of the opinion climate.

As for recent studies that examining this relationship the study by Zhong and All entitled; spiral of silence in large language model, this study find that Opinion dynamics are assessed using trend tests such as Mann-Kendall and Spearman's rank, along with concentration measures including kurtosis and interquartile range.

Experiments across open-source and closed-source models show that history and persona together produce strong majority dominance and replicate SoS patterns; history signals alone induce strong anchoring; and persona signals alone foster diverse but uncorrelated opinions (Zhong et al., 2025).

The Use of Artificial Intelligence Applications in Developing Communication and Media Activities

Medium refers to all technologies that connect a sender and a receiver, carrying any type of message, this includes intelligent communication media, also known as Artificial Intelligence Applications (AI Apps), which play a role in this.

The generative content of these applications is predicated upon the collection of user data to enhance the system's automated understanding of the user, thereby developing what classical models refer to as the "shared semantic field."

This facilitates applications in simulating the attributes and characteristics obtained from this data throughout the interaction process with the user, within a novel communication model that obscures clear distinctions between human and automated interaction.

The facets of AI contributions to media sciences are numerous, reflecting the diverse elements and activities of the communication process, which makes them difficult to fully enumerate.

Therefore, this section aims to summarize the most significant ways AI is utilized in the field of media and communication, primarily focusing on applications that enhance the sender's functions and those related to the production of communication content, as follows:

Artificial Intelligence and the Development of Communicator Roles

The extensive history of interaction between media studies and technological imperatives has established a robust framework for comprehending contemporary advancements in the field of Artificial Intelligence, by tracing the manner in which media studies have approached the cumulative developments of prior communication technologies, a series of lessons can be extracted that facilitate an understanding of the challenges and opportunities that AI presents to communication and media professionals.

The training of news professionals in AI is currently undergoing profound transformations, particularly as investigations into the communicator have influenced and been influenced by the evolution of AI through their emphasis on the adoption of new technologies within newsrooms and their consequent impact on journalistic practices and professional identities (Mari, 2021).

Media studies has long been interested in the connection between humans and machines that mimic or represent human thinking. Rather than seeing technology as a threat to communication and its various activities, such as media, advertising, and propaganda, these studies have explored ways to use technology to enhance journalists' work and broaden their coverage.

There was a positive outlook on technology in publications like "Editor & Publisher" and "CJR," which looked at AI developments with optimism and saw them as beneficial to communicator professions (Mari, 2021).

Research on communication has contributed to a better understanding of the factors that shape the journalistic work environment and how technological developments influence journalistic practices. This body of research provides an important foundation for examining the impact of AI on the news industry (Anderson & De Maeyer, 2015).

This newfound knowledge has fueled the growth of AI in journalism, while also raising

questions about the future of the profession, the role of journalists, and the relevance of traditional tools and values (Peters, 2009).

Researchers like Morgan and Usher built on this framework to examine how these tools affect the emotional well-being of journalism professionals, Lindsay's 2003 case study on the growth of personal computer use in newsrooms also sheds light on the crucial role of understanding the relationship between technology and users in journalistic settings.

Ai apps that handle some of a communicator's roles often have behind-the-scenes operations that researchers tend to overlook (Parks et al., 2015), this is especially true when looking at massive collections of algorithms (Hesmondhalgh, 2021), and when considering newsrooms that rely entirely on intelligent software or human collaboration between journalists (Mari, 2019).

By looking beyond traditional methods of examining journalism tools, we can understand how new tools like AI applications impact journalists' work, their professional identity, and their overall status.

The Use of Intelligent Applications in Producing Communication Content

recent studies and research indicate that Artificial Intelligence and its various applications exert significant impacts, ranging from positive to negative, on the communication and media processes, particularly in the realms of content creation and generation.

This is not limited to enhancing journalists' editorial capabilities and modifying the content they produce, it also extends to generating entirely new content, which may be unrelated to actual reality.

This increases the necessity of studying AI, understanding its tools, and controlling its outputs to avoid falling behind the rapid developments of its apps.

It's also worth noting the significant risks of algorithmic bias in AI, which can lead to biased or fabricated media and communication content, although various apps claim to offer guarantees in their terms and usage policies, their algorithms remain unclear, casting doubt on their credibility and the causal motives behind their deployment (Reggaz, 2024).

AI driven media content creation tools provide numerous advantages, such as increased productivity, faster verification, and lower production costs (Dahlin, 2024). However, they also present risks, including fabrication, lack of originality, and content dominance (Elkin-Koren, 2020). Concerns about algorithmic bias towards owners' ideologies persist.

Tools for generating and modifying content are varied, there are many intelligent apps for image creation and editing, as well as those for text, video, and audio, which this paper can't fully cover.

Lastly, just as Artificial Intelligence has drawn from research and theories beyond those mentioned (e.g., media framing, agenda-setting), its applications have been applied in many fields outside of those mentioned (e.g., cinema, logo design, engineering).

This study aims to outline the most significant theoretical contributions of media and communication sciences to Artificial Intelligence development, and the chosen theories and models were selected based on their impact.

Sample and Statistical Classification

The sample consists of 15 Artificial Intelligence applications, distributed across the human sciences disciplines, and media sciences across the five elements of the communication:

Table (1): Distribution of the AI Applications Sample by Communication Elements.

Communication Element	AI Applications (3 per element)
Sender	ChatGPT, Twitter Bots, Canva AI
Message	Google Translate, Grammarly AI, QuillBot
Medium	YouTube Recommendation, Facebook Ads, TikTok Algorithm
Audience	Facebook Insights, Sentiment Analysis, Netflix Personalization
Impact	Hotjar, HubSpot, Sprout Social

According to disciplines: The sample of fifteen intelligent applications was classified based on the primary foundational science underpinning their algorithms, each application was attributed to the field that most influenced its design and functionality, while recognizing that some applications may intersect multiple disciplines.

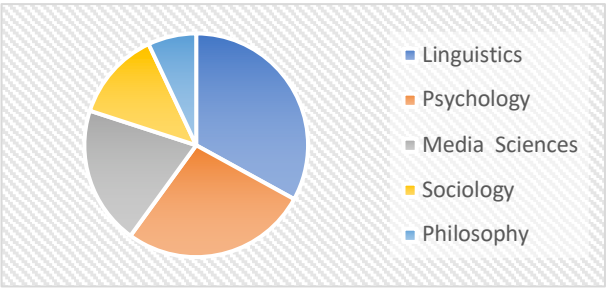
- **Linguistics (33%):** This category includes applications primarily based on language-processing mechanisms, particularly natural language processing, semantic analysis, and syntactic analysis. The applications classified within this field are **Grammarly, HubSpot, DeepL, and Copy.ai.**
- **Psychology (27%)**: Applications in this category are mainly based on behavioral analysis, interaction modeling, and persuasive communication processes. The applications assigned to this field are **Facebook, TikTok, HubSpot, and Hootsuite.**
- **Communication / Media Studies (20%)**: This category includes applications aligned with communication theories, content strategies, and audience influence through media systems. The applications classified within this field are **Google Analytics, YouTube, and Sprout Social.**
- **Sociology (13%)**: This category includes applications that reflect social networks, audience segmentation, and group dynamics. The applications classified within this field are **Meta Ads Manager and Sprout Social.**
- **Philosophy (7%)**: This category includes applications based on logic, epistemology, and meaning construction. The application classified within this field is **Brandwatch.**

The following table and figure summarize the percentage distribution of the sample by foundational field.

Table (2): Percentage Distribution of the Sample by Foundational Discipline.

Foundational field	Percentage
Linguistics	33%
Psychology	27%
Media Sciences	20%
Sociology	13%
Philosophy	7%

Figure (1): Percentage Distribution of the Sample by Foundational Discipline.



The sample according to media studies (communication elements)

The sample was organized according to the five core elements of communication studies: sender, message, medium, audience, and impact.

Unit of Analysis: Each conceptual intersection between an AI application and a communication theory was treated as one analytical unit. In other words:

$$\text{Application} \times \text{Theory} = 1.$$

Each valid intersection was coded with a check mark (✓) and counted as a single frequency unit.

Frequency (F): The frequency represents the number of communication theories associated with each application:

F = Number of theories associated with the application.

Percentage (%): The percentage for each application within the same communication element was calculated as follows:

$$\% = \frac{\mathrm{F}}{\sum \mathrm{F}} \times 100,$$

where: $\sum \mathrm{F}$ represents the total number of intersections within the same communication element.

Based on this analytical framework, the following tables present the distribution of AI applications across the five communication elements, along with their corresponding theoretical intersections and percentage frequencies.

Table (3): Sender Element: Distribution of AI Applications by Communication Theories.

AI Apps	Gate-keeping	Agenda Setting	Shannon	%
ChatGPT	✓	✓	✓	37.5%
Twitter Bots	✓	✓	✓	37.5%
Canva AI	✓	✓	✕	25%
Total F				8

Table (4): Message Element: Distribution of AI Applications by Communication Theories.

AI Apps	Lasswell	Content Analysis	Interact	%
Google Translate	✓	✓	✕	28.57%
Grammarly AI	✓	✓	✓	42.86%
QuillBot	✓	✕	✓	28.57%
Total F				7

Table (5): Medium Element: Distribution of AI Applications by Communication Theories.

AI Apps	Medium & Message	Uses & Gratifications	Cultural Studies	%
YouTube	✓	✓	✓	37.5%
TikTok	✓	✓	✓	37.5%
FB	✓	✓	✕	25%
Total F				8

Table (6): Audience Element: Distribution of AI Applications by Communication Theories.

AI Apps	Uses & Gratifications	Spiral of Silence	Agenda Setting	%
FB Insights	✓	✓	✓	37.5%
Netflix Personalization	✓	✓	✓	37.5%
Sent. Analysis	✓	✕	✓	25%
Total F				8

Table (7): Impact Element: Distribution of AI Applications by Communication Theories.

AI Apps	Strong Media Effects	Spiral of Silence	Uses & Gratifications	%
Hotjar	✓	✕	✓	28.57%
HubSpot	✓	✓	✓	42.86%
Sprout Social	✓	✓	✕	28.57%
Total F				7

Figure (2): Histogram of the Percentage Frequencies of Communication Theories and Models

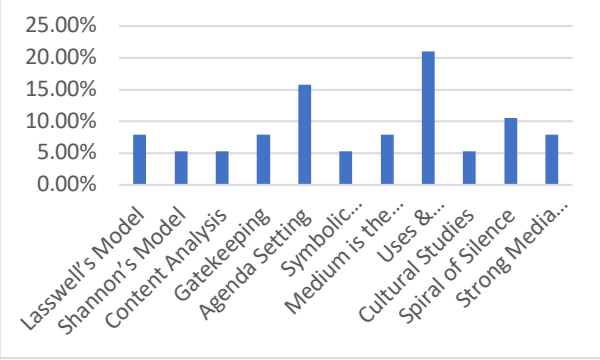


Table (8): Total Frequencies and Percentage Distribution of Communication Theories and Models

Model / Theory	F	%
Lasswell's Model	3	7,89%
Shannon's Model	2	5,26%
Content Analysis	2	5,26%
Gatekeeping	3	7,89%
Agenda Setting	6	15,79%
Symbolic Interaction	2	5,26%
Medium is the Message	3	7,89%
Uses & Gratifications	8	21,05%
Cultural Studies	2	5,26%
Spiral of Silence	4	10,53%
Strong Media Effects	3	7,89%
Total	38	100%

Conclusions

Through the theoretical presentation and the variables examination, we conclude that the contributions of the humanities and social sciences, particularly media and communication studies, have been cumulative in several theoretical endeavors, the most significant of which are:

How Communication Models Shape AI Development: A key foundational contribution is Harold Lasswell's model, which broke down the communication process into elements, this laid the groundwork for new subfields within media and communication sciences, by linking content to the right audience through the right medium, Lasswell's model contributed **7.89%**

to the theoretical foundations of algorithms that target and recommend media content.

This connection between communication elements is also the basis for intelligent systems that understand language, Lasswell's work continued to influence content analysis, which in turn advanced the development of AI systems that can process language with 5.26%.

Wilbur Schramm's model also drew the attention of artificial intelligence developers to the concept of shared experience, which later evolved into the collection of user data to create content that closely aligns with shared interests. linking them

Linguistics ranks first with **33%**, followed by psychology with **27%**, and communication studies with **20%**, as the most influential fields in AI Apps through the development of its algorithms, whereas communication studies remain the field that benefits the most from AI applications.

Changes in communication theory have been sparked by the Uses and Gratifications theory, shifting from the effects model to the reception model, this shift has led to a growing recognition of the positive role audiences play and the ability of users to provide databases with their needs and preferences.

The outcome is a focus on understanding and meeting the needs of user audiences, and delivering customized content, this concept developed into precise targeting algorithms for specific user groups in many smart applications.

Moreover, Uses and Gratifications is the communication theory that most strongly influenced AI development, accounting for **21.05%**.

From the contributions of the cybernetic perspective, Shannon and Weaver's model illustrates the communication model of AI as it exists today. Although it does not account for feedback, it helped explore the issue of semantic noise and contributed to the development of intelligent communication systems.

Based on statistical proportions, Uses and Gratifications is considered the most influential theory, followed by Agenda Setting, Spiral of Silence, Gatekeeping, and Strong Media Effects as key theoretical contributions from media and communication studies to the development of artificial intelligence.

With 5.26% Shannon’s model and the mathematical theory of communication reinforced the artificial intelligence as a cumulative process, and by applying the technical and instrumental perspective that draws from human communication, it laid the groundwork for the creation of this intelligent machine.

Although the theory focused on how information is transferred through communication channels and outlined the key components of the communication process, its seemingly simple classification had a profound impact on the development of intelligent neural networks.

Within critical thought, theories and intellectual currents contributed to raising philosophical issues regarding the ownership of intelligent media and applications concerning the hegemony over users' communication environments.

The Spiral of Silence theory is linked to AI with **10.53%**, and its algorithms explained how individual behavior at the micro-level, such as expression during interaction with intelligent applications (which the user considers confidential under certain circumstances), extends to the macro-level of public opinion formation, where data is collected and predictions of opinions.

It has become clear that the use of AI applications in media fields is more evident in two areas related to two communication

elements: the communicator and content. Some AI applications perform the roles of communicators in many media institutions, from gathering information and editing to producing reports and even presenting. Moreover, there is the possibility of establishing newsrooms almost entirely reliant on intelligent software.

Meanwhile, content creation and modification applications are the most popular among media content users and creators.

The functions of most of them are summarized as enhancing editorial capabilities, modifying content, and, in some cases, inventing entirely new content, this increases the need to study the ethics of AI.

Finally, it's worth noting that AI is tied to many theories and research within the scientific community, beyond what was mentioned, and is also used in areas not covered (like cinema, design, engineering).

The examples provided were meant to be illustrative, not comprehensive, we also confirm that AI is both a valuable tool for human societies and a double-edged sword when we use its vast capabilities, and when we reduce its risks especially those related to algorithmic bias, which can lead to media and communication content that's disconnected from reality, fabricated, or a threat to users' intellectual and human security.

Therefore, the research paper recommends the necessity of continued studies aimed at understanding its tools, critiquing its philosophies, and controlling its outputs to make them serve human communication and human intelligence, to decrease the chances of their deviation, and to keep pace with their developments.

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- **Ethical Approval and Consent to Participate:** N/A.
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