Proceedings of the 05th International Conference on Media Science and Digital Communication, Vol. 4, Issue 1, 2025, pp. 15- 30

ISSN 2950-6530 online
DOI: https://doi.org/10.17501/29506530.2025.4102

THE D-ACT MODEL (DYNAMIC-AGENTIC COMMUNICATION THEORY) ADVANCING HUMAN-AI COMMUNICATION BEYOND TRADITIONAL MODELS

Ayub A*

Independent Researcher, Media and Communication

Abstract: The existing media communication models were developed with an understanding that the communication was being done between humans and hence do not capture some of the essential characteristics of the AI systems. This paper proposes the D-ACT Model (Dynamic-Agentic Communication Theory), which is a holistic and dynamic structure, that changes the essence of communication from human to AI entities. As with the D-ACT Model's conceptual foundations, concepts from classical communication theory were incorporated as well as ideas from Human-Computer Interaction and media ecology; the D-ACT Model stream is situated positioning into an AI as an active participant into the reciprocal communication process. Introducing the D-ACT Model as an updated framework to fill the gap in the traditionally humanistic-centered communication theory gives the article its purpose and reason to be a valuable resource for researchers.

Keywords: human-AI, artificial intelligence, digital communication, theoretical framework, understanding barriers, AI ethics, feedback loops

Introduction

That is the primary reason why communication has remained an influential aspect in the existence of human beings (James W. Carey, 1989). The advancement of early man and his history has many defining aspects of his anthropological evolution but total and effective communication of information, feelings, and intentions can be said to be hallmarked of dominion of man (Claude Shannon & Warren Weaver, 1949). It has been postulated that people use communication to constitute the world, foster interpersonal relationships as well as bring forth cultures and societies (Stuart Hall, 1980). There can be no denying that today, communication is much different from what it was in the past; however, its role in the formation of societies and the impact on the people at any given society still remains the same (Carey, 1989).

One of the revolutionary changes in the modern era in the field of communication is artificial intelligence (AI). From the sphere of science fiction, AI systems have penetrated deeply into the daily routine of the people all over the world (Sherry Turkle, 2011; Nick Bostrom, 2014). Information-seeking using voice assistants such as Siri, conversing with chat bots, receiving medical advice from virtual health assistants, and even reading news articles produced through the use of AI, are types of human-AI interface that is gradually entering mainstream use (Reuters Institute for the Study of Journalism, 2023). These are not just simple mechanistic affairs but are social, emotional, and contextual processes, whatever they may mean (Turkle, 2011).

However, the technological advancement of artificial intelligence has advanced, the theoretical considerations of how communication takes place in such interaction have lagged behind. Many of the existing models were formed in a society that only involved human communicators (Shannon & Weaver, 1949). Evaluating these models as dictated above is still feasible; however, the aim is important to realize that these models are anthropocentric in essence and mainly linear. Perkins and thunderclouds consider the sender as well as the receiver of the message is a human being capable to understanding and sharing feelings, cultural background information and even facial expressions. The following

*Corresponding Author's Email: * aamirayub@uop.edu.pk

traditional frameworks are therefore limited by the fact that with AI assuming the communicator role: In light of this, there is a visually increasing need for a fresh conceptual approach to communications that will have regard to the communicative ability of AI and also the interactively different communicative patterns when humans are conversing with the AI.

The Human-AI Communication Model is therefore embarked upon to fill this gap in the communication theory. This is a theory that shifts the understanding of communication in order to make AI an agent instead of an object. From communication theories, this paper integrates prior knowledge from cybernetics, human computer interaction (HCI) and current research with focus to small display screen devices and cell phones in establishing the D-ACT Model that will address the communication processes that involves HAI systems (Norbert Wiener, 1948).

The second assumption of the D-ACT Model is the theoretical explanation of the roles and possibilities of AI technology which goes beyond the simple interaction systems and cognition as an interpreter of the words and meanings as well as a responder and an actor who can learn the context of the interaction and transform it. The previously discussed essential components for interaction between Human and Artificial intelligence contain three main components Interpretation, Feedback and Mutuality in Mutual Theory of Mind (Wang & Geol, 2024) which reflected the importance of a comprehensive framework include and clarify more components of Human AI communication. Moreover, due to the intro and application of Natural Language Processing (NLP), Machine Learning (ML) and multimodal AI system; machines today are capable of identifying the emotional states of humans, provide real-time feedback, and to some extents are capable of emulating empathy (Daniel Jurafsky & James H. Martin, 2023). These capabilities demand completely new ways of thinking and approaching the concept of communication.

the D-ACT Model has an important identification which adds more clarity to the aspect of understanding the contextual and interpretative layers during a communication process between humans and AI.

Moreover, the the D-ACT Model admits the socio-cultural aspects of communication to it. It affirms that human-AI interaction is not occurring in isolation but within socio-politics, culture, and ethically formed environment. Some of the factors constantly affecting human-communication through AI include algorithm bias, cultural portrayal and user-trust. For example, an AI which has been trained based on the data from the western countries cannot comprehend conversations that are peculiar to non-western cultures thereby leading to misunderstandings or lack of cultural sensitivity. It shows how the factors of contextual sensitivity and ethical responsibility should be incorporated in AI planning, execution and these are what the D-ACT Model incorporates in its design.

One other relevant aspect of the D-ACT Model is the issue inducted feedback management loops and two-way learning. In face-to-face and verbal communication, feedback is important in confirming whether a point was understood, the intended meaning of what was being said or to adapt to the reply. Same as in any human-Chatbot communication, feedback is also not restricted to a one-way process. Today AI systems are developed to interact with their users and learn from them, thus, change their behavior, understanding of the language, and become closer to the user's needs and preferences (Wiener, 1948).

In addition, the D-ACT Model provides the general framework of interpretative levels, and it defines them for both human and AI. Interpretation for human users comprises the aspect of experience or emotion, culture, and thinking pattern of a particular person. It is essential to understand the intricacies as well as to identify the risks that are inherent in the communication between human beings and AI systems when recognizing these interpretative mechanisms on both ends of the communicative spectrum.

Besides being used as theory, the elements of the D-ACT Model can be applied to numerous areas systematically. In the context of journalism, the method can be employed to determine the quality of the AI-produced information (Reuters Institute, 2023). Speaking of healthcare, it gives a guideline as to how to come up with compassionate, remotely operated health care aids (World Health Organization, 2021). So, in the field of education, it can help to design intelligent tutors that take into consideration the styles and cultures of learning of learners (UNESCO, 2021). The model also used to facilitate innovation in entertainment, governance and customer service where AI is interacting with people on large and diversified level.

This paper further established that AI has brought a new dimension to the nature and understanding of communication as a concept as well as practice and theory. Although the current models of the communication process provide certain optimal clues, the use of AI goes beyond these models. That is why the D-ACT Model is needed and timely to fill the existing theoretical gap with much desired and needed advancement. With interpretative, contextual, and adaptive attributes of an active speaker, the D-ACT Model paves way for a new generation of communication theory that encompasses the human, artificial, ethical, social, and cultural components. In this regard, the frameworks like D-ACT will be invaluable to help decide and shape the proper communication between humans and artificial intelligence.

Literature Review

1. Human-Computer Interaction and Social Responses

When the technology developed for dummy correspondence, researchers shifted their attention to studying the human computerization interactions and identified that people behave in response to the machines socially.

A. The Media Equation

According to Nass and Moon (2000), people interact with computers and media with the same interpersonal characteristics as they self-apply human social interaction in their relations with the computer. In their studies, the authors revealed that people interact politely, reciprocally, and in other ways that are characteristic of human relationships with computers, which implies that people tend to apply human characteristics to technology.

B. Embodied Conversational Agents

In their article of 2005, Bickmore and Cassell defined embodied conversational agents (ECAs) that are supposed to imitate human interactions. Combined with the findings of others, they posited that ECAs could develop a conduit to communicate, relation with users, and even alter user's behavior, stressing on the interactional nature of AI as communicators in human–AI interface.

2. Advances in AI Communication Capabilities

A recent advancement in artificial intelligence brought about added improvement in the preciseness of machines to hold and mimic human conversation.

Large Language Models

The large language models, particularly those developed in the recent past like the OpenAI's GPT series, have refinements to natural language processing. These models can produce syntactically sound, contextually appropriate text, demonstrate capacity to conversant and perform certain types of

syllogisms. For instance, the GPT-4.1 came along with a model that could extend context windows and enhanced instruction following. (Aoyama, Chujo, Hautasaari, & Naemura, 2025)

3. Ethical Considerations in AI Communication

The use of AI in communicating processes presents some ethical issues that must be observed while implementing the technology.

A. Bias and Representation

It is crucial to understand that artificial insecurities can also reproduce the problematic issue, which is present in the data set applied to train the algorithm. In order to eliminate discrimination in the AI outputs and be certain of the impartiality of the results, it is necessary to work tirelessly in sorting the data and constantly check for biases. (Apiola & Sutinen, 2020)

B. Privacy and Surveillance

Information and data sharing of AI systems is inherently intrusive to the privacy of the users. This point may be due to the ignorance of the number of people who can have access to the information that users provide or share during interactions, how long the information is retained or even processed for what purposes. (Apiola & Sutinen, 2020)

C. Transparency and Explainability

For people to fully trust these systems it is important to be able to get an understanding of how the AI systems come up with these decisions. However, justifiably so, with an increased level of complexity, other models like the Large Language Models (LLMs) become difficult in explaining the decision-making processes within them and thus providing a way to enhance the rate of transparency. (Xu & Shi, 2024)

4. Existing Proposed Frameworks

As a need of the time most of researchers are working in the area of Human-AI communication and proposed different frameworks recently.

A. Human-AI Interaction Outcomes (HAI-IO) Theory (Quilantang)

The Human-AI Interaction Outcomes (HAI-IO) theory is an inter-disciplinary theory, which concentrates largely on the dynamic and feedback-driven process of human-AI interaction and communication. This theory conceptualizes AI as more than a simple passive, communicative technological instrument, but as an adaptive and communicative, or intelligent, technological agent. This theory is very largely placed within the theoretical domain of cybernetics, social exchange theory (SET), and the domain of dialogue systems. The prime outcomes measured by the theory include satisfaction, trust, interaction, and the effects of ethics. (Quilantang, 2025)

B. HA-C Framework (Revolusi & Febriandy)

The Human-AI Collaboration framework is commonly used in an organizational setup to assess human and AI collaboration in accomplishing a common goal jointly. This framework is built in such a way that it considers AI not only as an auxiliary or a supportive element but also as a symbiotic entity that can be worked alongside or collaborated with. This framework centers around productivity gain and efficient allocation of work within a human and AI collaboration setup. It extends the definition of

agency by giving an active role to AI, which is not only a passive actor but a collaborator as well in such a setup. (Revolusi & Febriandy, 2025)

Table 1: Comparative analysis and key difference among recently proposed frameworks and the D-ACT Model

Feature	HAI-IO Model	HA-C Framework	The D-ACT Model
Full Name	Human-AI Interaction Outcomes Model	Human-AI Collaboration Framework	The Dynamic-Agentic Communication Theory
Core Focus	Feedback & Mutual Adaptation	Teaming & Task Performance	Communication Agency & Theory
Key Mechanism	Iterative feedback loops using predictive processing	Evaluates goal alignment, task allocation, and trust	Reframes AI as an active communicative agent

A. HAI-IO Model (Quilantang)

This model has strong connections to Cybernetics and Social Exchange Theory. This model concentrates more on the concept of "Outcomes" of satisfaction, trust, and ethics achieved through continuous feedback flows between humans and computers (Quilantang, 2025).

B. HA-C Framework (Revolusi & Febriandy)

This framework has been employed in an organizational setting; it views AI as a symbiotic entity. This framework aims to assess human-AI collaboration regarding their mutual goals in favor of increased productivity and optimal task allocation (Revolusi & Febriandy, 2025).

C. The D-ACT Model

This particular model is an academic attempt to fill the gap that arose from having conventional communication theories, such as the Shannon Weaver Model, despite the reality created by artificial intelligence. Also in comparison with the models recently presented by Quilantang and Revolusi & Febriandy; this model stands alone in that it tries to build a new paradigm for studies related to communication which also makes a bridge between the main subjects Psychology and Information Technology (Data Science).

5. The Need for an updated Communication Framework

The models of communication that were initiated and designed were for use with two humans and often fail to work in human and AI interactions. Also, the existing models for Human-AI interaction are mostly AI-centered or take artificial intelligence as a tool. These attributes make them unconscious, differently interpretable, data-dependent beings, which in turn call for revision of current theories.

Thus, the Human-AI Communication (D-ACT) Model appears as the adequate framework that addresses the bidirectional, adaptive, and context-dependent dynamics of the light human-AI interaction. More precisely, through the integration of principles from the traditional communication theories and empirical findings related to AI and human-computer interaction, the D-ACT Model will

help to improve the major aspects of the human–AI communication while also explicitly emphasizing the ethical considerations.

Methodology

This study uses qualitative discourse analysis for studying the emerging processes within the field of human-AI communication dynamics.

Comparative Theoretical Analysis: The methodology starts with a comprehensive comparison between traditional approaches to studying communication processes (such as Shannon & Weaver communication model), and the latest studies that suggest the existence of novel approaches to analyzing the dynamics of human-AI interaction (HAI-IO and HA-C models, for instance). Thus, at the stage of theoretical analysis, the gap between existing researches and the need for developing the D-ACT Model is clearly identified.

Speech Notes Transcription and Coding: The procedure is accompanied by the transcription of speech notes from these interactions. The transcription is analyzed in a dual-coding scheme, according to the components of the D-ACT Model:

1. Human Interpretation Coding – deciphering the intentions, mood, and mental state of the human communicator.

2. AI Interpretation Coding – decoding the reaction of the AI according to the principles of its algorithmic processing and training.

Study of "Understanding Barriers": The methodology is designed to analyze the communication barriers. If the failure of the Contextual Layer or the Interpretative Layer can be identified (cultural and semantic misunderstandings etc.), then the particular "Understanding Barriers" resulting from this situation will be mapped out.

Theoretical Framework: The D-ACT Model (Dynamic-Agentic Communication Theory)

The Human-AI Communication (D-ACT) Model is based on constructivist and interpretative epistemologies and ontology since meaning emergent during the interactions between human and artificial intelligence agents is the result of the integration of their actions in context. It builds on the transactional model of communication by reconstructing roles, responsibilities as well as capacities within the AI communication exchange. Unlike the traditional models of interaction, in the D-ACT framework there is bidirectional learning, accompanied by the training of an AI system and human participants' changes based on feedback.

This is done with the help of concepts borrowed from the field of cybernetics, human computer interaction, and media ecology and upon leaving AI not only as a passive 'black box' that receives input and provides output, It also provides understanding of how a variety of messages flow, getting encoded, decoded and transformed through the digital communication realm. (Osmanoglu, 2025)

Constructivist and Interpretative Paradigms

The theory named constructivism, inherent to Jean Piaget's, a Swiss development psychologist (1896-1980) writing suggests that knowledge is not absorbed by individuals, instead, it is built through experience and thinking. Regarding human-AI interaction, this paradigm is useful since it implies that both individuals and artificial intelligence constantly interpret meaning. AI systems interact with users and based on these interactions the next round of responses are shaped, especially when it is forms part of a machine learning AI system; hence engaging in co-constructing knowledge.

Interpretative paradigms can be considered as an addition to constructivism as the primary focus is made on the subjectivity of the process of perceiving meaning. As people understand, meaning is not located in messages but rather, it is located with people depending on their context and experiences. This shows that in human-AI cases especially in natural language processing, it is imperative that AI develop and provide meaning responses appropriately to elements which have been entered.

Human-AI Communication Process

Figure 1 explains the complete process of communication between humans and artificial intelligence. Thus, the Human-AI Communication (D-ACT) Model was created to define the process of human communicators' interactions with artificial ones systematically. It also acknowledges two parties involved in the process: humans and communication technologies, both using it to achieve their goals. The D-ACT Model diverges from prior models that portray communication as a linear process involving one-way transmission of information, as it posits the communication process as a continuously evolving entity that responds to feedback as well as the context in which it is taking place.

At its broadest level, the process reflects a feedback loop of information sharing and, hence, a cyclical flow of working, with both the human and the artificial components being involved in transmitting information as well as interpreting, adapting, and revising the information they receive. It guarantees an even more complex approach to interaction than it has currently been envisaged and implemented explaining why today's communication models cannot be applied to the human – now enhanced with artificial intelligence – interaction.

The Human AI Communication process is divided into ten main components, including the affective component that may cause a barrier in communication, which affects or indicates different stages and interactions between humans and artificial intelligence. This framework is divided into three subjects, where the Human Communicator is connected to Psychology (Natural Brain) and the AI Communicator is connected to Data Science/IT (Artificial Brain). Between these two subject the main focus of this study is on social sciences; the process of communication that is taking place. All of these components operate in series so as to provide a complete and efficient communication loop, one that not only provides feedback but focuses on the broader contextual aspects of a conversation.

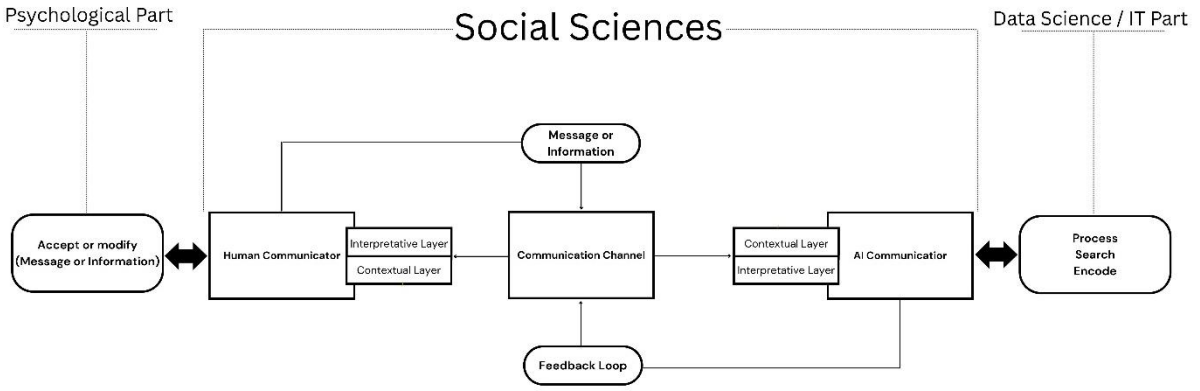

Figure 1: The Human-AI Communication process

Main Subjects and Model Overview:

There are three main subject related components in the framework, the main part contains the communication cycle and noted as social sciences, the process that is interconnected with human communicator indicates "Psychology Part" and the component that is connected to the AI communicator is signed as "Data Sciences/IT Part.

Though the main discussion is related to a framework that represents the Human-AI Communication it is essential to note that the main factors that can defect or improve the process lies in the natural brain and artificial brain.

The D-ACT Model (Dynamic-Agentic Communication Theory):

The D-ACT Model explains six main components involved in the communication that takes place between humans and artificial intelligence. The model has a focus on understanding and the barriers to understanding on the basis of the context interpretation of both parties. All the components involved in Figure 2 are explained in detail.

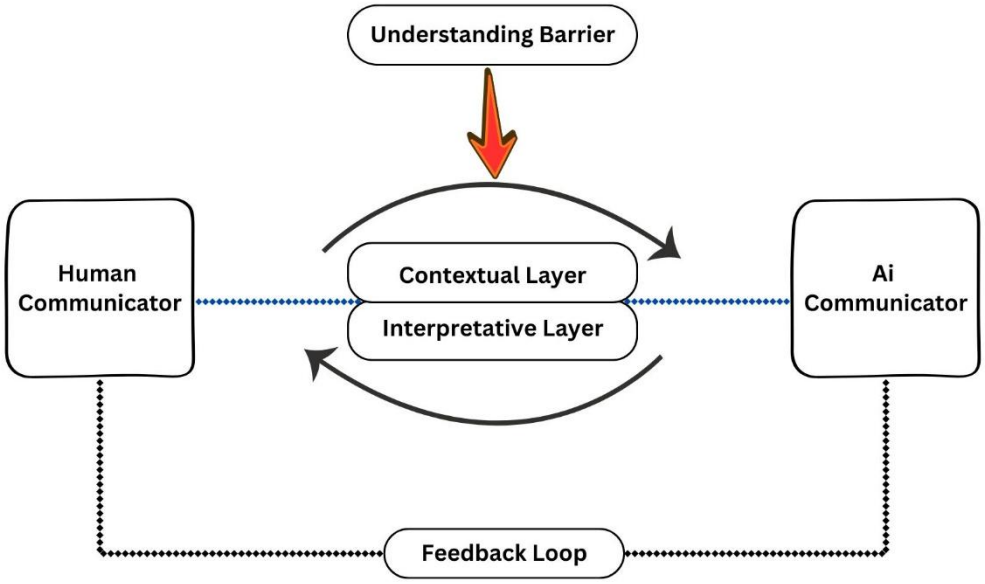

Figure 2: The D-ACT Model (Dynamic-Agentic Communication Theory)

Human Communicator

The communication process within D-ACT Model starts with human communicator as in any model of communication. One starts the conversation by getting commenced to produce a message or information to pass across. This initial stage is determined by; before undertaking this step, the human has intentions, mood, socio- cultural endowment and psychological status. It has been argued that the message which the human conveys to other also consists of the fact that is colored by his or her subjectivity, by the way he or she views the world, and in which he or she live.

This stage takes time is critical during human-AI interaction because, unlike in the case of human-human interactions, the message from the human participant is not even and may vary depending on the mood, emotions, and cognitive processes of the subject at the time of interaction. For instance, tone varies with a person's mood when addressing the AI, the level of trust that person has in the system as well as the need for communication. The intention of a human communicator is to get a meaningful/informative response back; however, the content and the intention of the message launched can differ in a great degree depending on the communication situation.

Cycle of Contextual and Interpretative Layers

Once the human comes up with a message, the generative layer is processed by a contextual and interpretative layer; that is interconnected to the Psychology part in subject notation, comprises of end genetic, exogenetic as well as psychological factors. This layer refers to final message that the human's

internal processes before it is transmitted to the recipient. It involves activities like perceiving, interpreting and how the individual handles or feels in response to particular stimuli. A human communicator will enact these psychological filters on their communication, which may also include such factors as social trends, prejudice and partisanship.

For instance, while querying an AI system for an answer, the human might trace their intention of communication by means of culture, experiences, and situation. The same way that the human's beliefs towards the AI – whether the AI is seen as a helper, a tool, or as an intelligent machine has an impact on the form in which they structure their message. As such, the interpretative level is very important as it has to ensure that the message passed by the communicator is interpreted correctly in relation to both the communicator and the context.

Interpretative layer is a part of the whole D-ACT Model which deals with an artificial intelligence also and noted as the Data Science/IT in subject area. Where the human's interpretative layer is swayed by passes personal and emotional judgment, the AI interpretative layer is earned through algorithms, the training data the AI was programmed with, or techniques is trained to learn. This layer specifies how the AI comprehends the arriving message and the perspective it acquires on the context of the message as well as how it comes up with an adequate response.

The interpretative layer of AI is the aspect that enables the system to understand particular inputs besides the huge amount of data it comes across.

AI Communicator

After the message has been transmitted through the communication channel, it gets to the AI communicator. AI communicator can therefore be said to refer to the capability of the system in relaying messages from the human, interpreting the messages and vice versa. The various working functions which are performed by the AI are based on certain modern technologies like Natural Language Processing (NLP), Machine Learning (ML), and multimodal recognition systems.

In broad terms, the main function of the AI communicator is to introduce an input from a human and to determine the message meaning, as well as its purpose and background. NLP is used to interpret the language and analyze the text, while the ML is used to change the response of the system according to previous conversations and learned information. However, if the AI system uses the types of recognition beyond video, it can also use voice or gesture inputs making the experience even more enjoyable.

Besides this, the AI communicator should also be able to manage unprotected and heuristic failures of message processing. When a human provides input that can be ambiguous or containing opposite meaning, the AI system would require the background knowledge to be able to respond. The AI communicator does not then merely mechanically produce the interpretation but participates in it as a human communicator does.

Feedback Loop

The feedback loop can therefore be considered as one of the main components of the D-ACT Model. Communication is not an irradiation but a process of information exchange. The feedback loop is the response from the AI is received by the human, further analyzed based on the human knowledge and circumstances, and more information may be offered if needed. Such architecture can be beneficial due to offering a loop in which both the input can now be clarified, the interaction adapted and subsequent intricacies refined.

The feedback loop is actually necessary in two ways. First, it allows the human to adapt the further communication depending on the given AI response. The human can rephrase a question or add contextual details if they had the impression that the AI's response was ambiguous or somewhat disappointing. Second, through the feedback loop, AI system also helps to gain knowledge and modifications of own answers are made periodically as well. This again is not far from the idea of

human-human feedback in which both the senders switch signals based on feedback received from the receivers.

In this way, the iteration of such feedback makes the human and the AI systems learn how to communicate effectively with each other based on feedback from the patient. The author is getting feedback from the user and the user, in turn, can also customize the approach to the further interaction with the AI system.

D-ACT Model offers a complex and rather suitable approach in understanding and analyzing the communication between humans and artificial intelligence. It enhances the communication process where both the human and artificial agents in the communication process are involved in decoding and encoding messages. It makes the human-AI interaction loop recursive, contextually perspective, and dynamic because the model consists of six elements: Human Communicator, Interpretative Layer (Human), Communication Channel, AI Communicator, Interpretative Layer (AI), and Feedback Loop. It also offers insights on how communication happens in AI-mediated environments and created new possibilities as to how these interfaces could be improved. Such an adductive approach to the development of this communication progressively enhances the understanding of the involved parties, which is why the D-ACT Model is so useful in analyzing the future of interactions between humans and AI.

Understanding Barrier

The Understanding Barrier in the Human-AI Communication (D-ACT) Model defines all barriers which disrupt or misalign the process through which humans and AI transmit their understanding. The barrier occurs when either contextual information or interpretive abilities are lost which results in answers that do not meet needs or provide incorrect information. The D-ACT framework establishes this barrier as active through two essential structural components.

1. Contextual Layer The layer represents all information that establishes the background and purpose, and current context of the message.
   An understanding barrier arises when:
   • The human provides insufficient or vague context
   • The AI lacks situational awareness or prior knowledge
   • Cultural linguistic or domain-specific cues are missing the main point about AI systems is that they only use information which users provide through their explicit or implicit contact with the system.

2. Interpretative Layer The layer describes how people process messages through decoding and response procedures.
   Barriers occur when:
   • The AI misinterprets the user's intent
   • The human misinterprets AI-generated responses
   • Ambiguity leads to multiple possible meanings People use language for interpretation because they want to create shared understanding of meaning between each other.

Here is the transcription of a short conversation (speech notes) between a human and an artificial intelligence about the weather. The conversation took place in the Urdu language, which is transcribed in English

After asking about the weather, the conversational AI asked about plans, while in the second phase of conversation, the AI combined two different tastes and mixed up the food combination of sweet with sour.

Implications for Media and Mass Communication

The D-ACT Model contributes to the change of perspective for media and mass communication perspectives as it presents AI as a Strategic Partner as opposed to an Instrument in message construction, distribution, and perception. Mass communication theories based on the one-to-many transmission, message effects, and audience reception model become outdated and need to be reshaped with regard to AI's algorithmic agency. As AI writes news articles, moderates content in social media, and recommends articles or products, concepts of credibility, authorship, and ethics are defined differently. Academician and journalists should engage in the development of critical models that describe AI's duality in relation to 'authorship' and 'media', specifically, understanding the input of machine learning algorithms to the manipulation of collective understanding.

Ethical Considerations and Media Ethics

Sue gives special emphasis on the recent rising concern of ethical issues due to AI's contribution in content production. They can also reinforce racism, sexism, and other prejudices which are inherent in the data used for processing, present false information under the guise of news that were popular on the internet, or artificially create fakes that undermine confidence in digital technology. The D-ACT Model foregrounds ethical audits at each stage of AI-mediated communication: from algorithmic design and data selection to deployment and feedback. There is a clear need for constant supervision of advertisement production made by AI because of potential ethnic bias and trust inaccuracy. Moreover, there is a need to introduce provisions and recommendations of how AI should be integrated into journalism, including requiring discloser of the use of AI, user privacy concerns, and ways to address mistakes and fake news dissemination.

Toward New Theories and Methodologies

Therefore, the D-ACT Model suggests that one has to have the multifaceted approach that is infused with elements of communication theory, data analysis, and ethical and human computer interaction.

Media scholars need to come up with innovative approaches that will include computational analysis of what is produced by the algorithms in question and qualitative studies of perceptions of the masses on those algorithms. Thus, the field should use AI both as the object of study and a partner for a more profound analysis that may assist in identifying new approaches to technology development as well as contributing to the formation of adequate policies and media awareness of the significance of artificial intelligence. These new theories will be useful to complement and/or modify the current journalism and mass communication theories that are fit for the contemporary society that is dominated by digital technology.

Conclusion

The D-ACT Model is the most recent theoretical innovation in the field of human–AI communication and is the most comprehensive theory for the contemporary type of communication since it accounts for its intricacy, fluctuation, and the ethical aspect. Based upon the analysis of the communication theories, cybernetics, and Human- Computer interaction Lab (HCL), the model raises AI from the mere medium that transmits information to active participant that enters the loop of communications with the feedback, interpretation, and adaptation.

However, it is most importantly the bi-directional learning that is central to the D-ACT Model .In one paradigm, human behavior adapts to AI's reaction to the message that has been generated, and at the same time, AI algorithms learn new parameters of behavior from human feedback. It also means that each transactional exchange is helpful for refinement for greater accuracy, relevance and for user satisfaction. Unlike the static views which convey meaning in a one-off manner, D-ACT can be seen to exist in light of the dynamic approach to dialogical communication indicating that meaning is co-built in an ongoing process as opposed to being packaged in an enclosed manner from the senders to the receivers.

Moreover, the D-ACT Model foregrounds interpretative and contextual layers on both sides of the communicative act. These individual factors include cognitive structures, emotion, cultures, prior experiences and knowledge among the human users. Interpretation for AI agents is determined by training data, algorithms, or any other input from the environment. In this way, with such an approach D-ACT offers the diagnostic lens where it is possible to observe the breakdowns – be it cultural misinterpretations, semantic ambiguities, or algorithmic bias, as well as to design the remedy – improve cultural competence, to increase empathy, and enhance transparency.

The other component of D-ACT framework is ethical accountability. Larger and more-capacious the roles played by AI systems in content creation, decision making or social interactions, grosser become the chances of perpetuating/reinforcing bias, intrusion of privacy, or concealment of decision-making pathways. D-ACT tackles these issues through the provision of audit points: the processes by which a decision can be explained, human participation formulas that ensure users' independence, and periodic ethical check-ups. This normative dimension has the requirement that AI communication has to be aligned in how it meets human's needs and values to be trustworthy and socially responsible.

Appreciating the broad applicability of the D-ACT Model, further, it is relevant in journalism, health related issues, education sectors, customer relations, and government sectors where there is a need to communicate effectively and sensitively with the public. In each of them, D-ACT's six elements of human communicator, human interpretative layer, channel, AI communicator, AI interpretative layer and feedback loop present a clear framework for reviewing existing systems and designing new interfaces of the future.

For the future development, the D-ACT Model prepares a longitudinal research plan covering the subsequent stages of cross-cultural confirmations, emotional intelligence (EI) incorporation, user trust investigations, and application to learning environments. Diverse involvement of the interdisciplinary group of communication scholars, practitioners of AI ethics, behavioral scientists, and technologists

will be helpful in refining the conceptual framework and in developing its utility in practical form and substance.

To sum up, given that the concept of AI is escalating in communicative platforms, it is imperative that this particular knowledge is well ethically under spooled. The D-ACT Model meets this need with its feature of human-orientation, as well as its value-shaped structure. Thus, D-ACT situates AI not as the observer but as the co-speaker in the construction and reconstruction of the interpretative and contextual frameworks in order to facilitate the ethical, beneficial, and sustainable relations between human and AI in the world of digitalization.

Future Directions and Research Opportunities Future research should:

- Test the D-ACT Model across languages and cultures.
- Examine emotional intelligence in AI-human communication.
- Evaluate user trust and engagement over long-term interaction.
- Explore educational integration of the D-ACT Model.

The **interdisciplinary collaboration** bridging communication studies, AI ethics, and behavioral science is essential. Ethicists can guide bias mitigation; psychologists can assess cognitive impacts; communication scholars can refine interpretative frameworks. Together, these perspectives will refine the D-ACT Model into a robust, ethically grounded theory for the next generation of human-AI interaction.

References

Carey, J. W. (1989). *Communication as culture: Essays on media and society*. Routledge.

Cassell, J. (2000). *Embodied conversational agents*. MIT Press.

Crawford, K. (2021). *Atlas of AI: Power, politics, and the planetary costs of artificial intelligence*. Yale University Press.

Hall, S. (1980). Encoding/decoding. In S. Hall, D. Hobson, A. Lowe, & P. Willis (Eds.), *Culture, media, language* (pp. 128–138). Hutchinson.

Jurafsky, D., & Martin, J. H. (2023). *Speech and language processing* (3rd ed.). https://web.stanford.edu/~jurafsky/slp3/

Nass, C., & Reeves, B. (1996). *The media equation: How people treat computers, television, and new media like real people and places*. Cambridge University Press.

Noble, S. U. (2018). *Algorithms of oppression: How search engines reinforce racism*. New York University Press.

OpenAI. (2023). *GPT-4 technical report*. https://openai.com/research/gpt-4

Picard, R. W. (1997). *Affective computing*. MIT Press.

Reuters Institute for the Study of Journalism. (2023). *Digital news report 2023*. University of Oxford. https://www.digitalnewsreport.org/

Shannon, C. E., & Weaver, W. (1949). *The mathematical theory of communication*. University of Illinois Press.

Turkle, S. (2011). *Alone together: Why we expect more from technology and less from each other*. Basic Books.

UNESCO. (2021). *AI and education: Guidance for policy-makers*. https://doi.org/10.54675/PCSP7350

Weizenbaum, J. (1976). *Computer power and human reason: From judgment to calculation*. W. H. Freeman.

Wiener, N. (1948). *Cybernetics: Or control and communication in the animal and the machine*. MIT Press.

World Health Organization. (2021). *Ethics and governance of artificial intelligence for health*. https://www.who.int/publications/i/item/9789240029200

Bostrom, N. (2014). *Superintelligence: Paths, dangers, strategies*. Oxford University Press.

Bickmore, T., & Cassell, J. (2005). Social dialogue with embodied conversational agents. In J. C. Lester, R. M. Vicari, & F. Paraguaçu (Eds.), Intelligent Virtual Agents: IVA 2005 Lecture Notes in Computer Science, vol 3661 (pp. 23–35). Springer. https://doi.org/10.1007/11550617_4

Wang, Q., & Goel, A. K. (2022). Mutual theory of mind for human-AI communication. *arXiv preprint arXiv:2210.03842*.

Nass, C., & Moon, Y. (2000). Machines and mindlessness: Social responses to computers. *Journal of Social Issues*, 56(1), 81–103. https://doi.org/10.1111/0022-4537.00153

Aoyama, S., Chujo, R., Hautasaari, A., & Naemura, T. (2025). *Intersubjective model of AI-mediated communication: Augmenting human-human text chat through LLM-based adaptive agent pair*. arXiv. https://doi.org/10.48550/arXiv.2502.18201

Osmanoglu, B. (2025). The theory of cybernetics for managing human-AI interactions: A framework for AI management. In K. Arai (Ed.), *Advances in information and communication. FICC 2025* (Lecture Notes in Networks and Systems, Vol. 1283, pp. [insert page numbers if known]). Springer. https://doi.org/10.1007/978-3-031-84457-7_16

Xu, K., & Shi, J. (2024). Visioning a two-level human–machine communication framework: Initiating conversations between explainable AI and communication. *Communication Theory*, *00*, 1–14. https://doi.org/10.1093/ct/qtae016

Quilantang, R. F. (2025). The HAI-IO Model: A framework for understanding the human-AI communication process. Human-Machine Communication Journal, 10(9), 1-20. https://doi.org/10.30658/hmc.10.9

Revolusi, P., & Febriandy, R. K. (2025). Human AI communication (HA-C): Transforming the role of technology in human interaction. *Multidisciplinary Science Journal*, *8*(3), 2026201. https://doi.org/10.31893/multiscience.2026201

Apiola, M.-V., & Sutinen, E. (2020). Towards Constructivist Design of Artificial Intelligence: Perspectives and Ideas. *Constructivist Foundations*, *16*(1), 055–056. https://constructivist.info/16/1/055.apiola
Http://www.worldcat.org/oclc/47679653

Binns, R. (2018). Fairness in machine learning: Lessons from political philosophy. *Proceedings of the 2018 Conference on Fairness, Accountability and Transparency* (FAT*), 149–159. https://doi.org/10.1145/3287560.3287598

Binns, R., Veale, M., Van Kleek, M., & Shadbolt, N. (2018). 'It's reducing a human being to a percentage': Perceptions of justice in algorithmic decisions. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, 1–14. https://doi.org/10.1145/3173574.3173951

Boden, M. A. (2016). AI: Its nature and future. *Oxford University Press*.

Floridi, L., & Cowls, J. (2019). A unified framework of five principles for AI in society. *Harvard Data Science Review*, 1(1). https://doi.org/10.1162/99608f92.8cd550d1

Hancock, P. A., Billings, D. R., Schaefer, K. E., Chen, J. Y. C., de Visser, E. J., & Parasuraman, R. (2011). A meta-analysis of factors affecting trust in human-robot interaction. *Human Factors*, 53(5), 517–527. https://doi.org/10.1177/0018720811417254

Krizhevsky, A., Sutskever, I., & Hinton, G. E. (2012). ImageNet classification with deep convolutional neural networks. *Advances in Neural Information Processing Systems*, 25, 1097–1105.

Miller, T. (2019). Explanation in artificial intelligence: Insights from the social sciences. *Artificial Intelligence*, 267, 1–38. https://doi.org/10.1016/j.artint.2018.07.007

Mitchell, M., Wu, S., Zaldivar, A., Barnes, P., Vasserman, L., Hutchinson, B., Spitzer, E., Raji, I. D., & Gebru, T. (2019). Model cards for model reporting. *Proceedings of the Conference on Fairness, Accountability, and Transparency* (FAT*), 220–229. https://doi.org/10.1145/3287560.3287596

NIST (National Institute of Standards and Technology). (2023). *AI Risk Management Framework (AI RMF 1.0)*. U.S. Department of Commerce. https://doi.org/10.6028/NIST.AI.100-1

OpenAI. (2023). GPT-4 technical report. *OpenAI Research*. https://cdn.openai.com/papers/gpt-4.pdf

Raji, I. D., & Buolamwini, J. (2019). Actionable auditing: Investigating the impact of publicly naming biased performance results of commercial AI products. *Proceedings of the 2019 AAAI/ACM Conference on AI, Ethics, and Society*, 429–435. https://doi.org/10.1145/3306618.3314244

Samek, W., Wiegand, T., & Müller, K. R. (2017). Explainable artificial intelligence: Understanding, visualizing and interpreting deep learning models. *arXiv preprint arXiv:1708.08296*. https://arxiv.org/abs/1708.08296

Vinuesa, R., Azizpour, H., Leite, I., Balaam, M., Dignum, V., Domisch, S., ... & Fuso Nerini, F. (2020). The role of artificial intelligence in achieving the Sustainable Development Goals. *Nature Communications*, 11(1), 1–10. https://doi.org/10.1038/s41467-019-14108-y

Carlson, M. (2015). The Robotic Reporter: Automated journalism and the redefinition of labor, compositional forms, and journalistic authority. Digital Journalism, 3(3), 416–431. https://doi.org/10.1080/21670811.2014.976412

Diakopoulos, N. (2019). Automating the News: How algorithms are rewriting the media. Harvard University Press.
Hermida, A. (2019). AI in journalism. Journalism Studies, 20(1), 1–3. https://doi.org/10.1080/1461670X.2018.1545581

Westerlund, M. (2020). The emergence of deepfake technology: A review. *Technology Innovation Management Review, 10*(3), 39–52. https://doi.org/10.22215/timreview/1330

Bickmore, T. W., & Cassell, J. (2005). *Social dialogue with embodied conversational agents*. In C. C. L. (Ed.), *Proceedings of the International Workshop on Human-Agent Interaction* (pp. 1-8).

Carlson, M. (2015). The robotic reporter: Automated journalism and the redefinition of labor, compositional forms, and journalistic authority. *Digital Journalism, 3*(3), 416–431. https://doi.org/10.1080/21670811.2014.976412

Lewis, S. C., & Westlund, O. (2015). Actors, actants, audiences, and activities in cross-media news work. *Digital Journalism, 3*(1), 19–37. https://doi.org/10.1080/21670811.2014.916449

Nass, C., & Moon, Y. (2000). Machines and mindlessness: Social responses to computers. *Journal of Social Issues, 56*(1), 81-103. https://doi.org/10.1111/0022-4537.00153