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Pragmatic Analysis of User Interaction with AI Chatbots in Digital Services

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ABSTRACT

The rapid development of artificial intelligence technology has significantly transformed digital communication through the increasing use of AI chatbots in various sectors such as e-commerce, banking, healthcare, education, customer service, and government digital services. As human interaction with AI systems becomes more common, the effectiveness of chatbot communication has become an important issue, particularly in relation to contextual understanding, implied meaning, and conversational appropriateness. This study aims to analyze the pragmatic aspects of user interaction with AI chatbots in digital services, focusing on speech acts, contextual understanding, conversational implicature, politeness strategies, and communication effectiveness. The study employs a qualitative descriptive approach using discourse analysis and a pragmatic analysis framework. Data were collected from chatbot-user conversations across various digital platforms through observation, documentation, screenshot collection, and conversation transcription. The analysis is based on pragmatic theories including Speech Act Theory by John Searle, the Cooperative Principle and conversational implicature by H. P. Grice, and Politeness Theory by Penelope Brown and Stephen Levinson. The findings reveal that AI chatbots are generally capable of performing basic pragmatic functions effectively, particularly in structured and direct interactions involving information delivery and procedural guidance. However, chatbots still experience limitations in interpreting indirect requests, implied meanings, emotional nuances, sarcasm, and complex contextual relationships. Communication failures frequently occur when users employ implicit or emotionally sensitive expressions that require deeper pragmatic inference. Therefore, improving contextual awareness, emotional sensitivity, and inferential reasoning is essential for developing more natural, adaptive, and human-centered conversational AI systems in digital services.

1. Introduction

R The rapid advancement of artificial intelligence technology has significantly transformed communication practices in modern digital society. One of the most widely used innovations is the AI chatbot, a computer-based conversational system designed to simulate human interaction through text or voice communication(Rodríguez Cardona et al., 2019). AI chatbots are increasingly integrated into various digital platforms to provide efficient, fast, and automated services for users. In recent years, the use of chatbots has expanded rapidly across multiple sectors, including e-commerce, banking, education, healthcare, customer service, and government digital services. Companies and institutions employ chatbots to answer customer inquiries, provide recommendations, process transactions, and support users twenty-four hours a day without direct human assistance.

The growing dependence on AI chatbots demonstrates the increasing importance of human–AI communication in contemporary society. Communication between humans and machines is no longer limited to simple command-based interactions but has evolved into more complex conversational exchanges that require contextual understanding and meaningful interpretation(Williams et al., 2015). In digital services, users expect chatbots to communicate naturally, accurately, and politely, similar to human interaction. Therefore, the effectiveness of chatbot communication has become an essential aspect of user satisfaction and service quality.

In this context, pragmatics plays an important role in analyzing how meaning is constructed and interpreted during chatbot-user interaction. Pragmatics is a branch of linguistics that studies meaning in relation to context, speaker intention, and situational factors. Unlike semantics, which focuses on literal meaning, pragmatics examines how language users understand implied meanings, indirect expressions, and communicative intentions. The application of pragmatic theory is highly relevant in chatbot communication because chatbot interactions often involve contextual interpretation, politeness strategies, speech intentions, and conversational cooperation.

However, despite the rapid development of AI technology, chatbot communication still faces various pragmatic problems. One common issue is the misunderstanding of user intentions, where chatbots fail to interpret what users actually mean, especially when users employ indirect language, ambiguity, sarcasm, or implied requests(TONTS, 2018). Chatbots may also generate irrelevant responses that do not match the conversational context. In many situations, AI systems demonstrate limited contextual understanding, causing conversations to become repetitive or ineffective. Additionally, politeness problems frequently appear in chatbot interactions because some AI systems produce responses that sound overly mechanical, insensitive, or socially inappropriate. Ambiguity in meaning also becomes a challenge because human communication often depends on contextual interpretation rather than literal expressions alone.

To analyze these communication phenomena, several pragmatic concepts are important in this study. One of the primary concepts is speech act theory, which examines how utterances function as actions such as requesting, apologizing, informing, or promising. Through speech act analysis, researchers can identify how chatbots perform communicative functions during interaction with users. Another important concept is conversational implicature, which refers to implied meanings that are not explicitly stated in conversation. This theory helps examine whether chatbots can successfully interpret indirect user intentions and hidden meanings.

Context also becomes a central aspect of pragmatic analysis because meaning in communication depends heavily on situational conditions, previous utterances, and user intentions(Kecskes, 2010). In chatbot interaction, contextual understanding determines whether responses are relevant and coherent. Deixis is another pragmatic feature that examines context-dependent expressions such as pronouns, time references, and location references. Chatbots often encounter difficulties in interpreting deictic expressions accurately. Presupposition theory is also relevant because communication frequently involves assumptions shared between speakers and listeners. Chatbots may fail when they cannot recognize presupposed information within user statements.

Furthermore, the cooperative principle proposed in pragmatics explains how effective communication depends on cooperation between participants through conversational maxims such as relevance, clarity, quantity, and truthfulness. Chatbot responses can be evaluated based on whether they follow these conversational principles effectively. Politeness strategies are equally important because communication in digital services requires respectful and socially acceptable interaction. Through politeness analysis, this study can evaluate how chatbots maintain user comfort, empathy, and positive interaction during communication.

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Research on AI chatbots and human-computer interaction has grown significantly over the last decade due to the increasing integration of conversational agents into digital services. One important study was conducted by Asbjørn Følstad and Cameron Taylor in 2021. Their research titled "Investigating the User Experience of Customer Service Chatbot Interaction" focused on qualitative analysis of chatbot dialogues in customer service environments. The study proposed a framework for evaluating chatbot interactions by analyzing conversational flow, communication quality, and user satisfaction. The researchers found that chatbot effectiveness strongly depends on relevance, contextual coherence, and conversational responsiveness. They also identified communication breakdowns caused by repetitive responses and failure to understand user intentions. This study contributes to understanding user experience in chatbot interaction, but it focuses more on usability and service quality rather than pragmatic linguistic analysis.

In 2021, Francesca Paladini and colleagues conducted a systematic literature review entitled "The Human Side of Human-Chatbot Interaction." The study reviewed ten years of research on text-based chatbots and highlighted important themes such as emotional engagement, anthropomorphism, conversational trust, and communication expectations. The researchers emphasized that human interaction with chatbots involves social and psychological dimensions beyond technological performance. They argued that chatbot communication should be analyzed not only from computational perspectives but also from human communication theories. However, the review mainly focused on interaction design and emotional factors without deeply discussing pragmatic concepts such as implicature, deixis, or speech acts.

Another important contribution was presented by Luminița Nicolescu and Monica Teodora Tudorache in 2022 through their systematic literature review on human-computer interaction in customer service chatbots. Their research examined how AI chatbots influence customer experiences in digital services. The findings indicated that users generally prefer chatbots that display human-like communication styles, empathy, and politeness. The study also identified trust, responsiveness, and conversational clarity as important factors affecting interaction quality. Nevertheless, the research concentrated more on service management and user satisfaction rather than pragmatic language interpretation.

In the same year, Qingxiao Zheng and colleagues published a literature review on conversational human-AI interaction in the ACM Digital Library. Their study investigated user experience in conversational AI systems and analyzed communication, engagement, relationship maintenance, and ethical interaction issues. The researchers highlighted the importance of trust-building, contextual awareness, and conversational naturalness in human-AI communication. They also emphasized the significance of social boundaries and privacy in conversational systems. Although the study contributes to understanding interaction dynamics, it does not specifically apply pragmatic linguistic frameworks to chatbot conversations.

Research focusing more directly on pragmatics emerged in later years. In 2024, Doris Dippold published a study entitled "Making the Case for Audience Design in Conversational AI." This research analyzed users' pragmatic strategies and rapport expectations in interactions with task-oriented chatbots. The study demonstrated that users apply different pragmatic strategies when communicating with AI systems and expect chatbots to respond according to social and contextual norms. Dippold argued that chatbot design should consider audience design principles to improve communication effectiveness and inclusivity. The findings showed that mismatches between chatbot responses and user expectations negatively affect communication quality. This study is highly relevant because it explicitly connects pragmatics with chatbot interaction, especially regarding rapport management and contextual adaptation.

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Also in 2024, a study published in the Journal of Pragmatics examined the feasibility of using AI-generated conversations in pragmatic analysis. The researchers analyzed whether conversations generated by ChatGPT could function similarly to human conversational data in pragmatic studies. The findings revealed that AI-generated interactions demonstrated comparable performance to human conversations in several sociopragmatic and pragmalinguistic features, including formality and syntactic diversity. The study concluded that AI-generated communication could become an important object of pragmatic research. However, the research focused more on AI-generated data itself rather than on user interaction with chatbots in real digital service environments.

Previous studies on AI chatbots mostly focus on technological development, machine learning performance, and computational efficiency rather than linguistic interaction. Many researchers examine chatbot accuracy, programming models, and system optimization, while fewer studies investigate how meaning is negotiated pragmatically between users and AI systems. In addition, limited research specifically explores how chatbots interpret implied meanings, contextual information, and indirect communication within real digital service interactions. As a result, the pragmatic dimension of chatbot communication remains underexplored, particularly in understanding communication failures and conversational effectiveness.

Based on these issues, this study aims to investigate the pragmatic aspects of user interaction with AI chatbots in digital services. The study seeks to answer several research questions: How do AI chatbots perform speech acts in digital interactions? How do users interpret chatbot responses pragmatically? What types of pragmatic failures occur during chatbot communication? These questions are important for understanding the communicative capabilities and limitations of AI systems in real conversational settings.

The objectives of this research are to analyze pragmatic features in chatbot-user interactions, identify the effectiveness of communication between users and AI chatbots, and examine pragmatic problems that appear in digital service communication(Følstad & Taylor, 2021). By focusing on pragmatic analysis, this study aims to provide a deeper understanding of how AI chatbots construct meaning, respond to user intentions, and maintain conversational interaction.

This research is expected to contribute theoretically and practically to several fields. In linguistics and pragmatics studies, the research expands the application of pragmatic theory into the field of artificial intelligence communication. In the field of AI and digital services, the findings may help developers improve chatbot communication quality, contextual understanding, and politeness strategies. Furthermore, this study contributes to human-computer interaction research by providing insights into how users communicate with AI systems and how conversational technology can become more natural, effective, and user-oriented in the future.

2. Method

This study employs a qualitative approach using a descriptive qualitative method to analyze the pragmatic aspects of user interaction with AI chatbots in digital services. A qualitative approach is considered appropriate because the research focuses on understanding language use, contextual meaning, conversational behavior, and communication patterns that occur naturally during chatbot-user interaction. Rather than measuring numerical data, this study aims to interpret how meaning is constructed and understood within conversations between humans and artificial intelligence systems. The descriptive qualitative method allows the researcher to describe communication phenomena systematically and provide detailed interpretations of pragmatic features found in chatbot interactions.

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In addition, this study applies discourse analysis and a pragmatic analysis framework to examine how communication occurs within digital conversations(Bou-Franch, 2020). Discourse analysis is used to investigate language use in context, particularly how chatbot responses are organized, interpreted, and connected within conversational exchanges. Meanwhile, pragmatic analysis focuses on implied meaning, speaker intention, contextual understanding, and communication effectiveness. Through this framework, the study investigates how AI chatbots interpret user utterances, perform communicative actions, and respond to contextual situations during interaction.

The data sources in this research consist of chatbot conversations collected from various digital service platforms(Kim et al., 2019). The conversations involve interactions between users and AI chatbots operating in sectors such as e-commerce, banking, education, healthcare, customer service, and government digital services. Data may include conversations from chatbot applications integrated into websites, mobile applications, and AI assistant platforms. Examples of platforms that can be observed include e-commerce service bots, banking virtual assistants, educational chatbots, customer support chat systems, and AI conversational assistants such as ChatGPT, Google Gemini, Microsoft Copilot, or other automated customer service systems. The selected conversations focus on naturally occurring communication involving requests, questions, complaints, recommendations, and problem-solving interactions.

To collect the data, several data collection techniques are employed(Auberlet et al., 2014). The first technique is observation, in which the researcher observes chatbot-user interactions directly within digital platforms. Through observation, the researcher identifies communication patterns, conversational structures, and pragmatic phenomena that emerge during interaction. The second technique is documentation, where chatbot conversations are documented systematically for further analysis. Documentation may involve collecting digital records of interactions, customer service chat logs, or publicly accessible chatbot conversations.

Furthermore, screenshot collection is used to capture important conversational exchanges that demonstrate pragmatic features such as speech acts, politeness strategies, contextual misunderstandings, or conversational implicatures. Conversation transcription is also conducted to convert chatbot interactions into written textual data that can be analyzed linguistically. In some cases, recording chatbot interactions may also be applied to preserve the sequence and flow of communication accurately. These techniques help ensure that the collected data remain authentic and contextually complete for pragmatic analysis.

The data analysis process in this study follows several systematic stages(Tawfik et al., 2019). The first stage involves identifying utterances within the chatbot conversations. Each conversational exchange between users and chatbots is examined carefully to determine communicative functions and interactional patterns. After identifying utterances, the researcher classifies speech acts based on their communicative purposes, such as requests, apologies, confirmations, suggestions, greetings, or informational responses. This stage helps reveal how chatbots perform communicative actions during interaction.

The next stage involves analyzing conversational context to understand how meaning depends on situational factors, user intentions, and previous utterances. Contextual analysis is important because chatbot communication often requires interpretation beyond literal meaning. The researcher also identifies conversational implicatures to determine whether users imply meanings indirectly and whether chatbots successfully interpret those implied intentions. Through implicature analysis, the study examines the extent to which AI systems can understand indirect communication, hidden meanings, or implied requests.

In addition, the analysis examines politeness strategies used by chatbots during interaction. This stage focuses on how chatbots express politeness, empathy, apologies,

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gratitude, and respectful communication. The researcher evaluates whether chatbot responses maintain social appropriateness and user comfort within digital conversations(Chaves & Gerosa, 2021). Finally, the study interprets communication failures that occur during interaction, including misunderstandings, irrelevant responses, contextual errors, repetitive answers, ambiguity, and inability to recognize implied meanings. These communication failures are analyzed to identify limitations in chatbot pragmatic competence.

This research applies several pragmatic theories as its theoretical framework. The primary theory used is Speech Act Theory proposed by John Searle. This theory explains how utterances function as actions, such as requesting, apologizing, promising, or informing. Speech Act Theory helps analyze how chatbots perform communicative functions within conversations.

The study also applies the Cooperative Principle and conversational implicature theory developed by H. P. Grice. Grice's theory explains how effective communication depends on conversational cooperation through the maxims of quantity, quality, relevance, and manner(Hossain, 2021). This framework is useful for analyzing whether chatbot responses are informative, relevant, truthful, and clear during interaction. Conversational implicature theory also helps identify implied meanings that are not directly expressed in conversation.

In addition, the research uses Politeness Theory developed by Penelope Brown and Stephen Levinson. This theory examines how speakers maintain social relationships, protect face needs, and express politeness during communication. Through this framework, the study evaluates how AI chatbots employ politeness strategies to create socially acceptable and user-friendly interactions.

3. Results and Discussion

3.1 Types of Speech Acts Used by Chatbots

One of the important findings in this study is the identification of various types of speech acts performed by AI chatbots during interactions with users in digital service platforms. The first category identified in chatbot interaction is representatives. Representative speech acts are utterances used to provide information, describe situations, confirm facts, or state beliefs. In digital service communication, representative acts are among the most frequently used by chatbots because their primary function is often to deliver information to users. Chatbots commonly use representatives when answering questions, confirming transactions, explaining procedures, or providing updates(Zumstein & Hundertmark, 2017). For example, utterances such as "Your payment has been successfully processed," "The package is currently being shipped," or "Your appointment is scheduled for tomorrow" function as representatives because the chatbot conveys information believed to be true. These utterances demonstrate the chatbot's role as an information provider within digital communication systems.

The second category is directives, which are speech acts intended to encourage users to perform certain actions. Directive acts are highly common in chatbot interactions because chatbots frequently guide users through digital processes and service procedures. The analysis shows that chatbots often use polite instructional language to direct users during conversations. Examples include statements such as "Please enter your account number," "Click the link below to continue," or "Please wait while I process your request." These utterances function as directives because they instruct or request users to take specific actions(Holmes, 2014). The use of directive speech acts reflects the procedural and task-oriented nature of chatbot communication, especially in customer service, banking, and e-commerce platforms.

Another type of speech act identified in the data is commissives. Commissive speech acts express commitments, promises, or future actions that the speaker intends to perform. In chatbot interactions, commissives appear when the AI system assures users that certain

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processes will be completed or when follow-up actions are promised. Examples include utterances such as "We will contact you within 24 hours," "Your issue will be forwarded to our support team," or "I will help you find the best solution." These utterances indicate commitments made by the chatbot on behalf of the digital service provider. Although chatbots do not possess personal intentions like humans, they are programmed to simulate commitment-oriented communication in order to maintain user trust and conversational continuity.

The analysis also reveals the frequent use of expressive speech acts in chatbot communication(Babaeva et al., 2020). Expressives are utterances used to express emotions, attitudes, apologies, gratitude, or empathy. Many digital service chatbots employ expressive language to create a more natural and human-like interaction. Examples found in the data include statements such as "I apologize for the inconvenience," "Thank you for your patience," "I'm happy to assist you," and "We appreciate your feedback." These utterances function as expressive speech acts because they communicate emotional or interpersonal attitudes toward users. The use of expressives is particularly important in customer service interactions because politeness and empathy contribute significantly to user satisfaction. However, the analysis indicates that some expressive responses appear overly mechanical or repetitive, reducing the sense of genuine empathy in communication.

The final category identified is declaratives. Declarative speech acts are utterances that change a situation or status immediately upon being expressed. Compared to other categories, declaratives appear less frequently in chatbot interactions because chatbots generally operate within limited institutional authority. Nevertheless, some declarative-like utterances are still present in digital services. Examples include statements such as "Your account has been successfully activated," "Your booking has been confirmed," or "The transaction has been canceled." These utterances perform actions through language because the status of a process changes immediately after the chatbot delivers the message. Declaratives are especially common in automated transactional systems where the chatbot communicates the completion or activation of digital services.

Overall, the findings demonstrate that AI chatbots perform multiple types of speech acts in order to facilitate communication with users effectively. Representative and directive speech acts appear most frequently because chatbots primarily function as providers of information and procedural guidance. Commissive and expressive speech acts are also important because they help maintain conversational engagement, trust, and politeness in interaction. Meanwhile, declarative speech acts occur mainly in transactional contexts where system status changes are communicated directly to users.

The analysis further indicates that while chatbots are capable of producing structurally appropriate speech acts, limitations still exist in pragmatic flexibility and contextual sensitivity. Some chatbot responses successfully imitate human conversational behavior, but others appear rigid, repetitive, or insufficiently adaptive to user intentions. As a result, the effectiveness of chatbot communication depends not only on grammatical accuracy but also on the system's ability to employ speech acts appropriately according to conversational context and user expectations.

3.2 Contextual Understanding

One of the most significant aspects of pragmatic analysis in chatbot interaction is contextual understanding. In human communication, meaning is not determined solely by the literal interpretation of words but also by contextual factors such as speaker intention, previous utterances, situational background, and implied meanings. Therefore, the effectiveness of AI chatbot communication depends greatly on the system's ability to interpret context accurately and respond appropriately to users' communicative intentions. The findings of this study indicate that although AI chatbots demonstrate considerable progress in

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contextual processing, limitations still exist in understanding user intentions, indirect requests, implied meanings, and maintaining context continuity during interaction.

The analysis reveals that chatbots are generally capable of understanding straightforward user intentions when requests are expressed clearly and directly. In many digital service interactions, chatbots successfully identify users' communicative goals such as requesting information, tracking orders, checking account balances, resetting passwords, or asking for service assistance. For example, when users type explicit requests such as "I want to check my order status" or "How can I reset my password?", the chatbot is usually able to recognize the purpose of the utterance and provide relevant procedural responses. This demonstrates that AI chatbots perform effectively in handling routine transactional communication that follows predictable linguistic patterns.

However, the findings also show that chatbot performance decreases when user intentions are expressed indirectly or ambiguously. Human communication frequently involves indirect language where speakers imply requests without stating them explicitly(Pinker et al., 2008). In several interactions analyzed in this study, users employed indirect expressions such as "I can't access my account anymore" or "This payment issue is really frustrating." In these situations, human interlocutors would typically infer hidden intentions such as requests for technical assistance or emotional reassurance. Nevertheless, some chatbots failed to interpret these implied meanings correctly and instead generated generic or unrelated responses. This indicates that while chatbots can process explicit commands efficiently, they still experience difficulties understanding pragmatic intentions embedded within indirect communication.

The study further demonstrates that implied meanings and conversational implicatures remain major challenges for AI chatbots. In pragmatics, conversational implicature refers to meanings that are suggested rather than directly stated. Human speakers often rely on shared knowledge, assumptions, and contextual inference to interpret intended meaning(Bergen & Grodner, 2012). The findings reveal that chatbots sometimes struggle to recognize these implied communicative purposes because their responses are often based primarily on keyword recognition and programmed conversational models. For example, when users express dissatisfaction indirectly through sarcastic or emotionally nuanced language, chatbots may fail to detect the underlying emotional meaning. As a result, responses can appear insensitive, irrelevant, or overly mechanical. In several cases, chatbots responded to complaints with standard informational messages without acknowledging the emotional context of the conversation.

Another important finding concerns context continuity within conversations. Effective communication requires the ability to maintain and connect information across multiple conversational turns. Human interlocutors naturally remember previous statements and use them to interpret subsequent utterances. In chatbot interactions, context continuity becomes essential because users often provide information gradually throughout the conversation. The findings indicate that advanced AI chatbots demonstrate some ability to maintain short-term conversational context by referencing previous messages and continuing related discussions. For instance, chatbots may correctly connect follow-up questions such as "What about tomorrow?" or "Can you change it?" to previous topics discussed earlier in the interaction.

Despite these improvements, limitations in context continuity remain evident in many chatbot systems(Li et al., 2021). Some chatbots fail to retain important contextual information when conversations become longer or more complex. In certain cases, chatbots repeatedly ask users to restate information that had already been provided earlier in the interaction. This disrupts conversational coherence and reduces communication efficiency. The findings also show that chatbots may lose contextual understanding when users shift topics, use pronouns without explicit references, or employ vague expressions requiring situational interpretation.

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Consequently, conversations may become fragmented, repetitive, or pragmatically inappropriate.

The analysis further suggests that contextual understanding in chatbot communication is influenced by the sophistication of natural language processing models and the availability of conversational data. AI systems with more advanced language models generally perform better in interpreting user intentions and maintaining conversational flow. Nevertheless, even highly advanced chatbots still encounter difficulties with culturally specific expressions, sarcasm, humor, figurative language, and emotionally implicit communication. This demonstrates that contextual understanding in human language involves complex cognitive and social dimensions that remain challenging for artificial intelligence systems to fully replicate.

3.3 Conversational Implicature

One important aspect identified in this study is the role of conversational implicature in chatbot-user interaction. Conversational implicature refers to implied meanings that are not explicitly stated but are understood through context, shared assumptions, and conversational inference(Benotti & Blackburn, 2014). According to the pragmatic theory proposed by H. P. Grice, speakers often communicate meanings indirectly rather than expressing them literally. In human communication, listeners generally interpret hidden intentions naturally by relying on contextual knowledge and conversational experience. However, the findings of this study indicate that conversational implicature remains one of the greatest challenges for AI chatbots in digital services.

The analysis demonstrates that users frequently imply meanings indirectly during interactions with chatbots. Rather than giving direct commands, users often employ indirect expressions, emotional statements, or situational hints to communicate their intentions. For example, instead of explicitly requesting technical assistance, users may say "I have been trying to log in since this morning," which indirectly implies a request for help. Similarly, statements such as "This delivery is taking forever" may imply dissatisfaction and an expectation for clarification or compensation. In human conversation, these indirect utterances are usually interpreted without difficulty because speakers and listeners share pragmatic understanding and social context.

The findings reveal that users tend to use indirect language for several reasons. First, indirect communication is often considered more polite and socially acceptable than direct commands. Users may soften requests by expressing problems or concerns indirectly. Second, indirect expressions allow users to communicate emotional attitudes such as frustration, disappointment, or uncertainty without openly stating them. Third, conversational implicature frequently occurs naturally in spontaneous communication because humans rely heavily on contextual interpretation rather than literal wording alone.

Despite advances in natural language processing, the study indicates that chatbots do not always interpret hidden intentions correctly(Abdellatif et al., 2021). In interactions involving direct and explicit requests, chatbots generally provide accurate and relevant responses. However, when users rely on indirect language or implied meanings, chatbot responses often become less effective. In several cases analyzed in this study, chatbots responded only to the literal meaning of user utterances without recognizing the implied communicative purpose behind them.

For example, when a user stated, "I guess nobody can help me with this issue," the chatbot interpreted the sentence as a general statement rather than recognizing it as an indirect complaint or request for reassurance. Instead of providing empathetic assistance, the chatbot generated a generic response unrelated to the user's emotional intention. Similarly, when users employed sarcasm or figurative expressions, some chatbots failed to detect the intended meaning and responded inappropriately. These findings demonstrate that chatbots

often struggle to move beyond surface-level linguistic processing toward deeper pragmatic interpretation.

The analysis further reveals that chatbot difficulties with implicature are closely related to limitations in contextual reasoning(Wilkowska, 2020). Human interlocutors typically infer hidden intentions by combining linguistic information with emotional cues, situational awareness, and shared social knowledge. In contrast, many chatbots rely primarily on keyword recognition, statistical prediction, or predefined conversational patterns. As a result, chatbots may interpret utterances literally even when the intended meaning differs significantly from the explicit wording.

Another important finding concerns emotionally implied meanings. Users frequently communicate frustration, confusion, or dissatisfaction indirectly rather than through direct complaints. For instance, utterances such as "This is getting complicated" or "I've already tried everything" often imply emotional exhaustion and a need for support. Human conversational partners usually recognize these emotional implications and adjust their responses accordingly. However, several chatbot interactions analyzed in this study showed limited sensitivity to emotional implicature. Chatbots sometimes responded with procedural instructions without acknowledging the user's emotional state, making the interaction appear impersonal and mechanically generated.

Nevertheless, the findings also indicate that more advanced AI chatbots demonstrate partial success in interpreting conversational implicatures. Certain chatbot systems are capable of identifying common indirect requests and responding contextually. For example, when users express uncertainty such as "I'm not sure how to continue," some chatbots provide guidance even without an explicit request for help. Similarly, advanced conversational models occasionally recognize dissatisfaction expressed indirectly and respond with apologies or reassurance. These improvements suggest that recent developments in conversational AI have increased the ability of chatbots to process pragmatic cues more effectively.

However, the overall findings suggest that chatbot interpretation of hidden intentions remains inconsistent and context-dependent. Chatbots perform relatively well when indirect meanings follow predictable conversational patterns, but they continue to struggle with complex implicatures involving sarcasm, humor, emotional nuance, cultural references, or ambiguous contextual assumptions. This indicates that pragmatic interpretation in human communication involves sophisticated inferential abilities that artificial intelligence systems have not yet fully mastered.

From a pragmatic perspective, these findings highlight the importance of conversational implicature in evaluating communication effectiveness between humans and AI systems(Cummings, 2013). Successful interaction depends not only on grammatical accuracy but also on the ability to infer meanings beyond literal expressions. The inability to interpret hidden intentions correctly may result in communication breakdowns, user frustration, and reduced trust in digital services. Therefore, improving chatbot capability in recognizing conversational implicatures is essential for creating more natural, empathetic, and contextually appropriate human-AI communication in the future.

3.4 Interpretation of the Findings

The analysis of speech acts demonstrates that chatbots can successfully imitate many communicative functions commonly found in human interaction. Representative and directive speech acts dominate chatbot communication because digital service interactions primarily involve information delivery and procedural guidance. Chatbots are particularly effective when communication follows predictable and task-oriented patterns, such as answering frequently asked questions, confirming transactions, or guiding users through service processes. This suggests that AI systems perform well in structured communicative environments where language use is relatively explicit and standardized.

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However, the findings also indicate that chatbot communication becomes less effective when interaction requires pragmatic flexibility. Human communication is inherently adaptive and context-sensitive because speakers continuously interpret social cues, emotional signals, and implied meanings throughout conversation. Chatbots, in contrast, often rely on statistical prediction and pre-trained conversational models rather than real inferential understanding(Kuźba, 2021). As a result, while chatbots may produce linguistically appropriate utterances, they do not necessarily "understand" meaning in the same cognitive and social sense as humans do.

The findings related to contextual understanding further reinforce this interpretation. Chatbots generally succeed in recognizing direct requests and maintaining short-term conversational continuity. This demonstrates the growing sophistication of natural language processing technologies and contextual memory systems in modern conversational AI. Nevertheless, difficulties emerge when users employ indirect expressions, vague references, sarcasm, or emotionally nuanced language. In such cases, chatbots frequently interpret utterances literally rather than pragmatically. This suggests that current AI systems still lack deeper contextual reasoning abilities that humans naturally apply during communication.

From a pragmatic perspective, contextual understanding requires more than identifying keywords or grammatical structures(Kay, 2006). Human interlocutors interpret meaning through shared social knowledge, cultural expectations, emotional awareness, and situational inference. The findings show that chatbots struggle particularly with these inferential dimensions of communication. For example, users often imply requests indirectly to maintain politeness or express emotions subtly. Human listeners generally infer these intentions automatically, whereas chatbots may fail to recognize the hidden communicative purpose. Consequently, chatbot responses may appear irrelevant, insensitive, or mechanically generated despite being grammatically correct.

The analysis of conversational implicature reveals even deeper limitations in AI-mediated communication. Conversational implicature depends heavily on the Cooperative Principle proposed by H. P. Grice, where interlocutors assume cooperation and infer meanings beyond literal expressions. The findings indicate that users naturally employ implicature in chatbot interaction just as they do in human conversation. This demonstrates that users often treat chatbots as social conversational partners rather than merely technological tools. Users expect chatbots to interpret hidden meanings, emotional undertones, and indirect intentions in socially appropriate ways.

However, chatbot performance in interpreting implicature remains inconsistent. The inability to process hidden meanings accurately reveals a major limitation of artificial intelligence in pragmatic communication. While chatbots can recognize common conversational patterns, they still encounter significant challenges in interpreting culturally dependent meanings, emotional subtleties, irony, humor, and contextual ambiguity. This suggests that human communication relies on complex cognitive and experiential processes that are difficult to replicate computationally.

Another important interpretation concerns the role of politeness and emotional communication in digital interactions. The findings indicate that chatbots frequently use expressive speech acts such as apologies, gratitude, and empathetic statements to create more human-like interactions. On the surface, these expressions may improve user satisfaction and conversational comfort. However, the analysis also reveals that many chatbot responses appear formulaic and repetitive, reducing the authenticity of emotional engagement. This reflects a fundamental difference between simulated empathy and genuine human emotional understanding.

The findings further suggest that users evaluate chatbot communication not only based on informational accuracy but also on social appropriateness and interactional quality. When

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chatbots fail to recognize emotional implications or contextual meanings, users may perceive the interaction as impersonal or frustrating. This demonstrates that effective human-AI communication requires pragmatic competence in addition to technical efficiency. In digital service environments, communication success depends on the chatbot's ability to manage both transactional tasks and interpersonal relationships simultaneously.

Moreover, the findings indicate that AI chatbots occupy an intermediate position between machine systems and social communicators. On one hand, chatbots function as automated technological tools designed to process information efficiently(Ahmad et al., 2018). On the other hand, users increasingly interact with them using natural conversational norms typically applied to human communication. This dual role creates communicative expectations that are difficult for AI systems to fully satisfy. Users expect chatbots to behave socially, understand intentions, and respond empathetically, yet chatbot systems remain limited by computational processing and programmed conversational structures.

The study also highlights broader implications for the development of conversational AI in digital services. The persistence of pragmatic failures suggests that future chatbot development should focus not only on improving linguistic accuracy but also on enhancing contextual reasoning, emotional sensitivity, and inferential capabilities. Pragmatic competence is essential because communication effectiveness depends largely on how meaning is interpreted within specific social and situational contexts. Without sufficient pragmatic understanding, chatbot interactions may remain functional but lack the naturalness and adaptability characteristic of human conversation.

3.5 The Relationship Between Context Understanding and Communication Success

The analysis reveals that communication tends to be successful when chatbots correctly understand the context of user utterances. In interactions involving clear requests and straightforward intentions, chatbots are generally able to provide relevant and satisfactory responses. For example, when users explicitly ask about payment status, account access, product availability, or service procedures, chatbots can usually identify the intended meaning and generate appropriate replies. In these situations, contextual understanding enables smooth conversational flow, efficient problem-solving, and positive user experiences. This indicates that the effectiveness of chatbot communication increases when the system successfully recognizes the relationship between the user's utterance and the situational context of the interaction.

Furthermore, context understanding contributes significantly to conversational coherence and continuity. Effective communication requires the ability to connect current utterances with previous parts of the conversation(Dubberly & Pangaro, 2009). The findings show that users expect chatbots to remember earlier information, recognize references, and maintain topic continuity throughout interaction. When chatbots successfully retain contextual information, conversations appear more natural and efficient because users do not need to repeat explanations repeatedly. For instance, when a chatbot accurately interprets follow-up questions such as "Can you change it?" or "What about tomorrow?" based on previous discussion topics, communication becomes smoother and more coherent. This demonstrates that contextual continuity strengthens interaction quality and increases user trust in digital communication systems.

In contrast, communication failures frequently occur when contextual understanding is weak or incomplete. The findings indicate that chatbots often struggle when users employ indirect language, implied meanings, vague references, or emotionally nuanced expressions. In such situations, chatbots may generate irrelevant or repetitive responses because they interpret utterances literally rather than contextually. For example, users may indirectly express frustration through statements such as "I've been waiting for hours," expecting empathy or immediate assistance. However, if the chatbot fails to recognize the emotional and

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contextual implication of the statement, the response may appear insensitive or unrelated to the user's actual concern. Consequently, the interaction becomes ineffective and unsatisfactory.

The relationship between contextual understanding and communication success is also closely connected to conversational implicature(Ahlsén, 2008). Human communication frequently depends on implied meanings that are not explicitly stated. Users often expect chatbots to infer hidden intentions naturally, similar to human conversational partners. However, the findings reveal that chatbots experience difficulties when interpreting indirect requests, sarcasm, figurative expressions, or context-dependent meanings. As a result, misunderstandings occur because the chatbot responds only to surface-level linguistic structures without recognizing deeper communicative intentions. This demonstrates that inadequate contextual interpretation reduces the pragmatic effectiveness of chatbot interaction.

Another important finding concerns emotional and interpersonal communication. Successful communication is influenced not only by informational accuracy but also by the chatbot's ability to respond appropriately to users' emotional states and social expectations. Contextual understanding allows chatbots to recognize whether users are confused, frustrated, anxious, or dissatisfied during interaction. When chatbots respond with empathy, politeness, and situational sensitivity, users tend to perceive the interaction more positively. On the other hand, when emotional context is ignored, chatbot communication may appear mechanical and impersonal. This suggests that emotional contextual awareness is an important component of communication success in digital service environments.

The findings further indicate that contextual understanding directly affects user satisfaction and trust toward AI systems. Users are more likely to trust chatbots that can maintain coherent conversations, recognize communicative intentions, and provide contextually appropriate responses. In contrast, repeated misunderstandings or irrelevant answers reduce confidence in the system and increase user frustration. This relationship highlights that communication success in AI interaction is not merely a technical issue but also a pragmatic and social phenomenon.

From a pragmatic perspective, the study demonstrates that contextual understanding functions as the foundation of effective human-AI communication. Context enables interpretation beyond literal meaning and supports cooperation between conversational participants. According to the Cooperative Principle proposed by H. P. Grice, successful communication depends on relevance, clarity, adequacy, and shared understanding. When chatbots fail to interpret context accurately, these conversational principles are disrupted, leading to communication breakdowns and reduced interaction quality.

3.6 The Limitations of AI in Interpreting Human Pragmatics

One major limitation identified in this study is the inability of AI chatbots to consistently understand implied meanings and indirect communication. Human speakers frequently communicate through hints, suggestions, sarcasm, or emotionally nuanced expressions without stating intentions explicitly. In everyday interaction, people naturally infer hidden meanings by considering contextual and social information. However, chatbots often interpret utterances literally because they primarily rely on computational language patterns and statistical prediction models. As a result, AI systems may fail to recognize indirect requests, emotional implications, or implied dissatisfaction expressed by users.

For example, when users state sentences such as "I have tried everything already" or "This service is really taking too long," human interlocutors usually understand these utterances as indirect expressions of frustration or requests for assistance. In contrast, some chatbots respond with generic procedural instructions that do not address the emotional or pragmatic intention behind the statement(Dall'Acqua & Tamburini, 2021). This demonstrates

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that AI systems may recognize linguistic structures without fully understanding the communicative purpose embedded within them.

Another important limitation concerns contextual understanding. Human communication depends heavily on situational context, shared experiences, and conversational continuity. People naturally connect current utterances with previous interactions, background knowledge, and social expectations. Although modern chatbots can maintain limited conversational memory, the findings indicate that they often struggle with long or complex interactions involving multiple contextual references. Chatbots may lose track of earlier information, misunderstand pronouns or vague expressions, or fail to recognize shifts in conversational topics. Consequently, conversations can become repetitive, fragmented, or pragmatically inappropriate.

The study also reveals limitations in interpreting emotional and interpersonal meanings. Human pragmatics involves not only understanding information but also recognizing emotions, attitudes, intentions, and social relationships. During communication, humans interpret tone, emotional nuance, politeness, and empathy naturally. AI chatbots, however, do not possess genuine emotional awareness or social consciousness. Although they are programmed to simulate empathy through expressions such as "I understand your frustration" or "I apologize for the inconvenience," these responses are generated algorithmically rather than through authentic emotional understanding.

As a result, chatbot empathy may appear superficial or repetitive, particularly in emotionally sensitive situations. In some interactions analyzed in this study, chatbots failed to recognize emotional escalation or user dissatisfaction and continued providing standardized responses. This often reduced conversational quality and created perceptions of insincerity or mechanical interaction. The findings therefore suggest that simulated empathy cannot fully replace human emotional interpretation in communication.

Furthermore, AI chatbots experience difficulties with figurative language and nonliteral expressions. Human communication frequently includes sarcasm, irony, humor, metaphors, and culturally specific expressions that require inferential reasoning beyond literal interpretation. The findings indicate that chatbots often misunderstand or fail to respond appropriately to these forms of language because such expressions depend heavily on cultural context, shared social knowledge, and pragmatic inference. For example, sarcastic statements intended to express dissatisfaction may be interpreted literally by the chatbot, resulting in irrelevant or confusing responses.

Cultural and social variability also represent important limitations for AI pragmatics(Wierzbicka, 2009). Human communication norms differ across cultures, communities, and social situations. Politeness strategies, indirectness, humor, and conversational expectations vary significantly depending on cultural background and social context. While humans adapt their communication styles flexibly according to these factors, AI systems often rely on generalized conversational patterns that may not account for cultural diversity adequately. Consequently, chatbot responses may occasionally appear socially inappropriate, culturally insensitive, or pragmatically unnatural in certain contexts.

Another limitation identified in this study is the absence of genuine intentionality in AI communication. Human speakers communicate with conscious intentions, personal experiences, beliefs, and emotional motivations. Pragmatic interpretation in human interaction therefore involves understanding the mental states and intentions of conversational participants. AI chatbots, however, do not possess consciousness or subjective understanding. Their responses are generated through algorithmic processing of language data rather than genuine comprehension of meaning or intention. This means that chatbots simulate communication behavior without truly "understanding" communication in the human cognitive sense.

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The findings further suggest that AI systems remain dependent on predictable conversational patterns. Chatbots generally perform well in routine and structured interactions such as answering frequently asked questions, processing transactions, or providing procedural guidance. However, their performance decreases significantly when communication becomes ambiguous, emotionally complex, or socially nuanced. This indicates that AI pragmatics remains largely procedural rather than inferential. Human communication, by contrast, involves dynamic interpretation, adaptability, and context-sensitive reasoning that extend beyond predefined conversational structures.

From a pragmatic perspective, these limitations demonstrate that successful communication involves far more than grammatical correctness or information delivery. Effective human interaction requires the ability to infer hidden meanings, interpret emotional and social cues, maintain contextual coherence, and adapt communication according to situational demands. While AI chatbots can imitate certain aspects of conversational behavior, they still lack the cognitive, emotional, and social capabilities necessary for fully human-like pragmatic interpretation.

4. Conclusion

This study examined the pragmatic aspects of user interaction with AI chatbots in digital services by analyzing speech acts, contextual understanding, conversational implicature, politeness strategies, and communication effectiveness. The findings demonstrate that AI chatbots have become increasingly capable of performing various communicative functions in digital interactions. Chatbots are generally effective in handling routine communication tasks such as providing information, answering questions, guiding procedures, confirming transactions, and responding to direct user requests. Through speech act analysis, the study found that chatbots frequently employ representative, directive, commissive, expressive, and declarative speech acts depending on the communicative context and service objectives. The findings further reveal that AI chatbots can perform basic pragmatic functions relatively effectively, particularly in structured and predictable interactions. However, the study also found that significant limitations remain in chatbot pragmatic competence. One of the major challenges involves contextual understanding and the interpretation of implied meanings. AI chatbots perform effectively in routine transactional communication where language use is explicit and predictable. Nevertheless, their ability to interpret complex human pragmatics remains limited compared to human communicative competence. Human communication involves inferential reasoning, emotional interpretation, contextual flexibility, and social awareness that are difficult to replicate computationally. Therefore, current AI chatbots function more as sophisticated conversational simulators rather than fully context-aware communicative participants.

5. References

Abdellatif, A., Badran, K., Costa, D. E., & Shihab, E. (2021). A comparison of natural language understanding platforms for chatbots in software engineering. *IEEE Transactions on Software Engineering*, *48*(8), 3087–3102.

Ahlsén, E. (2008). Conversational implicature and communication impairment. *The Handbook of Clinical Linguistics*, 32–48.

Ahmad, N. A., Che, M. H., Zainal, A., Abd Rauf, M. F., & Adnan, Z. (2018). Review of chatbots design techniques. *International Journal of Computer Applications*, *181*(8), 7–10.

Auberlet, J.-M., Bhaskar, A., Ciuffo, B., Farah, H., Hoogendoorn, R., & Leonhardt, A. (2014). Data collection techniques. *Traffic Simulation and Data. Validation Methods and Applications; CRC Press: Boca Raton, FL, USA*, 5–32.

Babaeva, R., Babaev, D., & Peters, M. (2020). Verbal Communication of a Person with a Chatbot as a Discursive Practice in the Era of Digitalization: a Pragmatic Aspect. *SHS Web of Conferences*, *88*, 1023.

Benotti, L., & Blackburn, P. (2014). Context and implicature. In *Context in Computing: A Cross-Disciplinary Approach for Modeling the Real World* (pp. 419–436). Springer.

Bergen, L., & Grodner, D. J. (2012). Speaker knowledge influences the comprehension of pragmatic inferences. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *38*(5), 1450.

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Bou-Franch, P. (2020). Pragmatics and digital discourse in Spanish research. In *The Routledge handbook of Spanish pragmatics* (pp. 533–547). Routledge.

Chaves, A. P., & Gerosa, M. A. (2021). How should my chatbot interact? A survey on social characteristics in human–chatbot interaction design. *International Journal of Human–Computer Interaction*, *37*(8), 729–758.

Cummings, L. (2013). *Pragmatics: A multidisciplinary perspective*. Routledge.

Dall'Acqua, A., & Tamburini, F. (2021). Toward a linguistically grounded dialog model for chatbot design. *IJCoL. Italian Journal of Computational Linguistics*, *7*(7–1, 2), 191–222.

Dubberly, H., & Pangaro, P. (2009). What is conversation? How can we design for effective conversation. *Interactions Magazine*, *16*(4), 22–28.

Følstad, A., & Taylor, C. (2021). Investigating the user experience of customer service chatbot interaction: a framework for qualitative analysis of chatbot dialogues. *Quality and User Experience*, *6*(1), 6.

Holmes, J. (2014). The structure of teachers' directives. In *Language and communication* (pp. 89–115). Routledge.

Hossain, M. M. (2021). The application of Grice maxims in conversation: A pragmatic study. *Journal of English Language Teaching and Applied Linguistics*, *3*(10), 32–40.

Kay, P. (2006). Pragmatic aspects of grammatical constructions. *The Handbook of Pragmatics*, 675–700.

Kecskes, I. (2010). Situation-bound utterances as pragmatic acts. *Journal of Pragmatics*, *42*(11), 2889–2897.

Kim, S., Lee, J., & Gweon, G. (2019). Comparing data from chatbot and web surveys: Effects of platform and conversational style on survey response quality. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*, 1–12.

Kuźba, M. (2021). *Conversational explanations of Machine Learning models using chatbots*.

Li, Z., Zhang, J., Fei, Z., Feng, Y., & Zhou, J. (2021). Addressing inquiries about history: An efficient and practical framework for evaluating open-domain chatbot consistency. *Findings of the Association for Computational Linguistics: ACL-IJCNLP 2021*, 1057–1067.

Pinker, S., Nowak, M. A., & Lee, J. J. (2008). The logic of indirect speech. *Proceedings of the National Academy of Sciences*, *105*(3), 833–838.

Rodríguez Cardona, D., Werth, O., Schönborn, S., & Breitner, M. H. (2019). *A mixed methods analysis of the adoption and diffusion of Chatbot Technology in the German insurance sector*.

Tawfik, G. M., Dila, K. A. S., Mohamed, M. Y. F., Tam, D. N. H., Kien, N. D., Ahmed, A. M., & Huy, N. T. (2019). A step by step guide for conducting a systematic review and meta-analysis with simulation data. *Tropical Medicine and Health*, *47*(1), 46.

TONTS, S. (2018). *Chatbots, will they ever be ready? Pragmatic shortcomings in communication with chatbots*.

Wierzbicka, A. (2009). *Cross-cultural pragmatics: The semantics of human interaction*. Walter de Gruyter.

Wilkowska, M. (2020). *Pragmatic analysis of language understanding and use by Artificial Intelligence systems (the case of chatbot language)*.

Williams, T., Briggs, G., Oosterveld, B., & Scheutz, M. (2015). Going beyond literal command-based instructions: Extending robotic natural language interaction capabilities. *Proceedings of the AAAI Conference on Artificial Intelligence*, *29*(1).

Zumstein, D., & Hundertmark, S. (2017). CHATBOTS--AN INTERACTIVE TECHNOLOGY FOR PERSONALIZED COMMUNICATION, TRANSACTIONS AND SERVICES. *IADIS International Journal on WWW/Internet*, *15*(1).

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