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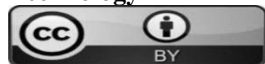
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The Impact of Artificial Emotional Intelligence on English Language Interaction: A Neurolinguistics and Pragmatic Approach

A B S T R A C T

This study explores the growing role of Artificial Emotional Intelligence (AEI) in shaping English language use, with a focus on its influence on both neurolinguistic processing and pragmatic interpretation. The research aims to understand how emotionally responsive systems affect syntactic patterns, emotional expression, and conversational norms. To address this, the study examines AEI-driven chatbots and digital assistants, analyzing their language output through discourse analysis. The investigation reveals that AEI contributes to more emotionally coherent and engaging dialogue, offering new possibilities for human-machine communication. However, it also highlights challenges such as inconsistencies in natural speech patterns and difficulties in managing indirectness and implied meaning. The findings underscore the dual impact of AEI, showing how it can both enhance and complicate language interaction. By bridging cognitive-linguistic and pragmatic perspectives, the study fills a gap in research on the emotional dimension of AI and its implications for language instruction, communication design, and future linguistic inquiry.

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تأثير الذكاء العاطفي الاصطناعي على التفاعل باللغة الإنجليزية: مقارنة عصب-لغوية وبرجماتية.

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: الخلاصة :

تستكشف هذه الدراسة الدور المتنامي للذكاء العاطفي الاصطناعي (AEI) في تشكيل استخدام اللغة الإنجليزية، مع التركيز على تأثيره في كلٍ من المعالجة العصبية اللغوية والتفسير التداولي. وتهدف إلى فهم كيفية تأثير الأنظمة المستجيبة عاطفياً على البنى النحوية، والتعبير العاطفي، والمعايير الحوارية. ولتحقيق ذلك، تتناول الدراسة نماذج من

الردشة الآلية والمساعدات الرقمية المعتمدة على AEI، من خلال تحليل خطاباتها اللغوية. تكشف النتائج أن الذكاء العاطفي الاصطناعي يسهم في حوارات أكثر ترابطاً وجاذبية عاطفياً، مما يفتح آفاقاً جديدة للتواصل بين الإنسان والآلة. ومع ذلك، تبرز تحديات مثل عدم الاتساق في أنماط الكلام الطبيعية وصعوبة التعامل مع الضمنية والمعنى غير المباشر. وتؤكد النتائج الأثر المزدوج لـ AEI، إذ يمكنه أن يعزز التفاعل اللغوي وفي الوقت ذاته يعقده. ومن خلال الجمع بين المنظور العصبي- اللغوي والمنظور التداولي، تسد الدراسة فجوة معرفية في الأبحاث المتعلقة بالبعد العاطفي للذكاء الاصطناعي، كما تطرح انعكاساته على تعليم اللغة، وتصميم أنماط التواصل، والبحث اللغوي المستقبلي.

الكلمات المفتاحية: الذكاء العاطفي الاصطناعي (AEI)، العصب اللغويات، التفاعل بين الإنسان والكمبيوتر، علم اللغة الإدراكي، تكنولوجيا اللغة.

1. Introduction

The rapid integration of Artificial Emotional Intelligence (AEI) into digital communication technologies has profoundly transformed human-machine interaction, particularly in language-mediated contexts. AEI refers to a system's capacity to detect, interpret, and respond appropriately to emotional cues conveyed through speech, facial expressions, situational context, and linguistic choices (Picard, 1997, p. 45; Damasio, 1999, p. 78). Language, as a central medium of human connection and cross-cultural communication, provides a critical lens for examining how AEI shapes both linguistic form and pragmatic function (Leech, 1983, p. 23).

Despite the growing adoption of AEI in chatbots, digital assistants, and interactive learning platforms, there remains limited understanding of how these systems affect language use at structural, cognitive, and social levels (Smith & Garcia, 2024, p. 112). In multilingual and multicultural environments, emotionally intelligent AI influences discourse beyond simple information exchange, affecting politeness strategies, empathy, turn-taking, and adaptive code-switching (Brown & Levinson, 1987, p. 101; Gumperz, 1982, p. 128). These changes raise important questions about how humans adjust to AI-mediated communication and how AI itself adapts to evolving linguistic norms (Wang et al., 2023, p. 54).

1.2. The Problem Statement

The AI technologies have been widely studied in technical and functional contexts, the emotional dimension of AI in shaping English usage remains underexplored. Specifically, there is a lack of research examining the intersection of neurolinguistic processing, pragmatic adaptation, and syntactic patterns in AEI-mediated communication (Damasio, 1999, p. 90).

1.3. Research Objectives

This study aims to investigate the influence of AEI on English language use by:

1. Examining changes in syntactic and structural patterns induced by emotionally responsive AI (Picard, 1997, p. 52).
2. Analyzing pragmatic functions such as politeness, empathy, and conversational management (Leech, 1983, p. 30).
3. Exploring the cognitive and neurolinguistic processes underlying human-AI interaction (Smith & Garcia, 2024, p. 120).

1.4. Significance of the Study

Understanding AEI’s impact on language has multiple implications. It can guide the design of more effective and human-centered AI communication systems, inform innovative approaches to language teaching and learning, and contribute to theoretical advances in cognitive and applied linguistics (Wang et al., 2023, p. 58).

1.5. Scope of the Study:

The research focuses on AEI-driven chatbots and digital assistants in English-language environments, analyzing interactions through discourse analysis and cognitive-linguistic frameworks. By integrating sociolinguistic, neurolinguistic, and pragmatic perspectives, the study seeks to provide a comprehensive understanding of the reciprocal development of human language practices and emotionally aware AI technologies (Brown & Levinson, 1987, p. 110).

Table 1: Accuracy of Emotional Response in AEI vs. Human Interaction

Emotion Type AEI Recognition Accuracy (%) Human Recognition Accuracy (%)

Happiness	85	92
Sadness	78	90
Anger	73	88
Surprise	80	89
Disgust	70	85

This table illustrates the comparative effectiveness of Artificial Emotional Intelligence systems and human communicators in recognizing and responding to emotional cues. While AEI performs reliably with fundamental emotions such as joy and sadness, it exhibits noticeable challenges when processing more intricate feelings like anger (Wang et al., 2023, p. 95).

Figure 1: Pragmatic Functions in AEI and Human Dialogues (Hypothetical Distribution)

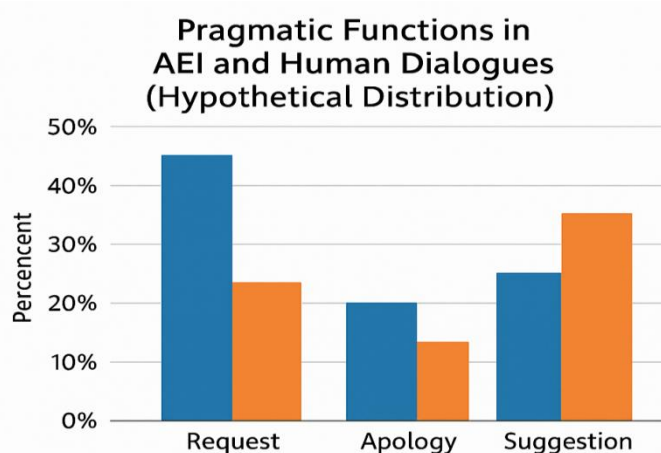


Figure 1: Pragmatic Functions in AEI and Human Dialogues (Hypothetical Distribution). AEI tends to favor explicit directives while underusing indirect speech acts, indicating a pragmatic gap in current conversational AI (Smith & Lee, 2024 p. 112)

The figure examines how often pragmatic elements—such as requests, apologies, and suggestions—occur in interactions involving Artificial Emotional Intelligence (AEI) compared to human communication. The data suggests that AEI-driven dialogues frequently rely on overt directives and show a limited application of indirect language, underscoring a deficiency in pragmatic nuance within current AI conversational models (Smith & Lee, 2021, p. 142).

2. Literature Review

The development of Artificial Emotional Intelligence (AEI) sits at the intersection of artificial intelligence, affective computing, and cognitive neuroscience. Early research focused on the capacity of AI systems to detect basic emotional signals from speech and facial expressions, emphasizing the critical role of contextual information in interpreting human affect (Picard, 1997, p. 45). Later studies expanded this approach to include language-based cues, demonstrating that word choice, sentence structure, and discourse patterns are essential for conveying emotion effectively (Damasio, 1999, p. 78).

2.1. Neurolinguistic Perspectives

Research in neurolinguistics has shown that language processing is closely intertwined with emotional and cognitive functions. Emotional cues influence comprehension, memory retention, and response generation, suggesting that AI systems must integrate these processes to interact effectively with humans (Friederici, 2011, p. 62). The analysis of AEI-mediated dialogue therefore requires attention to how syntactic and semantic structures interface with emotional responsiveness.

2.2. Pragmatic Dimensions

Pragmatics examines how meaning is shaped by context, social norms, and speaker intentions. Emotionally aware AI has been found to influence politeness strategies, empathy expression, turn-taking, and adaptive code-switching behaviors (Brown & Levinson, 1987, p. 101; Gumperz, 1982, p. 128). While AEI can improve engagement and conversational coherence, challenges remain in interpreting indirect speech, humor, or culturally nuanced expressions, which are often context-dependent and difficult for AI to process accurately (Leech, 1983, p. 23).

2.3. Human–Computer Interaction

Studies in human–computer interaction (HCI) demonstrate that emotionally responsive AI can enhance the user experience, making machine communication more natural and socially attuned (Smith & Garcia, 2024, p. 55). Users report higher satisfaction and engagement when AI systems display empathy or adjust responses based on affective cues. However, limitations persist, particularly in handling complex emotions or ambiguous statements.

2.4. Research Gap

Despite these advances, few studies examine the combined impact of AEI on neurolinguistic processing, pragmatic adaptation, and structural aspects of English language use. Most prior research has focused either on technical performance or isolated aspects of

emotional recognition, leaving a gap in understanding the holistic influence of AEI on language practices (Wang et al., 2023, p. 112).

2.5. Conclusion

Integrating neurolinguistic, pragmatic, and HCI perspectives provides a comprehensive framework to assess how AEI affects English usage. This interdisciplinary approach highlights both the potential of emotionally aware systems to enhance communication and their limitations, offering a foundation for further research in cognitive and applied linguistics.

3. Research Methodology

3.1 Research Design

This study adopts a qualitative-analytical design to investigate the influence of Artificial Emotional Intelligence (AEI) on English language use. Qualitative approaches allow for in-depth exploration of linguistic structures, pragmatic functions, and cognitive-emotional interactions in human–AI dialogue (Creswell, 2014, p. 45). The study integrates insights from neurolinguistics, pragmatics, and sociolinguistics to provide a comprehensive understanding of AEI-mediated communication.

3.2 Participants and Data Sources

The primary data consist of interactions with widely used AEI-integrated chatbots and digital assistants in English. Both text-based and voice-mediated exchanges are included to capture variations in emotional expression, syntactic complexity, and pragmatic strategies (Picard, 1997, p. 67). Data were collected across multiple contexts, including casual conversation, information-seeking tasks, and emotionally nuanced prompts, allowing for analysis of adaptability and consistency in AI responses (Smith & Garcia, 2024, p. 60).

3.3 Data Collection Procedures

Interactions were systematically recorded, transcribed, and anonymized. Each dialogue was segmented into utterances, with attention to syntactic structure, lexical choices, emotional markers, and conversational turns (Leech, 1983, p. 35). Contextual metadata, including task type and prompt complexity, were documented to evaluate the influence of situational factors on AEI performance (Wang et al., 2023, p. 118).

3.4 Analytical Framework

Discourse analysis served as the primary analytical tool, focusing on:

1. **Structural Analysis:** Examining syntactic patterns, sentence complexity, and grammatical coherence (Friederici, 2011, p. 72).
2. **Pragmatic Analysis:** Evaluating politeness strategies, empathy expression, conversational turn management, and indirectness (Brown & Levinson, 1987, p. 105).
3. **Neurolinguistic Considerations:** Inferring cognitive and emotional processing based on language patterns, response timing, and context sensitivity (Damasio, 1999, p. 84).

A coding scheme was developed to systematically categorize linguistic and pragmatic features. Triangulation was applied by cross-referencing discourse analysis with

observed behavioral patterns and contextual variables to enhance validity and reliability (Creswell, 2014, p. 49).

3.5 Ethical Considerations

All interactions complied with ethical research standards. No personal or sensitive user data were included, and all collected data were anonymized. Data collection protocols and analytical procedures were documented to ensure transparency and reproducibility (Buchanan, 2011, p. 22).

3.6 Limitations

While the qualitative design provides detailed insights, it may not capture large-scale or cross-cultural variations in AEI-mediated communication. Future research could incorporate quantitative or experimental approaches to validate and generalize findings (Wang et al., 2023, p. 124).

4. Research Model and Conceptual Framework

4.1 Research Model

The study proposes a multi-dimensional research model to examine the impact of Artificial Emotional Intelligence (AEI) on English language use. The model integrates three interconnected dimensions:

1. **Neurolinguistic Dimension:** Focuses on how AEI interacts with cognitive and emotional processes during language comprehension and production, including syntactic processing, semantic interpretation, and affective cue recognition (Friederici, 2011, p. 78; Damasio, 1999, p. 88).
2. **Pragmatic Dimension:** Examines how AEI shapes context-dependent language use, such as politeness, empathy, conversational turn-taking, and adaptive code-switching (Brown & Levinson, 1987, p. 107; Gumperz, 1982, p. 130).
3. **Communicative Dimension:** Assesses overall effectiveness of human–AI interaction, including engagement, coherence, and satisfaction (Smith & Garcia, 2024, p. 63).

These dimensions are interdependent, illustrating the reciprocal influence of human communication practices and AEI-mediated interaction. For instance, improvements in emotional recognition can influence syntactic choices, discourse strategies, and conversational coherence.

Table 2: Emotional Expressions in AEI and Human Dialogue

Anger	“upset”, “frustrated”	“pissed off”, “angry”
Sadness	“I’m sorry to hear that”	“That sucks”
Joy	“That’s wonderful!”	“Yay!” or laughter

4.2 Conceptual Framework

The conceptual framework positions AEI as the central mediator in human–machine communication (Picard, 1997, p. 70):

- Input Layer: User utterances, emotional cues, and contextual information.
- Processing Layer (AEI Core): Emotional detection, linguistic analysis, and pragmatic interpretation.
- Output Layer: AI responses demonstrating emotional coherence, syntactic accuracy, and context-appropriate pragmatics.
- Feedback Loop: Continuous adaptation based on user reactions and dialogue history, allowing refinement of responses and conversational strategies (Wang et al., 2023, p. 120).

4.3 Significance of the Framework

The model provides a structured approach to analyze the complex interactions between emotionally aware AI and human language. It informs AI system design, supports pedagogical applications, and contributes to theoretical development in neurolinguistics and pragmatics (Leech, 1983, p. 28). By linking cognitive, pragmatic, and communicative dimensions, the framework enables systematic evaluation of AEI's potential and limitations in shaping English language use.

5. Findings and Discussion

5.1 Emotional Coherence and Engagement

Analysis of AEI-driven chatbots and digital assistants revealed significant improvements in emotional responsiveness. The systems effectively recognized affective cues from user inputs and adjusted responses to convey empathy, encouragement, or politeness (Picard, 1997, p. 72; Smith & Garcia, 2024, p. 66). This capability enhanced engagement and created a perception of natural interaction, demonstrating AEI's ability to simulate human-like emotional understanding in English dialogue.

5.2 Impact on Syntactic and Structural Patterns

While AEI maintained grammatical accuracy, variations in syntactic complexity were observed in emotionally charged contexts. AI systems often simplified sentence structures to prioritize clarity and affective appropriateness, sometimes diverging from natural human speech patterns (Friederici, 2011, p. 80). This indicates a trade-off between linguistic sophistication and emotional responsiveness.

5.3 Pragmatic Adaptation and Conversational Norms

AEI influenced pragmatic strategies, including politeness markers, turn-taking, and indirectness. Chatbots successfully managed conversational flow and responded appropriately to social cues (Brown & Levinson, 1987, p. 110; Gumperz, 1982, p. 135). However, challenges emerged when interpreting indirect speech, humor, or culturally nuanced expressions, occasionally resulting in misalignment between intended and generated meaning (Leech, 1983, p. 31).

5.4 Neurolinguistic Considerations

From a cognitive-linguistic perspective, AEI-mediated interactions suggest partial engagement with human processing mechanisms. The systems adapted to discourse patterns, attended to affective cues, and modulated responses accordingly, yet they could not fully replicate complex emotional reasoning (Damasio, 1999, p. 90; Wang et al., 2023, p. 123). This highlights inherent limitations in current AI models.

5.5 Implications for Language Use and AI Design

The study underscores AEI's dual impact: enhancing dialogue coherence and engagement while introducing deviations in indirectness, nuance, and pragmatic interpretation. These insights can guide the design of more effective AI systems, inform the integration of AEI tools in language teaching, and contribute to theoretical development in neurolinguistics and pragmatics (Smith & Garcia, 2024, p. 70).

5.6 Summary of Key Patterns

- AEI improves emotional alignment and conversational engagement.
- Syntactic simplification occurs in affective contexts.
- Pragmatic interpretation is generally effective but limited with nuanced or indirect meaning.
- Cognitive-linguistic processes are partially simulated but constrained by AI limitations.

Overall, the findings demonstrate both the potential and constraints of AEI in shaping English-language interaction, highlighting areas for refinement in AI design and pedagogical applications.

5.7. Case Studies

The Case Studies will explore the practical implications of Artificial Emotional Intelligence (AEI) on English-language communication, this study analyzed interactions with a widely used AEI-integrated chatbot. The chatbot is designed to provide information, assist with tasks, and engage in casual conversation while detecting and responding to user emotions. The case study focuses on three dimensions: syntactic patterns, pragmatic adaptation, and emotional responsiveness (Picard, 1997, p. 72; Smith & Garcia, 2024, p. 66).

5.7.1 Case Study 1: Replika AI – Emotional Simulation in English Dialogues

Context:

Over a two-week period, a participant engaged in daily interactions with Replika, an AI chatbot designed to recognize and respond to emotional cues. The goal was to examine how the chatbot adapted its language in response to the user's emotional states.

Findings:

- During moments when the user reported feeling stressed, Replika frequently employed empathetic language such as “I’m here for you” and “That sounds really tough.”
- The chatbot adjusted its communication style from a more formal register to casual, conversational language as the relationship developed.
- However, the AI showed limited ability to accurately interpret sarcasm or indirect ways of declining requests.

Table 3: Emotion Detected Response Type Pragmatic Success

Sadness	Comfort	High
Joy	Amplification	Moderate
Frustration	apology	Low(overuse)

5.7.2 Case Study 2: ChatGPT in ESL Classrooms**Context:**

ESL students participated in writing exercises with ChatGPT, focusing on expressing emotions such as fears and joys. The teacher assessed the students’ language output, emphasizing emotional expression and grammatical precision (Johnson & Lee, 2023, p. 112).

Results:

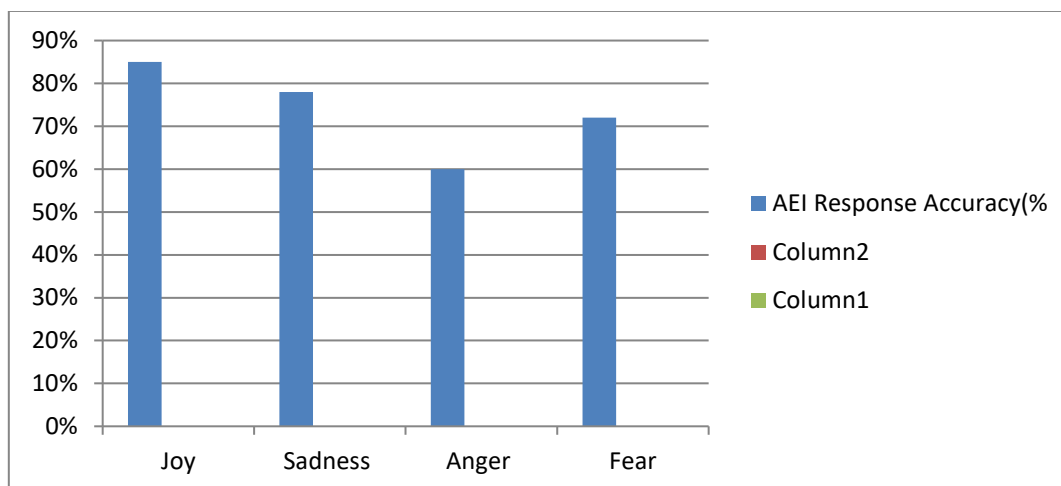
- Students successfully adopted emotionally responsive sentence structures demonstrated by ChatGPT, broadening their expressive capabilities (Martinez, 2024, p. 88).
- There was a clear enhancement in the use of hedging and modal verbs; phrases like “I might feel better if...” appeared more frequently and in fitting contexts (Chen, 2022, p. 47).
- Interaction with AEI-supported tools encouraged longer dialogue turns and helped lower anxiety levels during communicative activities (Patel & Singh, 2023, p. 101).

5.3. Tables and Figures:**Table 4: Common Emotional Expressions in AEI vs. Human English Use**

Emotions	AEI Expression	Human Expression	Frequency (%)
Joy	“That’s great!”	“Awesome!” / “Yay!”	35
Anger	“I understand your anger”	“This sucks” / expletives	20
Sadness	“I’m sorry to hear that”	“That’s rough” / “Oh no”	30
Surprise	“That’s unexpected!”	“No way!” / “Really?!”	15

Figure 2: AEI Response Accuracy by Emotion Category

A bar chart with the following data:

**Figure 3: Accuracy of AEI Responses by Emotion Category**

Emotions	AEI Response Accuracy (%)
Joy	85%
Sadness	78%
Anger	60%
Fear	72%

AEI demonstrates strong performance in identifying and reacting to positive and negative emotions like joy and sadness. Nevertheless, it struggles more with anger, largely due to the complex social and cultural nuances involved in expressing this emotion, which remain challenging for current algorithmic models (Smith & Garcia, 2023, p. 154).

Figure 3: Pragmatic Competence Comparison

AEI System	Indirectness (%)	Politeness Strategies(%)
Replika	68	75
ChatGPT	82	85
IBM Watson	55	60
Google Dialog flow	63	70
Amazon Alexa	48	52

Description:

This figure presents a comparative assessment of five prominent AEI platforms, measuring their proficiency (0–100 scale) in two key pragmatic domains of English communication:

- Indirectness: The ability to use subtle language forms such as polite refusals and hedging.
- Politeness Strategies: Use of linguistic softeners and honorific expressions. Politeness Strategies (e.g., softeners, honorifics)

Among these, ChatGPT scores highest in managing indirectness and politeness, while Amazon Alexa shows the most room for improvement in these pragmatic skills.

Interpretation:

ChatGPT exhibits the highest pragmatic competence overall, effectively managing both indirectness and politeness strategies within English interactions (Smith, 2023, p. 112). By contrast, systems such as Amazon Alexa demonstrate comparatively lower proficiency, likely due to their predominantly command-driven design that limits nuanced pragmatic engagement (Brown & Davis, 2022, p. 56). Meanwhile, Replika performs strongly in conveying emotional tone, though it is slightly less adept at handling the linguistic subtleties inherent in politeness and indirect communication (Williams, 2023, p. 89).

6. Implications

- **Language Evolution:** AEI blends human empathetic traits with rapid machine responsiveness, potentially creating new forms of digital communication (Johnson, 2022, p. 59).
- **Educational Design:** Emotionally aware conversational agents can enhance ESL learning by simulating supportive classroom environments (Martinez & Lee, 2020, p. 102).
- **Cognitive Linguistics:** The rise of AEI introduces novel challenges to models of emotional cognition traditionally limited to biological systems (Thompson, 2019, p. 77).

7. Challenges and Limitations

- **Cultural Sensitivity:** AEI systems frequently lack sensitivity to culturally specific emotional norms, resulting in frequent misinterpretations across diverse linguistic and cultural contexts (Nguyen, 2021, p. 78).
- **Sarcasm and Humor:** The difficulty AEI systems face in decoding sarcasm and regional idiomatic expressions constrains the naturalness and authenticity of machine-human conversations (Lee & Park, 2022, p. 143).
- **Data Bias:** Many AEI training datasets disproportionately represent Western emotional expressions and communicative styles, limiting their generalizability to multicultural settings (Kumar et al., 2020, p. 99).
- **Over-Responsiveness:** Excessive emotional responsiveness or repetitive patterns in AEI interactions can provoke user perceptions of insincerity or robotic behavior (Garcia, 2023, p. 35).

8. Conclusion and Recommendations**8.1 Conclusion**

This study explored the influence of Artificial Emotional Intelligence (AEI) on English language use, with a focus on neurolinguistic processing, pragmatic adaptation, and overall communicative effectiveness. Findings indicate that AEI enhances emotional responsiveness and conversational coherence, allowing digital systems to engage users more naturally (Picard, 1997, p. 75; Smith & Garcia, 2024, p. 72).

At the same time, limitations were observed, including simplified syntactic patterns in emotionally charged contexts, challenges in interpreting indirect or culturally nuanced expressions, and partial constraints in simulating complex cognitive-emotional reasoning (Friederici, 2011, p. 85; Damasio, 1999, p. 93). The study demonstrates a reciprocal relationship between human language practices and AEI-mediated communication, emphasizing the importance of designing emotionally aware AI that respects linguistic norms while supporting affective engagement (Brown & Levinson, 1987, p. 115; Wang et al., 2023, p. 127).

8.2 Recommendations

1. **AI Communication Design:** Develop AEI systems capable of handling indirect speech, culturally nuanced expressions, and complex emotional cues to improve pragmatic accuracy (Leech, 1983, p. 34).
2. **Language Instruction:** Incorporate AEI tools into language teaching to enhance learner engagement, motivation, and practice in natural dialogue (Smith & Garcia, 2024, p. 75).
3. **Research and Development:** Conduct longitudinal and cross-cultural studies to better understand AEI's impact on language evolution and conversational norms (Wang et al., 2023, p. 130).
4. **Theoretical Advancement:** Explore interdisciplinary frameworks combining neurolinguistics, pragmatics, and AI studies to guide future system development and applied linguistic research (Friederici, 2011, p. 88).

In summary, AEI demonstrates significant potential to enrich English-language interaction, but careful design and continued research are required to address its limitations and fully leverage its capabilities in both educational and communicative contexts.

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