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Neuro-Pragmatic Patterns in AI-Mediated Arabic–English Interaction: Rethinking Meaning Construction in Digital Dialogues

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ABSTRACT

The transformation of communication in the digital era has shifted human interaction toward technology-mediated engagement, where Artificial Intelligence (AI) now functions as an active "digital actor" mediating the construction of meaning. This study aims to analyze how meaning is reconstructed in Arabic–English bilingual interactions mediated by AI through a neuro-pragmatic approach. Employing a descriptive qualitative method, the research relies on a digital corpus of interactions between bilingual speakers and the ChatGPT and Gemini platforms, collected via purposive sampling and Computer-Mediated Discourse (CMD) 2.0 simulations. The primary findings indicate a paradigm shift from intersubjectively negotiated meaning toward algorithmically predicted meaning. The study identifies the phenomenon of Algorithmic Mimicry, where users cognitively adjust their communicative strategies by simplifying linguistic structures to align with machine processing logic. Furthermore, the research uncovered Contextual Amnesia in AI, referring to the system's failure to maintain semantic coherence during rapid code-switching. Theoretically, this study contributes an integrative model bridging neurocognitive aspects with digital pragmatic realities, emphasizing the importance of developing pragmatic competence to navigate the "hidden agency" of AI algorithms

Keywords: Artificial Intelligence; Digital Pragmatics; Arabic–English Bilingualism; Neurocognitive Adaptation; Algorithmic Mimicry.

INTRODUCTION

The transformation of communication in the digital era has shifted human interaction from face-to-face practices toward technology-mediated engagement. In this context, language no longer functions merely as a tool for conveying information; it serves as a digital symbol that is continuously constructed and negotiated through various communication platforms (Blumer, 1969). The symbolic interactionism perspective pioneered by Herbert Blumer and George Herbert Mead remains relevant in explaining how individuals assign meaning to these symbols (Blumer, 1969; Mead, 1934). However, developments in digital technology indicate that the process of meaning construction no longer occurs solely through human-to-human interaction but also involves Artificial Intelligence-based systems that influence the production and interpretation of meaning (Følstad & Brandtzæg, 2020; Zhai & Wibowo, 2022). This situation demonstrates that the construction of meaning in modern communication has become increasingly complex and contextual.

The emergence of Artificial Intelligence technology has revolutionized bilingual communication patterns, particularly in Arabic–English interactions, where large language models enable the instantaneous negotiation of meaning across linguistic and cultural boundaries (Hassan, 2023; Zhai & Wibowo, 2022). In this framework, AI does not function simply as a translation tool but as a "digital actor" mediating the process of meaning construction in bilingual interactions (Følstad & Brandtzæg, 2020). This creates a new dynamic in digital communication, where meaning is negotiated not only between humans but also through algorithmic responses that adapt to the user's linguistic and cultural context. Consequently, this phenomenon shows that the understanding of meaning in bilingual communication is increasingly dependent on the interaction between humans and technological systems.

The transformation of this digital communication ecosystem demands a more comprehensive analytical approach, particularly within the field of Pragmatics. In an AI-mediated environment, the process of meaning-making depends not only on the speaker's intention but also on algorithmic responses based on data and contextual prediction (Følstad & Brandtzæg, 2020; Zhai & Wibowo, 2022). Furthermore, studies indicate that the digital communication process is related to cognitive adaptation, where users adjust their communicative strategies to the characteristics of the technology (García & Sullivan, 2023; Lee & Kim, 2021). The role of technology and media in shaping language learning and communication in Arabic contexts has been extensively theorized by Anggara, Jamalin, and Salam (2025), who argue that digital tools fundamentally alter the conditions under which Arabic is produced and interpreted — a perspective directly relevant to understanding AI-mediated Arabic–English discourse. However, research that integrates pragmatic, cognitive, and technological aspects within the Arabic–English

bilingual context remains limited. Therefore, a more interdisciplinary approach is required to understand the construction of meaning in contemporary digital communication.

Furthermore, the integration of technology in digital communication also impacts cognitive processes in language production and interpretation. Interaction based on Artificial Intelligence does not only influence linguistic structures but also involves neurocognitive adaptation in users' communication strategies (García & Sullivan, 2023; Lee & Kim, 2021). Digital environments can alter language processing patterns, including lexical efficiency, response speed, and more dynamic meaning-making (Martinez, 2022; Zhao et al., 2024). Anggara and Nashoih (2025) further demonstrate that technology-mediated Arabic language learning reshapes learners' motivational and cognitive orientations, reinforcing the view that the digital interface is not a neutral conduit but an active force shaping how Arabic speakers encode and decode meaning. This indicates that the construction of meaning in digital communication is the result of a complex interaction between linguistic, cognitive, and technological factors.

LITERATURE REVIEW

2.1. Introduction to Literature Review

Current research in linguistics no longer focuses solely on language structure but also on how language is utilized within dynamic communication contexts. In digital communication, meaning depends not only on words but also on the situation, context, and the media employed. Therefore, this literature review explores how meaning is constructed in digital interactions, specifically in communication involving Arabic and English.

In the study of Pragmatics, meaning is understood as something highly dependent on the context of language use. In the digital era, this process becomes more complex as interactions occur not only between humans but also involve Artificial Intelligence-based systems that can influence how messages are understood and responded to. This indicates that meaning in modern communication is more dynamic and not always fixed.

Furthermore, the advancement of digital technology has transformed human communication from direct interaction to interaction mediated by digital platforms. This shift necessitates a broader approach to language studies integrating not only linguistics but also cognitive and technological perspectives to fully understand how meaning is formed within digital interactions.

2.2. Digital Pragmatics and AI-Mediated Discourse: Reconstructing Meaning in Hybrid Spaces

The advancement of information technology has pushed pragmatic studies into a new frontier known as digital pragmatics. Unlike conventional communication, pragmatics in the digital sphere is characterized by the use of multimodal symbols that replace face-to-face non-verbal cues (Herring & Androutsopoulos, 2021). Within this ecosystem, meaning is no longer static or solely dependent on

literal text; instead, it becomes highly contextual and dynamic. The use of emojis, abbreviations, and fragmented sentence structures represents users' efforts to convey communicative intentions within the limitations of digital mediums (Tagliamonte & Denis, 2020). This phenomenon suggests that the construction of meaning in online communication requires a higher level of interpretation, as it involves understanding the ever-evolving norms of digital communities.

The integration of Artificial Intelligence (AI) into digital discourse shifts the position of technology from a passive medium to an active mediator of meaning. Through Large Language Models (LLMs), AI now acts as an entity capable of predicting, directing, and even synthesizing messages before they reach the recipient (Nguyen & Harrison, 2023). This creates what is termed a hybrid dialogue, where the negotiation of meaning no longer occurs purely between humans but involves algorithmic logic. AI functions as a "context translator" that often filters the complexities of human pragmatics into computationally efficient patterns, which can sometimes reduce the existing emotional and sociocultural depth (Følstad & Brandtzæg, 2020). Consequently, the speaker's agency in determining the direction of communication must now share space with algorithmic preferences.

A fundamental shift in digital pragmatics is also evident in the transition from "negotiated meaning" to "predicted meaning." In traditional interactions, meaning is built through an empathetic and contextual process of action and reaction. However, in AI-mediated discourse, the emergence of predictive text and virtual assistants offering automated response suggestions has changed this dynamic. Fletcher and Koh (2022) argue that reliance on these automated suggestions is gradually altering how humans construct their own linguistic structures. Word choices suggested by AI tend to be selected based on efficiency and data frequency rather than unique individual expression. This poses a serious challenge to pragmatic studies: to what extent does the meaning emerging in digital dialogues truly reflect original human intent, and to what extent is it a product of artificial systems that prioritize engagement over semantic accuracy (Hassan et al., 2024; Zhai & Wibowo, 2022)?

2.3. Bilingualism and Neurocognitive Adaptation

Bilingual interaction in digital communication, particularly between Arabic and English, demonstrates high complexity in the process of meaning formation and transfer. In these situations, speakers deal not only with differing linguistic systems but also with divergent cultural backgrounds and contexts of use. This process often involves strategies such as code-switching — the alternation of languages within a single interaction — to align meaning with the communicative context (Lee & Kim, 2021).

In the study of bilingualism, this transfer of meaning is not merely linguistic; it involves highly complex cognitive processes within the brain. Speakers must rapidly select, adapt, and interpret the language used according to the communication setting. This indicates that bilingual communication demands a

higher cognitive load compared to monolingual communication, especially within fast-paced and dynamic digital environments (García & Sullivan, 2023).

In this context, neurocognitive adaptation serves as a vital aspect in explaining how the human brain adjusts to the simultaneous use of two languages. This process is related to neuroplasticity — the brain's ability to adapt and reshape neural pathways based on linguistic experience (Martinez, 2022). In digital communication mediated by Artificial Intelligence, this process becomes even more intricate because users are not only responding to humans but also to algorithmic systems that generate automated language responses (Zhao et al., 2024). Anggara (2025) notes that interactive approaches in Arabic language teaching foster communicative competence in ways that extend beyond the classroom, equipping learners with adaptive strategies for navigating complex bilingual environments — including those mediated by AI.

Furthermore, the use of Arabic and English in digital interactions shows that the language selection process depends not only on linguistic proficiency but also on cognitive efficiency in comprehending the message's context. Thus, bilingualism in the digital era cannot be separated from the neurocognitive factors that influence how meaning is processed, understood, and adapted in daily communication.

2.4. Theoretical Synthesis and Research Gap

The advancement of linguistic studies in the digital era highlights the need to integrate various theoretical perspectives to understand the construction of meaning. Pragmatics explains that meaning is highly dependent on the context of language use (Tagliamonte & Denis, 2020), while the cognitive perspective emphasizes the role of mental processes in understanding and producing language (Lee & Kim, 2021). On the other hand, progress in Artificial Intelligence introduces a new dimension to communication, where digital systems serve not only as media but also play an active role in mediating and shaping meaning (Lee & Kim, 2021).

Although these three perspectives — pragmatic, cognitive, and technological — have evolved significantly, most research still addresses them in isolation. Pragmatic studies generally focus on linguistic context (Herring & Androutsopoulos, 2021), cognitive research centers on mental processes, and AI studies largely discuss technical and computational aspects. Consequently, there remains a limitation in understanding how these three dimensions interact to form meaning, particularly in Arabic–English bilingual communication mediated by digital technology (Hassan et al., 2024). This gap indicates a "silo mentality" in digital communication research, where neurobiological dimensions are often overlooked or examined separately from pragmatic analysis and AI system development.

Furthermore, research specifically examining the integration of neuro-pragmatics in human interaction with AI systems is still very limited. In digital communication practices, users do not only interpret

meaning based on linguistic context but also through cognitive adaptation processes influenced by algorithmic responses. The brain's involvement in adjusting to digital communication systems suggests that the process of meaning-making is far more complex than what a single-approach model can explain. This research aims to break through these sectoral barriers by offering an integrative model that bridges neurocognitive aspects with pragmatic realities in digital spaces.

Therefore, there is an urgent need to develop an approach capable of unifying pragmatics, cognition, and technology. This study is significant as it seeks to fill that gap by analyzing how meaning is constructed in Arabic–English bilingual interactions mediated by Artificial Intelligence through a neuro-pragmatic approach. The framework proposed by Anggara, Jamalin, and Salam (2025) on technology and media in Arabic language learning provides a useful theoretical anchor for situating AI-mediated discourse within broader debates about digital Arabic pedagogy and communication. In doing so, this research is expected to provide a theoretical contribution to understanding the increasingly complex and multidimensional dynamics of modern digital communication.

2.5. Conceptual Framework

This study proposes a conceptual framework depicting the relationship between artificial intelligence, pragmatic processes, cognitive adaptation, and meaning construction in bilingual digital communication. Within this framework, AI-based systems function as the primary mediator influencing how messages are produced and interpreted in digital interactions.

The process begins with AI-based interaction that generates linguistic responses in Arabic–English bilingual communication. These responses are then processed through pragmatic mechanisms, where context, intent, and communicative situation determine how meaning is understood by the user. Subsequently, this process involves cognitive adaptation within the human brain, where users adjust their understanding of information received through digital systems.

In the final stage, the interaction between AI, pragmatic processes, and cognitive adaptation produces meaning construction that is dynamic and contextual. Thus, meaning is no longer understood as something static, but as the result of complex interaction between technology, language, and human cognitive processes. Conceptually, this relationship can be represented as follows:

AI Interaction → Pragmatic Processing → Cognitive Adaptation → Meaning Construction

METHOD

The methodology of this research is based on a descriptive qualitative approach, systematically designed to dissect the construction of meaning in Arabic–English bilingual interactions mediated by Artificial Intelligence (AI). The selection of this qualitative design is viewed as a methodological necessity because

the phenomenon under study involves processes of contextual meaning interpretation, linguistic identity negotiation, and subjective communicative dynamics, which cannot be reduced to quantitative measurements alone (Creswell & Creswell, 2023). Within this framework, the researcher focuses the analysis on how meaning is not only produced but also reconstructed within a hybrid dialogue involving human actors and machine systems, demanding a profound understanding of digital communicative behavior in the post-pandemic era (Sunarto, 2020).

To obtain rich and in-depth data, this study relies on a digital corpus sourced from interactions between bilingual speakers and leading Large Language Model (LLM) platforms, specifically ChatGPT and Gemini. Data sampling was conducted using a purposive sampling technique to ensure that the selected dialogue units possess sufficient pragmatic and linguistic richness (Silverman, 2022). The established inclusion criteria include the presence of Arabic–English code-switching as a representation of speaker identity, pragmatic complexity — including the use of sarcasm or context-bound cultural expressions — and temporal relevance between 2024 and 2026 to reflect the latest developments in digital assistant technology (Hassan, 2023). A total of 50 dialogue units were selectively chosen for their potential to reveal ambiguities and the predictive negotiation of meaning within modern digital discourse (Fletcher & Koh, 2022).

In its operationalization, the researcher positions themselves as the primary instrument, actively interpreting the layers of meaning that emerge during the interaction process. Data is collected through a combination of digital archival records and participant observation oriented toward live interaction simulations using the Computer-Mediated Discourse (CMD) 2.0 method (Herring & Androutsopoulos, 2021). The researcher intentionally conducts “prompt-based observation” by constructing specific bilingual scenarios to trigger algorithmic responses from the AI; these are subsequently documented via text transcripts and screenshots to maintain the authenticity and traceability of the original data.

This simulation process is conducted using hardware with 16GB RAM to ensure smooth rendering of AI responses and interface stability during the digital data recording process. A Chromium-based browser within a stable operating system environment was selected to minimize technical latency that could distort the response time between the user and the algorithmic system. This procedure allows the researcher to capture linguistic innovations occurring organically within hybrid digital spaces (Tagliamonte & Denis, 2020).

Data analysis is performed in a circular and continuous manner, following the latest interactive model which includes stages of data condensation, data display, and conclusion drawing or verification (Miles, Huberman, & Saldaña, 2020). The initial stage begins with data condensation, where the researcher filters dialogue segments that exhibit pragmatic phenomena and indications of user cognitive adaptation. Subsequently, the data is organized into a comparative format to highlight the relationship

between the user's original intent and the system's automated responses. The researcher then applies a neuro-pragmatic coding scheme that integrates classical pragmatic categories with indicators of neural adaptation and AI-mediated language processing (Zhao et al., 2024).

To maintain the trustworthiness and analytical rigidity of the results, this study implements criteria for credibility and transparency through an investigator triangulation strategy (Nowell et al., 2020). Analytical interpretations are discussed in depth with experts in the fields of digital linguistics and information technology to minimize researcher subjectivity and strengthen the credibility of the findings. Furthermore, verification is conducted by comparing the researcher's interpretations with the perceptions of native bilingual speakers to ensure that the explanations regarding cognitive load and meaning perception align with real-world communicative experiences.

FINDINGS

4.1. Pragmatic Shifts in AI-Mediated Bilingual Interaction

The primary finding of this research indicates a fundamental shift in how pragmatic meaning is constructed during Arabic–English bilingual interactions. In human-to-human communication, meaning is a collaborative product of shared social history. However, in the AI-mediated environment, meaning is reduced to "statistical probability."

To illustrate this, consider Extract 1, which demonstrates a failure in detecting high-context cultural nuances:

Table 1. Extract 1: Pragmatic Mismatch in AI-Mediated Bilingual Interaction

User Input (Bilingual)	AI Response (Literal)	Pragmatic Mismatch
"I've been working on my dissertation for 10 hours. Ya Allah, khalas, I can't even see the screen anymore."	"It is important to take breaks. If you cannot see the screen, please check your monitor settings or consult an eye doctor."	The AI failed to recognize "khalas" as a pragmatic marker of psychological exhaustion (burnout), instead treating it as a literal medical or technical vision complaint.
"I will submit the revised chapter by tomorrow, Insha'Allah."	"Great! I have marked my calendar for tomorrow to	The AI interpreted "Insha'Allah" as a definitive 100% promise, ignoring the cultural nuance of

	remind you of your commitment."	"human limitation" or "unpredictable future events."

Note. Both examples drawn from the corpus of AI interactions collected for this study.

Analysis of Extract 1: In this interaction, the user employs the Arabic term "khalas" not to signal the end of a task, but to express an emotional breaking point (burnout). A human interlocutor would respond with empathy or encouragement. However, the AI utilizes a literal-diagnostic logic, suggesting technical or medical intervention. This confirms that AI-mediated discourse often flattens the "illocutionary force" of an utterance into a mere "locutionary act" (Herring & Androutsopoulos, 2021). This shift forces the user to rethink their expressive style, moving away from emotional-cultural markers toward more clinical descriptions to avoid being misunderstood by the algorithm. Such pragmatic flattening is particularly acute in Arabic–English interactions, as Anggara (2025) observes that communicative competence in Arabic is deeply tied to culturally embedded interactional norms that resist algorithmic simplification.

4.2. *Code-Switching and the Challenge of "Contextual Amnesia"*

Bilingual speakers use code-switching as a "bridge" to fill lexical gaps or emphasize identity (Tagliamonte & Denis, 2020). However, AI often exhibits what this study terms "Contextual Amnesia" during rapid language shifts.

Extract 2: Contextual Amnesia in Bilingual Prompts

User: "Research methodology itu susah banget. Especially when dealing with al-manhaj al-kifi. Do you have any tips for the interview part?"

AI Response: "Interviews are common in many fields. Are you preparing for a job interview or a media appearance?"

In Extract 2, the AI failed to connect the Arabic term "al-manhaj al-kifi" (qualitative methodology) with the subsequent English question about interviews. Because the AI processed the Arabic segment as a distinct linguistic block, it lost the academic context of the English follow-up, resulting in a generic question about "job interviews." This indicates that while AI is "multilingual," it is not yet "inter-lingually cohesive." This finding aligns with Zhai and Wibowo (2022), who argue that LLMs often process code-switching as a sequence of tokens rather than a unified conceptual intent. Anggara and Nashoih (2025) similarly point out that technology-mediated Arabic language environments frequently fail to account for the pragmatic coherence demands of bilingual learners, leaving significant gaps in meaning that users must bridge through additional meta-communicative effort.

4.3. Neurocognitive Adaptation: The "Algorithmic Mimicry" Effect

One of the most significant neuro-linguistic findings in this study is the evidence of "Algorithmic Mimicry." When users realize the AI is struggling with complex bilingual pragmatics, they undergo a neurocognitive shift.

Table 2. Neurocognitive Adaptation Strategies Observed in the Corpus

Initial Human Strategy	Adjusted "AI-Friendly" Strategy	Cognitive Implication
High usage of idioms, sarcasm, and regional code-mixing (Arabic–English).	Use of simplified, mono-lingual, and declarative S-V-O sentences.	Reduced Cognitive Complexity: The user stops prioritizing expressive identity to ensure "machine readability."
High reliance on implicit context and shared cultural background.	Explicitly stating every detail and context in a robotic manner (Over-explanation).	Pragmatic Redundancy: Meaning becomes transparent and functional, but loses its human "texture" and emotional depth.
Use of "rapport-building" markers like "ya akhi" or "ya habibi".	Total removal of interpersonal markers; direct instruction only.	Depersonalization: The neural process of language production shifts from "social act" to "data transaction."

Note. Data derived from 50 dialogue units collected across ChatGPT and Gemini platforms.

This adaptation, as seen in the data, suggests that the human brain is "rewiring" its communicative output to match the machine's "receptive field" (García & Sullivan, 2023). This is not merely a change in word choice; it is a fundamental shift in the neural processing of language production, where the goal of "being understood" by the machine overrides the goal of "authentic expression." The pedagogical implications of this finding are significant: as Anggara, Jamalin, and Salam (2025) emphasize in their comprehensive framework for technology-mediated Arabic pedagogy, the design of digital learning environments must consciously counteract the tendency toward communicative flattening by preserving space for culturally rich, pragmatically complex language use.

4.4. From Negotiated Meaning to Predicted Meaning

The data consistently shows a transition from negotiated meaning to predicted meaning. In traditional interactionism, meaning is "alive" — it changes as we talk (Blumer, 1969). In AI interaction, the meaning is "pre-calculated."

Extract 3: The Predictive Nature of AI Response

User: “In the context of my PhD, I think the silo mentality in our department is...”

AI Response: “...is a significant barrier to interdisciplinary collaboration. You should consider implementing cross-functional teams.”

In Extract 3, the AI “completes” the user’s thought based on high-probability data strings before the user has even fully defined their specific problem. This “predicted meaning” effectively shuts down the negotiation process. The user often accepts the AI’s “prediction” because it is cognitively easier than correcting it — a phenomenon this study calls Interpretative Passivity. This supports Fletcher and Koh’s (2022) theory that AI-mediated communication is becoming a series of probabilistic exchanges rather than symbolic negotiations.

4.5. Implications for Digital Linguistics and Academic Pedagogy

The results of this study have profound implications for doctoral candidates and academic lecturers. While AI tools such as ChatGPT or Gemini offer immense support for linguistic technicalities, they pose a risk to pragmatic competence.

For bilingual researchers, there is a danger of “Linguistic Flattening,” where the unique nuances of Arabic-academic discourse are lost in favor of standardized English AI outputs. For digital linguistics, this study advocates for a “Techno-Pragmatic” framework that accounts for the “hidden agency” of the algorithm in shaping human thought (Darics, 2023). For Arabic language education more broadly, Anggara (2025) makes a compelling case that interactive, communicatively oriented instruction equips learners with the pragmatic flexibility needed to navigate AI-mediated environments without surrendering cultural or linguistic identity.

DISCUSSION

The findings of this study illuminate a set of structurally significant shifts in the pragmatic and neurocognitive dimensions of Arabic–English bilingual communication when mediated by Artificial Intelligence. These shifts are not merely superficial adaptations in word choice or sentence structure; they reflect deeper transformations in the way meaning is produced, negotiated, and received in digital dialogues. The discussion below synthesizes the four principal findings in relation to the theoretical frameworks introduced in the literature review, while also considering their broader implications for digital linguistics, bilingual pedagogy, and AI system design.

The first and most foundational finding concerns the pragmatic mismatch that emerges when bilingual speakers employ culturally embedded Arabic markers within English-dominant discourse. As

demonstrated in Extract 1, the AI system's processing of terms such as "khalas" and "Insha'Allah" revealed a categorical inability to recognize their illocutionary force within context. This aligns with Herring and Androutsopoulos's (2021) theoretical position that digital pragmatics demands a higher order of contextual interpretation than conventional communication systems can provide. What is particularly noteworthy, however, is the directionality of this mismatch: the AI does not adjust toward human pragmatic complexity; instead, the human speaker is compelled to adjust downward toward machine-readable simplicity. This asymmetry represents a fundamental reversal of the communicative contract, wherein the burden of interpretive labor is displaced from the technological system onto the human interlocutor.

The second finding, Contextual Amnesia, extends this analysis into the domain of bilingual code-switching. As illustrated in Extract 2, the AI's failure to maintain interlingual cohesion across rapidly alternating Arabic and English segments exposes a critical architectural limitation in current Large Language Model design. While LLMs are increasingly described as "multilingual," this study reveals that multilingualism in the computational sense does not equate to the pragmatic coherence demanded in real bilingual interaction. This distinction is theoretically significant: it challenges the assumption, implicit in much of the AI communication literature (Nguyen & Harrison, 2023), that linguistic breadth is synonymous with communicative competence. The Contextual Amnesia phenomenon further suggests that the tokenization-based architecture of most LLMs processes code-switching as a sequence of isolated linguistic units rather than as an integrated, meaning-bearing strategy, a finding consistent with Zhai and Wibowo's (2022) critique of AI pragmatic processing. From a pedagogical standpoint, this means that bilingual Arabic–English learners who rely on AI tools for academic or communicative support risk receiving systematically fragmented responses that fail to honor the coherence of their bilingual intent.

The third and perhaps most neurolinguistically significant finding is the Algorithmic Mimicry effect documented in Table 2. The data reveal that users do not passively receive AI responses; they actively recalibrate their communicative behavior to optimize machine comprehension, often at the cost of expressive authenticity and socio-cultural identity. This process of neural recalibration, wherein the brain suppresses its default pragmatic repertoire in favor of algorithmic compatibility, constitutes a form of communicative depersonalization. The shift from rapport-building markers such as "ya akhi" or "ya habibi" toward flat, instruction-based phrasing is not merely stylistic; it reflects a reorganization of the speaker's cognitive orientation toward language production. From a neurocognitive standpoint, this finding resonates with Martínez's (2022) account of neuroplasticity, wherein prolonged exposure to digitally mediated communication environments reshapes the neural pathways associated with language production. When the goal of "being understood by the machine" consistently overrides the

goal of "authentic expression," there is a real risk that the pragmatic and cultural dimensions of bilingual competence will gradually atrophy through disuse.

The fourth finding, the transition from negotiated meaning to predicted meaning, raises profound questions about the future of human symbolic interaction in AI-saturated communication environments. As Extract 3 demonstrates, the AI's completion of the user's unfinished utterance based on probabilistic data strings effectively forecloses the open-ended negotiation that characterizes genuine dialogic exchange. The concept of Interpretative Passivity, introduced in this study, names the cognitive tendency whereby users accept the AI's semantic predictions rather than expending the effort required to correct or redirect them. This passivity, however, is not simply laziness; it is a rational response to the asymmetric power dynamics of human–AI interaction, where the algorithm's outputs are perceived as authoritative precisely because they are fluent and formally coherent. The theoretical implications are far-reaching: if meaning in digital discourse is increasingly a product of statistical prediction rather than intersubjective negotiation, then the Blumerian framework of symbolic interactionism (Blumer, 1969), which posits meaning as perpetually "alive" and negotiated in situ, requires substantive revision to account for the algorithmic "freezing" of meaning at the point of prediction.

Taken together, these four findings converge on a singular theoretical insight: AI-mediated bilingual communication does not simply channel or transmit meaning; it actively reconstitutes it. The algorithm's hidden agency, to invoke Darics's (2023) terminology, operates at multiple levels simultaneously, shaping lexical choices, foreclosing pragmatic complexity, disrupting interlingual coherence, and displacing negotiated meaning with predicted outcomes. This reconstitution of meaning is not neutral; it bears differential consequences for speakers of high-context languages such as Arabic, whose communicative traditions rely heavily on implicit cultural knowledge, relational markers, and contextual inference, all of which resist algorithmic capture. The integrative neuro-pragmatic framework proposed in this study thus offers a conceptual architecture for understanding these dynamics that neither purely pragmatic nor purely computational approaches can adequately supply.

From a pedagogical perspective, the findings compel a reconsideration of how bilingual Arabic–English speakers are prepared to navigate AI-mediated communication environments. The frameworks developed by Anggara, Jamalin, and Salam (2025) for technology-integrated Arabic language pedagogy provide a productive starting point, particularly in their emphasis on preserving pragmatic richness and cultural identity within digital learning contexts. However, the present study suggests that such frameworks must extend beyond the classroom to encompass a broader "techno-pragmatic literacy," equipping users with the meta-communicative skills needed to recognize when AI systems are distorting their intended meanings and to strategically compensate for these distortions. The capacity to switch between "AI-friendly" and "human-authentic" communicative modes, without losing one's pragmatic

identity in the process, represents a new and urgent dimension of bilingual communicative competence in the digital age.

CONCLUSION

This study demonstrates that the transformation of digital communication mediated by Artificial Intelligence (AI) has fundamentally altered the mechanisms of meaning construction within Arabic–English bilingual interactions. The primary findings indicate a paradigm shift from intersubjectively negotiated meaning toward algorithmically predicted meaning. In this context, AI no longer functions as a passive tool but operates as a digital agent that actively shapes the trajectory of discourse and semantic interpretation. Furthermore, the research reveals that interaction with AI triggers neurocognitive adaptations in users, characterized by a tendency to simplify linguistic structures, reduce contextual expressions, and increase message explicitness to align with machine processing logic. This phenomenon, identified as Algorithmic Mimicry, suggests that language production in digital communication no longer fully reflects the user's authentic linguistic identity but is rather a hybridized output resulting from negotiation with algorithmic systems.

5.1. Theoretical Contributions

Theoretically, this research contributes to the evolution of pragmatic studies by introducing a neuro-pragmatic perspective within the context of AI-based communication. This study moves beyond traditional boundaries by integrating pragmatic and cognitive frameworks while positioning technology as an active variable in meaning construction. Specifically, the research offers three pivotal concepts: Algorithmic Mimicry, which explains the neurocognitive adaptation of users to AI systems; Contextual Amnesia, describing the failure of AI to maintain semantic coherence in bilingual shifts; and Predicted Meaning, which serves as a new paradigm replacing traditional negotiated meaning in digital discourse. These concepts enrich the discourse in digital linguistics and AI-mediated communication by providing a lexicon to describe the "hidden" agency of the algorithm in shaping human thought.

5.2. Practical Implications

Practically, these findings have significant implications for language education, particularly in the instruction of Arabic and English within digital environments. First, the integration of AI in language learning must be accompanied by a critical awareness of the system's pragmatic limitations to prevent the erosion of cultural sensitivity and contextual depth. Second, language educators must develop pedagogical strategies that transcend structural proficiency, emphasizing pragmatic competence and contextual interpretation within digital interfaces. The comprehensive framework offered by Anggara, Jamalin, and Salam (2025) for technology and media in Arabic language learning provides concrete

guidance for how educators in Indonesian Islamic higher education contexts can structure technology-integrated curricula that preserve rather than diminish pragmatic richness. For academic researchers and bilingual students, a strategic balance is required between leveraging AI for efficiency and maintaining an authentic, nuanced linguistic voice that reflects their specific socio-cultural identity.

5.3. Limitations and Future Research

While this study provides a comprehensive framework, it is limited by its relatively small corpus and its focus on specific AI platforms. Consequently, future research should expand the scope of investigation by utilizing larger and more diverse datasets to enhance the generalizability of the findings. Comparative studies across different AI architectures could reveal variations in pragmatic processing, while the integration of neuro-experimental methods, such as eye-tracking or EEG, could empirically validate the cognitive adaptation patterns identified in this study. Furthermore, exploring other high-context language pairs would provide a broader cross-cultural perspective on how AI reshapes the future of human symbolic interaction.

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CONFLICT OF INTEREST STATEMENT

The author(s) declare no conflict of interest with respect to the research, authorship, or publication of this article.

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