Interpreters as Mediators in Medical Settings: A Multimodal AI-Assisted Behavioural Analysis

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Abstract: The critical role of interpreters in facilitating communication in healthcare settings is beyond dispute, especially for patients' comprehension, interaction, and safety. Interpreters have moved from traditional neutral conduits to mediators whose vital responsibility is to enhance communication and facilitate interactional coordination. In modern interpreting studies, being a mediator means actively participating in both verbal and nonverbal communication, including facial expressions, spatial positioning, and posture. The rapid development of artificial intelligence (AI), exemplified by technologies for computer vision and posture estimation, can address these novel methodological challenges in the systematic analysis of behavioural markers. Using AI-assisted behavioural analysis, this study examines whether the medical interpreters portrayed in 20 photos function as mediators. Qualitative multimodal methods were utilised, including the General Communication Behaviour Analysis (GCBA) framework proposed by AI, body language clusters, and Positioning Theory. The analysis revealed behavioural features that correspond with mediation, such as neutral posture, balanced positioning among participants, and controlled facial expressions, which supported interactional coordination and communicative neutrality. The findings show that interpreters are highly skilled communicators in medical settings and effective mediators; in addition, AI-assisted behavioural analysis offers a systematic, theoretically grounded method for investigating interpreter roles through observable nonverbal behaviour. This paper demonstrates that AI-assisted behavioural analysis, as a methodological instrument, applies to interpreting studies by assessing interpreter mediation and extending multimodal research methodologies to include static photo analysis in healthcare interpreting scenarios.

Keywords: AI, body language, GCBA, medical interpreters, mediators, non-verbal communication

1. Introduction

With the rapid development of the medical field and the increasing number of immigrants, the demand for community interpreters has also increased. Community interpreting is active when officers, lawyers, or doctors meet civilians for specific purposes and at certain institutions for legal or medical care (Gentile, Ozolins and

Vasilakakos 1996). Community interpreting, public service interpreting, cultural interpreting, social interpreting, and health care interpreting are all labels for interpreting that "includes specialised areas such as legal, medical, mental health, welfare, religious or educational settings" (Hale 2015:66). However, Gentile et al. (1996) state that these labels differ in prevalence across countries.

Medical interpreting (MI) is a branch of community interpreting, and because interpreters deal with patients, qualified medical interpreters should be communicators and mediators. Furthermore, this is confirmed by Hsieh (2003:13), who states that "medical interpreters' performances are not only dependent on other speakers' utterances but also on their understanding of the communicative goals of the interpreting events". Much attention was given to MI's communicative perspective. This was achieved by investigating the significant effect of communicative goals and social identities on interpreting (Boydell, Goering and Morell-Bellai 2000; Brashers, Goldsmith and Hsieh 2002). Moreover, its effect on institutional influences on MI (Bolden 2000), while there has yet to be a systematic analysis of interpreter' nonverbal presence in medical settings. Therefore, communication between medical staff, agent, and medical interpreters could be better understood. The rapid development of artificial intelligence (AI) has paved the way for new technologies that analyse nonverbal communication, including posture, orientation, and facial expression (Stenum, Rossi and Roemmich 2021). In healthcare communication research, AI-assisted behavioural analysis has been progressively applied.

Despite widespread research on interpreter mediation and multimodal communication interpreting and multimodal translation studies (Abed and Wadia 2024), the application of AI to analyse interpreters' nonverbal communication remains limited. Generally, current studies rely on qualitative observation or analysis of video-based interactions, which may introduce researcher subjectivity. In addition, static images, widely used in professional documentation and educational environments, remain insufficiently examined as sources of behavioural data (Kress and van Leeuwen 2021). Although static photos fail to capture temporal interactional processes, they provide observable behavioural indicators, such as orientation, posture, and facial expression, that may reveal interpreters' communication roles as mediators when analysed within applicable theoretical frameworks.

This study merges AI-assisted behavioural analysis with the General Communication Behaviour Analysis (GCBA) framework proposed by AI in a medical setting. The paper addresses the following research question: Do the medical interpreters depicted in the 20 photos function as mediators, as indicated by behavioural indicators identified through AI-assisted analysis?

2. A Bird's-Eye view of medical interpreting

Medical Interpreting (MI) began in the 1970s with the increase in immigrants worldwide (Corsellis 2008) and came to the attention of interpreting researchers in the 1990s (Harris 1997). Although the six official languages of the United Nations are the most popular ones, millions worldwide do not speak or understand them.

This situation urges the health sector to provide medical interpreters for non-native speakers at medical institutions, i.e., hospitals and medical and health centres, to ensure patients' understanding and interaction with medical providers. Medical tourism is well known worldwide. According to Connell (2013) and the World Health Organization (2021), many Iraqis, for example, travel abroad to receive high-quality medical care in Jordan, Turkey, India and Iran.

Medical interpreters must have extensive medical terminology and deep knowledge of the medical genre in both source and target languages (Souza 2016). Mahdi and Mohammed (2025) argue that mistakes in rendering medical terminology from English to Arabic can lead to conceptual distortion, underscoring the essential need for linguistic accuracy in interpreter-mediated healthcare. Flores et al. (2012) recommend receiving more than 100 hours of training to avoid errors in interpretation. However, Hsieh argues that medical interpreters should not be assessed solely on the basis of finding an equivalent between the source and target speech. She adds that "healthcare interpreting is situated in a larger communicative event (i.e., provider–patient interaction) that entails specific goals (e.g., improving patients' health), which are accomplished through healthcare delivery" (Hsieh 2016: 13). Objectivity and neutrality are codes of conduct for healthcare interpreters (Kaufert and Putsch 1997); Niska (2007) adds that neutrality and impartiality are essential for healthcare interpreters.

As MI is varied in nature, this affects its type. This means many types of interpreting can be seen in MI settings. Hale (2015: 67) states that a simultaneous interpreting mode is used in some mental health consultations; a short consecutive mode is utilised "to avoid interrupting the flow of the patient's talk" in mental health settings. Furthermore, in some cases, medical interpreters use a hybrid mode that combines simultaneous and consecutive modes. Hale (2015: 67) adds that sight translation can also be seen when a patient "cannot read the text in the original language". Ozolins (2011) notes that remote interpreting is used via telephone or video conference, which helps provide interpreting services when medical interpreters are absent. During the COVID-19, pandemic there was a transformation in visual access and interactional coordination, underscoring how digitally mediated contexts modify embodied communication, which is pertinent to interpreter-mediated healthcare (Mohammed and Mustafa 2023).

Medical interpreters can be classified into "family members, bilingual nurses, telephone interpreters, and on-site professional interpreters", and the type of interpreter depends on the illness and the tasks involved (Hsieh 2016: 31). Both telephone and on-site interpreters are more professional than other types (Hsieh 2003).

3. Interpreters as mediators and nonverbal communication

As an interpreter's main job is to bridge gaps between patients and medical providers, an interpreter must be a linguistic and cultural mediator and an adequate communicator. In this regard, Samsudin, Abdul Rahman and Ismail (2021:1) confirm that "a medical interpreter acts as a mediator in bridging the gaps between

medical teams and patients". By the same token, Hsieh (2003) states that medical interpreters need to achieve some communicative goals in their assignments, such as "the role expectations that others (e.g., physicians, patients, hospitals, and even interpreting agencies) have placed on them, and the contextual factors (e.g., emergency vs. routine follow-up) that are relevant to the interpreting events" (p. 13-14). Hsieh (2016) adds that a successful interpreter may not only mediate medical linguistic performances but also perform as part of the therapeutic processes of healthcare delivery.

Lipovec Čebron and Škraban (2022:1) shed light on intercultural mediation, which seeks to assure equity in the field of healthcare; they "explore the role of intercultural mediators in relation to the two sides that they are supposed to connect: the side of the patients and the side of healthcare workers". Chang et al. (2021:353) urge "use of interpreter roles beyond linguistic conversion (clarifier, cultural broker, or advocate/mediator) may enhance interpreter-mediated care by improving cultural understanding and the therapeutic alliance".

Additionally, Hsieh (2003) focuses on the importance of communication. She considers it a challenge for medical interpreters, stating that four main difficulties are mastering language proficiency, mastering communication, how interpreters interact with medical staff, and how interpreters interact with patients. In her book, *Medical Interpreting and Cross-Culture Communication*, Angelelli (2004) discusses the importance of communication among the three parties in the medical setting: interpreter, patient, and medical provider. She adds that "without communication, successful relationships would not be possible" (Angelelli 2004: 15), and she reviews how medical interpreters serve as moderators and communicators during their interpreting assignments. Moreover, Bolden (2000) explores the essential role of medical interpreters in structuring interaction between physicians and their patients.

Communication can take many forms, primarily verbal and nonverbal. The first refers to the words used when communicating with others. At the same time, the latter is described as an integral part of communication, which is certainly one of the largest and most fascinating sources of information for the interpreter" (Rennert 2008:204). Hargie and Dickson define nonverbal communication as "[…]direct communication not exclusively relying on the use of words, written or spoken." (2004:44). Knapp, Hall and Horgan (2014) state that nonverbal communication is devoid of linguistic content and is expressed through the body. In an experimental study, Mehrabian and Ferris (1967) found that nonverbal elements dominate the overall communication process, with facial expressions accounting for 55 percent of the communication, while Poyatos (2002) states that 70 percent of our communication is nonverbal. Kurien (2010) affirms that body language carries more and better content than verbal language. Similarly, in some cases, it is the only way of communication (Ibid), and it may vary from one language and culture to another (Andersen et al. 2003). Abdulghafor, Turaev and Ali (2022: 1251) provide scientific evidence that "body language can be analyzed and understood by machine learning". Nonverbal communication is less controlled than verbal communication. For instance, "the movement of the hands is a

spontaneous action during a speech, an action that serves to accompany what we say" (Grillo and Enesi 2022:305).

In interpreting, Poyatos (1997) states that visual-nonverbal communication is usually linked to body language and kinesics (gestures, facial expressions, gaze direction). Rennert (2008) clarifies that kinesics can be widely utilised in interpretation in interpreting settings. Poyatos (1997) states that a message can be conveyed and achieved through communication in other ways, namely: proxemics (interpersonal distance), cultural and social traits (clothing, socially determined behaviour), and specific visible physiological reactions (such as blushing or tear-shedding). Poyatos (2002) identified three main categories ofnonverbal communication: interpreting visible systems, interpreting audible systems, and dermal reactions.

According to Kendon (1967), Hall (1983), Ekman (1992) and Knapp et al. (2014), there are nine types of nonverbal communication as follows: facial expressions, gestures, paralinguistic, posture and movement, proxemics, eye gaze, haptics (touch communication), appearance (cloth, hairstyle and other factors related to appearance), and artifacts (objects and images).

4. AI analysis in interpreter-mediated healthcare

Recent developments in AI, specifically in multimodal machine learning and computer vision, have significantly enhanced the ability to analyse nonverbal communication, including healthcare communication. Baltrušaitis, Ahuja and Morency (2019) and Poggi (2025) state that modern techniques can distinguish gaze, posture, spatial orientation, and facial expressions through multimodal architectures that combine visual and contextual information. Clinical communication studies, including Tsai et al. (2019) affirm that these technologies have been used to assess interactional dynamics, engagement, and affect modulation. Some AI computer vision systems, such as *OpenPose* and *MediaPipe*, help analyse proxemic relationships, orientation angles, and body alignment (Cao et al. 2021). According to Zeng et al. (2019), these AI systems provide measurable indicators of spatial positioning, and they require ethical consideration and theoretical grounding, especially regarding cultural diversity and algorithmic bias.

AI-assisted nonverbal analysis enhances methodological rigour by recommending standardised behavioural markers that complement qualitative analysis. When AI is combined with established frameworks for multimodal interaction and healthcare interpreting, it leads to a more systematic consideration of embodied mediation in interpreter-mediated healthcare.

5. Method

Methodologically, multiple attempts were made to identify an AI model that is more reliable and accurate for analysing the selected data. The dataset consists of 20 photos showing interpreters in two situations: photos 1-10 show medical interpreters in medical settings, while photos 11-20 show interpreters interpreting remotely. The selection of photos was based on covering a range of cases for each

scenario. AI tools *DeepSeek* (https://www.deepseek.com/en/) and the free version of *ChatGPT* were used, and the researchers attempted to apply Kendon's Gesture Model (2004) to analyse the 20 photos, as Kendon is a pioneer of gesture studies as an interactional, linguistic system (Chovil 2024; Kendon, 2004). Later, it is recognised that adopting Kendon's model alone will not support the study's research questions. Kendon's model applies well to gestures and movements; still, it is implausible for static photos or images. Also, the photo analysis using *DeepSeek* was elementary. For these inadequacies, many other attempts of searching were fulfilled, for example, the *JustBuildThings tool* (https://justbuildthings.ai/); again, after many searches with the help of *ChatGPT* (the free version), the tool was found unsuitable for the study's purposes as it seems technically acceptable in analysing postures and body language, but fails to recognise the communication. After that, the *photo-suited methods* were utilised, as they can detect body poses and gestures, analyse facial expressions, and infer the communicative roles of interpreters as mediators. This method requires *ChatGPT 5.2* (paid version), as it is a premium version. Finally, general communication behaviour analysis (GCBA) is the best, as it is a developed form of Photo-suited methods that can evaluate interpreters' nonverbal communication cues and integrates embodiment, spatial configuration, and relational context. The present study used the GCBA, a researcher-developed framework assisted by the AI tool (*ChatGPT 5.2*), body language clusters and Positioning Theory by Davies and Harré (1990).

6. Analysis and discussion

6.1 General Communication Behaviour Analysis (GCBA)

GCBA is an interdisciplinary blend of key theories in nonverbal and multimodal communication and gesture studies. It is based on Kendon (2004) and McNeill (2005), who concentrate on gestures that determine the nature of communication. GCBA examines spatial relationships, body orientation, and interpersonal distance by integrating proxemics from Hale (2015). Burgoon, Guerrero and Floyd (2016) shed light on interpersonal dynamics, nonverbal immediacy, and emotional tone, whereas Hsieh (2016) and Leanza (2005) focus on the interpreter's role as both a relational and a cultural mediator in medical interpreting. In addition, embodied interaction and role management are considered through the work of Goffman (1959) and Poggi (2025), which analyse turn-taking and the synchronisation of gaze and posture during social contact. GCBA also utilises the multimodal interaction analysis model by Norris (2004) and the situated action framework by Goodwin (2000) to combine spatial organisation, gesture, and gaze, thereby integrating spatial configuration, gaze, gesture, and posture as coordinated semiotic resources. Goodwin (2000) and Birdwhistell (1970) conceive bodily movement as contextually located action. Ultimately, the interpreter-mediated interaction models by Wadensjö (1998); Leanza (2005); Hsieh (2016) apply GCBA to healthcare interaction, specifying mediation as a role characterised by relational equilibrium, neutrality, and ethical constraints. Eventually, GCBA activates the interconnected dimensions of communication in terms of cognition, embodiment, location, and

role enactment as interconnected facets of communication through this convergence.

Figure 1. Medical interpreters in person, photos (1-10)

Based on the GCBA model and ChatGPT analysis, Table 1 presents an analysis of the main body language features, namely facial expressions, proxemics, gaze, posture, semiotic perspective, and cognitive perspective, of the medical interpreters in photos (1-10) in Figure 1.

Table 1. AI analysis of GCBA medical interpreters (1-10 Photos)

Photo No.	Facial Expressions	Proxemics	Gaze	Posture	Semiotic Perspective	Cognitive Perspective
1	Neutral, controlled	Lateral, non-central	Alternating	Upright, slight lean	Mediator neutrality	Comprehension monitoring
2	Emotionally restrained	Close but non-intrusive	Task-focused	Forward-leaning	Urgency & precision	High cognitive load
3	Calm, softened	Respectful distance	Balanced	Relaxed upright	Reassurance signals	Low-stress processing
4	Serious, attentive	Moderate	Turn-taking	Stable upright	Clarification system	Conceptual mapping
5	Mild reassurance	Lateral spacing	Inclusive	Open stance	Facilitative mediation	Shared framing
6	Warm but restrained	Equal eye level	Sustained	Symmetrical	Trust & cultural alignment	Reduced strain
7	Highly neutral	Close visual access	Fixed	Still upright	Primary sign system	Very high decoding load
8	Supportive neutrality	Reduced distance	Multi-directional	Relaxed	Collective mediation	Multi-input coordination
9	Professional calm	Close but bounded	Alternating	Composed upright	Instrumental reassurance	Accuracy maintenance
10	Subtle positive affect	Open spacing	Mutual	Open relaxed	Encouragement signals	Motivational support

6.1.1 Facial expressions

Interpreters demonstrated apparent professional neutrality, emotional regulation, and strong role awareness across the ten photos, as reflected in their controlled facial expressions. As shown in Photo 4, seriousness and attentiveness are evident during the interaction, whereas Photos 1 and 7 convey neutrality and conversational control. In photo 2, all participants are wearing masks, which may reflect the patient's serious condition, but the interpreter remains visibly professional and emotionally composed (Ibbotson 2020). In photos 3, 4, 7, 9, and 10, there was direct eye contact between the interpreter and the patient, which shows intimacy. The interpreter's facial expressions, which show familiarity and gentle warmth, are explicit in photos 3, 5, and 6. In all photos except (7, 8, and 9), the presence of an

identification badge indicates the interpreters' professional affiliation, but in those exceptions, it is unclear due to the camera angle.

6.1.2 Proxemics

Maintaining lateral, intermediary, and non-dominant spatial positioning, deliberately avoiding central placement during the interaction, is clearly evident when analysing the proxemics of the interpreters in the 10 photos. Their positioning clarifies the role of interpreters as mediators. It enhances balanced interactional dynamics without imposing control, as shown in photos 1, 3, 4, 5, 6, 7, 9, and 10, where interpreters stand beside or slightly offset from the patient and the medical staff (Burns, Tsoi, Falk, Speer, Tshilobo and Tamir 2025). The proximity is different in photo 2, as the urgency and high task demands require interpreters to adopt a more distant position to facilitate efficient communication with medical staff while maintaining ethical spatial boundaries.

6.1.3 Gaze behaviour

A disciplined gaze management by interpreters was recognised across photos 3, 4, 6, 7, 8, 9, and 10, because it is utilised as a mechanism of coordination and regulation rather than a reference of dominance or authority (Tiselius and Sneed 2020). As shown in photos 1, 2, and 5, the interpreter's gaze is not centred on the patients; instead, it is directed towards the medical staff or the companion, as in photo 5. This reflects friendly, supportive interaction. To clarify, in photo 2, the interpreter's gaze on the documents held by the medical staff indicates, as Fu (2024) claims, a prioritisation of accuracy under time pressure. In Photos 3, 4, 7, 9, and 10, the patients' gaze is directed to the interpreters and to their signing articulation, as in Photo 7, where hand movement is a fundamental feature of sign language rather than an indication of interactional dominance. Photos 9 and 10 show instances of physical and emotional support, in which interpreters maintain direct eye contact and touch the patient's hand. This reflects direct physical communicative engagement and provides emotional encouragement. Similarly, in photo 6, while the patient neither looks directly at the interpreter nor at the medical staff, professional neutrality and successful communication are reflected by the interpreter's smile (Fang, Sauter and van Kleef 2020).

6.1.4 Posture

After analysing the posture in the ten photos, it is noted that there are three postures: the first is recognised as *open*, characterised by non-crossed arms, the interpreter's body leaning forward towards the patient and the medical staff, relaxed shoulders, and an exposed torso. This posture places the interpreters in photos 1, 4, 5, 6, 9, and 10 as a bridge, serving as a basic means of communication and interaction between patients and medical staff, rather than as a central authority for interpreters (Ono and Yang 2024). The second posture is the *active upright*, in which the interpreter stands directly in front of the patient, maintains high visual concentration, keeps a fixed, straight torso, and uses raised hands to move between the chest and face

within the signalling space. Finally, a precise, controlled movement indicates the performance of a linguistic task rather than a social or communicative one. These combined positions are clearly seen in photo 7. Photos 2, 3, and 8 show the third posture, being straight neutral, where the interpreters maintain an upright posture and do not lean forward, unlike in the open position and during hand movements, which do not involve direct linguistic performance, indicating their readiness to become involved in the situation when called upon.

6.1.5 Semiotic perspective

According to GCBA's analysis of kinesthetic-somatic clusters, the semiotic meanings identified in the first ten photos can be categoriesed as follows. The semiotics of *neutral mediation* appear in images 1, 3, and 9; the primary reference is the interpreter's position as an intermediary between the medical staff and the patient. The body here forms a *mediation cluster* that encodes professional neutrality and confirms that the interpreter is a conveyor of meaning, not a party to the dialogue. In addition, the interpreters' non-dominant, upright body posture and limited, non-expressive gestures confirm their role as mediators. In photo 2, the semiotics of *cognitive load and precision* are evident in reduced movement, bodily stillness, a narrowed gaze, and trunk stability, accompanied by slight muscle tension, indicating the interpreter's urgent, high-accuracy information transfer under pressure (Seeber 2013). In contrast, a *regulated support semiotic* is revealed and displayed by photos 5, 6, and 10; this is represented by an accumulation of semiotic resources, a respectful distance from the patient, a non-intrusive gesture, an open palm, a soft facial expression, and a slight inclination of the head or torso. This conveys empathy without compromising professional neutrality. Precise supportive signals and a calming expression offer subtle symbolic support without interfering with the underlying interaction, while maintaining the role's boundaries. The *directive and coordinative semiotics* are highlighted in photo 4 through the interpreter's torso facing the patient, the synchronisation of gaze with the gesture, and a clear hand gesture indicating a procedure or information.

If meaning is constructed through the sign itself rather than through emotional expression, the body becomes a complete visual language system (Shiffrar 2008). This is clearly demonstrated in photo 7, where the semiotics of the *sign-modality* place the hand as the primary channel of meaning, with a relatively still body to ensure visual clarity and focus on the signing area. As for the *collective mediation semiotics* in photo 8, it is manifested in an open orientation towards more than one participant, a balanced visual distribution between the parties, and limited and organisational gestures that coordinate the meaning between the participants, and present the interpreter as an organiser of the required interaction between the main parties rather than a primary speaker (Wadensjö 2022).

6.1.6 Cognitive dimension: Processing and load management

When looking at the ten photos, it seems that the interpreters have cognitive control, as evidenced by an economical posture, sustained focus, and a clear task orientation that enhances effective processing and load management.

Photos 1, 4, and 10 reveal well-known patterns in which the interpreters are deeply engaged in checking their understanding and reformulating what they have heard, sustaining focused attention and regulating their physical conduct throughout the exchange. In photo 2, we observe higher cognitive load under pressure, as evidenced by focused attention and a forward orientation, indicating increased demands on encoding and decoding. Photo 3 illustrates low-stress receptive processing, in which the interpreter is characterised by perfectly balanced attention, as evidenced by their relaxed posture. Also, photo 5, collaborative development of shared meaning is demonstrated, while the interpreter fosters comprehension rather than imposing it unilaterally. In photo 6, the interpreter's workload can be reduced through mutual understanding and a strong bond with other interlocutors, helping keep the interaction moving smoothly. On the other hand, photo 7 depicts a sign language interpreter; therefore, it is the peak of cognitive load and motor demands. This requires a sustained visual–motor coordination. Photo 8 is an instance that requires simultaneous attention to multiple interlocutors and broadens cognitive capacity to strengthen multi-input processing. Finally, a combination of effectively balancing emotional encouragement, professional control, and supportive motivation with sustained neutrality is identified, as in photo 9.

6.2 Body language clusters

Body language clusters is the second model for analysing the ten photos. As mediators, when considering the 10 photos, a standard professional body-language pattern emerges: the interpreters constantly accommodate their nonverbal cues to their role. It is essential to emphasise that the interpreters' eye contact, facial expressions and postures are all slanted towards being neutral and less dominant completely. For example, in photos 1, 5, and 8, interpreters open themselves to healthcare staff and patients, and do not use arrogant or bossy gestures. Also, they reveal a measured gaze in photos 1, 3, and 5, an upright posture in photo 4, and controlled emotions in photos 2, 7, and 9. These examples support the consistent *mediator profile* of medical interpreters, in which their bodies serve to consolidate the conversation rather than to serve as a source of power or emotion. It is essential to re-emphasise that the two interacting dimensions of these body language clusters are cognitive load and practical orientation. For instance, a tendency towards cognitive efficiency is identified in high-load situations, as in photos 2 and 7; a forward lean, near proxemics, an intense gaze, and precise hand movements that report increased cognitive demands and urgency, as in photo 2; and a static posture, meticulous hand movements, a concentrated gaze, and, prioritising decoding accuracy over expressive signalling, as in photo 7. These instances indicate that the body emphasises informational fidelity, and therefore, the impact is condensed.

On the other hand, clearly positive clusters in photos 3, 5, 6, 8, and 10 lead to a set of supported affiliative expressions. For instance, in photo 3, an encouraging climate created to enhance a sense of emotional safety is as understood from the relaxed posture and soft facial expression. Also, the interactional scope in photos 5 and 8 is broadened by adopting a multi-directional, inclusive gaze and promoting

group cohesion through direct collaboration with healthcare staff and the patients. In photo 6, hierarchical distance is overtly shortened by eye contact at the same level as others and physically relaxed muscles; in contrast, in photo 10, mirrored movements and a specific kind of smile are used to foster the motivation of friendliness. That is to say, the nonverbal cues in these photos are clustered to support trust and relational attunement. Another instance is seen in photos 1, 4, and 9, where the median position is occupied by the hybrid and neutral clusters. Without dominance, confidence is conveyed as in photo 1, to balance restraint with openness. In photo 4, instructional clarity is characterised by a proper posture and accurate gaze changes, and these, in turn, subordinate the emotion to a cognitive framework. Moreover, in photo 9, the combination of a calm facial expression and limited proximity illustrates instrumental comfort without emotional surplus. These clusters suggest that neutrality is accommodated to the oral assignment requirements, since it is dynamic rather than static.

A final analytical examination of the first 10 photos reports and illustrates the adaptation of a controlled orientation towards mediation and a pattern of non-dominance and control. The differences are only in how an interpreter focuses and concentrates. High-stress situations might really limit what readers and researchers can state and consequently lead them into overdrive, making it hard to focus on the task at hand (Li, Wang and Rasmussen 2023). However, in a supportive and collaborative setting, we feel more open to warmth and clear communication. This is because the interpreter can adapt their body language or semiotic markers to the occasion's mood without compromising their professional neutrality. Table 2 below presents the AI analysis of body-language clusters for the 10 photos. The first column shows the photo number, the second lists the interpreter's behaviours, and the evidence and justification based on GCBA are provided in the third and fourth columns, respectively.

Table 2. AI classification of medical interpreter BL clusters (photos1-10)

No.	Cluster Type	Observed Interpreter Behaviors	Evidence (Nonverbal Cues)	Justification (GCBA)
1	Positive–Neutral	Neutral mediation	Open posture, controlled gestures, alternating gaze	Converging cues show professionalism and reassurance without dominance
2	Mixed (High Cognitive Stress)	Task-driven mediation	Close proxemics, forward lean, focused gaze	Urgency present, but emotional regulation maintained
3	Positive	Supportive mediation	Soft facial expression, balanced gaze, relaxed posture	All channels converge toward trust and emotional safety
4	Neutral	Instruction-focused mediation	Serious face, upright posture, precise gaze	Cognitive clarity prioritized over affect
5	Positive	Facilitative mediation	Open stance, inclusive gaze	Affiliative cues support cooperation and engagement
6	Positive	Culturally aligned mediation	Equal eye level, relaxed facial muscles	Reduction of hierarchy supports trust-building
7	Neutral (High Cognitive Load)	Sign-language mediation	Still posture, focused gaze, precise hand movements	Accuracy and decoding override emotional signaling
8	Positive	Group mediation	Multi-directional gaze, softened expression	Nonverbal alignment with group emotional state
9	Positive–Neutral	Clinical reassurance mediation	Calm face, bounded proximity	Instrumental reassurance without emotional excess
10	Positive	Motivational mediation	Mirrored gestures, subtle smile	Clear convergence of affiliative cues

6.3 Positioning theory

This third step of the analysis applies the Positioning Theory: the triangle positioning that facilitates efficient interpreter mediation was recognised across the ten photos and represents a consistent and coherent pattern. In each photo, patient, interpreter, and medical staff member, the three main parties of the medical interaction setting, form functional triangles, where the interpreter assumes a lateral or intermediate, playing a supporting role, the essential authority lies with the medical staff member, and the patient rights are maintained. This positioning affirms the moral order, visually indicates the interpreter's function as a mediator rather than an authority holder, and avoids dyadic dominance, which aligns with the core principles of Positioning Theory and interactional interpreting (Davies and Harré 1990; Wadensjö 1998; Kayi-Aydar 2019).

In photos 1, 3, 4, 5, and 9, which exemplify instructional and procedural situations and working in routine, the interpreter consistently locates non-central and non-apex positioning. This empowers triangular circulation of meaning and stable interactional access. In instructional or procedural contexts, the physician

usually assumes the peak position. At the same time, the interpreter angles themselves towards both the patient and the medical staff member to ensure inclusion and facilitate mediation. In emergencies that demand high pressure, as in photo 2, spatial compression occurs; nevertheless, the interpreter stays off-peak, revealing that situational proximity does not imply role violation. Harré and van Langenhove (1999) state that role preservation is maintained despite cognitive and temporal stress (Hirvonen et al. 2025; McVee and Van Langenhove 2025). Photo 6 exemplifies culturally sensitive, rapport-oriented interactions and reflects relational repositioning, in which it is often most effective for the interpreter to position herself at eye level with the patient to promote dignity, respect, and involvement while maintaining professional hierarchy. This also applied in group and family-involved situations, as in photo 8, where the interpreter upheld lateral positioning, avoiding showing alignment with the family's advocacy and maintaining ethical neutrality.

In contrast to the sign language interpretation in photo 7, the interpreter becomes visually central due to functional needs. This repositioning is, nonetheless, transient and instrumental rather than moral or intellectual, as the therapist still holds the authority. In some interactions where decisions-making is needed, such as motivational and affective ones, as in photo 10, triangle positioning indicates a temporary convergence of moral placement while preserving separate role distinctions (Hirvonen 2016), as in more open and forward-oriented triangle positioning. No evidence of marginalisation of the interpreter, dominance posture, or role collapse is presented in any of the ten photos. On the contrary, interpreters preserve a relationally influential yet ethically neutral role, building bridges for communication without seizing authority. The interpreters' consistent maintenance of triangular balance confirms their effectiveness as professional mediators who facilitate understanding while preserving institutional structure and ethical boundaries (Davies and Harré 1990; Wadensjö 1998; Harré and van Langenhove 1999; Pöchhacker 2016). Overall, the ten photos demonstrate effective positioning management in an interpreter-mediated medical setting. Furthermore, Positioning Theory asserts that the consistency of rights, obligations, and the moral order is a vital indicator of effective mediation. Davies and Harré (1990); Wadensjö (1998); Harré and van Langenhove (1999); Pöchhacker (2016) state that when interpreters preserve the balance of the triangle, they demonstrate their efficacy as professional mediators who can promote comprehension while maintaining institutional integrity and ethical boundaries. Table (3) demonstrates the AI analysis of triangle positioning of the medical interpreters in the photos 1-10, where the first column includes the analytical aspect, the second column contains the observed patterns for the photos that are numbered in the third column and the justification of the position theory is listed in the fourth column.

Table 3. AI analysis of triangle positioning patterns based on positioning theory (Photos 1–10)

Analytical Aspect	Observed Pattern Across Photos	Photo No(s)	Positioning Theory Interpretation
Overall Triangle Structure	Functional clinician–interpreter–patient triangles consistently maintained	1–10	Preserves moral order and interactional balance by distributing rights and duties (Davies & Harré, 1990).
Interpreter Spatial Position	Lateral or intermediary placement; never apex	1–6, 8–10	Confirms mediator role and prevents authority appropriation (Wadensjö, 1998).
Clinician Authority Positioning	Clinician positioned as epistemic authority, often closest to patient or at apex	1, 4, 9	Apex or proximal placement symbolizes instructional or procedural authority (Harré & van Langenhove, 1999).
Emergency / High-Pressure Configuration	Reduced spatial distance; interpreter remains off-axis	2	Spatial compression reflects urgency without role transgression (Harré & van Langenhove, 1999).
Buffered Mediation	Interpreter positioned between parties but slightly withdrawn	5	Redistributes communicative access while maintaining power boundaries (Pöchhacker, 2016).
Cultural & Rapport-Oriented Positioning	Equal eye-level and symmetrical alignment	6	Enhances dignity and participation without dissolving hierarchy (Davies & Harré, 1990).
Modality-Driven Repositioning	Interpreter visually central due to sign-language modality	7	Temporary functional repositioning justified by modality, not authority transfer (Harré & van Langenhove, 1999).
Family / Group Involvement	Multi-layered triangle with lateral interpreter positioning	8	Maintains boundaries and prevents advocacy alignment (Wadensjö, 1998).
Procedural Dominance	Clinician's action dominates; interpreter maintains bounded proximity	9	Authority enacted through action while interpreter sustains communication (Pöchhacker, 2016).
Motivational Alignment	Open, forward-oriented triangle with shared engagement	10	Temporary convergence of moral positioning without role collapse (Davies & Harré, 1990).

The interpreters in the photos shown in Fig. 2 provide remote interpreting, in which the interpreter is located at a different site from the patients and medical staff. The same analysis steps will be applied to the AI analysis of photos 11-20, using GCBA, body language clusters, and positioning theory.

Figure 2. Remote/online medical interpreting (11-20 photos)

Because of a number of technical issues like limits of words, AI analysis of photos is presented in tables. Table (4) represents the GCBA, Table (5) demonstrates the BL clusters, and Table (6) synthesises all the AI results for photos (11-20). This is followed by a discussion of the overall results for the twenty photos.

Table 4 combines the *ChatGPT 5.2* analysis of the GCBA and BL clusters of the medical interpreters in remote interpreting (11-20 photos). The number of photos is listed in the second and third columns, respectively; and cluster type, emotional-cognitive load, and the gist of the interpretive outcome are listed in columns 4, 5, and 6, respectively.

Table 4. AI analysis of GCBA and cluster-based body-language of medical interpreting (Photos 11–20)

No.	Medical Interpreting Context	Observed Nonverbal Cues (GCBA)	Cluster Classification	Emotional–Cognitive Load	Interpretive Outcome
11	Pediatric consultation with parent	Open posture, soft facial expression, affiliative touch	Positive–Supportive Cluster	Low stress / High empathy	Trust-building and reassurance achieved
12	Adult outpatient consultation	Relaxed gestures, steady gaze, upright posture	Positive–Neutral Cluster	Low cognitive load	Clear and balanced communication
13	Isolation/PPE inpatient setting	Restricted facial cues, controlled movements, task focus	Neutral–Task-Oriented Cluster	High cognitive load	Accuracy prioritized over emotional signaling
14	Sign-language medical interpreting	Precise hand movements, sustained eye focus, still posture	Cognitive-Load (Positive) Cluster	Very high cognitive load	Linguistic precision successfully maintained
15	Bedside nursing consultation	Open stance, patient-oriented screen placement	Positive–Facilitative Cluster	Moderate emotional engagement	Patient autonomy supported
16	Nurse-mediated remote interpreting	Professional posture, calm facial affect	Neutral–Professional Cluster	Moderate cognitive load	Effective procedural mediation
17	Physician-led bedside interaction	Chart-focused gaze, upright posture	Instruction-Focused Cluster	Moderate cognitive load	Efficient but emotionally limited exchange
18	Multidisciplinary medical team session	Shared gaze shifts, inclusive spatial orientation	Positive–Collaborative Cluster	Balanced emotional-cognitive load	Cooperative understanding enhanced
19	Family-mediated medical encounter	Close proxemics, expressive gestures, emotional cues	Mixed Emotional–Cognitive Cluster	High emotional load	Empathy high, potential overload
20	OB/GYN consultation	Patient-centered seating, soft gaze, open posture	Positive–Patient-Centered Cluster	Low stress / High trust	Empowerment and informed consent maximized

Table 5. AI Analysis of triangle positioning patterns in medical interpreting (Photos 11–20)

No.	Interacting Parties	Interpreter Position	Triangle Type	Power Balance	Functional Effect on Communication
11	Child – Parent – Clinician	Interpreter centered & visible	Balanced Triangle	Shared	Promotes trust and reassurance
12	Patient – Clinician – Remote Interpreter	Interpreter on screen at eye level	Modified Triangle	Balanced	Maintains visual equity
13	Patient – Clinician – Remote Interpreter (PPE)	Interpreter mediated through device	Asymmetric Triangle	Clinician-leaning	Accuracy prioritized
14	Deaf Patient – Clinician – Interpreter	Interpreter visually dominant	Visual Triangle	Interpreter-centered	Ensures linguistic accuracy
15	Patient – Nurse – Interpreter	Interpreter device angled toward patient	Balanced Triangle	Patient-centered	Supports autonomy
16	Patient – Nurse – Remote Interpreter	Interpreter anchors interaction remotely	Interpreter-Anchored Triangle	Neutral	Professional mediation
17	Patient – Physician – Interpreter	Interpreter slightly peripheral	Clinician-Dominant Triangle	Clinician-centered	Efficiency over emotion
18	Patient – Team – Interpreter	Interpreter integrated within group	Expanded Triangle	Shared	Collaborative decision-making
19	Patient – Family – Interpreter	Interpreter central but compressed	Compressed Triangle	Emotionally driven	High affect, overload risk
20	Patient – Physician – Interpreter	Interpreter supports patient view	Patient-Dominant Triangle	Patient-centered	Empowerment maximized

Again, Table (5) comprises 6 columns, with the number of photos and the participants listed in the first two columns. The interpreter's position and triangle type are included in columns 3 and 4. At the same time, the last two pillars show the power balance and impact on communication efficacy.

Table 6. AI analysis of GCBA and cluster-based body-language analysis of medical interpreting with triangle positioning photos (11–20)

Photo No.	Interpreting Context	Key Nonverbal Cues (GCBA)	Cluster Classification	Triangle Positioning Pattern	Mediator Effectiveness
11	Pediatric consultation	Open posture, supportive touch, calm gaze	Positive–Supportive	Balanced Triangle	High
12	Outpatient consultation	Relaxed gestures, steady gaze	Positive–Neutral	Modified Triangle	High
13	Isolation/PPE setting	Restricted gestures, controlled movement	Neutral–Task	Asymmetric Triangle	Moderate
14	Sign-language interpreting	Precise hand movement, still posture	Cognitive-Load (Positive)	Visual Triangle	High
15	Bedside consultation	Open stance, patient-oriented screen	Positive–Facilitative	Balanced Triangle	High
16	Nurse-mediated session	Professional posture, calm affect	Neutral–Professional	Interpreter-Anchored	Moderate–High
17	Physician-led interaction	Chart focus, upright stance	Instruction-Focused	Clinician-Dominant	Moderate
18	Multidisciplinary team	Shared gaze, inclusive stance	Positive–Collaborative	Expanded Triangle	High
19	Family-mediated session	Close proximity, emotional cues	Mixed Cluster	Compressed Triangle	Moderate
20	OB/GYN consultation	Patient-centered seating	Positive–Patient-Centered	Patient-Dominant	Very High

Table (6) combines GCBA, BL clusters and the triangular positioning results of the photos (11-20) and summarises the results of the ten photos (11-20) and the three steps of analysis.

After analysing the role of medical interpreters in the 20 photos and tables generated by *ChatGPT 5.2*, and based on GCBA, BL cluster analysis, and Positioning Theory, the medical interpreters served as effective mediators and proficient professional communicators across diverse medical settings, while preserving fidelity and ethics.

As for the effectiveness of the mediator role, in both photo groups, medical interpreters, whether in person (1–10) or remote or online (11–20), served as mediators, both spatially and interactively. The interpreters, as Tables 3 and 5 clarify, preserve institutional hierarchies by smoothing the communication between patients and physicians and by avoiding epistemic or moral authority. This aligns with Wadensjö (1998); Angelelli (2004); Hale (2015); Pöchhacker (2016) who state that the essential requirements of an interpreter as a mediator in medical interpreting are to enable communication without assuming a primary interactional role. In interpreting assignments that demand functional visibility, for example, sign-language interpreting as in photos (7 and 14) or remote/video-mediated interactions as in Photos (11–20), the role of the interpreter was instrumental rather than authoritative. The physician held the institutional authority, while patients' rights and involvement were maintained. Based on Positioning Theory, the distribution of rights and duties is a crucial indicator of an effective mediator, upheld across emergency cases, culturally sensitive scenarios, and everyday and high-cognitive-load contexts. No indication of advocacy drift, role collapse, or over-identification was identified. In all scenarios, interpreters acted as professional mediators rather than aligning emotionally with any participants, and they maintained a regulated involvement that harmonised empathy with professional restraint.

Regarding communicative competence and nonverbal regulation, GCBA analysis indicates that a significant degree of nonverbal self-regulation is a prerequisite for proficient medical communication, as shown in Tables 1 and 4. Gaze behaviour was controlled to encourage turn-taking and attentional alignment, facial expressions were primarily neutral to somewhat supportive, and postures were upright and composed. Communicative competence is increasingly signified and illustrated by these patterns, in which interpreters enhance clarity and synchronisation, accompanied by a regular decrease of nonverbal distractions. This finding is supported and emphasised by the cluster analysis. For instance, the main types of clusters, namely, positive, positive–neutral, and neutral professional, are shown in the columns in Table 2. The positive clusters are identified by semiotic characteristics like open postures, friendly eye contact, and affiliative signals. These are common in photos (3, 5, 6, 8, 10, 11, 15, 18, and 20) across obstetrics/gynaecology, paediatrics, patient-centred care, and the environment of collaborative teamwork. Based on instances of building trust, fostering patients' engagement, and providing reassurance, these positive-cluster actions highlight high-quality healthcare communication. The neutral clusters were clearly observed in task-oriented contexts and highly loaded cognitive situations, such as emergency care and language interpretation, as well as in environments involving personal protective equipment. In these situations, decoding and the demands of accuracy completely override emotional signals. It is important to note that these instances of neutral clusters do not indicate miscommunication; rather, they confirm the adaptation of affective responses to situational needs.

Interpreters in the 20 examined photos demonstrated skilled control of cognitive load, in contrast to conditions that required greater stress or complexity. MIs could perform regulated movements, maintain postural stability, and sustain a

focused gaze. All of these indicate professional composure and continued attentional management. Thus, cognitive stability performs as an essential indicator of effective communication in medical interpreting, directly affecting accuracy, coherence, and patient safety (Wadensjö 1998; Flores et al. 2012; Hale 2015; Napier 2015; Pöchhacker 2016).

7. Conclusions

The present study aimed to investigate the vital role of medical interpreters as mediators, using an AI-assisted analysis of 20 photos across two settings (in-person and online interpreting). The analysis has shown that interpreters serve as medical mediators and effective communicators by the following:

1. Demonstrating controlled nonverbal behaviour based on the GCBA model of *ChatGPT 5.2* (paid version), supported with the semiotics of professional neutrality.
2. Maintaining the triangle positioning, without adopting advocacy or authority roles, supports the effectiveness of interpreters as they are professional mediators who work to preserve their balanced behaviour in the institutional structure and ethical boundaries.
3. Preserving triangular interactional in both interpreting scenarios: face-to-face and remote/video interpreting, without important differences due to ethical limits and institutional regularities.
4. Preserving the ethical limits, patient understanding, and medical staff authority helps interpreters to maintain their role as mediators.
5. Modifying the style of interpreters' communication to cope with diverse cognitive, emotional, and institutional changes. This is represented by examining a set of semiotic resources in an in-person scenario, such as gaze, postures, and cognitive load (Table 1), in contrast to observed nonverbal cues and interpretive outcomes in an online scenario (Table 4).

This paper demonstrates that AI-assisted behavioural analysis, as a methodological instrument, applies to interpreting studies by assessing interpreter mediation and extending multimodal research methodologies to include static photo analysis in healthcare interpreting scenarios. Overall, based on AI analysis of GCBA indicators, stable positioning patterns, and the predominance of positive and neutral clusters, the interpreters were shown to be highly-skilled communicators in medical settings and effective mediators. These findings align with theoretical and professional ethics in medical interpreting and provide strong empirical evidence for the efficacy of interpreter-mediated communication across diverse clinical settings. However, this study is limited to two photo scenarios; thus, it did not investigate, for example, whether interpreters are available, whether patients are sitting rather than lying, or the efficiency of in-person versus remote interpreters in medical settings. To do this, it is suggested to explore additional images or different settings.

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