# Towards Human-Centered Legal AI: Designing a Facilitative Mediation Agent Integrating Tacit Knowledge and Multimodal Dialogue Cues

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**Abstract.** This study proposes a human-centered legal AI framework to support facilitative mediation in family disputes. It focuses on the design and evaluation of the Mediation Support Chatbot (MSC), an AI dialogue agent developed in collaboration with legal practitioners. Rather than offering legal advice, MSC reproduces key mediation techniques, such as reframing, summarizing, and active listening, to help in emotionally complex interactions. Expert evaluations indicate that MSC performs well in generating neutral, context-sensitive responses and reducing the linguistic burden on mediators. However, challenges remain in interpreting tacit knowledge, detecting emotional changes, and handling nonverbal features such as timing and silence. To address these issues, future work explores the integration of multimodal cues and a Mixture-of-Experts (MoE) architecture that delegates dialogue functions to specialized modules (e.g., empathy generation, legal summarization). This research contributes to the development of empathetic and context-sensitive legal AI agents that augment - rather than replace - human judgment in mediation, improving both fairness and emotional resonance in legal communication.

**Keywords:** Legal dialogue systems · Facilitative mediation · Tacit knowledge modeling · Multimodal interaction · Human-centered AI.

## 1 Introduction

Family mediation involves not only legal reasoning but also emotional sensitivity and interpersonal dialogue. In Japan, divorce mediation often addresses complex issues like custody and finances, where empathy and containment are vital skills beyond formal legal training.

Most existing legal AI systems focus on rule application or prediction tasks and remain ill-suited for facilitative mediation, where mediators interpret tacit signals and manage emotionally charged discourse.

To address these gaps, this doctoral research introduces two systems: the Mediation Support Chatbot (MSC), which models summarization and reframing [3], and the Legal-Emotional BATNA chatbot, which combines legal estimation with emotional state modeling [1].

Expert evaluations revealed both systems reduced linguistic burden but struggled with tacit shifts, emotional tones, and nonverbal signals. These limitations motivate the development of legal AI systems that can complement human mediators by replicating key elements of human communication—such as tacit reasoning and nonverbal sensitivity. The following section outlines the specific research questions this project investigates.[2]

## 2 Research Questions

This research is guided by the following questions:

RQ1: How can AI agents support facilitative mediation without replacing or overpowering human judgment?

RQ2: What tacit and emotional aspects of mediation dialogue can be computationally modeled and embedded into dialogue systems?

RQ3: How can nonverbal and multimodal cues—such as silence, timing, or emotional tone—be represented and utilized in legal AI-mediated communication?

These questions aim to bridge the current gap between technical language modeling and the interpersonal, affective dimensions of real-world legal dialogue, particularly in family law settings where relational and emotional complexity plays a pivotal role.

## 3 Background and Related Work

Research in artificial intelligence and law has made substantial progress in tasks such as legal document classification, information retrieval, and rule-based reasoning [4]. However, these advances have not fully extended to domains requiring affective understanding or dialogic sensitivity, such as family mediation.

In the field of Online Dispute Resolution (ODR), early work by Lodder and Zeleznikow emphasized structured negotiation and dialogue models [5], but often relied on formal logic and evaluative frameworks rather than interpersonal nuance. More recent systems, such as JusticeBot [6] and LLMediator [7], explore the use of interactive AI for improving access to justice, with the latter integrating large language models for enhanced user dialogue. However, both approaches still struggle to incorporate tacit knowledge and emotional awareness into their interaction paradigms.

In negotiation theory, the concept of BATNA (Best Alternative to a Negotiated Agreement) has long been central to strategic decision-making [8], but rarely incorporates emotional factors. The Legal-Emotional BATNA model developed in this project builds upon this theory by bifurcating legal and emotional dimensions, enabling users to explore both rational outcomes and subjective preferences.

Generative AI, particularly large language models (LLMs), has shown promise in producing contextually relevant human-like dialogue. Studies in affective com-

puting and behavioral economics suggest that such systems can reduce the cognitive burden of users and improve emotional expression [11, 12]. However, these models still struggle with implicit reasoning and domain-specific ethical sensitivity, particularly in legal contexts [9].

Finally, recent research in multimodal AI, including gesture recognition, voice prosody, and silence modeling, indicates a growing awareness of nonverbal communication in human-computer interaction. However, its application in legal dialogue systems remains in its infancy. This project aims to extend these insights into the domain of legal mediation, proposing a hybrid approach that blends tacit, emotional, and formal legal reasoning within AI-supported dialogue [13, 10].

## 4 Methodology

This study adopts a multiphase, interdisciplinary methodology that combines qualitative fieldwork, AI system prototyping, expert-centered evaluation, and iterative refinement. The process is grounded in real-world family mediation practices and aims to integrate legal accuracy with emotional and dialogic realism. The methodology is structured into four main phases.

### 4.1 Qualitative Grounding and Design Foundations

Semi-structured interviews were conducted with three legal professionals experienced in family mediation. The interviews aimed to uncover tacit communicative strategies used by human mediators, such as recognizing emotional shifts, reframing narratives, and maintaining neutrality. These findings informed the initial design of both chatbot systems, particularly in constructing prompt strategies that emulate professional mediation behavior.

### 4.2 System Development: MSC and Legal-Emotional BATNA

Two distinct systems were developed to model complementary aspects of mediation support:

**Mediation Support Chatbot (MSC):** Built using prompt engineering on GPT-4 (via ChatGPT API), MSC integrates techniques such as summarization, reframing, and active listening. The dialogue output is optimized for neutrality and emotional containment. Temperature parameters were adjusted to align with stages of mediation (e.g., lower for reframing, higher for exploration).

**Legal-Emotional BATNA Chatbot:** This system combines rule-based legal calculators (e.g., child support tables, property division rules) with an emotion estimation module. The module adjusts output ranges (e.g., estimated financial proposals) according to user-labeled emotional states such as frustration, anxiety, or calm. Emotional reflection prompts were embedded to support user awareness and negotiation framing.

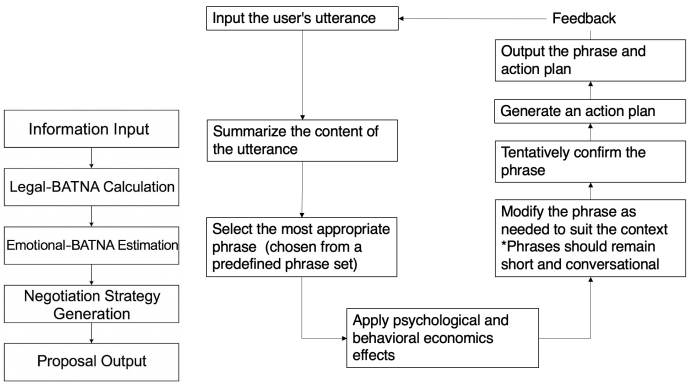


**Fig. 1.** (Left) Legal-Emotional BATNA architecture. (Right) Dialogue flow of MSC.

### 4.3 Evaluation Framework: Experts and Users

To evaluate the systems in context, we constructed realistic divorce mediation scenarios based on anonymized real-world case patterns, including disputes over child custody, asset division, and emotional resentment. For instance, one use case involved a high-conflict situation where the wife accused the husband of financial irresponsibility, while the husband expressed frustration over limited child visitation. These scenarios were used to simulate emotional stance shifts, such as transitions from defensive to conciliatory tones.

Tacit and emotional aspects were simulated by embedding prompts that include indirect or ambiguous emotional cues (e.g., "I just don't feel heard anymore"). The chatbot's ability to recognize and respond appropriately—by reframing or offering emotionally neutral summaries—was then assessed. Comparative runs were executed with and without these cues to observe differences in system behavior.

**MSC Evaluation:** The MSC was evaluated through structured simulations of divorce mediation. Seven legal professionals (including mediators, attorneys, and former judges) assessed the system across 15 dimensions using 5-point Likert scales, supplemented by open-ended comments. Detailed background profiles of the reviewers are presented in Table 3.

**BATNA Evaluation:** The Legal-Emotional BATNA chatbot was tested through a user survey ($n = 100$) on a Japanese crowdsourcing platform. Survey items assessed usability, trust, clarity, and emotional adequacy. Additionally, six legal professionals provided qualitative feedback based on scripted interactions.

## 5 Results and Observations

**Evaluation Questionnaire Items** The expert evaluation was based on 15 items reflecting both functional and affective aspects of system use, including:

- **Ease of Use**: Was the interface intuitive for mediators?
- **Trustworthiness**: Did the system maintain legal and ethical boundaries?
- **Helpfulness**: Did responses facilitate productive mediation?
- **Empathy Perception**: Did the system display understanding of emotional content?

**Qualitative Feedback Highlights** Experts provided qualitative insights beyond numerical scores. For example:

- Reviewer C commented that "the chatbot's reframing was helpful in de-escalating an emotionally tense exchange."
- Reviewer D noted, "The lack of delay or pause in responses made the dialogue feel unnatural—real mediators often allow for silence."
- Reviewer E suggested, "Incorporating backchanneling cues like 'I see' or 'please go on' would improve emotional resonance."

These comments helped identify key areas for improvement, especially in simulating hesitation, managing silence, and adjusting response tone dynamically.

### 5.1 Legal-Emotional BATNA

This chatbot was evaluated through a user survey ($n = 100$) via a Japanese crowdsourcing platform. Participants rated the system using 5-point Likert scales on various dimensions including usability, trust, clarity, and emotional adequacy.

**Table 1.** Quantitative Evaluation Results for the Legal-Emotional BATNA System (5-point Likert scale: 1 = Very Good, 5 = Very Poor)

| **Evaluation Item** | **Mean** | **SD** |
|---|---|---|
| Ease of Use | 1.95 | 0.914 |
| Trustworthiness | 2.05 | 0.809 |
| Response Speed | 1.65 | 0.833 |
| Clarity | 2.03 | 0.834 |
| Accuracy | 1.70 | 0.859 |
| Helpfulness | 2.07 | 0.967 |
| Communication Smoothness | 1.79 | 0.946 |
| Privacy Protection | 2.62 | 0.962 |
| Overall Satisfaction | 2.06 | 0.763 |
| Future Use | 2.08 | 0.939 |

*Note: SD = Standard Deviation, indicating the degree of variation or dispersion of participant ratings around the mean score. Lower SD values suggest more consistent responses across participants.*

Key findings included:

- High ratings in ease of use, trust, and clarity;
- Users appreciated legally grounded estimates on child support, property division, and solatium;
- Emotional reflection prompts were seen as helpful in clarifying emotional priorities.

Nonetheless, concerns were raised about:

- Limited emotional depth in high-conflict scenarios;
- Lack of empathetic or personalized phrasing;
- Weakness in privacy transparency.

In addition to the user survey, qualitative feedback was collected from six legal professionals. Table 2 lists their profiles.

**Table 2.** Profiles of Legal-Emotional BATNA Evaluation Experts

| ID | Occupation | Experience | Specialization |
|---|---|---|---|
| A | Lawyer / Ex-Judge | 30+ yrs | Civil / Family |
| B | Lawyer | 30+ yrs | Corporate |
| C | Law Prof. / Lawyer | 40+ yrs | Law / Econ |
| D | Law Professor | 30+ yrs | Harassment |
| E | Lawyer | 10+ yrs | Divorce |
| F | Lawyer | <10 yrs | Inheritance |

The experts provided written feedback highlighting the system's strengths and limitations.

Some noted the usefulness of displaying computational steps for monetary estimates to support negotiations (A), while others raised concerns about overly generic phrasing and limited accuracy in emotionally complex contexts (F, E).

Concerns included hallucinated statute wording (C), overreliance on point estimates rather than ranges (C), and potentially misleading solatium estimates (E).

Positive comments included its value as a starting point for legal inquiry (B), its responsiveness to uncommon queries like international divorces (B), and its accessibility for users hesitant to contact lawyers (D).

Recommendations included more personalized interaction, especially incorporating user attributes like age, family structure, and personality traits (C).

Overall, the expert feedback supported the use of the system for early-stage research and self-reflection, while highlighting the importance of legal accuracy and expectation management.

### 5.2 Mediation Support Chatbot (MSC)

Seven legal professionals—including mediators, family law attorneys, and former judges—evaluated MSC using demonstration scenarios. They rated the system on 15 items using a 5-point Likert scale.

Key strengths highlighted by experts included:

**Table 3.** Profiles of Expert Reviewers for MSC

| ID | Occupation | Experience | Specialization |
|---|---|---|---|
| 1 | Professor / Lawyer | 40+ yrs | Sociology of Law |
| 2 | Professor | 30+ yrs | Forensic Psychology |
| 3 | Attorney | 30+ yrs | M&A, Financial Law |
| 4 | Attorney | 50+ yrs | Divorce, Inheritance, Traffic Law |
| 5 | Attorney | 20+ yrs | Family and Inheritance Law |
| 6 | Attorney / Ex-Judge | 40 yrs | Civil and Family Court Practice |
| 7 | Assoc. Prof. / Lawyer | 20+ yrs | Corporate and Civil Litigation |

**Table 4.** Quantitative Evaluation Results for the Mediation Support Chatbot (MSC) by Legal Experts (5-point Likert scale: 1 = Very Good, 5 = Very Poor)

| Evaluation Item | Mean | SD |
|---|---|---|
| Ease of Use | 2.29 | 0.76 |
| Trustworthiness | 1.83 | 0.75 |
| Response Speed | 1.43 | 0.79 |
| Accuracy | 2.57 | 1.13 |
| Understanding | 1.86 | 0.90 |
| Helpfulness | 2.29 | 1.11 |
| Communication Ability | 2.00 | 0.82 |
| Sense of Security | 2.29 | 0.95 |
| Expert-like Judgment | 2.71 | 1.11 |
| Practical Use | 2.29 | 0.49 |
| Impact on Mediation Process | 2.14 | 0.69 |
| Support for Legal Reasoning | 2.29 | 0.95 |
| Ethical Consideration | 1.71 | 0.75 |
| Overall Evaluation | 2.43 | 0.53 |
| Intention to Reuse | 2.00 | 0.58 |

- Conciseness and clarity of responses,
- Effectiveness of summarization and reframing techniques,
- Ability to initiate difficult conversations through emotionally neutral phrasing.

Qualitative feedback revealed that MSC helped mediators "find appropriate words to begin the dialogue" and "lighten the linguistic burden in emotionally delicate situations."

However, experts also noted limitations:

- Inability to detect subtle emotional shifts or hesitation;
- Lack of simulated silence or pauses, which are important in real mediation;
- Fixed tone not adapted dynamically to conversation flow.

Despite these issues, MSC was seen as a useful scaffold for early mediation stages.

### 5.3 Cross-System Insights

Comparative analysis revealed several shared strengths and limitations across both systems.

- Legal-Emotional BATNA provided structured legal-emotional baselines for negotiation readiness;
- MSC supported early-stage dialogue by reducing emotional and linguistic entry barriers;
- Both systems struggled to interpret tacit cues or respond appropriately to nonverbal dynamics;
- Experts emphasized the need for AI to "pause," "wait," and "respond" to human emotional states rather than literal content alone.

Overall, the systems demonstrated potential as tools for structured, low-conflict settings, but require further refinement in adaptiveness, emotional nuance, and multimodal awareness to support the full complexity of real-world mediation.

## 6 Future Work

To address current limitations, future development will focus on three areas:

- **Tacit Emotion Detection:** Develop annotated Japanese legal dialogue datasets to detect shifts in user stance (e.g., defensive to conciliatory).
- **Multimodal Feedback Integration:** Simulate silence, pauses, and tonal cues via prosody tagging and delay modules to improve emotional realism.
- **Modular MoE Framework:** Assign dialogue roles (e.g., empathy, legal logic, de-escalation) to specialized modules under a central dialogue manager.

These enhancements aim to develop a collaborative legal AI agent that co-navigates emotional complexity in human mediation, rather than replacing human judgment.

## 7 Contributions

This doctoral research contributes to AI & Law and human-centered computing through:

**Dialogically-Aware Legal AI:** MSC models mediation techniques (reframing, summarizing, active listening) for emotionally sensitive communication.

**Legal and Emotional Integration:** The Legal-Emotional BATNA model combines legal calculators with emotional reflection prompts for holistic negotiation support.

**Empirical Validation:** Dual-layered evaluation (experts and general users) offers rare insight into system affordances and gaps.

**Path Toward Emotionally Adaptive Agents:** This research outlines foundational architecture for multimodal, modular, emotionally intelligent legal agents.

Together, these contributions emphasize that future legal AI must incorporate not only normative correctness but also relational intelligence—listening, reframing, and co-regulating meaning in human conflict.

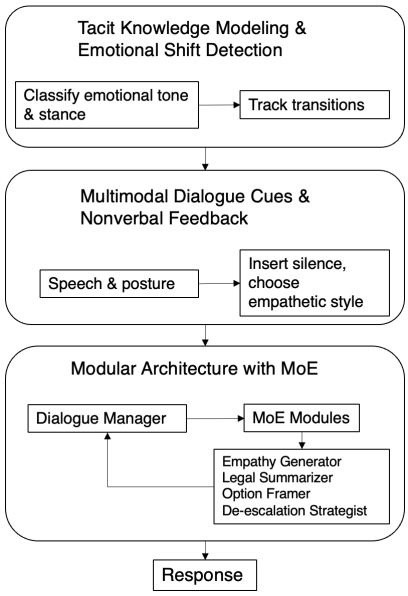


**Fig. 2.** Proposed next-generation architecture integrating tacit knowledge, multimodal cues, and modular dialogue management.

## 8 Conclusion

This research advances the design of AI systems that support emotionally sensitive and context-aware dialogue in family mediation. Through the development and evaluation of MSC and Legal-Emotional BATNA, it demonstrates how legal AI can assist conflict resolution by incorporating tacit knowledge and dialogic facilitation.

While evaluations show benefits in reducing communicative burden and supporting reflection, they also reveal gaps in emotional responsiveness and relational nuance. This motivates the pursuit of adaptive, multimodal legal agents capable of co-participating in justice through understanding.

## Acknowledgements

This research was supported by The Foundation for Research on Civil Dispute Resolution under the following funded projects: (1) “Creative Negotiation Support in ODR Using Spiking Neural Networks (SNN),” and (2) “An Innovative Approach to Mediation Chatbots Utilizing Mathematical Science-Based Methods.”

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## Objective

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## Education

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  - Reviewed essay submissions for academic awards
  - Participated in university entrance exam administration

**Awards and Fellowships**

- 12th FOST Newcomer Award, foundation for the Fusion Of Science and Technology (March 2025)
- Yamada Junjiro Award for Outstanding Thesis, Graduate School of Law, Meiji University (March 2023)
- Fellowship, The Japanese Association of Sociology of Law (2022, 2023, 2024)

**Journal Articles**

- Oshio, K. (2025). *Can Generative AI Enhance Legal Communication? — Exploring Divorce Mediation Chatbot Development*. Journal of Information and Communication, Vol. 24, Meiji University Graduate School of Information and Communication, pp. 20–40.
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**Technical and IT Skills**

- Programming Languages: Python, R, C, LaTeX, and other languages
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- Data Science Tools: Pandas, Scikit-learn, Jupyter Notebook
- Legal Technology: LEX/DB, Westlaw Japan, TF-IDF, topic modeling
- Documentation & Visualization: Word, PowerPoint, Excel, Matplotlib