# EXPERT WITNESS REPORT

# Sentiment Analysis of Spousal Text Message Communication

**Case Reference**: DIV-SMS-iMAZ-MB-SB
**Analysis Period**: May 13, 2024 - November 2, 2024
**Report Date**: June 16, 2025

## 1. EXECUTIVE SUMMARY

This report presents a comprehensive sentiment analysis of text message communications between spouses Melissa Bemer and Stephen Boerner spanning from May 13, 2024, to November 2, 2024. The analysis was conducted using multiple sentiment analysis algorithms to ensure objectivity and reliability. A total of 1,899 messages across 181 conversation segments were analyzed.

**Key Findings:**
- Overall sentiment score: 0.39 (on a scale from -1 to 1)
- Sentiment distribution: 138 positive segments (76.2%), 32 neutral segments (17.7%), and 11 negative segments (6.1%)
- Melissa's overall sentiment: 0.44 (slightly more positive than average)
- Stephen's overall sentiment: 0.37 (slightly less positive than average)
- 44 notable sentiment shifts were identified throughout the conversation history
- Predominant emotions expressed: affection, gratitude, and joy
- Three periods of significant sentiment volatility were identified: June 6-10, July 11-20, and July 28-August 2, 2024

This analysis was conducted with strict adherence to bias mitigation strategies and acknowledges the inherent limitations of text-only sentiment analysis in the context of legal proceedings.

# 2. QUALIFICATIONS AND METHODOLOGY

## 2.1 Analysis Methodology

The sentiment analysis followed a systematic, multi-step approach:

1. **Data Extraction and Preprocessing**
2. Text extraction from PDF source document
3. Cleaning and standardization of message format
4. Identification of message senders, timestamps, and conversation flow

5. Segmentation of conversation into 181 thematic sections based on time gaps and topic modeling

6. **Sentiment Analysis Approach**

7. **Multiple Algorithm Integration**: Combined VADER (Valence Aware Dictionary and sEntiment Reasoner) and TextBlob lexicon-based approaches to reduce algorithmic bias
8. **Quantitative Scoring**: Each message and segment received a compound sentiment score (-1 to +1)
9. **Emotion Detection**: Separate analysis of emotional content using lexicon-based detection
10. **Shift Identification**: Notable shifts in sentiment (>0.5 change) were flagged for further analysis

11. **Sender-Specific Analysis**: Separate analysis of each spouse's messages to identify individual patterns

12. **Bias Mitigation Strategies**

13. Multiple algorithm approach to reduce algorithmic bias
14. Quantitative scoring to minimize subjective interpretation
15. Context preservation through segment-based analysis
16. Separate analysis by sender to avoid attribution bias
17. Emotion detection separate from sentiment scoring
18. Objective reporting of shifts without causal attribution
19. Equal treatment of all conversation participants
20. Temporal analysis to identify patterns without presuming causality

### 2.2 Limitations

This analysis acknowledges the following limitations:

1. Text-only analysis without voice tone or non-verbal cues
2. Limited context understanding by algorithms
3. Potential cultural or linguistic biases in lexicons
4. Inability to detect sarcasm or subtle emotional nuances
5. Segmentation may artificially separate related messages
6. Lexicon-based emotion detection may miss context-specific expressions

## 3. DETAILED FINDINGS

### 3.1 Overall Sentiment Profile

The communication between spouses demonstrates a predominantly positive sentiment profile (76.2% of segments), with limited neutral (17.7%) and minimal negative (6.1%) interactions. The overall sentiment score of 0.39 indicates a moderately positive communication pattern throughout the analyzed period.

The consistent use of affectionate language and terms of endearment ("babe," "lovie," "love") appears throughout the conversation history, suggesting an established pattern of warm communication. Expressions of gratitude ("thanks," "thank you") are also frequent, indicating appreciation and acknowledgment between the parties.

### 3.2 Sender-Specific Sentiment Analysis

**Melissa's Communication Pattern:**
- Overall sentiment score: 0.44
- Sentiment distribution: 113 positive (78.5%), 24 neutral (16.7%), 7 negative (4.9%)
- Frequent use of affectionate terms and expressions of gratitude
- Higher emotional expressiveness in positive segments

**Stephen's Communication Pattern:**
- Overall sentiment score: 0.37
- Sentiment distribution: 117 positive (80.7%), 16 neutral (11.0%), 12 negative (8.3%)
- Consistent positive sentiment with slightly lower intensity
- More frequent neutral-to-positive transitions

While both parties maintain predominantly positive communication, Melissa's messages show slightly higher positive sentiment intensity, while Stephen's messages show a

marginally higher frequency of negative segments. However, these differences are minor and do not suggest a significant disparity in communication tone.

### 3.3 Emotional Content Analysis

The emotional content analysis reveals:

1. **Affection**: Most prevalent emotion, consistently present throughout earlier segments
2. **Gratitude**: Second most common emotion, distributed throughout the conversation
3. **Joy**: Present in multiple segments, often co-occurring with affection
4. **Sadness**: Limited occurrences, primarily in later conversation segments
5. **Anger**: Minimal presence, isolated to specific segments
6. **Fear/Anxiety**: Occasional mentions, particularly around scheduling and planning

The emotional distribution shows a clear pattern of positive emotional expression in the first half of the conversation timeline, with more varied emotional content in later segments.

### 3.4 Sentiment Trends Over Time

The sentiment trend visualization reveals several patterns:

1. **Initial Period (May 2024)**: Consistently high positive sentiment with few fluctuations, averaging around 0.65-0.75 sentiment scores.

2. **Mid-Period (June-July 2024)**: More variable sentiment with occasional dips into negative territory, particularly around segments 50-60 and 75-85.

3. **Later Period (August-November 2024)**: Continued variability with generally positive sentiment but more frequent neutral segments.

4. **Overall Trajectory**: While maintaining predominantly positive sentiment throughout, there is a slight downward trend in average sentiment scores from the beginning to the end of the conversation period.

### 3.5 Notable Sentiment Shifts

Of the 44 identified sentiment shifts:
- 9 shifts from positive to negative sentiment
- 7 shifts from negative to positive sentiment
- 16 shifts from neutral to positive sentiment
- 12 shifts from positive to neutral sentiment

Three periods show particularly significant sentiment volatility:

**June 6-10, 2024 (Segments 50-60)**

This period contains the most volatile sentiment patterns in the entire conversation, including:
- A sharp negative shift on June 7 (Segments 52-53): -1.48
- A strong positive recovery on June 10 (Segments 59-60): +1.24

This 5-day period shows extreme sentiment volatility that is unmatched elsewhere in the conversation history, suggesting a potentially significant event or conflict during this timeframe.

**July 11-20, 2024 (Segments 111-119)**

This period shows multiple significant sentiment shifts:
- Negative shift on July 11-14 (Segments 111-112): -0.88
- Positive recovery on July 14-15 (Segments 113-114): +0.85
- Negative shift on July 18-19 (Segments 116-117): -0.92

The clustering of dramatic sentiment shifts during this period suggests another potentially significant period of relationship dynamics.

**July 28-August 2, 2024 (Segments 126-128)**

This period shows a pattern of:
- Negative shift on July 28-30 (Segments 126-127): -0.82
- Positive recovery on July 30-August 2 (Segments 127-128): +0.83

The near-identical magnitude of the negative shift followed by a positive recovery suggests a potential resolution of a conflict or concern.

## 3.6 Topic Correlation with Sentiment

Several topics appear to correlate with significant sentiment shifts:

1. **Financial discussions**: Several negative shifts occur in segments discussing financial matters (recurring payments, storage units, insurance)

2. **Scheduling conflicts**: Negative shifts often appear in segments discussing scheduling and coordination

3. **Resolution discussions**: Positive shifts frequently follow segments containing problem-solving language or expressions of gratitude

# 4. ANALYSIS AND INTERPRETATION

## 4.1 Communication Pattern Assessment

The text message communication between the spouses demonstrates a predominantly positive emotional tone (76.2% positive segments), characterized by consistent expressions of affection, gratitude, and supportive language. While there are occasional negative sentiment segments (6.1%) and notable sentiment shifts, these appear to be isolated rather than forming a consistent pattern of deterioration.

The slight difference in overall sentiment between Melissa (0.44) and Stephen (0.37) suggests generally aligned but not identical emotional expression patterns. The temporal analysis shows some evolution in communication dynamics over time, with early conversations showing more consistent positive sentiment compared to more variable patterns in later months.

## 4.2 Relationship Dynamic Indicators

Based solely on sentiment analysis of text communication, several potential relationship dynamic indicators emerge:

1. **Consistent Positive Foundation**: The predominance of positive sentiment (76.2% of segments) suggests an established foundation of positive communication.

2. **Conflict and Resolution Patterns**: The presence of both negative shifts and subsequent positive recoveries of similar magnitude suggests a relationship dynamic where conflicts or tensions arise but are often followed by resolution or recovery.

3. **Temporal Evolution**: The slight decrease in average sentiment and increase in sentiment variability over time may indicate evolving relationship dynamics, though the overall positive sentiment remains consistent.

4. **Emotional Expression**: Both parties consistently express affection and gratitude, with slightly different patterns of emotional intensity but generally aligned sentiment directions.

## 4.3 Contextual Considerations

It is important to note that this analysis is based solely on text message content and does not account for:

1. External life events or circumstances that may influence communication patterns

2. Voice calls, in-person interactions, or other communication channels
3. Non-verbal cues, tone of voice, or contextual factors not captured in text
4. Individual communication styles and baseline emotional expression patterns

# 5. CONCLUSION

The sentiment analysis of text message communication between Melissa Bemer and Stephen Boerner reveals a predominantly positive emotional tone, characterized by affectionate language, expressions of gratitude, and generally cordial interactions. However, the presence of notable sentiment shifts, particularly in three identified periods (June 6-10, July 11-20, and July 28-August 2, 2024), indicates potential changes in relationship dynamics over time.

The communication patterns show consistent use of terms of endearment and supportive language, suggesting an established foundation of positive communication. The limited negative sentiment segments (6.1%) appear isolated rather than forming a consistent pattern, though their timing and context may be relevant to understanding the overall relationship trajectory.

This analysis provides an objective assessment of communication sentiment patterns based solely on text message content, acknowledging the limitations of text-only analysis in capturing the full spectrum of interpersonal communication.

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# APPENDIX A: METHODOLOGY DETAILS

## A.1 Data Processing Workflow

1. Text extraction from PDF using pdftotext utility
2. Cleaning and preprocessing of message content using Python
3. Identification of message senders, timestamps, and conversation flow
4. Segmentation of conversation into 181 thematic sections based on time gaps and topic modeling
5. Sentiment analysis using VADER and TextBlob algorithms
6. Emotion detection using lexicon-based approach
7. Visualization and statistical analysis of sentiment patterns

## A.2 Sentiment Analysis Algorithms

1. **VADER (Valence Aware Dictionary and sEntiment Reasoner)**
2. Specifically attuned to sentiments expressed in social media

3. Accounts for intensifiers, punctuation, and emoticons
4. Provides compound score from -1 (extremely negative) to +1 (extremely positive)
5. **TextBlob**
6. Lexicon-based approach using pattern library
7. Provides polarity score from -1 to +1
8. Provides subjectivity score from 0 (objective) to 1 (subjective)
9. **Combined Approach**
10. Average of VADER compound score and TextBlob polarity
11. Categorization: Positive (⩾0.05), Neutral (-0.05 to 0.05), Negative (⩽-0.05)

### A.3 Bias Mitigation Details

1. Multiple algorithm approach to reduce algorithmic bias
2. Quantitative scoring to minimize subjective interpretation
3. Context preservation through segment-based analysis
4. Separate analysis by sender to avoid attribution bias
5. Emotion detection separate from sentiment scoring
6. Objective reporting of shifts without causal attribution
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## APPENDIX B: VISUALIZATIONS

[Note: Visualizations referenced in this report are available as separate files:
1. complete_sentiment_trend.png - Sentiment trend across all conversation segments
2. sender_sentiment_comparison.png - Comparison of sentiment between Melissa and Stephen
3. complete_emotion_heatmap.png - Distribution of emotions across conversation segments]

## APPENDIX C: STATISTICAL SUMMARY

- Total messages analyzed: 1,899
- Total conversation segments: 181
- Overall sentiment score: 0.39
- Melissa's overall sentiment: 0.44

- Stephen's overall sentiment: 0.37
- Sentiment distribution: 138 positive (76.2%), 32 neutral (17.7%), 11 negative (6.1%)
- Notable sentiment shifts: 44
- Most significant negative shift: -1.48 (June 7, 2024)
- Most significant positive shift: +1.24 (June 10, 2024)