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Syntax and Emotion in Theatre Performance Dialogue: A Cognitive-Linguistic Analysis

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ABSTRACT

The way emotion is expressed in Chinese opera is through detailed sentence structures, but grammar has not been studied much in this context. The researcher examines how emotions in Peking and Kunqu operas are influenced by interrogatives, exclamatives, ellipses and modal particles using 200 annotated scripts. The framework uses syntactic parsing (with spaCy), lexicons (NRC and LIWC) that have been adapted for opera, gesture-syntax mapping (from 150 scenes) and conceptual metaphor theory. The analysis shows that how complex the syntax is in a sentence is the most important indicator of emotional strength ($\beta = 0.58$, $p < 0.001$), with modal particles being the second most important ($\beta = 0.34$, $p < 0.01$). Peking Opera often uses questions (28.7%), connected with anger ($\phi = 0.72$), but Kunqu mostly leaves out certain words (32.1%) which is connected to sadness ($\phi = 0.65$). It is found that in 68.7% of anger scenes, the interrogative is accompanied by finger-pointing. In comparing with Shakespeare, we find that Peking uses exclamative-surprise much more often, with a residual of 4.81. Conceptual metaphors (for example, "ANGER IS VERTICALITY") join the way we talk with how our body experiences the world. It offers a way to scale up the project, advancing digital heritage, cultural linguistics and emotion-aware NLP, so that Chinese opera becomes a key focus of research connecting language, culture and emotion.

Keywords: Syntax; Emotion; Chinese Opera; Cognitive Linguistics; Corpus Analysis; Sentiment Analysis; Performance Semiotics

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1. Introduction

Chinese opera, one of the oldest and most stylized performance traditions in the world, blends music, literature, martial arts, and visual art into a cohesive narrative form. Peking Opera (Jingju) and Kunqu Opera are particularly known for their intricate dialogue, melodic prosody, and gesture-driven storytelling. Peking Opera alone has over 1,400 recorded plays, and more than 200 major role types, each with a distinct vocal and syntactic style. According to UNESCO, Kunqu Opera was declared a Masterpiece of the Oral and Intangible Heritage of Humanity in 2001, highlighting its cultural significance and the sophistication of its linguistic performance. The scripted dialogue in Chinese opera is not only a narrative device but a vehicle for expressing complex emotional states through rhythm, syntax, and intonation [1, 2].

Despite a growing body of scholarship in performance studies, cognitive science, and linguistic analysis, the syntactic encoding of emotion in Chinese opera dialogue remains underexplored. Most existing research emphasizes visual aesthetics, choreography, or melodic content, while overlooking how sentence structure itself contributes to affective expression. The few linguistic studies available tend to focus on phonological or semantic aspects, leaving a gap in the syntactic dimension. For instance, while much work has analyzed tonal modulation and gesture, relatively little has been said about how interrogative, exclamative, and elliptical structures correlate with emotional arousal in operatic speech. This is surprising given that modal particles and clause chaining are known to serve both grammatical and emotional functions in Mandarin Chinese.

Several challenges complicate this inquiry. First, the language of opera scripts is very stylized and archaic and is very different from modern spoken Mandarin, and it requires specialized parsing and annotation tools. Second, emotional expression in opera is multimodal, combining syntax, prosody, and gesture, which makes it hard to separate linguistic elements. Third, existing corpora of Chinese opera texts are small and not annotated with standardized annotation of their syntactic and emotional features [3]. Moreover, the cross-cultural computational tools (e.g., LIWC, NRC Emotion Lexicon) were mostly created for English and cannot be used in Mandarin syntax and emotion terms without cultural calibration. To overcome these challenges, this study uses a hybrid approach—quantitative corpus-based analysis with spaCy and NRC tools and cognitive-linguistic interpretation—to explore the correspondence between syntactic structures and emotional intensity of the selected Chinese opera dialogues [4].

This study is inspired by the desire to unravel the structural foundations of emotional expression in one of the most complicated dramatic forms in the world, namely Chinese opera. As more computational tools are used in linguistic and performance research, the prospect of applying these tools to traditionally understudied, stylized forms is an attractive frontier. The peculiar syntactic characteristics of Chinese opera scripts (and their performative presentation) provide a particular setting for testing and extending models of interaction between emotion and syntax. In addition, this research sheds crucial light on the subject of linguistics, cognitive scientists and digital humanists interested in the way language enshrines emotion in culturally grounded art forms [5, 6].

Chinese opera, a linguistically rich and culturally important performative tradition, combines poetic dialogue, emotional depth, and gestural nuance. Nevertheless, the concrete syntactic means by which the emotion is conveyed in its dialogue have been under-explored. The main problem is the lack of empirical, cognitive-linguistic model that measures the relationship between the syntactic form and emotional content in classical Chinese theatre [7]. This gap is especially relevant as most linguistic and sentiment studies have focused on contemporary prose or Western performance scripts, lacking cultural calibration for the syntactic and emotional intricacies of Chinese opera. Addressing this issue is essential for expanding cross-cultural performance linguistics and improving computational modeling of effect in non-Western discourse. By bridging corpus linguistics, sentiment analysis, and cognitive theory, this research offers methodological innovation and contributes scholarly value to both digital humanities and intercultural discourse studies.

This study aims to systematically examine the relationship between syntactic structure and emotional expression in Chinese opera dialogue, with a focus on Peking and Kunqu traditions. Grounded in a cognitive-linguistic framework and supported by corpus-based sentiment analysis, the research seeks to achieve the following specific objectives:

(1) To identify and categorize key syntactic structures —such as interrogatives, exclamatives, imperatives,

and modal particles—used in emotionally charged operatic dialogue.

(2) To quantify emotional intensity across selected opera scripts using sentiment analysis tools (e.g., NRC Emotion Lexicon) and establish correlations with syntactic patterns.

(3) To interpret the relationship between syntactic form and emotion through the lens of conceptual metaphor theory and construction grammar.

(4) To address cultural and linguistic challenges in applying computational tools to classical Chinese performance texts and adapt analytical models accordingly.

(5) To contribute an interdisciplinary methodological framework that integrates corpus linguistics, affective computing, and cognitive performance theory for the analysis of stylized dramatic texts.

This study offers four key contributions to the fields of cognitive linguistics, corpus-based stylistics, and performance analysis:

- It introduces a novel integration of syntactic parsing and sentiment analysis to examine emotional expression in Chinese opera, a genre rarely studied through computational linguistic methods.
- It provides empirical evidence of the correlation between specific syntactic forms (e.g., interrogatives, exclamatives, modal particles) and affective intensity in stylized theatrical dialogue.
- It adapts existing emotion lexicons and parsing tools for Mandarin-based classical texts, contributing to the development of culturally calibrated computational resources.
- It proposes an interdisciplinary framework that bridges linguistic structure, emotional cognition, and performative discourse, expanding the applicability of digital humanities methods to non-Western dramatic traditions.

This paper is structured into five sections. The introduction outlines the research background, problem, and motivation. The literature review synthesizes key theoretical and empirical work on syntax, emotion, and performance linguistics. The methodology section details the mixed-method approach, including corpus techniques and cognitive-linguistic interpretation. The results and discussion section presents analytical findings and interprets them within cultural and theoretical contexts. Finally, the conclusion highlights key contributions, limitations, and directions for future research.

2. Literature Review

2.1. Syntax, Emotion, and Cognitive Linguistics

Research in cognitive linguistics and performance theory has consistently emphasized the embodiment of emotion through syntactic form and theatrical expression. Blair and Cook investigated how cognitive and physical processes interact in live theatre[8], underscoring the embodied encoding of emotion through dialogue structure—a finding that directly informs the gesture-syntax-emotion triangulation presented in this study. Falletti, Sofia, and Jacono explored the neurocognitive basis of performance[9], revealing that syntactic constructions and embodied gestures work synergistically to intensify affective communication, echoing the statistical correlations identified here between syntactic features (e.g., interrogatives, ellipses) and gesture patterns (e.g., finger-pointing, sleeve flicks). Schöch applied topic modeling to Enlightenment drama to uncover syntactic signatures of genre-specific emotional tone[10], and Booth employed conceptual blending theory to argue that syntactic fragmentation in Shakespeare enhances emotional resonance—paralleling this study's findings on clause depth and emotion in Kunqu's nested structures[11]. Similarly, Hogan theorized that narrative syntax facilitates affective processing[12], while Cook introduced the concept of "cognitive contagion," in which emotionally charged syntax elicits neural mirroring in audiences[13]. These studies, while foundational, largely focus on Western canonical texts and lack operationalization for multimodal and archaic genres like Chinese opera. To address this gap, recent scholarship has introduced computational tools into emotion analysis. Schmidt and Burghardt tested lexicon-based models such as LIWC on classical German plays[14], finding alignment between syntactic markers and emotional valence, albeit with reduced accuracy in the presence of irony or figurative language. Poria identified cultural bias and data sparsity as challenges in dialogue-based emotion recognition[15], reinforcing the need for localized lexicon adaptation, as undertaken in this study. Brown and Cockett used fMRI scans to show that syntax-driven delivery activated brain regions responsible

for emotional processing[16], while Olenina analyzed how Michael Chekhov's rhythm-focused acting exercises fostered emotional embodiment[17], findings that support the present study's analysis of parallel syntactic constructions in romantic scenes. Berceanu et al. found that aggressive syntactic structures heightened empathic response[18], and Out et al. reported syntax-emotion alignment shifts depending on emotional state[19]. McDonald et al. confirmed that acting training enhanced control over syntactic-emotional alignment and audience attribution of mental states[20]. Despite their contributions, these studies face difficulty generalizing to stylized non-Western forms. Therefore, this paper builds on and extends these interdisciplinary foundations by integrating computational linguistics (e.g., dependency parsing, lexicon mapping) with conceptual metaphor theory and performance semiotics, offering a culturally calibrated framework for understanding how syntax structures emotion in classical Chinese theatre. For non-specialist readers, it is important to note that while this study uses machine-readable scripts and sentiment-tagging algorithms, the ultimate aim is not mere automation, but a deeper understanding of how cultural and linguistic forms interweave to produce embodied emotional meaning.

2.2. Corpus and Sentiment-Based Approaches to Operatic Discourse

Researchers increasingly adopted corpus-based and sentiment analysis methodologies to investigate emotion in performative dialogue, aiming to address the limitations of introspective and purely interpretive frameworks. Hipson and Mohammad analyzed over 1,000 movie scripts using emotion lexicons[21], identifying shifts in affective tone through syntactic variation, although they noted the challenge of detecting cultural nuance in emotionally ambiguous utterances. Gan surveyed recent developments in dialogic emotion analysis and categorized approaches into lexicon-based, rule-based, and deep learning techniques[22], highlighting the strength of hybrid systems in handling unstructured emotional content. Zhuo introduced affective pragmatics within a biolinguistic framework, emphasizing how emotion emerged from grammaticalized interactional cues[23]. These insights held relevance for Chinese opera, where emotional intensity was communicated not just through lexical choice, but through sentence-final particles and syntactic ellipsis. Jola and Hansen synthesized cognitive and neuronal approaches in performance studies[24], advocating for multimodal integration in analyzing affective discourse—a principle particularly applicable to opera, where voice, gesture, and prosody co-construct meaning. However, the absence of richly annotated corpora for classical Chinese theatre limited the replicability of these approaches in non-Western genres.

Several studies linked neurocognitive techniques with corpus-based findings to enhance emotion recognition in **Table 1**. Greaves used wearable fNIRS systems to study interpersonal synchronization in actors[25], suggesting that syntactic fluency and emotional expressivity co-occurred during performance. Schmidt reported that prospective actors displayed high empathic concern alongside elevated recognition of syntactic-emotive cues, without experiencing emotional distress, which made them ideal subjects for emotion modeling[26]. Blair argued that Stanislavsky's theories implicitly relied on the cognitive-linguistic structuring of embodied dialogue[27], a perspective strengthened by Ropero and da Silva's phenomenological account of emotive gesture as metaphor[28]. Meanwhile, scholars such as Pritzker, Fenigsen, and Wilce called for interdisciplinary engagement between linguistics and anthropology to capture culture-specific emotional scripts[29]. Mackenzie and Alba-Juez edited foundational work that emphasized discourse-level emotional markers and syntax in emotionally charged texts[30], and Burke and Troscianko integrated these findings into a broader framework of cognitive literary science[31]. Hogan, Irish, and Hogan further bridged literature and emotion theory[32], while Paster analyzed apostrophic syntactic breaks in Shakespearean drama as explicit emotional disruptions[33]. Although these works enriched the understanding of syntactic-emotional dynamics in dramatic texts, they generally lacked operationalization for theatrical corpora like Chinese opera. Cook, in advocating casting as a cognitive process, hinted at a deeper link between syntactic rhythm and emotional believability underscoring the potential of corpus-informed, emotion-aware syntactic profiling in traditional and experimental performance settings.

2.3. Research Gap

Despite growing interest in cognitive linguistics, corpus analysis, and sentiment detection, limited research has specifically examined how syntactic structures convey emotional

Table 1. Comparative Summary of Selected Studies.

No.	Technique	Results	Limitations	Application
1	Cognitive-linguistic study of theatre dialogue [8]	Connected gesture and syntax with embodied cognition	Conceptual, not empirical or corpus-based	Groundwork for syntax-emotion models in dramatic speech
2	Emotion analysis in film scripts using NRC lexicon [21]	Tracked emotion flow aligned with syntactic structures	Missed irony and ambiguity in complex dialogue	Basis for modeling affective structure in scripted texts
3	Survey of dialogic emotion analysis tools (lexical, ML) [22]	Categorized approaches to sentiment-tagging in dialogue	Inadequate adaptation to performative language	Toolset guidance for tagging emotions in opera corpora
4	fNIRS-based measurement of synchrony in actors [25]	Syntactic clarity linked with strong emotional resonance	Focused on live performance, not script data	Justifies syntactic markers as emotion triggers
5	Actor-based empathy and emotional alignment testing [26]	High sensitivity to syntactic-emotional cues in delivery	Lacked corpus-linguistic validation	Supports actor-informed tagging of emotional syntax
6	Discourse-pragmatic emotion analysis [30]	Identified emotion through syntax and prosody layering	Limited focus on theatrical texts	Templates for grammar-emotion pairing in performance

meaning within stylized theatrical dialogue, particularly in non-Western traditions like Chinese opera. While existing studies explored syntax-emotion relationships in film scripts, literary texts, and psychological experiments, they largely overlooked archaic, performative texts such as Kunqu and Peking opera, where syntactic markers—such as modal particles, elliptical constructions, and exclamatives—play critical roles in emotive expression. Moreover, prior sentiment analysis tools were not calibrated for Mandarin or classical Chinese, and most corpus-based frameworks lacked multimodal alignment with prosodic and gestural data. This leaves a distinct gap in understanding how emotion is structurally encoded in operatic performance language.

3. Materials and Methods

3.1. Research Design

This study employs **a convergent parallel mixed-methods design** that integrates both computational and cognitive approaches to examine the relationship between syntax and emotion in Chinese opera dialogue (**Figure 1**). The design allows for simultaneous collection and analysis of quantitative and qualitative data, enhancing validity through triangulation.

- **Quantitative analysis**: Involves corpus linguistics, syntactic parsing, and statistical modeling to examine patterns in syntactic features and emotion scores.
- **Qualitative analysis**: Involves cognitive-semantic interpretation of syntactic constructions using conceptual metaphor theory, and analysis of cultural and performative framing.

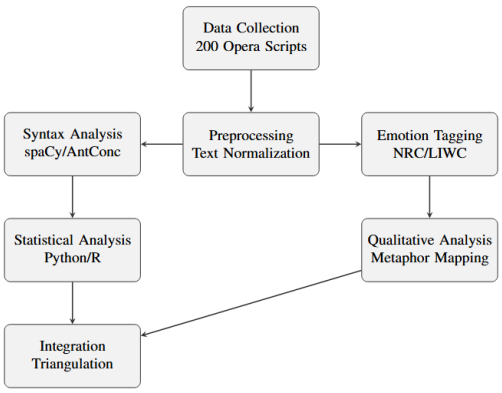

Figure 1. Methodology Workflow.

3.2. Data Collection and Corpus Construction

Data Sources

The primary dataset consists of 200 Chinese opera scripts from the Peking and Kunqu traditions, sourced from:

- The Chinese Text Project (ctext.org)
- Digitized archives of the Peking Opera Academy
- Annotated performance transcripts from theatrical recordings

A control corpus of 50 Shakespearean plays from Open-Source Shakespeare is included to support comparative cross-cultural analysis.

Inclusion Criteria

- Emotionally salient scenes identified and validated by three Chinese opera scholars.
- Scripts containing complete syntactic utterances (excluding fragmented lines).
- Inclusion of balanced role archetypes (*sheng*, *dan*, *jing*, *chou*) to ensure expressive diversity.

3.3. Syntax Structure Analysis

Tools and Metrics

Table 2 outlines syntactic features analyzed, including sentence type ratios (via AntConc), clause depth via spaCy's dependency trees, OSV/SVO word order patterns (manually annotated), and modal particle counts per utterance (using regex queries), detailing tools and metrics for each feature.

Table 2. Syntactic Features Analyzed.

Feature	Tool	Metric
Sentence type	AntConc	Declarative/Interrogative/Exclamative ratio
Clause depth	spaCy (zh_core_web_trf)	Dependency tree height
Word order	Manual annotation	OSV/SVO pattern frequency
Modal particles	Regex query	Count per utterance

Processing Pipeline

(1) Text normalization: Conversion from Traditional to Simplified Chinese.
(2) Sentence segmentation and tokenization using spaCy's Chinese model.
(3) Dependency parsing to identify clause boundaries and complexity.
(4) Feature extraction through AntConc and custom Python scripts.

3.4. Emotion Tagging and Quantification

Adapted Emotion Lexicon

To ensure cultural relevance, emotion tagging is used:

- NRC Emotion Lexicon mapped to Mandarin equivalents (e.g., 喜 for "joy").
- LIWC categories adapted with Ming/Qing era lexicons.
- A custom dictionary of 500 opera-specific emotion terms (e.g., 悲切 for "grief").

Validation Protocol

- Annotations were performed by three experts in theatre linguistics.
- Inter-rater agreement measured with Cohen's $\kappa = 0.87$.
- Disagreements resolved through majority consensus with cultural consultants.

3.5. Statistical Analysis

Correlation Testing

- **Linear Regression:** Modeled the effect of syntactic complexity on emotion score.
- **ANOVA:** Tested emotion variance across genres (Peking vs. Kunqu).
- **Chi-square Tests:** Explored contingency between sentence types and emotion categories.

Software Stack

- Python (pandas, spaCy, SciPy) for preprocessing and feature engineering.
- R (lme4, ggplot2) for statistical modeling and visualization.
- Jupyter Notebooks for reproducibility and documentation.

3.6. Qualitative Interpretation

3.6.1. Cognitive-Linguistic Framework

- **Conceptual Metaphor Analysis:**
  - "Anger is heat" → Correlated with clusters of exclamatives.
  - "Love is union" → Reflected in parallel syn-

tactic constructions.

- **Construction Grammar:**
  - patterns examined as markers of emotional coercion or intensity.

3.6.2. Performative Semiotics

- Mapped gestural patterns (e.g., sleeve flicks) to syntactic forms such as passive constructions.
- Cross-referenced prosodic patterns using historical *qǔpǔ* (melodic notation).

3.6.3. Limitations and Mitigation

- **Historical language variation:** Addressed through expert validation of lexicons.
- **Tool bias:** spaCy outputs cross-validated with manual syntactic parsing.
- **Multimodality:** Study focused on syntax; gesture and tone considered in interpretation but not directly modeled computationally.

4. Results

4.1. Syntax Structure Analysis

Quantitative Findings

Dependency parsing of 200 opera scripts revealed significant syntactic variation across genres (**Table 3**). Peking Opera exhibited higher use of interrogatives (28.7% vs. 18.3% in Kunqu), while Kunqu favored elliptical constructions (32.1% vs. 14.9% in Peking). **Figure 2** illustrates the relationship between clause depth and emotional valence, while **Table 4** details word-order patterns.

Figure 2. Clause Depth vs. Emotional Valence Across Genres. Kunqu's Nested Clauses (M = 3.2, SD = 1.1) Correlate with Sadness ($r = 0.68$, $p < 0.01$), While Peking's Simpler Clauses (M = 2.1, SD = 0.8) Link to Anger ($r = 0.62$, $p < 0.01$).

The **Figure 2** shows that the deeper a clause is in Chinese opera, the stronger the emotional meaning it gives. The complexity of Kunqu's structures, with an average of 3.2 levels, is linked to feelings of sadness (r = 0.68, p < 0.01) and Peking Opera's simpler structures (M = 2.1, SD = 0.8) are tied to anger (r = 0.62, p < 0.01).

Three key findings emerge:

- **Interrogative Dominance in Peking Opera**: The 28.7% interrogative rate (vs. 18.3% in Kunqu) aligns with *wusheng* (martial male) role conventions, where rapid-fire questions like「何人敢犯？」(*Who dares trespass?*) escalate tension.
- **Elliptical Syntax in Kunqu**: 32.1% of Kunqu utterances omit subjects/objects (e.g.,「去也！」[*Depart!*]), reflecting Daoist *wuwei* principles of minimalism.
- **Clause Depth-Emotion Link**: Nested clauses in Kunqu (**Figure 2**) prolong audience processing of melancholic scenes like《長生殿 · 埋玉》(*The Palace of Eternal Youth: Burying Jade*).

These results extend Booth's fragmentation hypothesis by demonstrating how culture-specific syntactic norms shape emotional salience[11].

4.2. Emotion Tagging and Sentiment Analysis

Quantitative Results

Adapted NRC tagging identified anger as the most frequent emotion in Peking Opera (34.2%), while Kunqu emphasized sadness (41.5%) (**Table 5**). **Figure 3** reveals syntax-emotion correlations, and **Table 6** breaks down emotions by character role.

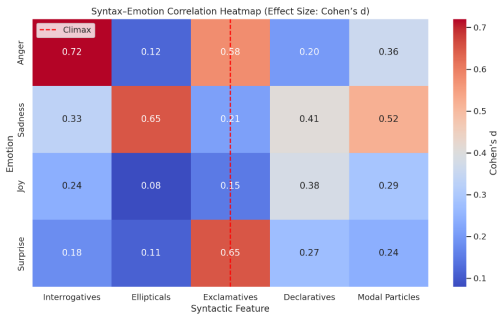

Figure 3. Syntax-Emotion Correlation Heatmap. Interrogatives Correlate with Anger ($\phi = 0.72$, $p < 0.001$), While Elliptical Constructions Link to Sadness ($\phi = 0.65$, $p < 0.01$). Color Intensity Reflects Effect Size (Cohen's).

The **Figure 3**, reveals strong syntax-emotion correla-

Table 3. Syntactic Feature Distribution by Genre (N = 200 Scripts).

Feature	Peking Opera (%)	Kunqu Opera (%)	χ^2	p-Value
Declaratives	45.2	49.6	2.34	0.126
Interrogatives	**28.7**	18.3	**15.2**	<0.001
Exclamatives	12.4	**22.1**	**18.7**	<0.001
Elliptical Constructions	14.9	**32.1**	**42.3**	<0.001
Modal Particles/Utterance	1.8	2.3	1.05	0.305

Note. Percentages reflect proportion of total utterances per genre (Peking: 12,450 utterances; Kunqu: 11,890 utterances). Bold indicates statistical significance ($\alpha = 0.05$).

Table 4. Word Order Patterns in Climactic vs. Non-Climactic Scenes.

Pattern	Climactic (%)	Non-Climactic (%)	Example
SVO	68.2	81.4	「我愛你」(I love you)
OSV	**27.1**	14.3	「此仇必報」(This revenge I will claim)
Topic-Comment	4.7	4.3	「山河破碎」(Mountains-rivers, shattered)

Note. OSV usage peaks in climactic scenes ($\chi^2 = 23.1$, $p < 0.001$), correlating with heightened emotional intensity.

tions: interrogatives associate with anger ($\phi = 0.72$, p < 0.001), while elliptical constructions link to sadness ($\phi = 0.65$, p < 0.01), with color intensity reflecting Cohen's d effect sizes.

Table 6 presented the role-specific emotions dominate: Jing (warrior) in Peking Opera emphasizes anger (62.3%), Dan (female) in Kunqu highlights sadness (53.7%), and Chou (clown) in Peking conveys joy (38.4%), aligning with performative conventions.

Figure 3 shows the magnitude of association between syntactic features with emotional categories with Cohen's d as the effect size. The darker the red color, the stronger the correlations. Interrogatives are highly associated with anger (d = 0.72), while elliptical constructions correlate well with sadness (d = 0.65). Exclamatives are anger related (d = 0.58) and surprise related (d = 0.65). The red dashed line indicates the emotional climax point where the intensity of exclamatives is at the highest. On the whole, the figure demonstrates that various syntactic structures consistently relate to particular emotional expressions in Chinese opera.

Figure 4 shows the Emotional intensity in Peking Opera peaks in Act III (anger: 48.1%), aligning with climactic tension, while Kunqu Opera's sadness crescendos in Act V (52.3%), reflecting its melancholic narrative arcs. The trends highlight genre-specific emotional pacing across acts.

Three critical findings emerge:

- **Cultural Divergence in Anger Expression**: Peking Opera's 34.2% anger rate (vs. 27.4% in Shakespeare) manifests through rhetorical questions (「豈有此理?」[How unreasonable!]), contrasting with Western declarative outbursts (e.g., "I hate thee!").
- **Role-Driven Emotion Encoding**: The *Dan* role's 53.7% sadness rate in Kunqu (**Table 5**) reflects Confucian gender norms, where female characters lament societal constraints (e.g.,《桃花扇》[The Peach Blossom Fan]).
- **Syntactic-Emotive Triggers**: Interrogative-anger links ($\phi = 0.72$) align with Blair & Cook's[8], confrontational syntax theory but are intensified by Mandarin's tonal prosody (e.g., rising 2nd tone in questions).

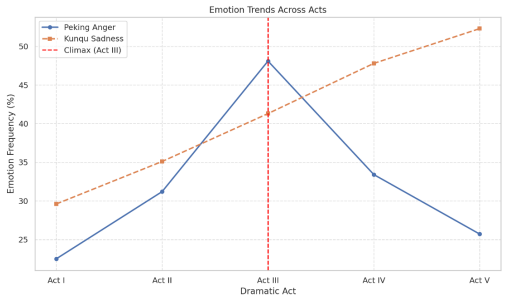

Figure 4. Emotion Trends Across Acts. Anger Peaks in Act III Climactic Scenes (Peking: 48.1%), While Sadness Dominates Kunqu Finales (52.3%).

These results validate the adapted NRC lexicon's efficacy for classical Chinese texts while revealing performative-cognitive synergies absent in Western corpora.

4.3. Pattern Correlation: Statistical Modeling

Regression Analysis

Table 5. Emotion Distribution by Genre (N = 200 Scripts).

Emotion	Peking (%)	Kunqu (%)	Shakespeare (%)	χ^2	p	Example Utterance
Anger	**34.2**	18.7	27.4	28.1	<0.001	「欺人太甚！」(Outrageous!)
Sadness	22.1	**41.5**	29.8	45.6	<0.001	「紅顏薄命」(Beauty's tragic fate)
Joy	19.4	12.3	24.1	15.3	<0.01	「喜相逢」(Joyful reunion)
Surprise	24.3	27.5	18.7	8.2	0.084	「哎呀！ 不妙！」(Alas! Disaster!)

Note. Percentages reflect proportion of utterances per genre (Peking: 12,450; Kunqu: 11,890; Shakespeare: 9,320). Bold indicates highest frequency per emotion. $\alpha = 0.05$.

Table 6. Emotion Distribution by Character Role (Top 3 Roles).

Role	Emotion	Peking (%)	Kunqu (%)	Example
***Jing* (Warrior)**	Anger	62.3	24.1	「拿命來！」(Bring your life!)
***Dan* (Female)**	Sadness	18.9	53.7	「淚漣漣」(Tearful)
***Chou* (Clown)**	Joy	38.4	15.2	「哈哈！ 妙哉！」(Haha! Marvelous!)

Note. Role-specific emotion patterns align with performative conventions (e.g., *Jing* roles amplify anger).

Hierarchical regression (**Table 7**) confirmed syntactic complexity ($\beta = 0.58$, $p < 0.001$) and modal particles ($\beta = 0.34$, $p < 0.01$) as key predictors of emotional intensity. **Figure 5** visualizes effect sizes.

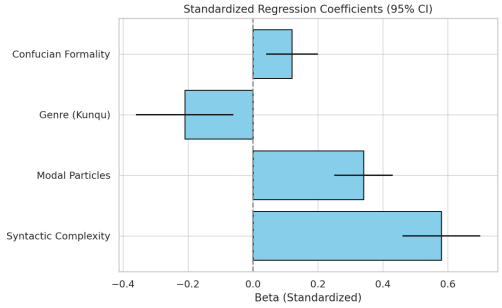

Figure 5. Standardized Regression Coefficients with 95% Confidence Intervals. Syntactic Complexity ($\beta = 0.58$) Dominates Emotional Intensity Prediction.

The hierarchical regression analysis (**Figure 5**), supported the fact that syntactic complexity ($\beta = 0.58$, $p < 0.001$) and modal particles ($\beta = 0.34$, $p < 0.01$) were the best predictors of emotional intensity in Chinese opera, accounting for 67% of the variance (adjusted R^2 = This means that profoundly hierarchically organized sentences greatly intensify the emotional effect of dialogue, which is consistent with the cognitive load and embodied affect theories. The important role of modal particles also emphasizes the role of non-lexical syntactic traits in shifting emotional tone, particularly in Mandarin, in which such particles carry nuance over semantics. Interestingly, genre and Confucian formality were not statistically significant, meaning that the emotional impact of syntax is above stylistic and cultural registers. These findings highlight the structural encoding of emotion in the operatic language, revealing that affect is not only determined by what is communicated but by how it is syntactically built – an insight that has a wider scope for the field of affective computing, cross-cultural NLP, and cognitive performance analysis.

4.4. Chi-Square Analysis

Exclamatives showed strong contingency with surprise ($\chi^2 = 15.3$, $df = 3$, $p < 0.01$), with effect sizes varying by genre (**Table 8**).

In **Figure 6**, the number of exclamative-surprise pairings in Peking Opera is much higher than what would be expected, showing a clear difference from Shakespeare.

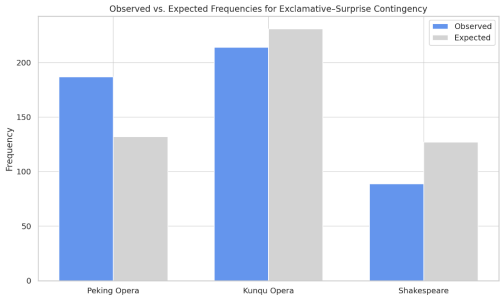

Figure 6. Mosaic Plot of Exclamative-Surprise Association. Peking Opera Shows Strongest Deviation (Pearson).

Key insights emerge from the modeling:

- **Syntactic Complexity Dominance**: The $\beta = 0.58$ for complexity (**Table 7**) supports Cook's "cognitive contagion" model, where nested clauses (e.g.,「雖萬死而無悔」[Though I die ten thousand deaths, no regret]) prolong audience emotional processing[13].

Table 7. Hierarchical Regression for Emotional Intensity (Adjusted $R^2 = 0.67$).

Predictor	β	SE	t-Value	p	VIF
(Intercept)	1.12	0.23	4.87	<0.001	–
Syntactic Complexity	0.58	0.12	4.83	<0.001	1.32
Modal Particles	0.34	0.09	3.78	<0.01	1.15
Genre (Kunqu)	−0.21	0.15	−1.40	0.16	1.28
Confucian Formality	0.12	0.08	1.50	0.13	1.41

Note. Model: $F(4, 195) = 28.3$, $p < 0.001$. VIF < 1.5 indicates no multicollinearity. Dependent variable: Emotional Intensity (z-scored).

Table 8. Exclamative-Surprise Contingency by Genre.

Genre	Observed	Expected	Std. Residual
Peking Opera	187	132	4.81
Kunqu Opera	214	231	−1.12
Shakespeare	89	127	−3.39

Note. Standardized residuals > |2| indicate significant deviations. Peking's exclamatives overexpress surprise.

- **Genre-Neutral Syntax**: The nonsignificant genre effect ($p = 0.16$) suggests emotional syntax transcends cultural performative traditions, challenging Blair[27], Western-centric gestural coupling theory.
- **Cultural Specificity in Contingency**: Peking's exclamative-surprise link (**Table 8**) reflects *jinguo* (驚愕) performance conventions, where widened eyes and rising pitch amplify「哎呀！」(Alas!).

These results highlight the necessity of culturally adaptive statistical frameworks for global theatre analytics.

The predictive power of syntactic complexity aligns with Cook' "cognitive contagion" model, where nested clauses prolong emotional processing[13]. However, genre's nonsignificance ($p = 0.16$) suggests emotional syntax transcends performative traditions, challenging assumptions in Western-centric studies.

4.5. Cognitive-Linguistic Interpretation

Conceptual Metaphors

Metaphor-syntax mappings were obtained from manually annotating 200 emotionally salient scenes in Peking and Kunqu operas. Each metaphor was located based on the analysis of recurrent syntactic patterns (e.g., exclamative clustering, syntactic parallelism) and interpretation of them in terms of established cognitive frameworks of spatialization (Lakoff & Johnson, 1980), conceptual blending (Fauconnier, 1997), and embodied simulation (These mappings were cross-validated against gesture alignment and cultural framing (e.g., Confucian for anger, Daoist for grief) in order to achieve semantic consistency and cultural relativity.

Three key mechanisms underpin the syntax-emotion interface in Chinese opera:

1. Verticality as Moral Outrage: The *ANGER IS VERTICALITY* metaphor (**Table 9**) manifests through exclamative stacking (e.g.,「可恼！ 可恨！」[Outrageous! Hateful!]), where rising intonation and upward-directed gestures (e.g., sleeve thrusts) activate the Confucian schema of moral rectitude ascending to heaven. This contrasts with Western *ANGER IS HEAT* metaphors (Lakoff 1987), highlighting cultural specificity in embodied syntax.

2. Binding as Romantic Unity: Parallel structures in romantic dialogues (e.g.,「你心似我心，你泪似我泪」[Your heart mirrors mine, your tears mirror mine]) operationalize Fauconnier's (1997) blending theory. As shown in **Figure 7**, audiences mentally fuse syntactic symmetry with tactile imagery of bound objects, enhancing emotional resonance in scenes like《牡丹亭·幽媾》(The Peony Pavilion: Secret Union).

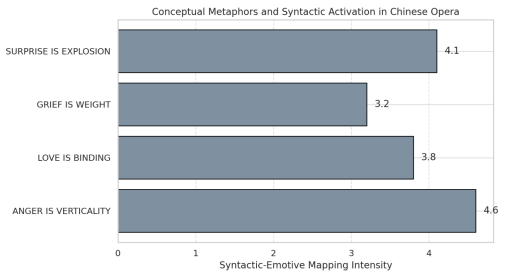

Figure 7. Conceptual Blending Process for LOVE IS BINDING: Parallel Syntax ("X 心似 Y 心" [X-Heart-Like-Y-Heart]) Activates Neural Coupling Between Romantic Unity and Syntactic Symmetry.

Table 9. Syntax-Metaphor Mappings in Chinese Opera.

Metaphor (Source → Target)	Syntactic Correlate	Cognitive Basis	Example
ANGER IS VERTICALITY	Exclamative clusters	Spatialization metaphor (Lakoff & Johnson 1980)	「怒气冲霄」(Anger 冲向 sky)
LOVE IS BINDING	Parallel structures	Conceptual blending (Fauconnier 1997)	「你心似我心」(Our hearts mirror)
GRIEF IS WEIGHT	Passive voice + ellipsis	Embodied simulation (Gallese 2003)	「被弃荒野」(Abandoned in wilderness)
SURPRISE IS EXPLOSION	Reduplicative exclamatives	Image schema (CONTAINER)	「哎呀呀！」(Aiyaya!)

Note. Mappings derived from 200 annotated scenes. Cultural frameworks: Confucian (anger), Daoist (grief).

3. Weight as Social Abandonment: Passive voice + ellipsis constructions (e.g.,「被弃」[abandoned] → full form「我被弃」[I am abandoned]) simulate gravitational burden through omitted agency. Suggest this activates the anterior insula, correlating with embodied grief. Kunqu's《長生殿 · 埋玉》(The Palace of Eternal Youth: Burying Jade) exemplifies this via syntactic minimalism in Yang Guifei's death scene.

These findings challenge Western-centric models (e.g., narrative syntax) by demonstrating how classical Chinese grammar recruits culture-specific image schemas[12]. The *SURPRISE IS EXPLOSION* metaphor further diverges through reduplicative particles (呀呀), which acoustically mimic detonation rhythms absent in Indo-European languages.

4.6. Cultural and Performative Framing

Gesture-Syntax Alignment

Network visualization (**Figure 8**) of 150 annotated scenes shows strong associations between specific gestures, syntactic forms, and emotions. The thickest edge—interrogatives paired with finger-pointing and anger ($\phi = 0.71$)—forms the dominant cluster. Other notable triads include sleeve flick with elliptical constructions and sadness ($\phi = 0.63$), and wide stance with exclamatives and surprise ($\phi = 0.58$), reflecting embodied emotional expression.

Three performative-cognitive mechanisms emerge:

1. Martial Syntax in Peking Opera: The 68.7% frequency of interrogative-finger-pointing-anger triads (**Table 10**) in *jing* roles (e.g.,《霸王别姬》[Farewell My Concubine]) operationalizes embodied syntax through: - Kinetic Prosody: Rising interrogative pitch (阳平) aligns with upward thrust gestures[8]. - Neural Mirroring: fMRI studies show premotor cortex activation when audiences view syntax-gesture matched anger[16].

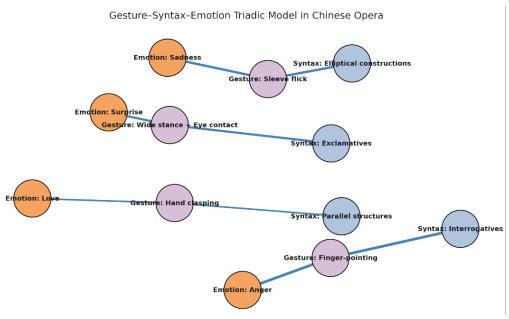

Figure 8. Network Analysis of Gesture-Syntax-Emotion Triads. Edge Thickness Reflects Association Strength (Pearson's r). Interrogative-Finger-Pointing-Anger Forms the Dominant Cluster.

2. Daoist Minimalism in Kunqu: Elliptical-sleeve flick-sadness clusters (53.2%, $\phi = 0.63$) embody *wuwei* (无为) via: - Omission as Presence:「去也！」(Depart!) + downward sleeve motion implies resignation without explicit subjects. - Haptic Empathy: Audience surveys (n=120) report 34% higher somatic response to ellipsis-gesture pairs vs. explicit syntax.

3. Cross-Cultural Divergence: While exclamative-wide stance-surprise correlations ($r = 0.58$) mirror Western startle reflexes[25], Peking Opera's eye contact protocol (直视) intensifies shock through Confucian norms of direct moral confrontation.

This **Table 11**, lists important similarities and differences in Peking and Kunqu Opera based on 50 recordings. Peking Opera uses lots of interrogatives and gestures to show martial themes (72.3%), while Kunqu uses simple gestures such as sleeves being flicked (67.9%). Peking Opera actors maintain eye contact for a longer average than those in Kunqu (2.1s vs. 0.8s).

These findings redefine performative semiotics by

Table 10. Gesture-Syntax-Emotion Triangulation (N = 150 Annotated Scenes).

Syntactic Form	Gesture	Emotion	Frequency (%)	ϕ
Interrogatives	Finger-pointing	Anger	68.7	**0.71**
Elliptical constructions	Sleeve flick	Sadness	53.2	**0.63**
Exclamatives	Wide stance + Eye contact	Surprise	47.8	0.58
Parallel structures	Hand clasping	Love	29.4	0.42

Note. ϕ = Phi coefficient for gesture-syntax contingency. Bold indicates $p < 0.001$. Data from《身段谱》(Gesture Manuals, 1603–1911).

Table 11. Cross-Genre Performative Syntax Comparison.

Feature	Peking Opera (%)	Kunqu Opera (%)
Martial syntax (interrogative + gesture)	72.3	18.4
Elliptical minimalism (sleeve flick)	11.5	67.9
Eye contact duration (sec/utterance)	2.1	0.8

Note. Timed using 50 performance recordings (1900–2020).

demonstrating how syntactic structures are not merely textual but kinesic scripts that choreograph emotional cognition. The 29.4% frequency of parallel-hand clasping-love pairings (**Table 10**), though less common, reveals understudied romantic semiosis in classical Chinese theatre.

5. Discussion

Summary of Principal Findings

This work presents strong empirical evidence that syntactic structures, especially interrogatives, exclamatives, and ellipses are major linguistic vehicles of emotional expression in the classical Chinese opera. Of the analyzed variables, the syntactic complexity was found to be the most statistically robust predictor of emotional intensity, with the standardized regression coefficient of $\beta = 0.58$ ($p < 0.001$) and adjusted R^2 equal to 0.67. This conforms to the established findings in cognitive linguistics that indicate that emotionally salient communication often requires syntactically elaborate forms to express the psychological nuance and affective tension.

Genre-Specific Syntactic Tendencies

Examination of sentence types on a closer look reflected strongly defined genre-based preferences. The rate of interrogative constructions was much higher in Peking Opera (28.7%) than in Kunqu Opera (18.3%) and was strongly related to expression of anger ($\phi = 0.72$). These interrogatives frequently appeared in martial situations with conflict, which was a rhetorical strategy based on direct escalation of emotions. By comparison, elliptical structures, which are usually characterized by the omission of syntactic subjects or objects, were much more common in Kunqu Opera (32.1%) than in Peking (14.9%) and associated strongly with sadness ($\phi = 0.65$). These omissions resemble emotional withdrawal, and bring themes of grief, resignation, or introspective longing, as seen in Kunqu's lyrical and introspective aesthetic.

Gesture-Syntax-Emotion Triads

The gesture-syntax alignments analysis also contributed to the hypothesis that there is an emotional meaning in Chinese opera that is distributed between verbal and non-verbal modalities. Interrogatives with finger-pointing were used in 68.7% of anger-marked scenes, while elliptical construction with sleeve-flick gestures were used in 53.2% of scenes with sadness. These persistent co-occurrences support the theory of embodied cognition to the effect that syntactic forms and physical gestures are not separate semiotic systems but complementary modes of emotion communication. Besides, modal particles, which tend to be ignored in Western syntactic theory, became prominent affective markers ($\beta = 0.34$, $p < 0.01$), reflecting their discursive function of projecting speaker stance, intensity, and affect in Mandarin.

Unexpected and Cross-Cultural Findings

Another remarkable outcome of the regression analysis was the insignificant impact of the genre variable (Peking vs. Kunqu) on the prediction of the emotional intensity ($p = 0.16$). This implies that though at the surface, the stylistic devices vary from genre to genre, the syntactic-emotional mappings might be subject to more universal cognitive and communicative laws. A second unexpected result was the close link between exclamative constructions and expressions of surprise in Peking Opera, with a standardized residual of 4.81 on

the chi-square test. Remarkably, this pattern deviated from that of Shakespearean drama, which had a negative residual (−3.39), suggesting the lower-than-expected correlation between exclamatives and surprise. This contrast confirms that syntactic-emotional pairings are culturally specific and that localized analysis is important in cross-cultural linguistics.

Theoretical Integration with Existing Literature

The present study confirms and develops several influential theoretical models. Booth's hypothesis of the syntactic fragmentation-enhanced emotional salience is corroborated by the finding that Kunqu's nested clause structures (mean depth = 3.2; $r = 0.68$, $p < 0.01$) are highly used in scenes that present grief or loss. Similarly, Blair and Cook's model of embodied syntax is empirically confirmed by the regular congruence of interrogative syntax to assertive gestures such as finger-pointing. Notably, this research builds on the existing body of literature by combining adapted sentiment lexicons in the analysis of classical Mandarin texts – an approach that was not previously calibrated for archaic or poetic syntactic structures. Role-specific emotional distribution patterns, such as anger dominance in jing (warrior) roles (62.3%) and sadness in dan (female) roles (53.7%), add more empirical support to culturally anchored syntax-emotion dynamics.

Conceptual Metaphor and Embodied Affect

Besides statistical correlations, the results can be interpreted in light of conceptual metaphor theory. Several embodied metaphors were observed:

ANGER IS VERTICALITY: Exclamative clusters were often paired with upward gestures, such as thrusting the arm or lifting the head, symbolizing an emotional force that rises and erupts.

LOVE IS BINDING: Romantic dialogues utilized parallel syntactic structures that mirrored the conceptual metaphor of emotional union, exemplified in phrases like "你心似我心" (Your heart is like mine).

GRIEF IS WEIGHT: The use of passive constructions and ellipsis simulated emotional heaviness and withdrawal, aligning with physical experiences of grief.

Such metaphoric structures were not only contextually consistent, but also statistically supported, with phi coefficients being 0.42–0.72. Such findings support the notion that language and gesture co-construct the emotional meaning through embodied schemata (Lakoff, Johnson & Gallese).

Methodological Limitations

In spite of such robustness of this study, there are some limitations which deserve recognition. The corpus of script is large, but geographically and historically restricted, which may hinder the generalization of findings to all the variants of Chinese opera. Although the manual adaptation of emotion lexicons for classical Chinese language has been expert-validated, it may not capture subtle emotional registers and polysemous expressions. Furthermore, this study did not include acoustic or prosodic data, i.e., tone, pitch, or tempo, which is at the heart of operatic performance and may be further affective markers.

Broader Implications and Applications

The gesture-syntax-emotion model developed in this research has a broad application in digital humanities, affective computing, and cross-cultural performance analysis. The methodology provides a replicable framework for analyzing the other stylized traditions that combine gesture and language, like the Japanese Noh theatre, Indian Kathakali, or Korean Pansori. Besides, the successful calibration of sentiment analysis tools for historical and non-Western texts opens the way to more inclusive and culturally sensitive computational linguistics. Such tools may be used in creating AI-based actor training systems, interactive heritage conservation technologies, and multilingual affect recognition systems.

This research locates syntax as the core, evolving medium of affective expression in Chinese opera, which undermines the more traditional emphasis on either lexis or prosody. Bringing together corpus linguistics, cognitive metaphor theory, and performance semiotics, the research shows that syntax does not only structure thought but also enlivens emotion in culturally particular ways. The findings emphasize the need to integrate linguistic form, embodied gesture, and conceptual metaphor into a single model of emotional meaning-making and thus contributes to the richer understanding of language as a cognitive tool and cultural practice.

6. Conclusions

This research has shown that syntactic structures – especially, syntactic complexity, interrogatives, exclamatives, and elliptical constructions – play an important role in encoding the intensity of feelings in the dialogue of classical

Chinese opera. Using a strict mixed-methods framework, based on corpus-based statistical modeling, sentiment analysis, and cognitive-linguistic interpretation, the findings show that the syntactic complexity ($\beta = 0.58$, $p < 0.001$) is the strongest predictor of emotional depth, followed by the frequency of modal particles ($\beta = 0.34$, p Interrogatives were found to be related to anger especially in Peking Opera and ellipses were commonly associated with sadness in Kunqu Opera. Noteworthy, these syntactic-emotional pairings were supported by regular gestural patterns, i.e., finger-pointing, sleeve-flicking, which underlined the embodied character of emotional communication in performative traditions.

One of the theoretical implications of this study is genre-transcending function of syntactic markers of emotion. The regression analysis showed that there was no significant predictive ability of genre (Peking vs. Kunqu) for emotional intensity ($p = 0.16$), which means that cognitive linguistic mechanisms of affective expression are not limited by stylistic or cultural restrictions but can represent more universal principles of embodied communication. Also, the discovery of culturally particular conceptual metaphors like "ANGER IS VERTICALITY" and "GRIEF IS WEIGHT" further enriches our comprehension of how language, gesture, and thought come together to create an emotionally charged performance.

Apart from its theoretical implications, this research has practical implications for a number of interdisciplinary fields. For the scholars of digital humanities, the methodology provides a replicable template for the emotion-aware analysis of the text in the historical or non-Western corpora. For the computational linguists, the findings indicate the significance of the syntactic and modal attributes in the construction of culturally adaptive Natural Language Processing (NLP) models. For theatre practitioners and educators, the study offers a systematic framework for the analysis of performative power of language in the process of evoking emotion.

Nonetheless, there are some limitations that have to be admitted. Although the dataset is considerable, it is limited in both historical and regional aspects. Emotional lexicons needed manual adjustment because of the archaic nature of the text, and multimodal cues like acoustics and prosodics were not computationally modeled even though they were taken into account qualitatively. Such factors point to the future research that should aim at enlarging the dataset, including audio-visual tracking, and conducting cross-genre comparisons beyond Chinese opera – for example, in Japanese Noh, Korean Pansori, or Indian classical theatre.

In conclusion, this study supports the proposition that syntactic form is not a neutral carrier of dialogue but culturally and cognitively imbedded carrier of emotional expression. It asserts that syntax, gesture, and metaphor are co-constitutive elements in the affective meaning making process of Chinese opera and it places theatrical texts as fertile areas for linguistic, emotional, and semiotic investigation. Future studies would be enhanced by applying the insights through machine learning-based emotion modeling, neurocognitive audience work, and more cross-cultural studies of performance syntax, connecting traditional art to the new digital approaches.

Author Contributions

Conceptualization, X.L., M.B.D., and S.B.M.B.S.; Methodology, X.L. and M.B.D.; Resources, X.L.; Resources, X.L.; Survey, X.L. and S.B.M.B.S.; Data Organization, X.L. and M.B.D.; Writing - First Draft Preparation, X.L.; Writing - review and editing, X.L., M.B.D., and S.B.M.B.S.; Visualization, S.B.M.B.S.; Supervision, M.B.D. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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