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The Evolutionary Basis of Dramatic Tension: A Neurobiological Approach to Cinematic Conflict

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Abstract

This article introduces an integrative framework for understanding dramatic tension in cinema through the lens of cognitive biology. It argues that dramatic conflict is not merely a cultural convention but reflects three evolutionarily conserved motivational systems: the fight/flight/freeze system (FFFS), the behavioral inhibition system (BIS), and the behavioral activation system (BAS). The discussion draws on neuroscientific findings related to the amygdala, prefrontal and cingulate cortices, dopaminergic pathways, as well as research on empathy and prediction error.

The study demonstrates that dramaturgic techniques engage viewers under two essential conditions: identification with the protagonist and the introduction of novelty within the narrative sequence. Identification fosters empathic resonance, while novelty prevents habituation and activates the brain's predictive coding mechanisms. Dramatic tension, therefore, is conceptualized as the activation of universal biological systems, whereas cultural forms represent historically variable modes of their expression.

The proposed model provides a foundation for developing empirically informed methodologies in screenwriting and directing. Future directions include experimental validation through cognitive neuroscience and the creation of applied tools for narrative analysis. This work will be of interest to scholars in film and media studies, screenwriters and directors, and researchers in cognitive science and neuroaesthetics who pursue interdisciplinary approaches to understanding art.

Keywords: *Dramaturgy, Cognitive Biology, Narrative, Conflict, FFFS, BIS, BAS, Prediction Error, Empathy, Protagonist Identification, Neuroaesthetics, Cultural Evolution, Cognitive Mechanisms, Neuroscience, Screenwriting, Film Studies.*

INTRODUCTION

The construction of dramaturgy in cinema—both in its narrative and audiovisual dimensions—remains largely an intuitive process. Screenwriters and directors tend to rely not on empirical methodology but on artistic experience, cultural conventions, and creative traditions [1,2]. Although numerous attempts have been made to systematize dramaturgy, from Aristotle to twentieth-century narratology, a truly universal theoretical model has yet to emerge [3].

Contemporary examples reveal the limits of formal approaches. Generative artificial intelligence systems trained on screenplay corpora can reproduce syntactic and structural patterns, yet they fail to generate genuine dramatic tension. Their texts are quickly recognized by audiences as mechanical and devoid of deeper cognitive triggers [4]. This observation suggests that dramaturgy cannot be reduced to the statistical regularities of language and genre; rather, it is rooted in fundamental mechanisms of attention, emotion, and evolutionary biology.

Consequently, the search for consistent principles of dramaturgy must move beyond purely descriptive or intuitive models. This article proposes to reinterpret the classical triad of dramatic conflicts through the framework of cognitive biology. The author hypothesizes that all forms of dramatic conflict reflect three evolutionarily conserved mechanisms rather than culturally conditioned constructs: competition for resources and social status; decision-making under uncertainty; and adaptation to environmental threats and chaos. Different dramaturgical techniques influence the viewer precisely through the activation of these mechanisms—individually or in various combinations (see Fig. 1).

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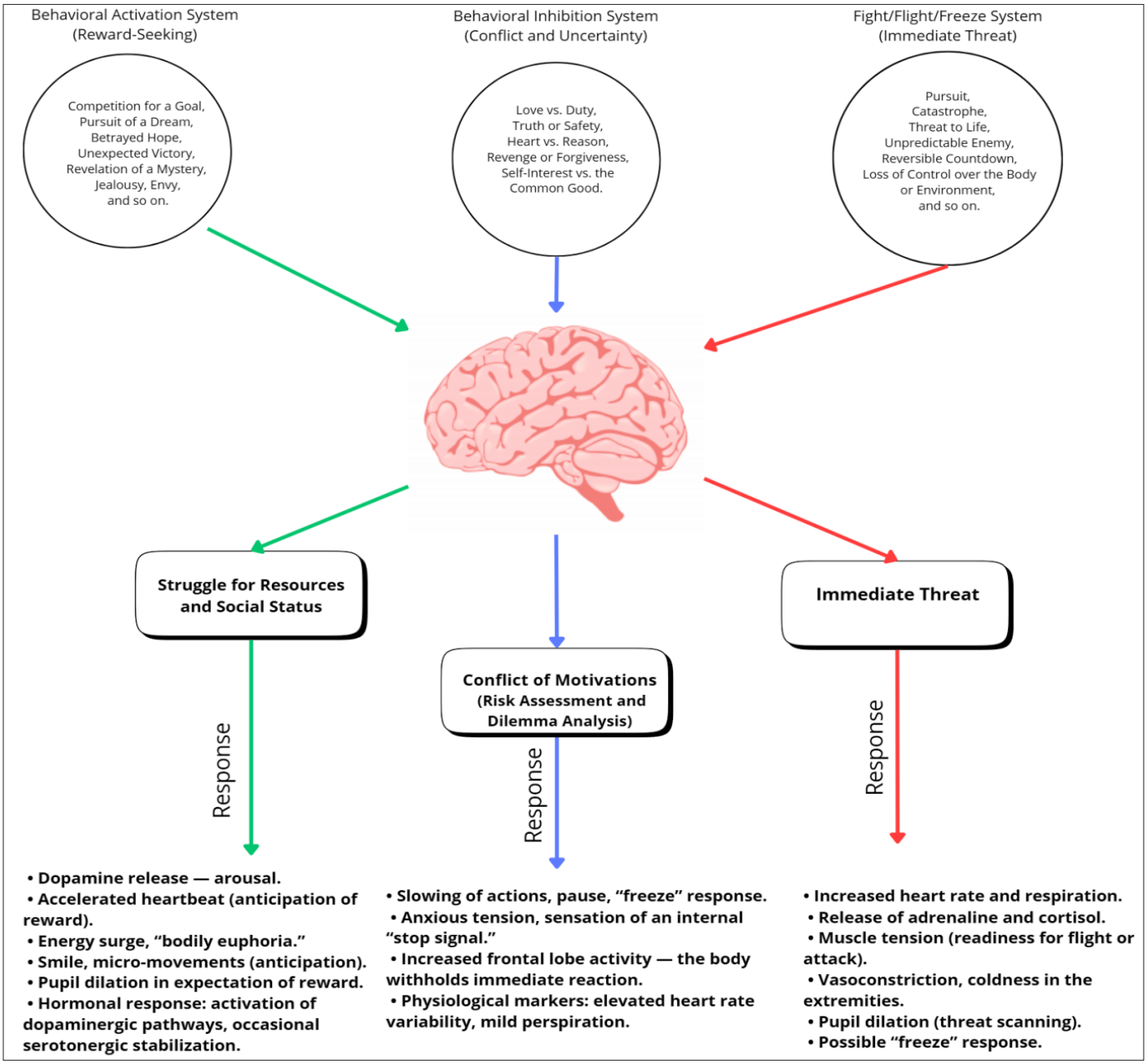

Figure 1. Neurobiological systems underlying dramatic tension: BAS (reward), BIS (conflict), and FFFS (threat).

DRAMATURGICAL REACTIONS AS MANIFESTATIONS OF BASIC INSTINCTS

Viewing the audience's response to dramaturgical techniques as the result of purely cultural conventions offers only a superficial explanation. Cultural forms do not exist in isolation—they evolve upon innate cognitive mechanisms. The theory of cultural evolution and dual inheritance emphasizes that biological predispositions define the boundaries of which cultural practices are retained and transmitted [5]. In other words, while narrative forms change, the underlying reactions remain the same: what once manifested as the pursuit of prey has transformed in modern society into the pursuit of professional status; the fear of expulsion from the tribe has evolved into the fear of social isolation or public humiliation.

Thus, cultural conventions can be understood as a "superstructure" built upon universal biological foundations. Dramaturgy operates precisely through these deep systems—the immediate threat response, the conflict of motivations, and the pursuit of reward—while modes of expression vary from one historical period to another.

However, for these mechanisms to become active within an artistic context, two conditions must be met.

1. Identification with the Protagonist

Empathic engagement is possible only when the viewer perceives the character as "one of their own"—an ally or member of the same social group. Neuroscientific research confirms that observing the emotions and actions of others activates the same neural networks involved in personal experience (the mirror neuron system, insular cortex, and amygdala) [6]. Moreover, the degree of activation depends

on social proximity: witnessing the pain of a close person elicits a stronger affective response than observing a stranger's suffering [7]. Therefore, an effective dramaturgical device must establish conditions for identification—moral legitimacy of the character, emotional appeal, and perceived similarity to the audience.

2. Novelty and Prediction Error

The second condition is the effect of novelty. The brain continuously predicts upcoming events, and the violation of these expectations—a prediction error—triggers heightened attention and emotional arousal [8]. Repeated stimuli quickly lose their impact through habituation [9]. This explains why predictable narrative patterns eventually fail to engage, whereas unexpected twists or original forms of presentation activate the dopaminergic reward system and evoke a powerful emotional response [10].

THREE MECHANISMS OF DRAMATIC TENSION

Let us now examine in detail the three evolutionarily conserved mechanisms underlying all forms of dramatic conflict: the immediate threat response (FFFS), the conflict of motivations (BIS), and the pursuit of reward (BAS). Their functioning explains why dramaturgy elicits emotional engagement in specific, predictable ways. Each of these mechanisms is a product of natural selection—originally formed to solve problems of survival and social interaction—and only later acquired cultural forms of expression.

1. Immediate Threat (FFFS — Fight/Flight/Freeze System)

This system governs rapid reactions to direct danger: a predator's attack, a sudden sound, or a threat of violence. Neurobiologically, it centers on the amygdala and its connections with the hypothalamus and brainstem defense circuits that trigger "fight, flight, or freeze" responses [11]. In cinema, these same mechanisms are activated by depictions of physical confrontation, pursuit, weapon threats, or public humiliation.

Physiologically, the body responds with increased heart rate, elevated cortisol levels, pupil dilation, and muscle tension [12]. This is why scenes of sudden danger produce an immediate bodily response in the viewer—the dramaturgical device activates a fundamental evolutionary defense system.

2. Conflict of Motivations (BIS — Behavioral Inhibition System)

The behavioral inhibition system is engaged when two opposing impulses collide—such as the desire to approach and the fear of punishment. Biologically, this mechanism is associated with the anterior cingulate cortex (ACC), hippocampus, and their interactions with the amygdala [13].

In dramaturgy, it manifests as a moral dilemma, an internal clash between love and duty, or a choice between equally painful outcomes. The brain "pauses" automatic action, producing anxiety and heightened attention to the resolution. Research shows that the ACC activates during cognitive conflict, intensifying tension and prompting reevaluation of behavioral strategies [14]. Thus, when viewers witness a character's hesitation, they themselves experience delayed reaction and anxious anticipation.

3. Pursuit of Reward (BAS — Behavioral Activation System)

This system evolved to motivate organisms toward obtaining resources—food, mates, or social status. Neurobiologically, it is linked to dopaminergic pathways (VTA → nucleus accumbens) responsible for anticipation and pleasure [10].

In dramaturgy, this mechanism is triggered by narratives of rivalry, jealousy, ambition, or betrayed hope. The strongest emotional effect arises when expectations are violated: a prediction error induces a dopamine surge, producing feelings of surprise, delight, or shock in the viewer [8,10]. This is why narrative twists and unexpected outcomes are so effective—they directly engage the biological reward system.

THE EVOLUTIONARY CONTEXT OF DRAMATURGY

When viewed through an evolutionary lens, the function of dramaturgy clearly extends beyond entertainment. Narrative—whether in cinema or literature—can be understood as a form of cognitive "simulation" that allows humans to rehearse responses to key adaptive scenarios: avoiding threats (FFFS), resolving motivational conflicts (BIS), and seeking or maintaining resources (BAS).

This idea aligns with hypotheses that frame art as a kind of "cultural training" for cognitive functions. Research shows that imagined scenarios activate the same neural networks as real actions [15]. Thus, watching a film can be seen as a safe rehearsal of potentially dangerous or resource-critical situations.

From an evolutionary standpoint, dramaturgy provides a form of collective "risk-free learning": viewers acquire emotional and cognitive experience without direct exposure to threat. This framework explains the universality of dramatic structures across cultures—they reflect adaptive mechanisms shared by all *Homo sapiens*.

AUDIENCE DIFFERENCES IN SENSITIVITY TO DRAMATURGICAL MECHANISMS

Although the core cognitive systems are universal, their activation varies depending on the viewer's age, social context, and psychological state.

Age Differences.

Adolescents exhibit heightened sensitivity to the BAS system: their dopaminergic sensitivity to novelty and reward cues is heightened, making genres with frequent rewards and unexpected plot twists particularly appealing [16]. Adult viewers, by contrast, are more often engaged by BIS-driven conflicts that require moral reflection and complex social decision-making.

Social Differences.

Individuals living under conditions of instability or threat (e.g., war, crisis) respond more strongly to FFFS mechanisms—scenes involving danger or catastrophe evoke more pronounced physiological reactions [17]. In contrast, in safe environments, audiences gravitate toward BAS-dominant genres such as comedies, romances, and adventure films.

Psychological State.

People with high anxiety levels show stronger activation of FFFS and BIS when viewing films featuring threats or dilemmas, as confirmed by fMRI and psychophysiological data [18]. This suggests that the perception of dramaturgy may also serve as a diagnostic tool for exploring individual differences in emotional processing.

Thus, universal biological mechanisms of dramatic tension manifest with varying intensity depending on audience characteristics. This explains why the same films evoke powerful emotional responses in some groups while leaving others largely unaffected.

CONCLUSION

Dramatic tension is grounded not in arbitrary cultural conventions but in universal cognitive systems established through evolution: the immediate threat system (FFFS), the conflict-of-motivations system (BIS), and the reward-seeking system (BAS). These three mechanisms form the core of audience responses, while the diversity of genres and narrative forms represents cultural variations in their activation.

The impact of dramaturgy depends on two key conditions: audience identification with the protagonist and the presence of novelty that disrupts prediction. The first ensures empathic engagement and activation of social instincts; the second prevents habituation and sustains the brain's predictive processes.

The practical value of the proposed model lies in its ability to conceptualize dramaturgical techniques as controllable stimuli that activate fundamental neurobiological systems. This opens the way for empirically grounded methodologies in screenwriting and directing, as well as for experimental research in cognitive science and neuroaesthetics.

Future research should aim to:

• Experimentally verify the functioning of the three systems within cinematic perception.

• Refine the cultural and genre-specific modifications of these universal responses.

• Develop applied tools for narrative analysis and design informed by neurobiology.

Ultimately, such integration of dramaturgy and cognitive biology could establish a unified research framework in which artistic practice and empirical science mutually enrich one another.

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