

FRAMING AND COMPOSITION: THE GEOMETRY OF EMOTIONS IN CINEMATOGRAPHY

OLUSHOLA AYO DONALDLOVE

Email:

officiallydbabalove@gmail.com

Tel: +2348036114634

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ABSTRACT

Cinematographers routinely describe their craft in emotional terms, yet scholarship on framing and composition rarely explains how a technical decision such as an aperture setting or an aspect ratio actually produces a feeling in an audience. Drawing on cognitive film theory, particularly the accounts of embodied perceptual response developed by Grodal (2009), Smith (2003), and Tan (1996), this paper asks three questions: how do compositional geometry and optical parameters function as emotional signals; whether these signals operate consistently across different film industries; and how the culturally specific visual grammars of Hollywood, Bollywood, and Nollywood cinema modify perceptual mechanisms that cognitive film theory treats as largely universal. Using a comparative case study method, the paper analyses seven films, *Blade Runner 2049*, *Her*, *The Revenant*, *Gully Boy*, *Lagaan*, *October 1*, and *The Milkmaid*, each chosen for a compositional strategy already identified in the cinematography literature. The analysis finds that the underlying perceptual mechanisms recur across all three industries, while the specific visual vocabulary used to activate them, colonial architecture in Nollywood, choreographed crowd geometry in Bollywood, minimalist symmetry in Hollywood, is shaped by each industry's production history. The paper argues that this combination of perceptual universality and culturally variable grammar is what makes cinematography legible as both geometric craft and emotional science.

Keywords:

Cinematography, Visual grammar, Cognitive film theory, Depth of field, Cross-cultural comparative analysis

1. Introduction: The Subtractive Art of Cinema

Where does a film actually begin? Not with the first line of dialogue, but with the drawing of a rectangle. Before any actor steps before the lens, a cinematographer has already made the most consequential decision of the production: what to show and what to remove. This act of subtraction, carving a coherent image out of the chaos of reality, is the true genesis of cinematic storytelling. The frame is not merely a border; it is an emotional proposition, a psychological contract between filmmaker and viewer that says, *look here, feel this, ignore the rest*.

Composition, the deliberate arrangement of elements inside that rectangle, determines whether an image whispers or shouts. Roger Deakins, one of the medium's most celebrated practitioners, has described his approach to the craft as fundamentally geometric, using light to build structure across the frame rather than simply to illuminate it (Deakins, 2018b). Nigerian cinematographer Yinka Edward pushes this further, describing cinematography as a discipline concerned with arranging visual truth rather than merely recording it (Edward, 2020, p. 46). Both positions point to the same claim: the camera does not simply record; it structures emotion through spatial logic.

Existing scholarship on cinematographic composition identifies visual patterns well but rarely explains the perceptual mechanisms that make them effective, and rarely tests whether the same geometric strategies carry the same emotional weight across cultural and industrial boundaries. That is the gap this study addresses through three questions: (1) How do formal compositional elements, position, line, shape, and aspect ratio, function as emotional cues according to cognitive film theory? (2) How does the mathematics of exposure translate technical precision into perceptible emotional tone? (3) Do these mechanisms operate uniformly across Hollywood, Bollywood, and Nollywood cinema, or does cultural context reshape how audiences read the same geometric signal? Answering these questions matters because cinematography training, particularly where formal film education remains unevenly resourced (Akande, 2022), tends to separate technical instruction from theoretical grounding.

2. Literature Review and Theoretical Framework

2.1 Cognitive Film Theory

Cognitive film theory grew out of a dissatisfaction, dating to the late 1980s, with the psychoanalytic and semiotic models that

had dominated film studies (Bordwell & Carroll, 1996). Cognitivist scholars such as Torben Grodal, Ed Tan, Greg Smith, and Carl Plantinga argued instead that film viewing is an active, embodied perceptual process governed by the same cognitive architecture that structures ordinary vision and emotion (Tan, 1996; Smith, 2003; Grodal, 2009). This paper adopts that tradition as its central lens because it offers a testable account of why particular formal choices, a low angle, a shallow depth of field, a converging line, produce particular emotional effects independent of the story being told.

Grodal's (2009) central claim is that film narrative engages a kind of embodied simulation, in which viewers unconsciously map spatial cues on screen onto their own bodily sense of balance, threat, and comfort. Smith (2003) extends this with an emotion system in which formal structure cues a limited set of primary emotional states that viewers elaborate as a story develops, while Tan (1996) frames film viewing as an emotion machine driven by continuous, low-level perceptual processing, exactly what cinematographers manipulate whenever they choose a lens or set an aperture. Plantinga's (2009) account of spectator emotion as a structured response further supports this paper's claim that a director of photography

is, consciously or not, engineering a sequence of perceptual triggers. This paper extends that literature by tying the perceptual account directly to the optical mathematics of exposure, a connection the theory gestures toward but rarely works through technically (Section 7).

2.2 The Frame as Psychological Territory

The human brain processes visual information hierarchically, registering position, scale, and balance before content. A subject at the geometric centre reads as stable and often isolated; shifted to the edge, the same subject suggests vulnerability or marginalisation (Zettl, 2013). A low-angle shot triggers associations with power; a high-angle shot evokes weakness; a Dutch angle signals disequilibrium. These are calibrated cognitive and affective cues, not random flourishes (Anderson, 1996, pp. 112-115).

2.3 Composition as Cultural Syntax

Hollywood's classical continuity system favours invisible composition, balanced frames and motivated movement that serve the story quietly (Prince, 2010). Nollywood, shaped by tight schedules and location-based production, developed an expressive realism that turns raw spatial constraints into loaded metaphor (Edward, 2020). Akande (2022)

frames the Nollywood camera as an instrument of philosophical world-building rather than a deficient imitation of Hollywood, and Ajiwe and Arinze-Umobi (2023) treat Nollywood's visual choices as a signifying system in their own right. Bollywood, meanwhile, treats the frame as a stage for collective energy, organising crowds into geometric patterns of celebration or conflict. The perceptual logic in Section 2.1 holds constant across all three; what changes is the visual material through which it is built.

3. Methodology

This study uses a comparative case study method suited to testing whether a perceptual mechanism holds constant across contexts. Seven films were purposively selected: *Blade Runner 2049* (2017), *Her* (2013), and *The Revenant* (2015) for Hollywood; *Gully Boy* (2019) and *Lagaan* (2001) for Bollywood; *October 1* (2014) and *The Milkmaid* (2020) for Nollywood, each chosen because published interviews or prior scholarship identify a dominant compositional strategy in the film. For each film, the analysis identifies the dominant device in a representative sequence, reads it against the cognitive film theory framework in Section 2.1 to state its predicted perceptual effect, and considers

whether the film's industrial and cultural context modifies that effect. This treats industry as the variable under test against cognitive theory's claim of perceptual universality. A limitation, discussed in Section 11, is that the aperture and lens values cited draw on published commentary rather than verified production logs in every case.

4. The Geometry of Affect: Lines, Shapes, and Balance

Lines pull the viewer's eye across the frame, and the more convergent they are, the stronger the psychological pull toward the vanishing point. In *The Revenant* (2015), Emmanuel Lubezki's natural lines, towering pines, river currents, mountain ridgelines, create an oppressive enclosure that mirrors Hugh Glass's psychological contraction toward survival (Lubezki, 2015). In *Gully Boy* (2019), diagonal staircases and crisscrossing wires suggest friction and aspiration; when Murad stands on a staircase bisecting the frame, the composition visualises his position between poverty and ambition. In *October 1* (2014), rigid colonial lines, door frames, window panes, prison bars, form a grid of historical entrapment rather than a path to freedom.

Shapes carry similar weight. An upright triangle conveys stability and collective strength; in *Lagaan* (2001), villagers assemble in triangular formations whose base spreads across the lower frame while the apex points toward defiance. An inverted triangle reads as precarious, as when *The Dark Knight* (2008) positions the Joker beneath expanding chaos. Frame position matters just as much: centre framing confronts and can isolate, as in *Her* (2013), where Theodore's solitude is amplified by perfect symmetry, while *The Milkmaid* (2020) uses off-centre framing and negative space to signify displaced identity.

5. Aspect Ratio and Depth of Field

Aspect ratio functions as an emotional container. Widescreen 2.39:1 evokes epic scale and isolation, as in *The Revenant*, where the frontier dwarfs the human figure, and in *Aníkúlápó* (2022), where it stages Yoruba landscapes within the watching presence of history. Standard 1.85:1 approximates ordinary vision and suits intimate, dialogue-driven scenes. Squarish ratios produce psychological contraction; Robert Eggers' *The Lighthouse* (2019) uses 1.19:1 to create maritime imprisonment, and interrogation scenes in *October 1* tighten toward narrower ratios as pressure mounts.

Depth of field works the same territory differently. A shallow depth of field isolates a subject from its environment, the grammar of romance and confession, while a deep depth of field, keeping foreground and background equally sharp, evokes documentary realism or, in violent scenes, sensory overload. Neither effect is achieved by intuition alone; both are governed by the optical mathematics addressed next.

6. The Mathematics of Exposure: F-Stops, T-Stops, and Emotional Increment

Cinematographers often speak of "feeling" a lens, yet that feeling is built on unyielding mathematical foundations. The f-stop scale, which appears esoteric to outsiders, is in fact a rigorous geometric system that translates optical physics into emotional texture.

6.1 The F-Stop Formula

The f-number (N) is defined as the ratio of the lens's focal length to the diameter of its aperture opening:

$$\text{f-number (N)} = \text{focal length (f)} \div \text{aperture diameter (D)}$$

Example: a 50mm lens with an aperture diameter of 25mm produces an f-number of $50 \div 25 = f/2$.

This ratio reveals why larger apertures (smaller f-numbers) produce greater light transmission, shallower depth of field, softer and more abstract backgrounds, and enhanced emotional intimacy. Smaller apertures (larger f-numbers such as f/11 or f/16) yield the opposite: reduced light transmission, deeper depth of field, sharper environmental detail, and a more objective, detached aesthetic. The choice of f/1.4 versus f/16 is therefore never merely technical; it is a decision about whether a scene should feel like a whispered secret or a witnessed event.

6.2 The Exposure Stop System

Each full stop represents a doubling or halving of light intensity, following a geometric progression based on the square root of 2 (approximately 1.414). The standard f-stop sequence runs f/1.4, f/2.0, f/2.8, f/4.0, f/5.6, f/8.0, f/11, f/16. Moving one step along this sequence toward a larger number halves the light reaching the sensor; moving toward a smaller number doubles it. These stops function as emotional increments. A cinematographer intentionally modulates whether a moment feels soft or sharp, intimate or detached, dreamlike or hyperreal by navigating this geometric scale.

Practical emotional applications: f/1.4 to f/2.0 tends toward romance, vulnerability,

subjective memory, and confession; f/4.0 to f/5.6 toward balanced drama, dialogue, and environmental portraiture; f/11 to f/16 toward crowd scenes, action sequences, documentary observation, and epic landscapes.

6.3 The T-Stop (Transmission Stop)

While f-stops measure theoretical aperture geometry, T-stops measure the light that actually reaches the sensor, accounting for transmission loss through glass elements and lens coatings. The relationship is expressed as $T\text{-stop} = f\text{-number} \div \sqrt{\tau}$, where τ is the lens's transmission efficiency expressed as a decimal. For example, a lens set to f/2.0 with a transmission efficiency of 0.81 (81 percent) yields a T-stop of 2.0 divided by the square root of 0.81, which is 2.0 divided by 0.9, or approximately T/2.2.

Cinematographers rely on T-stops for absolute exposure accuracy, particularly when cutting between lenses or matching footage across camera systems. This precision maintains emotional consistency; a shift in exposure between cuts would rupture the viewer's immersion, drawing attention to the apparatus rather than the feeling (Murch, 2001).

7. Colour and Composition

If lines and ratios provide the skeleton of cinematic emotion, colour provides the skin. The arrangement of colour planes within the frame creates harmonic or discordant relationships that prime the viewer's nervous system before a single word is spoken.

Colour arranges the frame's chromatic territories before a word is spoken. *Blade Runner 2049* (2017) opposes the suffocating orange of Las Vegas dust against the cool cyan of Joi's digital presence, visualising a tension between despair and synthetic hope. *The Milkmaid* shifts between desaturated war tones and the vibrant geometry of Hausa textiles, mapping the protagonist's conflict between cultural identity and insurgent violence. *Gully Boy* punctuates grey slum textures with turquoise and magenta accents that read as visual escape routes, suggesting aspiration within economic constraint.

8. Aspect Ratio: The Emotional Container

The aspect ratio, the comparative relationship between width and height, functions as an emotional container, determining how much air the characters have to breathe.

8.1 Widescreen (2.39:1)

The anamorphic widescreen format generates expansive horizontal space that evokes epic

scale, existential loneliness, or the overwhelming indifference of landscape. In *The Revenant*, the width makes the human figure small against the frontier, emphasising physical and psychological isolation. In *Aníkúlápó* (2022), the widescreen frame captures the sweep of Yoruba landscapes, allowing the horizontal layering of ancestral architecture, natural terrain, and human drama to coexist within a single gaze. The ratio suggests that individual actions unfold within the watching presence of history.

8.2 Standard Formats (1.85:1)

This ratio approximates the human field of view without extreme distortion, offering a balanced proportion between figure and environment. It is the workhorse of intimate drama and dialogue-driven scenes, creating proximity without claustrophobia.

8.3 Square and Near-Square (1.33:1 or 1.19:1)

The resurgence of squarish formats in contemporary cinema produces immediate psychological contraction. The reduced horizontal space forces vertical emphasis, prioritising faces and bodies over environments. Robert Eggers' *The Lighthouse* (2019) uses a 1.19:1 ratio to create maritime imprisonment. The frame is

too narrow to contain the ocean or sky; the lighthouse dominates the vertical axis, and the characters are trapped within its cylindrical geometry. Similarly, interrogation sequences in *October 1* tighten toward narrower ratios, the frame itself constricting as psychological pressure mounts.

9. Findings: Framing Across Three Cinemas

The case analyses allow a direct answer to the third research question posed in Section 1: does the perceptual logic described by cognitive film theory hold constant across Hollywood, Bollywood, and Nollywood cinema, or does cultural context reshape it? The short answer, developed case by case below, is that the underlying perceptual mechanism holds while its vocabulary changes.

9.1 Nollywood: History, Trauma, and Landscape

In *October 1* (Afolayan, 2014), the cinematography weaponises colonial architecture. Police stations and government buildings provide rigid vertical and horizontal lines that trap characters within the grid of imperial bureaucracy. The symmetry is oppressive because it is imposed, not organic.

The Milkmaid (2020) shifts to emotional portraiture. Tight facial framing and shallow depth of field (f/2.0 or wider) isolate the protagonist's trauma against the blurred suggestion of insurgent violence. The frame becomes a fragile sanctuary.

Aníkúlápó (2022) uses the 2.39:1 widescreen ratio to stage painterly Yoruba landscapes. The horizontal sweep allows for compositional layering that suggests ancestral depth, while a chromatic geometry of terracotta, deep green, and indigo establishes a palette distinct from Western fantasy conventions.

9.2 Hollywood: Isolation and Existential Scale

Her (2013) employs minimalist geometry and centre framing to evoke technological loneliness. The lines are too clean, the balance too perfect; the futuristic world has been geometrically optimised, leaving no room for human messiness.

Blade Runner 2049 oscillates between extremes: deep-focus wide shots (f/11 to f/16) that render the monumental scale of decaying infrastructure, and shallow-focus close-ups (f/1.4) that isolate K's face against vast emptiness. This geometric oscillation

between the monumental and the intimate visualises the post-human condition.

9.3 Bollywood: Social Kinetics and Crowded Frames

Gully Boy rejects spatial isolation in favour of crowded composition. Deep focus keeps multiple planes of Dharavi life simultaneously sharp, the visual density mirroring economic pressure and communal resilience.

Raazi (2018) turns domestic interiors into espionage geometries. The protagonist moves through symmetrical Pakistani households where every doorway and window is balanced, suggesting that the architecture of the enemy's home has become a trap of deceptive safety.

9.4 Cross-Case Synthesis

Read across the three industries, a consistent pattern emerges. In every case, filmmakers use geometry to either confirm or violate a viewer's expectation of stability, the mechanism Grodal (2009) and Smith (2003) describe as embodied response to spatial cues. What differs is the cultural material used to build that geometry: colonial architecture supplies the confining lines in *October 1*, domestic middle-class interiors supply them in *Raazi*, and minimalist

production design supplies them in *Her*. This supports the paper's central claim, that cinematography operates through a broadly consistent perceptual grammar articulated in locally specific visual vocabulary, and it directly answers the gap identified in Section 1: existing literature describes these vocabularies well but rarely explains, in cognitive or optical terms, why they work.

10. Discussion

This analysis has limits worth stating plainly. Cognitive film theory's claim of perceptual universality is itself contested; reception scholars argue that trained viewing habits, not only innate architecture, shape how audiences read composition, so the cross-cultural consistency observed here should be read as broadly supportive rather than conclusive. The reliance on published interviews and secondary technical commentary, rather than verified production logs throughout, means the f-stop and lens values cited function as illustrative anchors for the underlying optical logic rather than forensic production records. And seven core films, however clearly chosen, cannot support statistical claims about entire national cinemas; each industry contains far more internal variation than a handful of case studies can capture. Future work could test

this framework against a larger sample or through empirical methods such as eye-tracking. None of this undermines the central claim, but it does mean the vocabulary developed here should be read as a starting point for measurement, not a substitute for it.

11. Conclusion

This paper set out to show how compositional geometry and the mathematics of exposure function as emotional cues, and whether that function holds across Hollywood, Bollywood, and Nollywood cinema. The case analyses suggest that it largely does, with cultural context supplying the specific visual material through which a broadly shared perceptual grammar is expressed. Framing and composition are the invisible scaffolding of cinematic emotion: every line, every ratio, every stop of light is a choice about how a viewer should feel. By tying the vocabulary of cognitive film theory to the mathematics of exposure, and testing both against films from three industries, this paper offers a more precise account of how a rectangle of light becomes a rectangle of feeling, a discipline that is, at its best, both geometry and poetry.

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