



Adriano D'Aloia

Neurofilmology of the Moving Image

Gravity and Vertigo in Contemporary Cinema

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To Paolo Giuseppe



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Bergamo, 19 March 2021

As I submitted the final version of the manuscript of this book to Amsterdam University Press I realized it would be published exactly on the twentieth anniversary of the September 11 terrorist attacks of 2001. At that time I had just entered my twenties as a student in the early years of his academic path. However dramatic those events were, 9/11 was undoubtedly *that* moment that impacted on the real *and* imaginary world in the life of a young man. Years away, I can now clearly see in the rear-view mirror how that turning point has continued—more or less subtly—to produce its long-lasting effects on my scientific attitude. The journey through the cinematic forms of *vertiginous* experiences that this book offers is indirectly indebted to an awareness of the *embodied symbolic* power of visual media I learnt on that occasion. Today, the 2020-2021 global Covid-19 pandemic seems to be *that* moment for all those students currently in their twenties. I sincerely hope that the dramatic oddity of these times will turn into a fruitful awareness for them too.

11 September 2021



I Vertigo

Towards a Neurofilmology

Abstract

The chapter 'Vertigo. Towards a Neurofilmology' offers an introduction to the book's contents and methods. The implementation of psychology of perception, philosophy of mind, and suggestions from cognitive neuroscience (in particular the role of 'mirror neurons' and the hypothesis of 'embodied simulation') has the capability to renew contemporary film theory and to reduce the distance between competing approaches (i.e. cognitivist and phenomenological film studies). 'Neurofilmology' adopts an enactive and embodied approach to cognition and provides interpretative tools for the exploration of contemporary cinema. Through a series of recurrent 'aerial motifs' in which the film character loses his/her equilibrium—acrobatics, fall, impact, overturning, and drift—the cinema offers an intense motor and emotional experience that puts the spectator's somatosensory perception in tension. At the same time, it provides compensation by adopting embodied forms of regulation of stimuli and a dynamic restoration of gravity and orientation (the so called 'disembodying-reembodying' dynamic).

Keywords: Neurofilmology, Embodied simulation, Mirror neurons, Spectator-as-organism, Enaction, Embodied cognition

While examining the dream of flight, we will find still more evidence that a psychology of the imagination cannot be developed using *static forms*. It must be based on forms that are in the process of being deformed, and a great deal of importance must be placed on the dynamic principles of deformation. The psychology of air is the least 'atomic' of the four psychologies that treat material imagination. It is essentially vectorial. Every aerial image is essentially a *future* with a vector for breaking into flight. If there is a dream that is capable of showing the vectorial nature of the psyche, it is certainly the *dream of flight*. The reason is based not so much on its imagined movement as on its inner substantial nature.

—Gaston Bachelard, *Air and Dreams* 1943 (1988, 21)

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Our own body is in the world as the heart is in the organism: it keeps the visible spectacle constantly alive, it breathes life into it and sustains it inwardly, and with it forms a system.

—Maurice Merleau-Ponty, *Phenomenology of Perception* 1945 (2002, 235)

Tension in the air

Shortly before the enigmatic finale of *Inception* (Nolan 2010), the moment arrives for the members of the idea-implanting team led by Dom Cobb to climb back up the progressive levels of dreams into which they have entered. The only way that the dreamers can be successfully awakened is through the synchronization of a series of ‘kicks’. A kick consists of inducing a sensation of falling in the dreamers, a disturbance of their sense of balance that causes them to wake up. In the fourth and deepest level of dream the characters throw themselves out of a window and into the void. In the third level, the fall is brought about by the explosion and resulting collapse of the entire building the dreamers are occupying. In the second level, which unfolds in a zero-gravity setting, the floating bodies of the sleeping characters are shoved into an elevator before being flung upwards by an explosive charge, which artificially generates gravity and results in the kick being felt when the elevator’s movement is abruptly halted. In the first and shallowest level, the kick corresponds to the moment when the van transporting the dreamers hits the surface of the river. Jumps into the void, falling down, floating in the absence of gravity, and violent impacts: taken in all of its variations, *Inception*’s synchronized kick is a catalogue of *corporeal imbalances*—physical states in which, in order to climb up the levels of consciousness, the dreamers voluntarily seek the sensation of dizziness.

More than a simple narrative device that is strategically used to resolve the complex asynchrony that characterizes *Inception* (and almost all of Nolan’s filmography, as well as the so-called ‘puzzle film’ genre), the series of synchronized kicks and states of imbalance signals a more general tendency in contemporary narrative cinema, which is the fundamental issue dealt with by this book: the rise of a new model of spectatorship based on a pronounced involvement of *somatosensory perception*. Along (and only apparently in conflict) with an increasingly demanding mental effort to decipher the complexity of narration and understand the *sense* of the story, a rich array of *senses* is engaged to construct a new form of interaction between the *system of bodies* that inhabits the film experience, namely



the spectator's, the character's, and the film's bodies. Far beyond the mere reception of visual and auditory stimuli, and not limited to synaesthesia, contemporary spectatorship involves forms of somatosensory perception such as proprioception (the sense of one's own body position), kinesthesia (the sense of self-movement), and equilibrioception (the sense of balance). This extended sensoriality concerns the relationship between the internal and the external environment of the spectator, one who is conceived as a living organism and who is located in an experiential space traversed by an energetic flow generated by the encounter with both the character and the film. In some precise circumstances, this encounter is destabilizing because it perturbs physical and psychical equilibrium, triggers a shock interruption in the ordinary flow of perception, and not only evokes but also provokes defamiliarization.

This is, however, only one side of the coin. The opposite side is a corresponding dynamic aimed at rebalancing and restoring the lost equilibrium, a sort of homeostatic regulation that reduces excessive stimuli and re-establishes those conditions required for a full comprehension and interiorization of the experience. What is really new is the form *comprehension*: rather than a purely mental understating, contemporary cinema offers opportunities for a bodily and immediate *grasping*, a sort of 'mind gesture' or 'thought performance' in which mind and body are not dichotomised, or in which 'high-level' cognition is the sole origin of all experience. Perception, cognition, emotion, and action are not distinct and independent layers that function or that can be observed separately; rather, they are inextricable components—intimately dependent and mutually implicated—of a single experience. To quote Nolan's latest work *Tenet* (2020): 'Don't try to understand it, feel it', as the protagonist is advised when he needs to learn how the reversed and chronologically palindromic world works and how to physically move into that world.

As I will discuss in this book, the excess of stimulation and its regulation are specific characteristics of a series of recurrent themes in Western cinema after September 9, 2001 (but which can be traced back to the last forty years). In pivotal scenes of these films, the main characters walk on a wire, fall down, hit the ground, turn upside down, or float in the void: *acrobatics*, *fall*, *impact*, *overturning*, and *drift* are the five motifs that the following chapters deal with. I have chosen the word 'motif' not only to identify a predominant feature or element that recurs often in contemporary cinema, as the term is intended in the history of art, in music, or in narrative composition, but also to establish a connection between such features and the Late Latin etymology of the word (*motivus*), which emphasizes movement, mutability,

return, and dynamism. The Latin *movere* ('to move') suggests a central argument of this book, namely the fact that a film is comprehended and experienced through the sensorimotor activity of its spectator.

The five tensive motifs do not, of course, cover the totality of possibilities, nor is there any presumption of completeness behind the choice of these motifs over that of others. It is nonetheless true that these motifs were not given a priori, but rather have emerged from the analysis of key *tense* sequences from a wide sample of both 'mainstream' and *auteur* films (or, rather, Hollywoodian *auteur* films that sparked critics' interest and obtained success at the box office). By necessity, only a few cases, albeit significant ones, are explicitly cited and analysed.

Although different in many respects, these five motifs hold two fundamental aspects in common. The first is the element that constitutes the nature of the environment in which the movement takes place: air. The motifs represent different declensions and variations of the movement of the body in the aerial space: acrobatic stunts, precipitous climbs, plunges, attempts at flight, revolutions, and floating in the void. The second is the force that generates the tension that is perceived by both the character and the spectator: gravity. The specificity of the motifs resides in the nature of the forces at work within an aerial space: attractive or propulsive, vertical or horizontal, which more or less pronouncedly influencing the movement of the body in space, its expressivity, and its empathetic potential. In each case the force of gravity, that is to say the force that *directs* the movement and posture of the bodies, determines their speed and direction as a function of their weight and altitude. Taking this conception of vector as intentional force, I will consider *tension* as the structuring principle of an environment that allows for a shared experience, a space in which 'fictional' forces emerge of the surface of the screen and resonate in the spectator's physical and psychic environment. Because of their capacity to elicit *tension* (in a multiplicity of meanings that I will discuss later), I call these cinematic *topoi* 'tensive motifs'.

The spectator-as-organism

How then can the spectator experience the 'kick'? How can he share the characters' physical and psychical imbalance? How can the cinematic representation alone evoke the response of the spectator's somatosensory system? How does the spectator take part *corporeally* in the actions, motivations, and emotions of the apparently *incorporeal* cinematic bodies?



How can he find a place in the fictional spatial environment in which the characters move and act? These variations and progressive extensions of the same fundamental question should be addressed by setting up a theoretical platform capable of holding together a wide range of psychological and physiological phenomena and dynamics. In particular, interrogating the involvement of somatosensory perception and the nervous system as an innovative and specific aspect of the contemporary film experience requires conceptual tools and analytical methods that are only partially already available. Relying on the notion of *embodied cognition* and, more broadly to the paradigm of *enaction*, this book aims to fill this gap.

Since the late 1980s, modern film theory has produced accurate models for the analysis of the spectator's involvement. These models have in common a dissatisfaction with and reaction to the ideological viewpoint of the dominant film theories in the 1970s—psychoanalytical semiotics in particular—but differ in the epistemological paradigms they draw on. On the one hand, cognitivist film theory launched a project of 'rationalization' of the film experience guided by the premises of analytic philosophy. Scholars such as David Bordwell (1985; 1989), Noël Carroll (1988; 1990), Edward Branigan (1992) and others proposed to adopt and progressively developed a 'mentalist' approach that sees the human mind as the engine of the film spectator's response. Ted Nannicelli and Paul Taberham (2014) identify the main characteristics of the cognitivist approach as follows:

- (1) a dedication to the highest standards of reasoning and evidence in film and media studies and other fields (including, but not limited to, empirical data from the natural sciences);
- (2) a commitment to stringent inter-theoretical criticism and debate;
- (3) a general focus on the mental activity of viewers as the central (but not the only) object of inquiry; and
- (4) an acceptance of a naturalistic perspective, broadly construed (4).

Initially focused on attention, learning, memory, problem-solving, and perception as cognitive processes functional to narrative comprehension, this approach has gradually moved its attention from 'cold' cognition (information-driven inferences) to 'hot' cognition, which gives centrality to affect-driven mental processes (Smith 1995; Grodal 1997; Tan 1999; Plantinga & Smith 1999). However, as I will discuss in the next chapter in regard to the notion of empathy, even in this second age of the history of cognitive film studies, and even if this approach emerges as a reaction to the impalpable subjectivity of psychoanalytical semiology, the physical body remains an

abstract object, not involved as a site of subjectivity and as the very means of the meaning-making process.

Conversely, another pathway of the reaction to semio-psychoanalysis puts the concrete and sentient body of the spectator and the reflexivity of conscious experience at the very heart of its endeavour. Opposed to ocularcentric, disembodied, and abstract spectator-film relationships, this approach, launched and led by Vivian Sobchack (cf. 1992), revolves around the idea that the spectator is addressed not simply through visual and mental processes, but also viscerally and physically, and that the form by which the spectator experiences the film is '*without a thought*' (Sobchack 2004, 64), through the 'sensemaking' capacity of the film. Sobchack's proposal is inspired by Maurice Merleau-Ponty's (1964; 2002) *Phenomenology of Perception* and in particular by the idea that in our engagement with the world sensorial processes precedes reasoning. The French philosopher already showed a direct interest in the filmic experience mid-way through the 1940s, examining it through the prism of Gestalt psychology in his lecture 'Film and the New Psychology' (Merleau-Ponty 1968). According to Merleau-Ponty, the meaning of a film does not emerge only from narration and dialogue, but also and primarily from the perception of the behaviour of the camera and the characters. Cinema is a phenomenological art capable of demonstrating the union between mind and body, between mind and world, and the expression of one in the other. In Merleau-Ponty's chiastic perspective the perceiver is never separate from the object of perception and perception is always an embodied experience that involves the perceiver's whole body, not just their sight. This means that the relationship between the sentient subject and the perceived world, between the spectator and the film, takes shape only through the body.

It is important to clarify that by body Merleau-Ponty (like Sobchack as well as I in this book) does not mean the physiological body as an object, but rather the 'lived body'. Whereas the former is the objective body that can be observed and analysed anatomically, as well as dissected into parts, each of which are responsible for specific function, the lived body is the body in the act of perceiving or experiencing the world, one which cannot be localized in a distinct function, 'since each region plays a role only in the context of a global activity' (Merleau-Ponty 1967, 207). As Shaun Gallagher (1986) summarizes, '[i]f the objective body is that which can be perceived as an object, the lived body is that non-object involved in the perceptual process' (140). These are not two separate bodies, but one and the same; the difference is not ontological, but perceptual. In Merleau-Ponty's (2002) words, 'the objective body is not the true version of the phenomenal body,



that is, the true version of the body that we live; it is indeed no more than the latter's impoverished image' (501). Rather than taking the standpoint of objective science, for which the lived body derives from the physiological body, and that of philosophy, according to which the lived body is prior and the physiological body derivative, the Merleau-Pontean perspective maintains that they are not distinguishable: physiological processes are lived (brain lesions, for example, are a disturbance of the lived body) and the lived body is physiological (when I perform an action, the body spontaneously organizes itself physiologically).

Importing the notion of lived body into her theoretical framework, Sobchack (1992) describes the film experience as the result of the sensorimotor coupling of the film's and the spectator's bodies, which are no longer conceived of as, respectively, an invisible and passive viewing subject and an equally invisible and inert entity. Rather, both are perceiving and expressive of being-in-the-world, and dynamically contribute to the general and particular meaning of the audio-visual experience. Cinema uses the *modalities of embodied existence* (vision, hearing, physical, and reflexive moment) and the *structures of direct experience* (the centrality of the body in respect to the subjective world) as the substance and structure of its own 'bodily language' (Sobchack 1992, 4-5). Like no other medium, the film not only represents but also *presents* acts of vision, listening, and movement as originary structures of existence (Sobchack 2004, 63). In Sobchack's (1992) view, not only the spectator but also the film has a body, in the sense that, although it uses linguistic and technical means, it has its own capability to express vital movements in tactile, muscular, and kinetic terms. As she concludes, '[i]ndeed, it is this mutual capacity for and possession of experience through common structures of embodied existence, through similar modes of being-in-the-world, that provide the *intersubjective* basis of objective communication' (5).

The importance and at the same time the criticality of Sobchack arduous proposal, which is indebted to Merleau-Ponty's notion of reversibility of sight (viewing-viewed) and touch (touching-touched), has to be underlined. In her own words:

It is the expressed bodily and intentional motility of the film's viewing-view that enables us as embodied and intentional spectators to understand the visual presence of the film's body to the viewed-view we see as visibly present. We understand that world we see projected before and for us as present *to* and *for* (not merely *in*) an embodied and conscious subject other than ourselves. [...] We recognize the moving picture as the work

of an anonymous and sign-producing bodysubject intentionally marking visible choices with the very behavior of its bodily being. However, these choices are not initiated by the movement of *our* bodies or *our* intending consciousness. They are seen and visible as the visual and physical choices of some body *other* than ourselves, some body that possesses the vision more intimately than we do, some body for whom it counts as 'mine.' That some body is the film's body, and, however anonymously, our bodies experience it as a signifying presence in the film experience (277-278).

In this sense, for example, a camera movement is not only a mechanical objectual tool of visual and kinetic perception, but the manifestation of 'a subject that sees and moves and expresses perception. It participates in the consciousness of its own animate, intentional, and embodied existence in the world' (Sobchack 1982, 327). We do not only perceive through technologies of filmmaking, but also *along with* the camera, the projector, the microphone etc., which are the organs of a very special kind of subjectivity. As Sobchack writes, in fact, 'the machine is incorporated into the human intentional act of perceiving the world' (Sobchack 1992, 184).

Although in radically different and alternative modes, both cognitivism and phenomenology of film contribute to illuminating the ways in which the spectator as a conscious subject relates to both the cinematic characters and the film as a communicative entity. However, their opposing theoretical genealogies and divergent paths led to mutually exclusive models of spectatorship. For cognitivists, the spectator performs information-driven mental processes aimed at narrative comprehension, as well as affect-driven mental processes aimed at understanding characters; for phenomenologists, the spectator is a subject that perceives synesthetically and cenesthetically and that internally coordinates his/her movements and sensoriality with those of the film, conceived as a pseudo-body that, although ontologically different from that of human beings, is capable of sensing and moving. While cognitivism entails a naturalistic theoretical approach and adopts empirically grounded methods aiming to *explain* the causal processes of the human experience, phenomenology privileges a subjectivistic first-person approach suited for the *description* of the aesthetic experience.

Although it offers a simplification of more articulated perspectives (cf. Sinnerbrink 2019), this dichotomization suggests the risk of perpetuating a sort of Cartesian dualism in film studies. Upon a deeper look, neither the cognitivist nor the phenomenological approach is dualistic: in different ways, they both see the mind and the body as part of a whole. However, they grant a precedence to one over the other. For cognitivists, the mediation

of the mind prevails over the immediacy of bodily multisensory perception, and vice versa for phenomenologists. Unfortunately, both pay little attention to the interaction between the system of bodies involved in the film experience—the character's, the spectator's, and the film's—and the *systemic environment* resulting from the merging of fictional, empirical, and psychological space, in which they jointly move, act, or are simply immersed.

Against the risk of an insidious dualism and, at the same time, in an attempt to overcome the rigid opposition and irreconcilability of seeming competition between an empirical/explanatory method and a descriptive/experiential perspective, the theoretical stance adopted in this book assumes the mutual implication or unity of body and mind and the interdependence of such a *bodymind* with the experiential environment as the fundamental structure of the film experience.

As Robert Sinnerbrink (2019) remarks, and as I will discuss later in regard to the role of the study of the brain as a terrain of encounter between the mind-focused and the body-focused approaches,

the two perspectives still remain frequently estranged from each other. Or where there is no theoretical conflict, they can remain confined within well-defined disciplinary and institutional boundaries, thus rendering the possibility of a synthetic or pluralistic approach more of a promissory note than a live possibility (1-2).

In advocating a pluralistic and 'dialectical synthetic' approach to film inquiry, Sinnerbrink sees a space for a potentially productive encounter between 'thick' phenomenological description of the cinematic aesthetic experience and empirically grounded explanatory accounts of the processes behind the spectator's cognitive activity. The combination and cooperation of perspectives that privilege, alternatively, the subjective (and empirically ungraspable) or the objective (and philosophically inconsistent) dimensions of the affective, moral, and aesthetic experience, would be extremely productive in the broader epistemological (and only apparently oxymoronic) framework of *embodied cognition*. As Sinnerbrink underlines,

Both phenomenologists and cognitivists agree on the importance of embodied experience, contextualized or 'embedded' in sociocultural niches, mediated via technological prosthetic devices (extended), and with an emphasis on activity, interactivity, and modes of communicative and pragmatic exchange (enactive) (4).



The so-called 4Es paradigm (embodied, embedded, extended, enactive) posits that cognition and meaning emerge through the interplay of a living organism and its environment, and that perception and action (or sensory inputs and motor processes) are fundamentally inseparable. I believe, with Sinnerbrink, that this paradigm offers the opportunity to overcome a 'false and misleading dichotomy' (4).

Accordingly, in this book I take inspiration from the enactive and embodied approach to human cognition and rather than opposing the cognitivist *spectator-as-mind* and the phenomenologist *spectator-as-body* approaches, I propose to conceive of the spectator as a living and sensing organism whose experience dynamically emerges from (instead of being pre-determined by) simultaneous perceptual, cognitive, affective and sensorimotor processes, all of which are dependent on the interaction with the biological, spatial, psychological, cultural and social environment in which the experience takes place. This approach will make it possible to describe the five tensive motifs as forms of complex modulation of the perceptual, affective and cognitive activity that characterizes the interaction between the *spectator-as-organism* (D'Aloia & Eugeni 2014) and his/her experiential cinematic environment. The tensive motifs, in fact, can be thought—or, rather, directly experienced—as modes of production, maintenance, and dissipation of that sensorimotor, attentional, and emotional energy that makes the cinema an experience that reveals those tensions that presently inhabit our subjectivity and society.

Cinematic neurons

Without a doubt, cognitive neuroscience is central to the process of the epistemological and methodological reformulation of film studies. As far as the enactive and embodied approach to the film experience is concerned, the relatively recent discovery of the so called 'visuomotor' or 'bimodal' neurons is particularly relevant. Beginning in the mid-1990s, a group of Italian neurophysiologists of the University of Parma led by Giacomo Rizzolatti explored several areas of macaque brains with the aid of functional neuroimaging techniques. Rizzolatti's group discovered a set of sensorimotor neurons in a sector of the monkey's premotor cortex that fire both when a subject executes an object-directed action and when the subject observes another subject executing the action, without entailing any overt motor activation on the part of the observing subject (di Pellegrino et al. 1992; Rizzolatti et al. 1996; Gallese et al. 1996; Rizzolatti, Fogassi & Gallese 2001; Rizzolatti & Craighero 2004). Neuroimaging studies indicate the existence of neurons in

