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GESTALT FILMOLOGY
INSIGHTS ON FORM AND EMBODIMENT IN THE FILM EXPERIENCE

EDITED BY ADRIANO D'ALOIA AND IAN VERSTEGEN

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BEYOND CINEMA

GESTALT FILMOLOGY. INSIGHTS ON FORM AND EMBODIMENT IN THE FILM EXPERIENCE

The Future of the Past. Arnheim and Film Today

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ARNHEIM, AGAIN

Exactly fifteen years ago, on June 9, 2007, psychologist of art and media theorist Rudolf Arnheim died in Ann Arbor, Michigan, one month before his 103rd birthday (he was born in Berlin on July 15, 1904). He devoted his entire life to the study of the arts — starting with film in the 1920s — and is the author of *Art and Visual Perception and Visual Thinking* and many other masterpieces that continue to be essential points of reference for generations of students, scholars and professionals in the fields of analysis, criticism and the practice of the visual arts[2]. Arnheim is also considered one of the classic film theorists for his application of the assumptions of Gestalt psychology to film analysis presented for the first time 90 years ago in his essay *Film als Kunst*.[3] His radical positions have been criticized in various eras and intellectual spheres, but they are in some respects still valid and are often unwittingly adopted by critics and scholars. As the essays of this special issue demonstrate, a recontextualization and revitalization of Arnheim's film theory and, more generally, a Gestalt approach to the film experience, can be still productive today.[4]

This task has been made easier in the past few years due to a series of publications that have clarified aspects of Arnheim's theoretical project or else further specified some of his philosophical commitments.[5] For years in film studies there was a standoff between psychoanalytic derived and more cognitive approaches. More recently, we have learned to nuance how to blend an approach that is not afraid of experimentation or quantification with one that can address the perennial problems of more speculative film studies like spectatorship, the gaze, enunciation and embodiment.[6] The latter, the turn toward embodied approaches to the filmic experience, has largely made this new idea possible. Yet many writers would still be hesitant that there is contained in Arnheim's work or Gestalt theory more largely the pieces of a kind of theory of Gestalt embodiment. In some ways, such a theory would clarify some of the more untenable elements of embodiment theories which in general have been

adopted as specular reversals of cognitive theory.[7] The body is meant to erase representation, when properly elaborated a Gestalt embodiment might show how the body and its role in filmic experience is still self-conscious because even awareness of the body is a form of consciousness.

The present special issue of *Cinéma & Cie* goes deeper into some of Arnheim's theories, broadening the platform of his work into Gestalt psychology more generally, and addressing question of fit between older theories and newer tendencies.

THE PARTS AND THE WHOLE

A multifaceted and passionate thinker, throughout the twentieth century Arnheim turned his interest to a variety of media and arts — from cinema to photography, from radio to television, from painting to sculpture, from architecture to video art —, applying with rigor and extending with creativity the assumptions of the Gestalt psychology method he learned in Berlin in the 1920s directly from its founders Max Wertheimer and Wolfgang Köhler. In clear opposition to the psychological and philosophical currents dominant at the time, in particular behaviorism and idealism, *Gestalttheorie* theorized perception as an immediate act through which the mind, in a predominantly innate way, organizes sensible data according to certain laws of 'unification' of single parts into a whole other than their simple sum. Distinct elements of the visual field tend to be perceived as belonging to a single overall configuration by virtue of their similarity, closeness, common destiny, continuity of direction, closure, figure-ground relationship, meaningfulness. In short, the images — or rather some of their qualities — 'communicate' directly with the observer, eliciting a mediation and organization of the visible that the human eye and mind tend to intuitively grasp, supported by their physiology.

Gestalt psychology cannot be reduced to a descriptive theory of optical phenomena, it is indeed a theory of mind based on the elective relationship between perception and cognition. Optical illusions and ambiguous figures (such as Kanizsa's triangle, Rubin's vase, or Jastrow's duck-rabbit) are evidence of the discrepancy between the physical object and its phenomenal perception. For Gestalt psychology and in particular for Arnheim, who applied its laws to artistic phenomena, perceiving is always also thinking, reasoning is also intuition, observation is also invention. The image is traversed by a system of forces which, in the eyes of the observer, make it more or less dynamic, unstable, tending to a momentarily disrupted equilibrium. Thanks to its gestalt qualities, the image expresses some relevant aspects of human experience, including emotions. Grasping the meaning of an image therefore means actively participating in the adventure of its perceptual organization.

An important element of properly understanding Arnheim — and one which is present in the following volumes — is the recognition that although moving forms are phenomenally immediate, it is the spatial, temporal and multi-medial

context that dynamically shifts their meaning. Therefore, there is an inherent provisional and fallible background to any observations made in an Arnheimian manner. His theory is the opposite of a dogmatic formalism and is therefore highly useful in our contemporary context because it links the ultimate meaning of the filmic work to analytic methods that are not reductive.

FORMATIVE FORMALISM

At the turn of the 1920s and 1930s, Arnheim made an original application of Gestalt laws to cinema, a phenomenon of considerable aesthetic importance which, however, had not been studied with a scientific approach until then. There was no better laboratory than cinema theaters to test the principles according to which the eye captures the forces, the vectors, the dynamism, the intensity and all the expressive element of a work of art on the basis of the systemic relationships between the visual elements involved. Also based on a large number of examples collected during his activity as a film critic at *Die Weltbühne* (a leading periodical of the Weimar Republic), in 1932 Arnheim composed an impressive volume entitled *Film als Kunst* [8]. The book was soon banned by the Nazi regime due to its author's Jewish origins and a too direct allusion to the similarity between the mustache of Charlie Chaplin's Charlot and those of Hitler in one of his review. *Film als Kunst*, however, was immediately translated into English and began to circulate in some Italian intellectual circles, in particular among the teachers and students of the Centro Sperimentale di Cinematografia in Rome. Having fled from Germany, Arnheim arrived in Rome in the summer of 1933 and for the following five years was one of the main editors of the magazines *Intercine* and *Cinema*. On the columns of these magazines he published a large number of articles on the psychological and aesthetic aspects of film, many of which were signed with various pseudonyms which have only recently been directly attributed.[9] His Italian 'idyll' was destined to end soon: in 1938, the promulgation of the racial laws in Italy forced him to a new escape (first to London and then to New York), which corresponded to a sort of 'denial' of cinema, of which he will return to deal only sporadically or incidentally.[10]

Film als Kunst is a tormented and controversial book not only for the political context in which it hardly begins to circulate, but also for its content. It was at the end of the 1920s that the transition from silent to sound was taking place and Arnheim opposed this and other technical innovations — color, the panoramic format — by taking a defensive position on the specificity of cinema. As eminently a visual medium, in order to claim its artistic status, cinema had to avoid contamination with non-original means of expression and to remain autonomous in developing and using its own language artistically. These contaminations were in fact evident concessions to spectacle and commercial success, but above all a fatal reproductive approach to reality, from which the film had to keep away. This 'purist' position remained substantially unchanged over time despite the advances in the art of cinema. In the new edition of the book,

published in the United States in 1957[11], the entire second part was replaced by a series of writings dating back to the Italian period, including the well-known essay *A New Laocoön* (1938) which confirmed his opposition to *talkies*.[12] At the turn of the 1950s and 1960s, however, in the wake of the success of *Art and Visual Perception*, the interest around Arnheim theory of cinema rekindled.

The fundamental assumptions of Arnheimian film theory is that cinema is not a means of simple mechanical transcription of reality, but a reality in its own right which dialogues with the former *by difference*. The transposition of reality on the screen brings out the insuperable partiality of the human eye (and of the camera) in front of the natural world. Arnheim identifies and describes a series of 'absences': the absence of depth, of color, of off-screen space, of space-time continuity, of non-visual stimuli.[13]

Yet precisely from its limitations with respect to reality, cinema has the possibility of being art, as the use of these 'differentiating factors' as 'formative means' allowed the 'cinematographic artist' to make a creative compensation of the gaps. Arnheim therefore describes the artistic use of each factor. First, the possibility of choosing a particular point of view, thus creating a surprise effect from a hiding/revelation dynamic. For example in the opening scene of Charles Chaplin's *The Immigrant*, the rear angle suggests that the character, leaning on the railing of the ship, is feeling bad, while it is later revealed that he was only fishing. On the other hand, Arnheim considers inappropriate and gratuitous — *formalist* instead of *formative* — the abundant use of extreme close shots in Theodor Dreyer's *The Passion of Joan of Arc* (1928), a solution that hides action and therefore prevents the viewer's full understanding of the narrative. Second, the possibility of composing the shot by exploiting the 'duplicity' of the image, which gives both the impression of a real event thanks to the illusion of depth, but it is still a two-dimensional image. Thus, for example, in King Vidor's *The Crowd* (1928) the shot of young John Sims climbing the stairs, already suspecting that he has lost his father, is not only a body that approaches the camera, but also a figure that enlarges by progressively widening towards the angles of the frame, physically and symbolically going towards his adult age. Third, the possibility of expressing inner states or symbolic meanings through the grayscale, lighting and contrast, without resorting to color, as in Walter Ruttmann's Berlin *Symphony of a Great City* (1927). For Arnheim, the availability of the entire color range is by no means an advantage for the film artist. Indeed, it is the grayscale, in its complex essentiality, that offers the possibility of expressing symbolic contents. It is no coincidence that Arnheim was on the jury of the 1964 Venice Film Festival which awarded the Leone d'oro to Michelangelo Antonioni's *Red Desert*, a film in which an non-naturalistic use of color is the reflection of the characters interiority. Fourth, the use of the limits of the frame to exclude and then reveal portions of the scene (off-screen space), to 'cut out' and bring a significant detail closer (close-up) or to play with the dimensions and proportions of objects placed at different depth levels (deep focus). The almost-squared aspect ratio in use in the 1910s and 1920s helped the viewer to have a comprehensive view of the action depicted on the screen, which is

instead prevented by the horizontal expansion of the format (as in Abel Gance's panoramic *Napoléon* [1927]). Fifth, the possibility of unnaturally reconstituting the fragments of space and time through editing. Finally, the ability to arouse sound perceptions using only images (in Josef von Sternberg's *The Docks of New York* [1928], the shot of a gun corresponds to the sudden flight away of a flock of birds). Arnheim accuses sound and in particular the dialogue of paralyzing the action, as it relieves the actor from the need to use the body and facial expressions as primary means of communication. Moreover, the absence of the nonvisual world of the senses, allows the film to arouse a sense of vertigo by exploiting the discrepancy between the viewer physical immobility and the camera movements.

The artistic use of these means made it possible to combine form and content: simple aesthetic solutions could immediately express inner states and symbolic meanings. The set of these means constituted the specific aesthetic language of cinema — a system that today we take for granted, but which in the 1930s still had to be described systematically.

Arnheim had already described the developed machine-like money profit orientation of the Berlin cinema industry, and in America saw this expanded in the Hollywood system.[14] Once the talking film could no longer be dislodged from the tastes of the public and the production schedules of the studios, he immediately recognized the new importance of ideological analysis, which was developed in his friendship with Siegfried Kracauer. At the same time, as a keen observer of technological issues, he was considering the consequences to cinema of the improvement of film stocks. Sharper and better emulsions almost required a shift toward realism, while he predicted that the traditional aims of cinema could be satisfied through animation.

A KINOGESTALTTHEORIE

Film als Kunst was therefore a retrospective book, aimed at discussing the effect of technological innovations on the great age of cinema as art. However, the immutability of Arnheim's position over the years, made his theory even more radical (as well as more criticized, especially in its method[15]). Despite the intrinsic limitations of *Film as Art*, in fact, the laws of Gestalt psychology continue to act in our perceptual experience of visual artifacts (as well as in their production), including films. Even without considering this approach as exclusive and exhaustive, but rather in integration with other models capable of explaining more rigorously the complexity of the viewing experience, a filmic *Gestalttheorie* can still be a productive means of access to the interpretation of film. The evolution of the history of visual media, characterized by the digitalization, the multiplication of screens and formats, the overabundance of images, and the multimedia contamination of languages, have changed the occasions and conditions of film viewing. However, these phenomena have not distorted the basic components of visual communication, nor do they suspend

the duty of a critic, a scholar or a student to describe the communicative and artistic effectiveness (or ineffectiveness) of audiovisual products (cinema, TV series, commercials, music videos...).

The study of cinematographic formative means can still help us today. Film analysis could return to dwell more precisely on the compositional aspects of shots (e.g. off-screen space, camera angles and point of view, shots scale, editing and deep focus) and its dynamics (in terms of vectors, balance, configuration, etc.).[16] Today eye-tracking tools allow us to register and study empirically the viewers' gaze behavior and the dynamics of attention.[17] This approach has the potential to enrich the analysis of the film experience with information on the quality and adequacy of stylistic choices.

The way in which viewers process editing — or what Arnheim called the 'space-time discontinuity' — is inherently a gestaltic activity: in fact, the viewer mentally reconstructs the continuity behind the logic of events despite the fact that there are lacks in space and time, applying the law of 'good continuity', that is, filling the gaps and constituting a whole that does not derive from simple juxtaposition of the shots or narrative chunks. In this sense, editing follows the functions of the mind in tending towards a 'complete' or 'pregnant' — that is, simple, coherent, logically structured — figure. On closer inspection, in drawing attention to the differences between reality and the film, Arnheim legitimized infringements of the rules of continuity (and, more generally, of Hollywood's 'ideology').[18] What matters is not balance *per se*, but the ability of the visual configurations to tend towards it, that is, to make themselves unstable, dynamic, in need of compensation.[19] As Gestalt approach thus identifies and describes the expressive potential of dynamic tension, and even of discontinuity, if this stimulates the viewer's propensity to comprehend the overall meaning of the narrative. Applied to the so-called 'puzzle films' or in general to complex storytelling, this approach allows us to conceive the film as a great mental game whose content is not the narration (or, the content), but the processes activated through the formal elements. An *insight* — another concept developed by Gestalt psychology — emerges as a reconfiguration of the relationship between the fragments in a new, sudden and intuitive way that allows a resolutive vision of a problem. If the film hides a real state of affairs until the last sequence, then there is no *insight*. If, on the other hand, it uses the space-time 'folds' of editing as formal means of expressing a momentarily incomprehensible state of affairs, then it involves the viewer actively in the comprehension of the content of the film. In short, it is likely that Arnheim would have loved Christopher Nolan's *Memento* (2000) for its formalism in the use of editing (and also for the mixed use of cinematography), but not Bryan Singer's *The Usual Suspects* (1995) or films that adopt the same type of 'unreliable' narrator.

Among the formative means, the ability of the film to evoke non-visual sensory experiences is one of the most interesting. This affects primarily the negative effects of the dialogue on acting, that Arnheim conceived as mostly a pantomimic activity. Interestingly, contemporary filmmakers have spontaneously rediscovered the power of the absence of speech, when the predominantly

visual medium takes over. For example, Brian De Palma — who had studied with Arnheim for a time at Sarah Lawrence College — remarked that he was 'essentially a silent film director', as he demonstrated with the abundant use of long-takes with little or no dialogue in his films.[20] Furthermore, for Arnheim, the absence of non-visual stimuli affects not only the actor's body, but also the viewer's. The latter, in fact, not only *watches* the movement represented on the screen, but also *experiences* camera movements. Here, the relativity of film expression emerges non only in terms of visual perception, but of the relation, potentially conflictual, between the eye and the body, between visual perception and proprioception and equilibrioception. Contemporary cinema often uses this conflict in order to intensify the viewer's perception. In this case, 'embodied cognition' is the result of a process that includes and strategically uses a 'disembodying phase' of viewer's perception.[21]

In short, Arnheim could be considered as *a classical theorist of modern and contemporary cinema*. On the one hand, he explained for the first time in a systematic way the aesthetic implications of the film language at the time of its evolution. On the other hand, with his 'differential' theory, he has aesthetically legitimized infringements of the rules of continuity and balance, identifying precisely in the interference to physiological perceptual laws, a vast range of artistic potential that the cinema then naturally developed and that today we can return to observe with its far-sighted gaze.

The orientation of much film scholarship to either avant-garde cinema or an inverted canon of popular culture and the condemnation of the elitist orientation of critique of the Frankfurt school caused Arnheim's approach to appear hopelessly outdated. Yet his argument was intended to be a playbook for those seeking various artistic effects. In that sense, its recommendations were rather uncontroversial. Once one no longer believes in a positivist manner that a prediction of a theory is a law-like certainty, one can begin to see Gestalt principles as tendencies, in interaction with others for unpredictable results. One can almost express the necessity of an Arnheimian filmology as a tautology. It is simply the science of aesthetic effects, presumed by each and every filmmaker for whatever their purpose.

FILM AS ART EXTENDED

As the contributions to this special issue demonstrates, a Gestalt approach to film is still productive today. Indeed, the coupling of Arnheim to Gestalt psychology focuses the film theorist less on Arnheim the *auteur* than on him as a Gestalt psychologist. Consequently, each of the essays contained in this special issue in some sense extends Arnheim's thought to new domains, brings in other aspects of Gestalt psychology that he may have neglected, and reconnects aspects of Gestalt filmological thinking to contemporary trends in thinking.

The article by Maarten Coëgnarts, 'Meaning Potential of Motion Vectors in

Cinema', connects the notion of vectors and directed tension — a prominent feature of Arnheim's post-film writing to his earlier work, creating a useful consolidation of Arnheimian theory, moving vector discourse into film. Vectors for Arnheim create meaning by creating pictorial analogues of existence within artistic works. Following Herbert Zettl (a theorist whose relation to Arnheim would be useful to further explore), there are also motion vectors in cinema: primary motion, secondary motion, and tertiary motion. Armed with such concepts, Coëgnarts pushes Zettl's discussion of motion vectors into meaningful expression with case studies of three films: Akira Kurosawa's *Sanshiro Sugata*, Ridley Scott's *Blade Runner*, and Brian De Palma's *The Untouchables*.

The next essay, Philippe Bédard's 'Points of Anchorage: Exo-centric Images and the perceptual Relativity of Camera Movement', considers camera movement as a kind of illusion. The exo-centric image, wherein a fixed camera registers a character's fixed face and body, while the world moves, are slightly jarring (see Darren Aronofsky's *Requiem for a Dream*, or Todd Phillips' *The Hangover*). Such subjective effects reverse body-space relations, denaturalizing the tacit acceptance of the camera as a fixed eye, recording events of the world. Bédard's analysis usefully moves filmic movement back into the general psychology of ego-centric motion.

Next Maria Poulaki, in 'A Gestalt Theory for "Disorder": From Arnheim's Ordered Chaos to Brambilla's Entropic Art' returns to Arnheim's comments in his 1971 book *Entropy and Art*. This book, an homage to Arnheim's mentor Wolfgang Köhler, tried to place the physicist's notion of entropy, which by then had been overtaken by humanistic popularization, and revisit its meaning for contemporary discourse. Poulaki brings Arnheim's opposition of order and disorder into dialogue with newer approaches from dynamic systems theory (e.g. complexity theory) to the neurosciences. By using the example of the digital endlessly transforming creations of artist and film director Marco Brambilla, Poulaki reminds us of the dynamic emergence and breaking of order in the spirit of the Gestalt theory inspiring Arnheim.

Brambilla's animations are a natural invitation to consider the topic more broadly, which is accomplished in Ryan Pierson's 'Gestalt, Animation and the Culture of Design'. Animation is a natural topic for Gestalt psychologists because experience itself is not regarded as a copy of reality. Accurately geometrically presented stimuli, for example, may not produce the most robust illusion. So too with animation, which though not live-action can be more 'real' than the former. For Pierson it is therefore fitting that Gestalt psychologists ought to have anticipated, and vice versa, been inspired by animators. Each also, for Pierson, participate in a culture of design, which can be construed as a parallel project of arranging senses and populations, a psychotechnics for a sociotechnics.

In line with the reconnection of filmic ideas with larger traditions of Gestalt theory, Massimo Locatelli's 'Paul Fraisse's Psychology of Rhythm: A Case for Filmology?' connects Arnheim to the work on rhythm by Albert Michotte's student, Paul Fraisse (in effect, Arnheim's theoretical 'cousin'). For Fraisse, rhythm follows Gestalt organization but also connects to sensory-motor

activation. It becomes a particularly important way to structure narrative and the comprehension of events, but in a way not even anticipated by Fraisse can also induce both bodily and neural entrainment. It therefore creates an informed link to recent neurofilmological approaches.

Finally, Emilio Audissino addresses the specific case of humor as cognitive restructuring in 'The Aha, Ha! Moment: A Gestalt Perspective on Audiovisual Humour'. Departing initially from observations on music, Audissino considers music to be a 'part' or micro-configuration of a 'whole' or macro-configuration. Incongruity not only among single modal elements but multi-modal elements can lead to humour. The restructuring related to an 'aha' moment can be reconfigured for humour as an 'Aha, Ha!' moment. Humour is indissolubly linked to problem-solving behaviour.

It is the hope of the editors that readers will appreciate the bridges that have been built across the career of Rudolf Arnheim, and from there to broader elements of Gestalt psychology from which a Gestalt filmology can profit. Limited exegesis of Arnheim's works will limit the appeal of his work and understanding of its potential breadth. We encourage scholars to continue to consolidate knowledge and fill in gaps to construct a vigorous Gestalt filmology.

Rudolf Arnheim
in *The Responsive Eye*
(Brian De Palma, 1965)

Notes

[1] This introduction is the product of work carried out in common by two authors, and the result of a single shared process of reflection. As far as the writing of the individual sections of the text is concerned, sections 1, 3, and 4 can be attributed to Adriano D'Aloia; 2, and 5 to Ian Verstegen.

[2] Rudolf Arnheim, *Art and Visual Perception: A Psychology of the Creative Eye* (Berkeley-Los Angeles: University of California Press, 1954/1974); *Visual Thinking* (Berkeley: University of California Press, 1969).

[3] See Dudley Andrew, 'Rudolf Arnheim', in Id., *The Major Film Theories: An Introduction* (London: Oxford University Press, 1976), 27–41.

[4] A previous attempt of revaluation of Arnheim's contribution to cinema and media theory can be found in *Arnheim for Film and Media Studies*, ed. by Scott Higgings (New York: Routledge, 2011).

[5] For example, Ian Verstegen, *Arnheim, Gestalt and Media: An Ontological Theory* (Cham: Springer, 2019).

[6] See Robert Sinnerbrink, 'Phenomenology Encounters Cognitivism', *Projections*, 13(2), 2019, 1–19, <doi: 10.3167/proj.2019.130201>; and Adriano D'Aloia and Ruggero Eugeni, 'Philo-, Neuro-, Post-. Che cos'è e cosa sarà la teoria del cinema', in *Teorie del cinema. Il dibattito contemporaneo*, ed. by Idd. (Milano: Raffaello Cortina, 2017), 9–28.

[7] See for example Adriano D'Aloia, *Neurofilmology of the Moving Image: Gravity and Vertigo in Contemporary Cinema* (Amsterdam: University of Amsterdam press, 2021). For a discussion of Gestalt theory in the context of film psychology, see Maria Poulaki, 'The "Good Form" of Film. The Aesthetics of Continuity from *Gestalt Psychology* to Cognitive Film Theory', *Gestalt Theory*, 40, 1, 2018, 29–44, <doi: 10.2478/gth-2018-0004>.

[8] Arnheim, *Film als Kunst* (Berlin: Ernst Rowohlt, 1932), translated into English as *Film* (London: Faber & Faber, 1933).

[9] See Arnheim, *I baffi di Charlot. Scritti italiani sul cinema 1932-1938*, ed. by Adriano D'Aloia (Torino: Kaplan, 2009). See also Arnheim, *Film Essays and Criticism* (Madison: The University of Wisconsin Press, 1997), originally published as *Kritiken und Ausfsätze zum Film* (München-Wien: Carl Hanser Verlag, 1977).

[10] See D'Aloia, 'Rodolfo Arnheim', *Comunicazioni Sociali on-line*, 5, 2012, 29–44.

[11] Arnheim, *Film as Art* (Berkeley-Los Angeles-London: University of California Press, 1957).

[12] Arnheim, 'A New Laocoön: Artistic Composites and the Talking Film', in Id., *Film as Art*, 199–230.

[13] See Verstegen, *Arnheim, Gestalt and Media*, for an insertion of this argument into the Brentanist ontological tradition and its affinity to Roman Ingarden's ontology of the work of art.

[14] See Arnheim's comments on the 'Psychology of the Mass-Produced Film', in *Film als Kunst* and the early English translation *Film* (170–181), but absent from the 1957 *Film as Art*.

[15] See Noël Carroll, *Philosophical Problems of Classical Film Theory* (Princeton: Princeton University Press, 1988).

[16] See for example Meraj Dhir, 'A Gestalt Approach to Film Analysis', in *Arnheim for Film and Media Studies*, 89–106.

[17] See for example the relevance of Arnheim's *The Power of the Center: A Study of Composition in the Visual Arts* (Berkeley-Los Angeles: University of California Press, 1982) in Tim Smith's 'Watching You Watch Movies: Using Eye Tracking to Inform Cognitive Film Theory', in *Psychocinematics: Exploring Cognition at the Movies*, ed. by Arthur P. Shimamura (Oxford: Oxford University Press, 2013), 165–190.

[18] For more on this argument, see Poulaki.

[19] See Meraj Dhir, 'A Gestalt Approach to Film Analysis', in *Arnheim for Film and Media Studies*, 90–106.

[20] On the influence of Arnheim's theory and teaching on De Palma's cinema, see Didier Truffo, 'Brian de Palma avec Rudolf Arnheim', *La furia umana*, 18, 2013, http://www.lafuriaumana.it/index.php/40-archive/lfu-18/74-didier-truffot-brian-de-palma-avec-rudolf-arnheim#sdfootnote6sym [accessed 25 May 2022].

[21] See for example D'Aloia, 'Overturning. Upside-down dissimulations', in Id., *Neurofilmology of the Moving Image*, 143–163, <doi: 10.5117/9789463725255_ch05.>

The Meaning Potential of Motion Vectors in Cinema

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This essay examines the meaning potential of directed forces or vectors in cinema. The first part draws on the pioneering work of Rudolf Arnheim to highlight the prominent role of vectors in the visual structuring of meaning in paintings. In the second part, we move on to explore the semantic significance of motion vectors in cinema. To this aim we first define and diagram the filmic space in which vectors may articulate themselves visually. Having firmly grounded this spatial framework in film theory, we adopt the terminology of Herbert Zettl to further distinguish between three types of motion vectors: primary motion vectors (elicited by motion of visual objects), secondary motion vectors (elicited by camera movement) and tertiary motion vectors (elicited by editing). We conclude by applying the proposed conceptual tools of this essay to three filmic case-studies in which the relation between narrative meaning and motion vectors is further discussed and illustrated.

Keywords
Camera movement
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Film style
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Vectors
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In memory of Stephen Prince

INTRODUCTION

Research in cognitive science increasingly shows that meaning is not just a matter of a transcendent disembodied view of logic at the level of sentences (or propositions), nor is meaning a matter of truth-conditions or referential relations only. Rather, meaning is highly dependent upon our bodily disposition and the way we physically interact with the world.[1] One way in which scholars have tried to make sense of this theme of embodied cognition is by showing how the semantics of certain linguistic concepts are metaphorically grounded in gestalt patterns, so called 'image schemas', that arise in and through our sensory-motor experience.[2] This idea is central to the field of cognitive linguistics and the theory of Conceptual Metaphor Theory as it was first proposed by George Lakoff and Mark Johnson in 1980.[3] One pattern in particular that has been argued to play a pivotal role in the structuring of meaning in language is the 'force' image schema.[4] This schema arises in and through our physical interaction with objects and persons in our environment and functions as an important source domain for metaphorically structuring the abstract target domain of (emotional)

causality ('The home run *threw* the crowd into a frenzy', 'He *drove* her crazy', or 'She *pulled* me out of my depression').[5]

It might not come as a surprise that both Lakoff and Johnson took inspiration from the work of the famous theorist of visual art Rudolf Arnheim in order to develop the image schema of force and its structuring role in language.[6] Even long before the embodied view gained foothold in the cognitive sciences, Arnheim believed that sensory perception structures and informs thinking. His notion of 'visual thinking' served as the key concept to signify this non-dualist interplay.[7] Informed by the principles of Gestalt psychology, he considered visual percepts to be prominently dynamic and therefore as intrinsically meaningful and expressive. [8] Consequently, he extended this view to the realm of art by showing, through various inspiring case studies, how non-temporal media such as paintings and sculptures are able to portray the (abstract) dynamics of human life 'as a closed system in which all relevant forces are shown together in configuration, each in its characteristic direction and appropriate strength'.[9]

One concept in particular that plays a highly significant role in Arnheim's work on dynamics in the visual arts is the concept of a 'vector'. Vectors are the 'forces generated by the shapes and configurations of visual objects'.[10] As such, they are the 'carriers of dynamics', that is, 'the directed tension perceived in visual objects'.[11] It is through the configuration of vectors in the composition of a work that Arnheim believed that artists are able to communicate themes and narrative meaning in a purely visual way. More recently, the semantic role of a vector has also become a crucial component in Kress and van Leeuwen's account of the grammar of visual representation in which the authors merge concepts from Arnheim's theory of visual dynamics in art with concepts from Halliday's functional-semantic theory of language.[12] In both the works of Arnheim and Kress and van Leeuwen, however, the meaning potential of vectors has been predominantly analysed with respect to fixed images such as photographs, sculptures and paintings. Only limited attention has been paid to moving images. It is the goal of this essay then to demonstrate the semantic potential of vectors in narrative cinema. To this aim the essay follows a threefold structure. In the first part we provide a brief case study from Arnheim to show how the link between vectors and meaning can be established visually in painting. In the second part, we move on to explore the semantic significance of motion vectors, a concept which we adopt from Herbert Zettl.[13] To assess its use in cinema we first define the filmic space in which vectors may articulate themselves visually. Having firmly grounded this spatial framework in film theory, we extend Zettl's terminology to further distinguish between three types of motion vectors: primary motion vectors (elicited by motion of visual objects), secondary motion vectors (elicited by camera movement) and tertiary motion vectors (elicited by editing). We conclude by applying the proposed conceptual tools of this essay to three filmic case-studies in which the relation between narrative meaning and motion vectors is further discussed and illustrated.

THE MEANING POTENTIAL OF VECTORS

When people talk about force they usually refer to a physical or gravitational manifestation of it. It is the literal sort that we all experience when our bodies causally interact with objects and persons in our environment.[14] Forces, however, do not only manifest themselves in physical experience. We may also observe them, as Arnheim pointed out, as 'directed tensions' in our acts of perception.[15] They constitute the 'perceptual forces' that are inherent in the shapes, configurations, colors and locomotion that inhabit the visual world. As Arnheim writes: 'These dynamic properties, inherent in everything our eyes perceive, are so fundamental', Arnheim argues, 'that we can say: *Visual perception consists in the experiencing of visual forces*'.[16] This applies to both natural objects (e.g., the highly dynamic curve that we perceive in an ocean wave) as well as works of art (e.g., a painting), but with this fundamental difference that the former were never intended to be seen as embodying an abstract pattern or configuration of forces. As Arnheim remarks: 'They carry visual form only impurely and approximately'.[17] By contrast, works of visual art are made for the exclusive purpose of being perceived, and therefore 'the artist endeavours to create the strongest, purest, most precise embodiment of the meaning, that consciously or unconsciously, he intends to convey'.[18] That is, in works of art forces or visual dynamic fulfil an important semiotic function as *carriers* of the meaning or theme of a work. The theme is the formal pattern that indicates what the work is about. It turns the visual pattern into a semantic statement on the human condition. This is also the original sense of the term vector. Combining the Latin verb, *vehere* (to carry) with the agentive suffix -tor, a vector literally means 'carrier'. Vectors thus are the carriers of dynamics. And since dynamics are the 'very basis of expression', and expression is the manifestation of life, vectors become also the 'carriers of meaning'.[19]

To illustrate how the meaning of a work may be conveyed through a dynamic configuration of vectors or directed forces, let us consider an excerpt from Arnheim's brilliant analysis of Giotto's depiction of the *Lamentation*.[20] This fresco, as shown in fig. 1, depicts the subject matter of the story (death and resurrection) through a formal interplay between the horizontal and the vertical. As Arnheim writes: 'The horizontal of death is indicated but left behind by the body of Christ, which has been lifted and thus endowed with the dynamic quality of oblique position'.[21] Obliqueness thus fulfils a fundamental role in the creation of directional tension (and hence meaning), something which Arnheim explicitly states: 'Oblique orientation is probably the most elementary and effective means of obtaining directed tension'.[22] Returning to the fresco, Arnheim draws the viewer's attention to the arms which 'are made to deviate obliquely from the body'. The author sees in this deviation 'a motif of revival' which then finds its continuation in the vector of the diagonal ridge of the hill: 'Just broad enough for a man to walk upward, it leads through the entire picture, from the horizontal of death to the verticals of the two upright men, the vertical edge of the picture

Fig. 1:
Lamentation (*The Mourning of Christ*) by Giotto (c.1304 - c.1306)

frame, and the three. The tree takes over where the diagonal of the hill is about to tend and turns the oblique climbing into straight rising'.[23] It is only a brief excerpt, but it vividly illustrates how graphical vectors play a significant role in the shaping of visual meaning.

Throughout his career Arnheim analyzed many other examples, albeit almost exclusively with an emphasis on the meaning potential of vectors in fixed images such as photographs, sculptures and painting.[24] There is, however, no reason to assume that the vectors involved in motion do not play an equally important role in the structuring of visual meaning. One merely has to look at the experiments on so called 'functional relations', wherein one perceives such high-level properties as animacy and causality in simple animated movies.[25] Evidence can also be found in an increasing number of publications on the subject of expression and cinematic movement.[26] Moreover, Arnheim himself includes the notion of 'locomotion' in his definition of directed tension.[27] The fundamental difference is that when actual motion is used, as in the dance, the theater, and the film, 'direction is already indicated by movement'.[28] This is also how Herbert Zettl defines a motion vector as 'a vector created by an object that is actually moving or seen as moving-on screen'.[29] He considers motion vectors generally to have a higher magnitude than index vectors, which in turn have a higher magnitude than graphic vectors. The latter 'is created by a stationary element that guides our eyes in a certain albeit undefined direction' (e.g., horizontal and vertical lines) whereas an index vector is created 'by something that points undeniable in a specific direction' (e.g., an arrow, or people point or looking in a particular direction). Not all vectors are explicitly

supported by visual objects that are represented in the visual field (e.g., shape, color, movement), what Arnheim, dubs 'retinal presence'.[30] For instance, the index vector created by a figure's glance, what Kress and van Leeuwen call an 'eyeline vector', is not.[31] The magnitude of a vector then can be defined as 'a product of its relative strength, that is, its directional certainty and perceived directional force'.[32] It expresses what the scholar labels the 'aesthetic energy', the energy that we perceive from aesthetic phenomena such as color, sound and motion. A high-vector magnitude is strong, a low vector magnitude is weak. Hence, because motion vectors always have a precise screen direction (contrary to graphic vectors) and because they have a perceived object speed, motion vectors are generally assumed to have a higher magnitude.

Zettl's definition of a motion vector, however, remains formal in the sense that it provides no indication of the meaning potential of motion vectors.[33] For instance, he does not demonstrate, as Arnheim does with respect to graphical and index vectors, how motion vectors can convey story content. In other words, Zettl provides no semiotic definition. Moreover, his definition is strictly limited to primary motion (motion of objects) and does not take into account the structural importance of secondary motion (camera movement) and tertiary motion (editing). In the next section of this paper we address this issue by providing a tentative conceptual framework for analyzing motion vectors in cinema. Having provided a toolkit for doing so, we are conceptually equipped to lay bare its relation to the story content of three filmic cases.

MOTION VECTORS IN CINEMA

Before examining the question of motion vectors in cinema, we first have to define the space through and in which they may manifest themselves. A distinction made by film theorist Noël Burch seems to be a good point to start. In his classical book *Theory of Film Practice*, the author identifies two kinds of space in a film: the space included in the frame, the on-screen space, and the space included outside the frame, the off-screen space, which he further divides into six segments.[34] The first four of these areas are the most obvious ones, and are determined by the four borders of the frame: the space left of the frame, the space right of the frame, the space below the frame, and the space above the frame. The fifth segment is a rather peculiar one as it cannot be defined with the same degree of geometric accuracy. It refers to the off-screen space 'behind the camera'. Characters commonly reach this area by passing just to the right or left of the camera. Finally, there is the sixth zone of space behind the set which a character may reach by, for example, going out a door or going around a street corner, or by 'disappearing behind a pillar or behind another person [...]. The outer limit of this sixth segment of space is just beyond the horizon'.[35]

We may continue to further define the on-screen space, as Zettl does, by adapting the spatial coordinate system of the French philosopher René Descartes which consists of three axes: the horizontal x-axis (screen width),

the vertical y-axis (screen height) and the illusionary depth line or z-axis with 'stretches from the screen (camera lens) to the horizon'.[36] Whereas the former two axes have definite spatial limits, imposed by the boundary of the frame, screen depth is 'virtually infinite'.[37] Zettl considers the z-axis aesthetically the most flexible screen dimension for it allows for a staging or blocking in depth; a technique which was famously applauded by the French film critic André Bazin. However, as Wittusen has pointed out, Bazin's interest lies not only in the z-axis as the single possible articulation of depth.[38] While making reference to the films of Jean Renoir, he also attributes significance to another depth dimension, which he coins 'the lateral depth'. 'In *The Rules of the Game*', he writes, 'Renoir actually uses simultaneous action on the same plane more than depth of field. This functions like a kind of lateral depth of field'.[39] In other words, the screen may suggest the presence of a field of depth which continues in the off-screen space beyond the spatial limits of the x-axis and the y-axis. As Bazin writes, 'The rest of the scene, while effectively hidden, should not cease to exist. The action is not bounded by the screen, but merely passes through it'.[40] More recently, Julian Hanich has adopted Bazin's concept of lateral depth for his own phenomenological analysis of complex mirror shots. Interestingly, he brings in two additional concepts to the discussion of depth in film: the 'anterior depth' which he uses in a similar sense as Zettl's z-axis dimension, and the 'posterior depth', which he uses to signify the 'depth' of Burch's sixth zone of off-screen space, that is, the depth 'behind and next to the camera'.[41] Whereas the anterior depth channels the viewer to look *into* the screen, the lateral and posterior depth dimensions make us look *beyond* the image.

Taken together, these theoretical terms constitute a spatial framework, which we may diagram as in fig. 2, and which allows us to further explore any number of vectors and dynamic forces within the frame space including not only graphical and index vectors, but also motion vectors which we will look

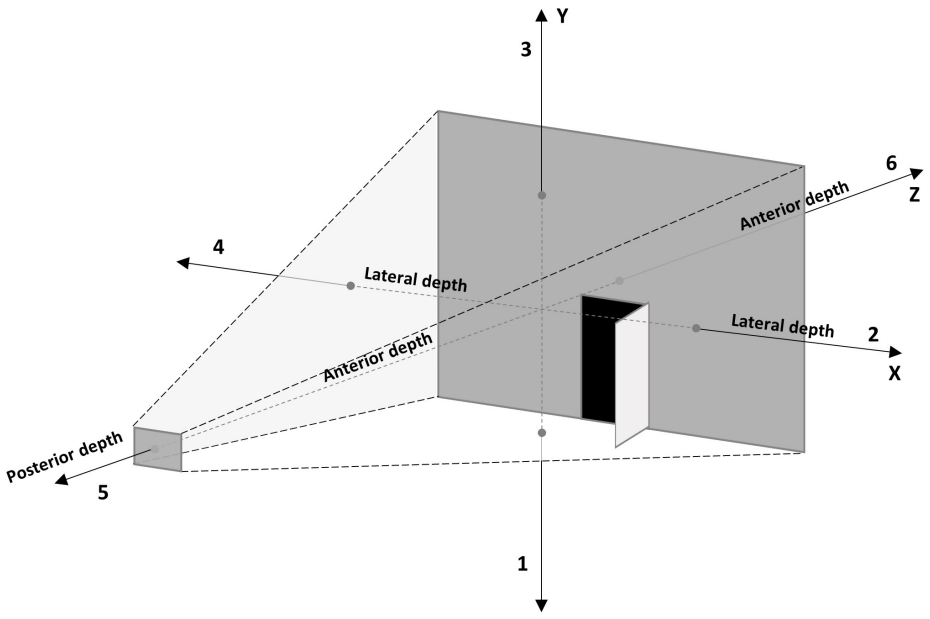

Fig. 2:
Diagramming the filmic space on the basis of film theory

into now. As stated above, Zettl originally used the term only to refer to the movement of visual objects, what he elsewhere describes as 'primary motion'.[42] In this paper, however, we will expand the notion of motion vector to also include Zettl's two other categories of motion, namely 'secondary motion' (or camera movement) and 'tertiary motion' (or editing). The latter further selects the primary and secondary motion vectors of the individual shots to shape what Karen Pearlman recently coined a 'trajectory phrase'.[43] In doing so, however, we should be aware of the phenomenological differences that still exist between the three types. As will become clear below, secondary and tertiary motion vectors seem more elusive and less definable than primary motion vectors.

Primary Motion

By primary motion we mean movement of visual objects (e.g., characters) in the on-screen space. Since the movement trajectory in this space is always relative to the 'container' of the frame in which the movement takes place, we may further distinguish between four dynamic patterns of fixed-frame movement: 'entry', 'exit', 'approaching', and 'distancing'.[44] Entry is created by an object that enters the on-screen space. The starting point from which the movement begins, is always located in one of the six zones of off-screen space as defined by Burch. When that same object leaves the screen space again, we speak of 'exit'. In this case one of the off-screen zones serves as the ending point of the moving object or trajectory. An object may also exit the frame along the z-axis. In such a case the pattern of exit is accompanied by a pattern of 'approaching'. The visual object increases in graphic mass as it comes closer towards the camera. By contrast, when an object 'distances' itself from the camera, the graphic mass will gradually decrease. As Burch has argued, these patterns of 'enters into' and 'exits from' a frame are crucial for delineating or 'defining' the spatial segments of off-screen space. By this Burch means that 'one or another of the spatial segments in question takes shape in the viewer's imagination every time an entrance or exit occurs into or out of that segment'.[45] This 'shaping' becomes especially vivid when a single primary motion vector starts to interact with another primary motion vector. Zettl goes further to delineate three such types of relationships that primary motion vectors can have within a single shot (and as we shall see later, also across a series of shots): 'continuing' (when two or more vectors point in the same direction), 'converging' (when they point to each other) and diverging (when they point away from each other).[46] The converging type can be nicely illustrated with a brief example that Burch describes in his book and that occurs towards the beginning of Jean Renoir's *Nana* (1926). It involves a static shot (see fig. 3) in which the paths of two men cross each other for a very brief moment. Young Georges has just left Nana's dressing room. Enchanted by her beauty he enters the frame left, along the horizontal x-axis. At the same time, the other guy, Muffat, rushes toward Nana's dressing room by entering the frame from the right. Their motion vectors cross like two arrows, without their even glancing at each other, and they exit on

Fig. 3:
Entries into and exits from the frame of Jean Renoir's *Nana* (1926)

opposite sides of the screen. As Burch observes: 'The essential part of the action in this shot (the trajectories of the two men) takes place *off screen*, although in such a brief span of time — the moment preceding and following each entrance and each exit — that it borders on the instantaneous; this action *simultaneously* defines the left and right segments of off-screen space'.[47] In other words, primary motion vectors play a significant role in further establishing Bazin's concept of 'lateral depth of field', as elucidated above.

Primary motion vectors, however, should not be limited to the actual movement of a visual object from one location to another. A primary motion vector may also originate from a fixed position by a character that moves his eyes away from one spatial zone to another (comparable to the tilting or panning of a camera). In such a case the direction of the eyeline vector (as an instance of an index vector) changes: the primary motion vector is not supported by the retinal presence of a movement trajectory along one of the axes, but by the retinal presence of a change of gaze. In a much cited example from Alfred Hithcock's *Notorious* (1946) there is a significant medium close-up in which Alicia (Ingrid Bergman) changes the direction of her glance from one zone (containing the reflection of Sebastian's shadow on the bathroom door) to another (containing the keys on the desk) (see fig. 4). Through this primary motion vector which makes us look beyond the image into its lateral depth, the film already foretells the movement trajectories that will unfold in the subsequent next shots, first of the camera getting closer, then of the character itself.[48]

Fig. 4:
Primary motion change of eyeline vector in Alfred Hitchcock's *Notorious* (1946)

Secondary motion

In cinema, however, we are not only dealing with motion vectors that have their origins in the actual on-screen movement of objects. In addition, we may also distinguish between motion vectors that emanate from the movement of the camera (e.g. dolly, zoom, tracking shots, pan shots). Naturally we do not see secondary motion vectors in the same way as we observe primary motion vectors. We do not literally see the camera moving from the right to the left as we see a character moving from the right to the left. What we do see is the on-screen effect of the mobile camera, that is, the component changes in what the camera records when its moves. For instance, it is well known that a camera pan to the left makes it seem as if a static object onscreen moves to the right.[49]

In contrast to primary motion vectors, secondary motion vectors usually do not interact with other secondary motion vectors in one and the same screen space unless the frame is a composite of multiple screens (e.g., split-screen). What the viewer perceives is the dynamic effect of the mobile frame as elicited by a single camera's movement. But secondary motion vectors may engage with primary motion vectors in various aesthetic ways. For instance, we speak of motivated camera movements as when the secondary motion vector is in tune or continuing with a primary motion vector. This occurs, for example, when the camera follows a character from behind. In such a case, both camera and character share the same direction. By contrast, when the secondary motion vector detaches itself from the character, such as is often the case in modernist cinema (e.g., the cinema of Antonioni), it becomes a 'wandering camera'.[50] It reveals the presence of a filmic narrator distinct from any of the characters. In this case, the independent movement of the camera (independent of any character's point of view) generates the spectators' awareness of an 'independent presence', that of an omniscient narrator.[51]

Tertiary motion

Once the primary and secondary vectors are created they can be further shaped into a temporal sequence by means of sequence motion or what Zettl terms 'tertiary motion'. Through a change of shots (i.e., single runs of the camera), we perceive 'a progression, a visual development'.[52] As Zettl points out, 'the important aspect of tertiary motion is not so much the vector field of the individual shot but the moment of change — the relationship of vector fields from shot to shot'.[53] In her own research Karen Pearlman, who is an editor herself, has termed this assemblage of movements appropriately 'trajectory phrasing'.[54] Together with timing and pacing it is one of the tools at an editor's disposal for shaping time, energy and movement for the purpose of creating cycles of tension and release. More specifically, trajectory phrasing 'describes the manipulation of energy in the creation of rhythm'.[55] The word 'trajectory' means 'the path described by a body moving under the action of given forces'.[56]

Trajectory phrasing then is joining together movement trajectories in different shots to shape the flow of energy (movements) between and through them. This is done by choices of takes and positioning of cuts. Using the vector terminology of this paper, we might well speak of 'vector phrasing' with the primary motion vectors and secondary motion vectors constituting a significant part of the raw material from which the editor produces affective rhythms, that is, patterned movement over time. This makes vectors at the level of tertiary motion to function more like an overflow effect, a higher-order accumulation or interplay of other vectors — comparable to what Eisenstein would label 'tonal' and 'over-tonal' effects in montage. They become a good deal more indistinct and diffuse as a result of it. Depending on the intentions of the filmmaker, we may nevertheless distinguish between several styles of editing for putting these vectors together. In most cases of narrative cinema, the editor will keep the audience spatially oriented. For this purpose, the editor will adhere to a prescribed syntax of continuity editing.[57] If for instance, a filmmaker shows a long shot of two people talking to each other (i.e., converging index vectors) and maintains these converging vectors in the subsequent separate close-ups of these people, there is still continuity across the converging vectors. Other filmmakers, however, will not strive for these subtle linkages, but for harsh collisions under Sergei Eisenstein's dictum that 'A smooth transition is an opportunity lost'. As Pearlman further writes, 'a collision might be a cut that juxtaposes light and dark, close-up and wide shot, but also movement left to right with right to left, [...] and so on'.[58]

There is more to be said about vectors in cinema and of their possible relationships with each other and with other types of vectors (e.g., color vectors, sound vectors, musical vectors), but for now let us put some of the conceptual tools that we currently have into practice by exploring, as Arnheim and Kress and van Leeuwen did with respect to fixed images, the expressive and metaphorical potential of motion vectors in cinema.

THREE CASE-STUDIES

In the last section of this paper we briefly discuss three filmic cases for the purpose of showing how motion vectors contribute significantly to the conveyance of meaning in cinema. In doing so, we will first stress the importance of vectors in two existing film analyses from the literature. We conclude this section by providing a more elaborated case study of our own.

Case study 1: Sanshiro Sugata (Akira Kurosawa, 1943)

In his brilliant treatment of Akira Kurosawa's cinema, Stephen Prince is keen to point out the importance of movement patterns in the conveyance of themes in the oeuvre of the Japanese director.[59] He states among others that the director frequently organizes movement to produce dialectical relationships often

in combination with the use of the telephoto lens. For instance, he describes one brief moment of converging (primary) motion vectors from *Yojimbo* (1961) in which the planes of movement are perpendicular to each other: the hero (Toshiro Mifune) crosses the frame along the horizontal x axis, from left to right in the foreground, while the villain advances from behind the setting (i.e., Burch's sixth zone) towards the camera from the background (the z-axis), as the telephoto lens produces the illusion that both primary motion vectors 'are about to crash into each other'.[60] In other occasions, however, motion vectors serve a more important narrative function by helping to situate characters according to 'important psychological and social relations prevailing along them', an interest that according the author runs throughout Kurosawa's oeuvre and reaches its climax in *Seven Samurai* (1954).[61] One vivid example that Prince analyses appears already very early in the director's career. It involves a scene near the beginning of *Sanshuro Sugata* (1943) in which the young pupil Sanshiro accompanies Momma and his mob to a late night ambush of the judo instructor Shogoro Yano (Denjiro Okochi). Kurosawa' formalizes Sanshiro's relation to Yano by introducing a lateral tracking shot and reduplicating its secondary motion vector three times. Each time Yano defeats one of Momma's men, the motion vector ends by including Yano into the frame, while the film intercuts between the two characters, 'each framed in isolation, in contrast to Momma's group'.[62] 'Here we can see clearly', as Prince argues, 'Kurosawa's injunction to use form in a meaningful manner: Yano is to be Sanshiro's teacher and spiritual guide, and the bonds between them are set out in visual terms during this early sequence, in which Sanshiro functions as an observer, learning a first lesson by watching a master'.

Case study 2: Blade Runner (Ridley Scott, 1982)

For our second example, let us consider a juxtaposition of images from Ridley Scott's *Blade Runner* (1982) that recently gave rise to an interesting discussion among two cognitive film scholars: Tim J. Smith and Karen Pearlman whose work we already cited above.[63] The first shot, as shown in fig. 5, involves a similar change of eyeline vectors that we already illustrated above with the example of *Notorious*. It shows how the character of Deckard (Harrison Ford) shifts his gaze from a horizontal x-axis index vector (pointing towards the second off screen space where the character of Rachel is located) to a z-axis index vector (pointing towards the sixth zone where an artificial owl is located). In the next shot the actual owl is shown as it gestures an opposite movement: the owl's gaze shifts from right (a z-axis index vector) to left (horizontal x-axis index vector). The film then cuts back to Deckard in a trajectory that exactly copies the owl's movement. Deckard now turns his head again from the owl in the direction of Rachel in the fourth off-screen zone (left of the frame). Smith considers this last cut to be 'slightly off', by which he means 'that the owl's gaze shift will cue viewer attention in the opposite direction to the saccade

Fig.5:
A trajectory phrase of eyeline motion vectors in Ridley Scott's *Blade Runner* (1982)

required to shift back to Deckard's face'.[64] The owl looks over Deckard's head and guides your eyes to slip over Deckard's head and then you slip them back. 'Such a mismatch', he argues, 'may result in a violation of a priori continuity'.[65] In her own analysis of the same scene, however, Karen Pearlman, argues that this mismatch is not a mistake. As she argues, 'it offers a different kind of editing, one that adds a visual rhythm, an embodied sense of alignment with character' and an element of what she reveals as 'a significant subtext'.[66] 'Its first creative purpose is to create a movement phrase. Like a dance phrase, a movement phrase created by the juxtaposition of two gestures is a statement of a rhythmic idea'.[67] But more importantly, she also adds a semiotic purpose to the movement phrase created by editing. As she writes: 'By comparing the owl's behaviour with Deckard's behaviour, the cut subtextually suggests that they are alike'.[68] She finds further evidence in the dialogue that immediately follows the comparison. Earlier Rachel has asked Deckard if he likes their owl. When Deckard moves his head away from the owl back to Rachel, he says 'it's artificial' upon which Rachel responds 'of course it is'. This is where the comparison takes on a semantic dimension. As Pearlman argues, it suggests that 'if they are similar, the possibility Deckard is also artificial, something that (spoiler alert) we learn only much later in the film may be true'.[69] From the terminology of this paper, we may further argue that this existential resemblance is pronounced visually by a formal similarity that is articulated at the level of primary motion eyeline vectors.[70]

Case study 3: The Untouchables (De Palma, 1987)

Our last example considers a case study that shows how vectors play an import role in the visual structuring of so called 'flow-of-emotion scenarios'.[71] A flow-of-emotion scenario conceives emotions to be embedded in a causal chain of three events: an emotion arousing event (the cause of event), an emotional state and a behavioural response (the effect of emotion). Such narratives of mental causation are not only ubiquitous in our ordinary lives, but also in films. To illustrate this, let us consider the first segment of the famous 'Odessa Steps' inspired staircase scene from Brian De Palma's *The Untouchables* (1987). During the Prohibition-era of the nineteen twenties, Chicagoan cop Elliott Ness (Kevin Costner) along with his sharp-shooting partner George Stone (Andy Garcia) have arrived at the city's Union Station in order to arrest bookkeeper Walter Payne (Jack Kehoe), the one man that could put Crime boss Al Capone in prison. As they wait for his arrival, a suspenseful chain of mental causation starts to unfold which we may analytically divide into a number of flow-of-emotion scenarios, the first of which may be described as follows: Ness, at the top of the stairs, sees a young mother appearing at the foot of the stairs, pushing a buggy while simultaneously carrying two large suitcases (the emotion arousing event). Perception in turn causes the first emotional state: Ness is nervously torn between helping the woman carry her buggy up the marble steps, and maintaining his watch for the accountant. The increase of emotional intensity results in a behavioural response: Ness gives into his good nature, and rushes down the steps to help the mother drag her buggy up the stairs (the effect of emotion).

The first part of this flow-of-emotion scenario is visualised, as shown in fig. 6, by extending the principle of index-vector target continuity: shots of Eliot Ness looking off-screen alternate between POV shots of the woman and the baby (located downstairs, Burch's second zone of off screen space) and shots of the station clock up the stairs. The emotional intensity increases as the clock almost reaches the pivotal moment of 12 am. To express this the film makes use of the

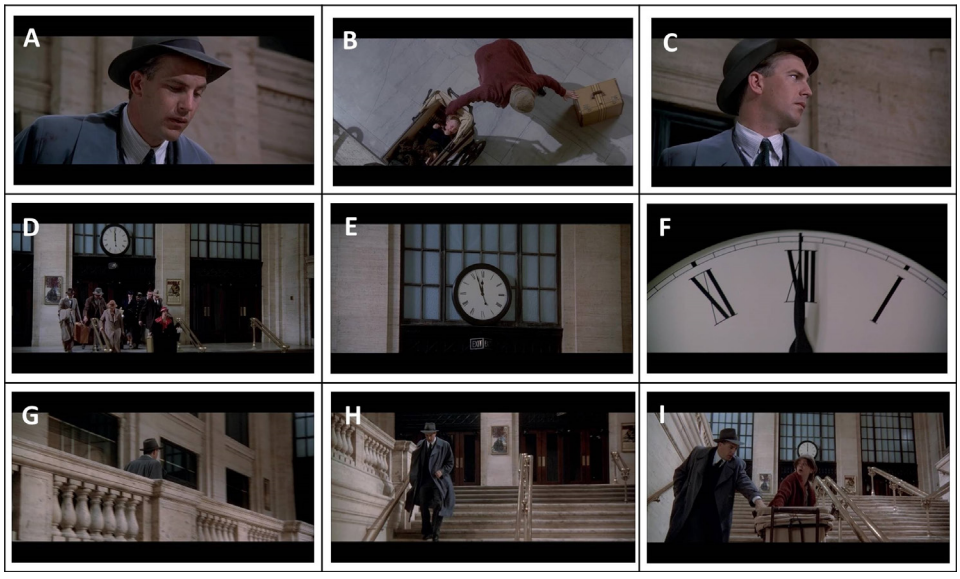

Fig. 6:
Visually structuring the flow-of-emotion scenario in Brian De Palma's *The Untouchables* (1987)

dynamic pattern of enclosure, here elicited by tertiary motion rather than by secondary motion: as the clock nears the arrival time and emotional intensity increases, the clock inside Nett's visual field increases in graphical substance. This visual progression in time can be seen as a cinematic manifestation of an embodied metaphor, which in the literature is known as the metaphor 'increase in emotional intensity is increase of substance in a container', a subtype of the more general metaphor 'emotions are forces'.[72] As the theory behind this metaphor goes, humans have a tendency to conceptualize the rising of a strong emotion (e.g., joy, anger, fear) inside a person's body in terms of the increase of a substance inside a container. When there is very little substance in the container, the pressure is low and thus emotion is at low intensity (there is enough breathing space).[73] By contrast, with an increase of the substance, the pressure becomes higher, and thus also the intensity of the emotion.[74] The increase of pressure, here visualized through the increase of the clock's graphical mass, further triggers a behavioral response. This is also what happens next. The eyeline vector, the directed force of Elliot's gaze, soon changes into a motion vector as our hero now hastens himself to go downstairs and help the woman. This further prompts the camera to move: as Ned lowers himself to approach the lady (and the location of the camera), the camera tracks backwards so as to *include* the woman and the baby inside the frame (i.e., Ness' 'container'). Another way of capturing this would have been to start with a fixed shot of the woman followed by a motion vector of fixed-frame movement as Ned enters the shot from above. But the effect of this would have been less dynamic and meaningful as it is Ness who 'brings' the woman and the baby safe into his 'personal container', not the other way around.

CONCLUSION

The goal of this article was to draw attention to the meaning potential of motion vectors in cinema. To this aim we first provided a preliminary discussion of the concept of a vector in the visual arts by reviewing the pioneering work on visual dynamics by Rudolf Arnheim. This theorist has convincingly demonstrated and illustrated through various cases how vectors play an important role in the visual structuring of narrative meaning in fixed images. Subsequently, we extended the question of vectors not only to the domain of fixed images, but also to the domain of moving images by addressing the meaning potential of motion vectors. For this purpose, we first had to define the filmic space in which motion vectors may unfold themselves. Having done so we distinguished between three types of motion vectors: primary motion vectors, secondary motion vectors and tertiary motion vectors. Since the proof of the pudding is in the eating, we concluded this paper by illustrating the concepts proposed using three filmic case-studies. The insights offered in this paper will hopefully provide an impetus to further explore, in an interdisciplinary way, the role of motion vectors in the structuring of meaning in cinema.

Notes

[1] Barbara Tversky, *Mind in Motion: How Action Shapes Thought* (New York: Basic Books, 2019); Varela, Francisco J., Evan Thompson and Eleanor Rosch, *The Embodied Mind: Cognitive Science and Human Experience* (Cambridge: The MIT Press, 1991); Raymond W. Gibbs Jr., *Embodiment and Cognitive Science* (Cambridge: Cambridge University Press, 2006); George Lakoff and Mark Johnson, *Philosophy in the Flesh: The Embodied Mind and its Challenge to Western Thought* (New York: Basic Books, 1999).

[2] The concept of an 'image schema' is central in two classic 1987 monographs: Lakoff, *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind* (Chicago: University of Chicago Press, 1987), and Johnson, *The Body in the Mind: The Bodily Basis of Meaning, Imagination and Reason* (Chicago: University of Chicago Press, 1987).

[3] Lakoff and Johnson, *Metaphors We Live By* (Chicago: University of Chicago Press, 1980).

[4] Johnson, 42–48; see also Leonard Talmy, 'Force Dynamics in Language and Cognition', *Cognitive Science*, 12.1 (1988), 49–100.

[5] Lakoff and Johnson, *Metaphors We Live By*, 184–185; María Sandra Peña Cervel, 'Subsidiarity Relationships Between Image-schemas: An Approach to the Force Schema', *Journal of English Studies*, 1 (1999), 187–208.

[6] For Johnson's discussion of the force schema, see Johnson, 76–79.

[7] Rudolf Arnheim, *Visual Thinking* (Berkeley and Los Angeles: University of California Press, 1969).

[8] Arnheim, *Art and Visual Perception: A Psychology of the Creative Eye* (Berkeley and Los Angeles: University of California Press, 1974); Rudolf Arnheim, 'Perceptual Dynamics', American Scientist, 76 (1988), 585–591; Arnheim, *The Power of the Center* (Berkeley and Los Angeles: The University of California Press, 1988).

[9] Arnheim, 'Perceptual Dynamics', 590.

[10] Arnheim, *The Power of the Center*, 229.

[11] Ibidem, 226.

[12] Gunther Kress and Theo Van Leeuwen, *Reading Images: The Grammar of Visual Design* (London: Routledge, 2021); Morten Boeriis and Theo van Leeuwen, 'Vectors', in *New Studies in Multimodality*, ed. by Ognian Seizov and Janina Wildfeuer (London: Bloomsbury, 2017), 15–36.

[13] Herbert Zettl, Sight, *Sound, Motion: Applied Media Aesthetics* (Boston: Cengage Learning, 2017), 127–131. As will become clear below, we will use the concept of a 'motion vector' in a wider sense than originally proposed by Zettl.

[14] Johnson, 43.

[15] Arnheim, *Art and Visual Perception*, 416.

[16] Ibidem, 412.

[17] Arnheim, *Visual Thinking*, 270.

[18] Ibidem, 270–271.

[19] Arnheim, 'Perceptual Dynamics', 585.

[20] Arnheim, *Art and Visual Perception*, 441–443.

[21] Ibidem, 441.

[22] Ibidem, 424.

[23] Ibidem, 441.

[24] It should be stressed, however, that Arnheim also wrote extensively about film, especially at the beginning of his career. Notable in this regard is his landmark book *Film as Art* (Berkeley and Los Angeles: University of California Press, 1957). However, since Arnheim never undertook any serious attempts to update or revise his position, and since his later work mostly focuses on static art media, the implications of vector dynamics for the study of meaning in film have been largely ignored in the literature.

[25] Notable in this regard are two classic works in the field of perceptual psychology: Albert Michotte's *The Perception of Causality* (New York: Basic Books, 1963), which is also cited and discussed by Arnheim, *Art and Visual Perception*, 388–395, and Fritz Heider and Marianne Simmel's influential article on perceptual animacy, entitled 'An Experimental Study of Apparent Behavior', *The American Journal of Psychology*, 57 (1944), 243–249.

[26] See, among others, Christina Schmitt, Sarah Greifenstein and Hermann Kappelhoff, 'Expressive

Movement and Metaphoric Meaning Making in Audio-Visual Media', *Body-Language-Communication*, vol. 2, ed. by Cornelia Müller, Alan Cienki, Ellen Fricke, Silva Ladewig, David McNeill and Jana Bressem (Berlin, München and Boston: De Gruyter Mouton, 2014), 2092–2112; Jordan Schonig, *The Shape of Motion: The Cinema and the Aesthetics of Movement* (Oxford: Oxford University Press, 2021); and Patrick Keating, *The Dynamic Frame: Camera Movement in Classical Hollywood* (New York: Columbia University Press, 2019).

[27] Arnheim, *Art and Visual Perception*, 416.

[28] Ibidem, 28.

[29] Zettl, 128. Notice that Zettl does not make reference to camera movement and editing in his definition of a motion vector.

[30] Arnheim, *The Power of the Center*, 228.

[31] Kress and van Leeuwen, 72.

[32] Zettl, 129.

[33] See also the criticism of Boeriis and van Leeuwen, 16.

[34] Noël Burch, *Theory of Film Practice*, trans. by Helen R. Lane (Princeton: Princeton University Press, 1981), 17.

[35] Ibidem, 17. For a discussion, see also David Bordwell and Kristin Thompson, *Film Art: An Introduction* (New York: McGraw-Hill, 2004), 258; Maarten Coëgnarts, *Film as Embodied Art: Bodily Meaning in the Cinema of Stanley Kubrick* (Boston: Academic Studies Press, 2019), 75.

[36] Zettl, 161–163; see also Michael Frierson, *Film and Video Editing Theory: How Editing Creates Meaning* (New York: Routledge, 2018), 5.

[37] Zettl, 162.

[38] Cato Wittusen, 'Varieties of Temporal Overlapping and Depth', *New Review of Film and Television Studies*, 12.2 (2014), 112–124 (118).

[39] André Bazin, *What is Cinema?*, trans. by Timothy Barnard (Montreal: Caboose, 2009), 69.

[40] Bazin, *Jean Renoir*, trans. by W. W. Halsey II and William H. Simon (New York: Da Capo Press, 1992), 89.

[41] Julian Hanich, 'Reflecting on Reflections: Cinema's Complex Mirror Shots', in *Indefinite Visions: Cinema and the Attractions of Uncertainty*, ed. by Martine Beugnet (Edinburgh: Edinburgh University Press, 2017), 131–156 (141).

[42] Zettl, 294.

[43] For a discussion of the concept of 'trajectory phrasing', see Karen Pearlman, *Cutting Rhythms: Intuitive Film Editing* (Amsterdam: Focal Press, 2016); Pearlman, 'Editing and Cognition Beyond Continuity', *Projections: The Journal for Movies and Mind*, 11.2 (2017), 67–86; Pearlman, 'On Rhythm in Film Editing', in *The Palgrave Handbook of the Philosophy of Film and Motion Pictures*, ed. by Noël Carroll, Laura T. Di Summa and Shawn Loht (Cham: Palgrave Macmillan, 2019), 143–163.

[44] Coëgnarts, *Film as Embodied Art*, 84–85.

[45] Burch, 18.

[46] Zettl, 129–130.

[47] Burch, 19.

[48] For a discussion of this scene, see also Pearlman, 'Editing and Cognition', 79; Vittorio Gallese and Michele Guerra, 'Embodying Movies: Embodied Simulation and Film Studies', *Cinema: Journal of Philosophy and the Moving Image*, 3 (2012), 183–210 (200–201); Coëgnarts, 'Cinema and the Embodied Mind: Metaphor and Simulation in Understanding Meaning in Films', *Palgrave Communications*, 3.1 (2017): 1–15; and Mircea Valeriu Deaca, 'The Control Cycle: Cognitive Model in Biology, Film and Culture', *Ekphrasis. Images, Cinema, Theory, Media*, 20.2 (2018), 63–97 (88–89).

[49] This apparently paradoxical phenomenon of the relativity of movement has been well described and illustrated by perceptual psychologists. See e.g., Julian Hochberg and Virginia Brooks, 'Perception of Motion Pictures', in *Cognitive Ecology*, ed. by Morton P. Friedman and Edward C. Carterette (San Diego: Academic Press, 1996), 205–292 (237–240).

[50] Seymour Chatman, *Antonioni or, The Surface of the World* (Berkeley: University of California Press, 1985). See also Kenneth Johnson, 'The Point of View of the Wandering Camera', *Cinema Journal*, 32.2 (1993), 46–56.

[51] Ibidem, 49.

[52] Zettl, 299.

[53] Ibidem, 299.

[54] Pearlman, *Cutting Rhythms*, 60.
[55] Pearlman, 'On Rhythm', 155.
[56] Ibidem, 155.
[57] For a discussion of continuity principles in relation to vectors, see Zettl, 369–393.
[58] Pearlman, *Cutting Rhythms*, 170.
[59] Stephen Prince, *The Warrior's Camera: The Cinema of Akira Kurosawa* (Princeton: Princeton University Press, 1999).
[60] Ibidem, 172–173.
[61] Ibidem, 42.
[62] Ibidem, 41.
[63] Tim J. Smith, 'The Attentional Theory of Cinematic Continuity', *Projections: The Journal for Movies and Mind*, 6.1 (2012), 1–27 (20); Pearlman, 'Editing and Cognition', 75.
[64] Smith, 20.
[65] Ibidem.
[66] Pearlman, 'Editing and Cognition', 75.
[67] Ibidem, 75.
[68] Ibidem, 76.
[69] Ibidem.
[70] A similar interpretation may be given to the cutting of the red men's bathroom in Stanley Kubrick's *The Shining* (1980). This is well addressed by Frierson, 22: 'Kubrick cuts across the 180° line to create a visual metaphor linking (Jack Nicholson) and Mr. Grady (Philip Stone) as socially isolated characters by flipping their position from shot to shot)'. Here, we may speak of a flipping of eyeline vectors through editing or rather the flipping of the participants from which these vectors emanate.
[71] For a discussion, see Coëgnarts, *Film as Embodied Art*, 28.
[72] Kövecses, 65–68; see also Coëgnarts, *Film as Embodied Art*, 63.
[73] For a discussion of the container image schema, see Lakoff and Johnson, *Philosophy in the Flesh*, 31–32.
[74] For a discussion of this metaphor in relation to the elevator scene from Francis Ford Coppola's *The Conversation* (1974), see Coëgnarts, 'Analyzing Metaphor in Film: Some Conceptual Challenges', in Current *Approaches to Metaphor Analysis in Discourse*, ed. by Ignasi Navarro i Ferrando (Berlin: De Gruyter Mouton, 2019), 295–320 (314–316).

Points of Anchorage: Exo-centric Images and the Perceptual Relativity of Camera Movement

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This essay analyzes a unique filmmaking technique to highlight the fact that camera movement is fundamentally an optical illusion based on a misinterpretation of visual cues. The unique technique in question is what I have called the 'exo-centric image', namely an image produced by a camera attached to the body of an actor which, paradoxically, generates the impression of an immobile body in a moving world. Through an analysis of this peculiar technique, I make claims about the illusory nature of camera movement in general. In so doing, this essay concludes that the vocabulary we use to describe camera movement keeps us from seeing some of the more eccentric aspects of the effect we call camera movement.

Keywords
Camera movement
Exo-centric images
Relative movement
Forbidden movements
Phenomenology
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INTRODUCTION

As a recent wave of scholarship has demonstrated, camera movement constitutes a rich, if elusive, topic.[1] As David Bordwell put it, 'camera movement has usually been considered too elusive to be analyzable'.[2] Part of the challenge stems from the fact that the vocabulary we typically use to describe camera movement refers to the realities of film production, and not to the 'phenomenon of camera movement on the screen as it is originally experienced and understood by us as viewers'.[3] This fact is best exemplified by edge cases — what Bordwell calls 'forbidden movements'[4] — where expectations about how a camera ought to move are subverted. Trick shots, digitally assisted camera movements and even animation confront us to the challenge of discussing camera movement with any precision. They also reveal the tenuous link between how a camera appears to move on screen and how it actually moved (or not) during production.

Consider the opening 17-minute sequence of Alfonso Cuarón's *Gravity* (2013), which has been analysed by countless authors for its virtuosic display of camera movement and for the problems it raises as a result of its unique production context.[5] While some authors take up *Gravity*'s daring opening long take to question the use of the term 'camera' to discuss this special effects-driven assemblage,[6] others address the cognitive[7] or proprioceptive[8] empathy

between the movements displayed on screen and those felt by viewers. Instead, I want to focus on the final act of this sequence (00:13:34-00:16:08), when the heretofore unchained camera seemingly becomes fixed to the body of an astronaut spinning out of control in Earth's orbit. From the beginning of the sequence, the camera has been moving fluidly around the protagonists, Ryan Stone (Sandra Bullock) and Matt Kowalski (George Clooney), two astronauts working on a module of the International Space Station who get caught in a sudden shower of space debris which sends Stone careening into orbit. Around the 13–minute mark, the roving camera seemingly comes to a stop in front of Stone, keeping her locked in the frame even as she continues to spin out of control. In fact, although we know her to be moving rapidly, Stone appears fixed in the frame; it is the earth and the stars instead that we see rotating around her in this part of the sequence. While a lot has been written about the narrative functions of — and affective responses to — this particular shot, I want to emphasize the unusual body-camera-space relations on display in this image sequence. By extension, my goal in this essay is also to highlight the tenuous link between the appearance of camera movement and any notion about how (or if) the camera might have moved (or not) during production.

Of all the movements showcased in *Gravity*'s opening sequence, the one I am describing here is an example of a technique I have called the 'exo-centric' image.[9] Through a unique arrangement of body, camera, and space, this technique creates the illusion of immobilizing on screen the actor who was wearing the camera and moving with it during production. Whether in *Gravity* or in any of the myriad films that feature exo-centric images, the technique also reveals a deception at the heart of all camera movement, namely that our perception of movement on screen is any indication whatsoever of the actual movements a camera performed during production. Starting from Bordwell's hypothesis that, 'there must be perceptual cues which determine a 'camera-movement effect' onscreen *regardless of whether the camera moved in production or not*' [emphasis in the original],[10] this essay seeks to demonstrate the fundamentally illusory nature of camera movement, a fact that is obfuscated by the vocabulary we generally use to describe it. To do so, I approach camera movements from a phenomenological perspective, considering first and foremost the *appearance* of movement on screen as a signifier of movement. This descriptive approach aims to free us from the preconceptions tied to the vocabulary typically used in film studies to discuss the phenomenon we call 'camera movement'.

While my claims in this essay are meant to reflect on all forms of camera movement, my central example remains the exo-centric technique and the uncanny effect it has of immobilizing heretofore mobile bodies. Beginning by a description of the technique behind exo-centric images, I start by demonstrating the limitations of the language typically used to describe camera movement. I continue with an overview of different ways of describing movement, using frames of references that are either 'subjective' or 'objective'. Namely, I call upon Maurice Merleau-Ponty and James J. Gibson to highlight how our perception of

movement is affected by what we focus our attention on, as well as on whether the body is actively moving or passively being moved. Bordwell's notion of a 'perceived screen event' allows me to come back to camera movement with a description of the 'visual cues' that enable us to determine whether parts or the whole of an image are moving on screen. Finally, I come back to exo-centric images and, following Jordan Schonig's lead, analyse it in a way that 'alters the "normal circumstances" under which the visual effects of the moving camera can be seen', so as to shed light on what our vocabulary otherwise obfuscates.[11]

THE EXO-CENTRIC TECHNIQUE

Whether it appears in movies, television series, commercials, music videos, or extreme sports videos, the phenomenon I have called the 'exo-centric image' stands out for its characteristic way of representing body-space relations: the body appears frozen in the centre of the frame while the world around it is seen moving in its place. This unique effect has been used in films such *Requiem for a Dream* (Darren Aronofsky, 2000), *Mean Streets* (Martin Scorsese, 1973) and *The Hangover* (Todd Phillips, 2009) among countless others. Regardless of the narrative or aesthetic reasons why this effect might have been sought after in these films, I focus on the exo-centric image in this essay because of the reasons for which it succeeds in subverting our expectations as to how cameras appear to move on screen.[12]

An exo-centric image is produced when a camera is attached to the body of an actor who carries it with them as they move during a scene. Technically speaking, this effect can be broken down into three basic elements:

1. the camera must be *connected* to the body which it films;
2. the camera must be *carried by*, but *away from*, the body (in front or behind);
3. the camera must be *facing* the body that carries it.[13]

For example, as the above production still from *Requiem for a Dream* shows, during her famous hallway scene Jennifer Connelly wore a device called a 'Snorricam' which allowed her to move on set with the camera placed about an arm's length in front of her, looking back at her [fig. 1]. [14] Whether it is placed in front, behind, or anywhere around the actor's body, the camera keeps them centred in the frame as it moves in unison with them.[15] In other words, camera and body maintain their position *relative* to each other regardless of their displacements through space. This lack of 'relative movement' between camera and body is translated on screen by a body that becomes immobilized in the frame despite the movements we know them to have performed during production; the body becomes the camera's ground, or its point of anchorage. The result is a point of view that, paradoxically, is both *physically detached from the body* while also being *intimately tied to it*. We see this effect in all forms of the exo-centric image: from early attempts in *Kri Kri e il Tango* (anonymous,

Fig. 1:
The so-called 'Snorricam' used to shoot *Requiem for a Dream* (Darren Aronofsky, 2000). Courtesy John Baer (© John Baer 1999)

1913) and *The Last Laugh* (Der Letzte Mann, F.W. Murnau, 1924), to more recent and formalized uses in *The Wolf of Wall Street* (Martin Scorsese, 2013), *The Muppets* (James Bobin, 2014), *The French Dispatch* (Wes Anderson, 2021), as well as in animated features such as *Frozen II* (Chris Buck and Jennifer Lee, 2019), *Mitchells vs the Machines* (Michael Rianda, 2021), and *Turning Red* (Domee Shi, 2022).

By depicting as motionless the body that moved with the camera during filming, the exo-centric image pushes us to recognize the inherent relativity of camera movement. It also highlights the shortcomings of the vocabulary we are taught to describe what we see on screen. Consider the movement the camera performed during the above-mentioned scene from *Requiem for a Dream*. Although we know full well that the camera moved backward during production as the actress wearing it was walking forward, it would be absurd to describe it as having dollied, tracked, or travelled backward. For one, this would obfuscate the passive nature of the camera's displacement. Consider Ryan Pierson's comment on the nature of what constitutes a moving camera or not:

> *If we were to say that every camera ever used on a film was a 'moving camera', on the grounds that the Earth underneath it was revolving around the sun, or if we were to say that no camera ever really 'moves' because it is always passively part of a dolly or a crane or a human body that's moving it, then the concept would become useless.*[16]

At the same time, a description of the camera's movement within profilmic space does not necessarily describe the effect that appears to us on screen. In the case of the exo-centric image, no profilmic account can satisfactorily describe the impression of an immovable body around which space seems to gravitate. To understand this strange reversal and the implication it has on our appreciation of camera movement, we must first understand the frames of

reference that allow us to make sense of the movement we perceive, on screen as much as in real life.

BODY-SPACE RELATIONS

According to David Bordwell, 'the very notion "camera" already situates us not before the cinema screen, but in a film studio, in production surroundings which include a mechanism called a *camera*'.[17] The same can be said for much of the language we have developed to discuss camera movement, which likewise is grounded in the displacements — whether real or imagined — of the device during production. 'The category "camera movement"', Patrick Keating writes, 'includes several techniques — most notably, pans, tilts, dollies, and cranes'.[18] Either these terms describe the tool used to perform a specific kind of movements (cranes are used to move the camera move vertically and dollies are most often used to move the camera in a straight line), or they refer to the particular kind of movement the camera performs (whether it pans left or right, or whether it tilts up or down). Importantly, none of these describes the effects of moving a camera, apart from the terms that metonymically name both the device and the movement for which it is known (e.g., crane, dolly, zoom, etc.).

Much like the way we might describe our own movements — or those of other bodies and objects in physical space — the vocabulary we use to describe camera movement assumes that space is fixed and that it is the subject (body or camera) that traverses it.[19] That being said, we must recognize that at least two distinct approaches can be used to describe the movements of a given entity in space. Those vary according to the point of reference upon which one anchors one's descriptions. For the sake of simplicity, I will call these 'subjective' and 'objective' frames of reference.[20]

Using what I am calling a 'subjective' frame of reference means taking the moving subject itself as the point of anchorage in one's description of their movements. For example, this could include describing someone as turning to their left or, in our case, saying that a camera pans right or tilts up. These descriptions are 'subjective' because they take the body of the subject as anchor; their point of reference is centred in the body. Such descriptions pay no mind to external factors that might affect or relativize how the individual (or the camera) is moving: a person sitting with their back to the direction that their train is moving might say that the vehicle turned (to their) right. Meanwhile, a bystander might describe the same movement as the train having banked left, as seen from their external perspective. This is what I am calling an 'objective' frame of reference, taking the individual who is moving — or being moved — as simply one among many other objects within a more expansive field of action. Using this approach is what allows sailors, among other examples, to give spatial cues that relate 'objectively' to their vessel (starboard, port, forward, aft, etc.), regardless of their own orientation at any particular moment. The individual that performs the movements remains the subject of the statement, but its status as a point of

anchorage is revoked in favour of more 'objective' points of anchorage.

A number of major issues keep me from suggesting this 'objective' model might reliably be used to describe the movements of a camera, at least as well as it can be used to describe the movements of objects in the real world. Firstly, the fact remains the vocabulary we have developed to speak of camera movement remains intimately tied to subjective referents. When we write of the camera panning left, tilting up, or tracking forward, we are in fact describing its movements from its own first-person perspective. Secondly, we cannot describe camera movement from an objective perspective precisely because our only access to camera movement — on screen, within a finished film — presents us exclusively with this subjective, first-person experience of movement. Note that this is different from suggesting that camera movement draws us into diegetic space, that it fosters empathy for or identification with the camera, or that it allows us to feel *at* the position of the camera, as Daniel Morgan has criticized of the notion of point of view.[21] On the contrary, my point is simply that, as viewers, we cannot observe a camera's movement from an external or third-person perspective. That is why I am advocating for an approach that is less reliant on the terminology used to describe the displacements of the camera in profilmic space than on 'the phenomenon of camera movement on the screen as it is originally experienced and understood by us as viewers'.[22] In turn, this shift brings us back to the question of the *appearance* of camera movement, and to the issue of our perception of movement in general.

POINTS OF ANCHORAGE

The question of our perception of movement is a large and complex one, having to do not only with the way we perceive our own subjective movements but also the way we come to understand the motion of objects in the world. James J. Gibson's questions are programmatic in this regard: 'How do we see the motion of an object? How do we see the stability of the environment? How do we perceive ourselves as moving in a stable environment?'.[23] These questions will bear on our appreciation of camera movement, but it is important to consider first how they are dealt with within our habitual modes of perception. Put simply, the answers Gibson gives to these questions have to do with whether parts or the whole of the retina are stimulated at any given time, suggesting objective motion or subjective movement respectively. This interpretation echoes that proposed by Jacques Paillard who, using the 'efference' model developed by Von Holst and Mittelstaedt, concludes that 'the movement of the retinal image resulting from the *controlled displacement of the eye* would be interpreted perceptually as a movement of the body in relation to a stable universe and not as a mobility of the external universe in relation to the body'.[24] In both cases of the movements of the body in its entirety and of those specific to the eye, subjective movement furnishes our perception with sufficient data (visual, but also kinesthetic, vestibular, etc.) to determine whether the movement the eye

records is due to its own displacement, to those of the body through space, or to those of objects external to the body.

While the field of psychophysiology offers illuminating answers to these questions, Maurice Merleau-Ponty' phenomenology of perception offers an equally stimulating explanation. It will also help us make our way back to the specific issue of movement in the cinema. Merleau-Ponty evokes a similar problem to that raised by Gibson when he describes how easy it is for our perception of movement to be altered by whatever we choose to focus our gaze on. Using as an example an individual sailing toward the coast, the philosopher recounts: 'It is the coast which slips by if we keep our eyes fixed on the rail, and the boat which glides along if we look at the coast'.[25] While an objective frame of reference might allow us to give a definitive answer as to what is moving and what is not, subjectively speaking, either one of these things may appear as though it is moving relative to the other. Movement, then, becomes a question of whether one chooses to focus on this or that part of the visual field, and of whether one allows oneself to attend to their perception of said movement. Several other examples of this relativity of movement in the eye of the subject can be found throughout *The phenomenology of perception*: 'The cloud floats over the steeple and the river flows under the bridge, if it is the cloud and the river that we are looking at. The steeple falls across the sky and the bridge slides over a static river if we are looking at the steeple or the bridge'.[26] Importantly, Merleau-Ponty's concern for the phenomenological description of appearances enjoins us not to see in these examples an immanent relativity of objects in motion, but rather a purely subjective relativity.[27] Indeed, Merleau-Ponty explains that '[w]hat makes part of the [visual] field count as an object in motion, and another as the background, is the way in which we establish our relations with them by the act of looking. [...] *The relation between the moving object and its background passes through our body*'.[28]

Here, Merleau-Ponty's phenomenology meets Gibson's ecological approach to perception as both call upon an edge case to highlight the body's active role in allowing us to make sense of the movement we perceive. The example in question is that of 'passive or involuntary locomotion', as is the case when the body is moved in a vehicle, a context in which 'the kinesthetic component may almost wholly drop out'.[29] Deprived of the body's active contribution, our perception of movement becomes more susceptible to dupery, as Gibson details:

> *It is worth noting that there are special cases of visual stimulation in which it* does *become equivocal whether the visual scene is moving or whether the observer himself is moving. If one sits looking through the window of a stationary railway train at another train on the adjacent track, and if one of the trains begins to move slowly, the impression of moving self with stationary scene may give way to that of stationary self with moving scene, or vice versa.*[30]

For Merleau-Ponty, the interpretation of this illusion depends on the articulation of what, in our field of perception, acts as figure or ground. In the

case of inattention, the philosopher describes, 'I can at will see my own train or the train next to it in motion whether on the one hand I do nothing or on the other consider the illusions of motion'.[31] If, on the contrary, our consciousness is focused on a particular element, then the nature of the movement we perceive will arise from the relationship between what, at any given point, serves as figure and ground of our perception. As Merleau-Ponty concludes, citing an example by Kurt Koffka, 'when I am playing at cards in my compartment, I see the neighbouring train move off, even if it is really mine which is starting; when I look at the other train and try to pick out someone, then it is my own train which is set in motion'.[32] Koffka's conclusions about this example are unequivocal: 'The chief rule for these ambiguous cases is this: that the objects which form the (dynamic) centre of our visual world are at the same time our points of anchorage'.[33]

Since it is always a question of the relationship between the subject and their environment, the conclusions of Merleau-Ponty, Koffka, and Gibson highlight the role played by points of reference in our perception of movement. These conclusions also prove stimulating for our appreciation of camera movement. Consider a common, if perceptually ambiguous, example: a camera mounted on a moving vehicle, pointed at the characters sitting within it. In his analysis of such a shot in *Gerry* (Gus Van Sant, 2002), Antoine Gaudin asks whether what we are looking at is 'a camera movement relative to the background of the shot, or a fixed shot of the characters (with a moving setting)?'.[34] A similar question might come up when watching *Locke* (Steven Knight, 2013), where the entirety of the action takes place within a car as Ivan Locke (Tom Hardy) drives from Birmingham to London. As the camera is fixed on the car, pointed at Locke, it would seem absurd to say that it is moving at a constant rate of 100km/h, or thereabouts. While this movement falls into the background of our attention, it is possible to notice when the camera tracks laterally on the hood of the car, or 'dollies' in toward Locke. Why is that?

In the example of passive locomotion described by Merleau-Ponty, Gibson, and Koffka — but also Bordwell — our perception of what is moving and how depends on whether our attention is directed toward this or that element of the visual field. Unlike the *active locomotion* of walking — context in which movement provides 'a dense stream of information about objects' slants, their edges, their corners, their surfaces, their relations with other objects'[35] – the experience of *passive locomotion* in a train allows us to witness the fundamentally interpretative character of perception, which works by primary *anticipation* and secondary adaptation.[36] If a case of passive locomotion such as riding in a vehicle can give rise to such optical illusions, what of cinema and its equally passive spectatorial position?

RELATIVE MOVEMENT IN CINEMATIC SPACE(S)

Without the clues provided when the body moves of its own free will, perception is quick to fall prey to illusions. This makes the spectator's passive position all the more interesting for questioning the illusory nature of the 'perceived screen event' we call camera movement. 'Camera movement', Bordwell writes, 'presents us with a constricted but effective range of visual cues for subjective movement'.[37] With no recourse to an objective frame of reference as to the camera's actual movements within profilmic space, and without having access to the stimulations their bodies typically afford them in cases of active locomotion, viewers are left to interpret movement solely from the visual cues furnished by the camera's own subjective movements, be they active, passive or nonexistent.

As Gaudin and Schonig have demonstrated following Bordwell's lead, several additional conditions can affect our understanding of camera movement.[38] More specifically, Bordwell reminds us that the 'the profilmic-event model cannot specify *the perceived screen event* which we identify as camera movement' and that, on the contrary, '[t]here must be perceptual cues which determine a "camera-movement effect" onscreen *regardless of whether the camera moved in production or not* (since we recognize camera movement without necessarily making any inferences about production circumstances)'.[39] Here, Bordwell shifts the focus from the movements that the camera *might* have made during production to what we can actually attest to: the appearance of camera movement as we perceive it on screen. Pierson makes a similar argument by calling to our attention to the fact that the camera movement we see in *Gravity*'s opening shot were actually stitched together from 'thousands of digitally composited events'.[40] The same can be said for animated films in general, as Pierson demonstrates once more, since the impression of camera movement can easily be produced even when no camera was ever used during production. The exo-centric image also illustrates this perfectly, since all traces of the camera's displacement during filming are eliminated in the final image; a profilmic account cannot adequately describe the onscreen effect. In turn, this shift opens up a discussion regarding the nature of camera movement as an optical illusion.

Part of the challenge when viewing camera movement is understanding what elements of the phenomenon seen on screen pertain to the movements of the camera as opposed to the movements of surrounding elements. In other words, how do we come to determine that it is the camera that moves and not the other objects in the frame?[41] As opposed to Gibson's discussion of subjective movement and objective motion, however, we must also remember that camera movement offers only (second degree) visual cues of subjective movement, leaving up much to interpretation.[42]

To demonstrate the hermeneutic character of camera movement, consider Rudolf Arnheim's account of the fundamental distinction between the active

perception of a body in motion and the stimuli presented through camera movement to the immobile body of the spectator. To set the stage for the effect produced by camera movement, Arnheim chooses first to describe the visual impressions produced by the movements of one's head:

> *If I turn my eyes or my head, the field of vision is altered. Perhaps a moment ago I was looking at the door; now I am looking at the bookcase; then at the dining-room table, then at the window. This panorama, however, does not pass before my eyes and give the impression that the various objects are moving. Instead I realize that the room is stationary as usual, but that the direction of my gaze is changing, and that that is why I see other parts of the motionless room.*[43]

In accordance with Gibson's hypotheses, the contributions of the active body are what allow Arnheim to understand that the movement he sees is due to his own 'subjective movement' rather than the 'objective motion' of external objects. Arnheim insists, however, on the ambiguity that arises when this same movement is executed by a camera and projected on screen:

> *If the camera was rotated while the picture was being shot, the bookcase, table, window, and door will proceed across the screen when the picture is projected; it is they which are moving. For since the camera is not a part of the spectator's body like his head and his eyes, he cannot tell that it has been turned.* He can see the objects on the screen being displaced and at first is led to assume that they are in motion.[44]

Although counterintuitive at first glance, this conclusion stems from the fact that for Arnheim, the camera's position is 'presumed to be fixed. Hence if something moves in the picture *this motion is at first seen as a movement of the thing itself* and not as the result of a movement of the camera gliding past a stationary object'.[45] This 'relativity of movement in film', as Arnheim calls it, can even result in movements on screen that completely contradict those performed during production.[46] This is also what I am suggesting is demonstrated by exo-centric images.

Even if we forego Arnheim's assumption that the camera is fixed until proven otherwise, the author's explanations perfectly exemplify Bordwell's conclusion that: 'For the camera movement effect to occur, monocular movement parallax must be read from the entire visual field. If only a part or item in the visual field yields that differential angular velocity across time, then camera movement will not be specified — only the movement of that object will be specified'.[47] In doing so, Arnheim also confronts us with the hermeneutic character of camera movement. To wit, perceiving the movement of the camera in the image asks of us to decipher purely visual cues, without the use of the kinesthetic stimuli that would usually allow us to perceive movement as either subjectively performed or objectively witnessed.

EXO-CENTRIC IMAGES AND THE REVERSAL OF BODY-SPACE RELATIONS

Arnheim's inclination to describe a simple panoramic camera movement as depicting the displacement of all objects in space around a stationary camera is an inspiring springboard toward an analysis of the effect produced by exo-centric images. If, like Bordwell and Arnheim before him we choose to focus on the *appearance* of camera movement on screen rather than on any preconceived notions about *if* or *how* a camera moved during production, what 'camera movement effect' can we say is produced by the exo-centric technique?

Consider the exo-centric image featured in *Requiem for a Dream*. Although there have been scores of exo-centric images in films and moving image media in the decades since the film's release, it remains the paradigmatic example of this technique and of its strange reversal of body-camera-space relations. Among the three sequences in Aronofsky's film that use this technique, the best known one occurs halfway through (01:00:20-01:01:25), when Marion (Jennifer Connelly), leaves the apartment of her psychiatrist after exchanging sexual favours for drug money. The 'camera movement effect' used to convey the unsettling feeling of this scene has the side effect of leaving us with a deep uncertainty as to the (camera-)body-space relations presented on screen.[48] If we were to describe the movements of the camera 'objectively', as it took place on set, we could easily start by noting that it was attached in front of the body of the actress. We would then describe how, equipped with this device, Connelly walked down a lengthy corridor before turning right, calling the elevator, going down to the ground floor and exiting the building, all the while transporting the camera along with her. In this case of passive locomotion — where the camera was simply carried by the actress — should we say that the camera was moving backward in the corridor, that it turned left to get to the elevator, and so on? In the strictest technical sense, these descriptions would indeed be correct with regard to the displacements of the camera within profilmic space. However, several problems would come from this approach.

Firstly, such an attempt at describing the camera's movements 'objectively' would obfuscate the fact that the camera did not move autonomously; that it was subject to the movements of the actress. Secondly, and as a result of our own limited access to this movement, we must also ask ourselves how this unique camera-body-space relation *appears* on screen, regardless of the movements we imagine the camera to have performed during production. Limiting ourselves to the visual cues this exo-centric sequence affords us, what can we glean about the origin and nature of the movement depicted on screen?

The sequence starts with Marion in the centre of the image, a position from which she does not move during the entire scene. The first of the three shots contained in this one-minute sequence begins when the wall behind Marion starts to move around her, counterclockwise. The vanishing lines that pointed to the left of the screen disappear when the wall fills the frame, then reappear

Fig. 2:
Beginning and end of the 180° rotation. The wall identified in yellow moves around Marion. Screen grab, *Requiem for a Dream* (Darren Aronofsky, 2000)

to the right of the frame as the wall continues its rotation totalling 180° [fig. 2]. Once the rotation is complete, the camera faces Marion and the man's apartment; all three are aligned. As the sequence advances, the man's apartment recedes into the background while Marion remains motionless in the centre of the frame [fig. 3]. Her immutable position at the centre of the image is crystallized by the rotations of the world around her once she has reached the end of the corridor.

Already, we find that all the visual cues contained in the image convey the impression of a body in a state of (relative) immobility; in the eyes of the camera, Marion has not changed position since the beginning of the sequence. According to Bordwell's conclusions — indebted to Gibson's theories and shared by his successors, including Gaudin and Schonig — the appearance of a partial transformation of the environment suggests that only changing elements are in motion. In other words, as Arnheim similarly concluded, 'if something moves in the picture *this motion is at first seen as a movement of the thing itself* and not as the result of a movement of the camera gliding past a stationary object'.[49] Otherwise, everything that remains fixed in the image is presumed to have been motionless. By extension, and as Bordwell concludes, '[f]or the camera movement effect to occur, monocular movement parallax must be read from

the entire visual field'.[50] In the case of *Requiem for a Dream*, these cues suggest the immobility of the character's body and the movement of all other elements in space around her. This is the very impression that all examples of exo-centric images in narrative cinema evoke.

Although the *Requiem for a Dream* sequence continues with two changes in the camera's position (it moves behind Marion and then back in front of her), these descriptions are enough to draw some conclusions regarding the shift that occurs when leaving behind the presuppositions that come with the vocabulary of film analysis. Specifically, I have chosen to describe this exo-centric image as depicting a body perfectly fixed in the centre of an otherwise moving space. This interpretation is encouraged by the relative immobility of the body in the eyes of the camera. Echoing Arnheim's equally eccentric description of a panning camera which gives rise to the impression that space is moving around a stationary camera, my analysis of *Requiem for a Dream*'s exo-centric image highlights how ambiguous the 'camera movement effect' really is. Similarly, borrowing from Jordan Schonig's interpretation of the gestalt shift that occurs when seeing camera movements in altered viewing conditions, I suggest the approach I have proposed here, 'doesn't modify the image itself, but merely

Fig. 3:
The vanishing point (identified by yellow lines) moves into depth as Marion remains fixed in the centre of the frame *Requiem for a Dream* (Darren Aronofsky, 2000)

alters the "normal circumstances" under which the visual effects of the moving camera can be seen'.[51]

CONCLUSION

By modifying a single aspect of our engagement with camera movement — rejecting the habitual, profilmic-focused vocabulary in favour of descriptions based purely on the appearance of visual cues — my goal in this essay has been to shed light on the inherent relativity of camera movement. We know that the camera did in fact move on set while filming *Requiem for a Dream*, but the absence of any *relative movement* between the camera and the actress who was carrying reflects another reality. A similar conclusion can be drawn from less unusual techniques for moving the camera. Even the seemingly simple example of a camera fixed onto the front of a moving car — as in the case of Locke described earlier — becomes ambiguous when we start questioning what the frame of reference should be for describing its movements. Ultimately, using a vocabulary anchored to the profilmic context keeps us from engaging more viscerally with the formal effects that camera movements produce on screen regardless — even *in spite* — of *if* or *how* the camera moved during production.

Thankfully, recent scholarship has shown that, now more than ever, camera movement is recognized as a complex phenomenon deserving of a more sustained theoretical engagement. Returning to the example with which we opened this essay, however, leaves us with further questions about the way camera movement might be analysed. The opening shot of *Gravity* is emblematic of a new production context that is transforming both the camera, and the things it is expected to do in narrative films: virtual production. In virtual production, camera, space, and all elements that compose the film (e.g., sets, lighting, actors, costumes, etc.) are transformed into digital data. The immateriality of the 'function' that the camera has become also allows it to cross space without any physical limits (volume, speed, course, etc.).[52] As there is no physical film set to speak of in some of these virtual productions, this context raises new questions as to the relevance of an analytical language based in descriptions of the movements of a camera in profilmic space. What is the nature of movement in this virtual cinema? What happens to the division between profilmic and scenographic spaces? How can we deduce the movements of the device in relation to space if they are now, ontologically speaking, one and the same thing?

Notes

[1] See Scott C. Richmond, *Cinema's Bodily Illusions* (Minneapolis: University of Minnesota Press, 2016); Ryan Pierson, *Figure and Force in Animation Aesthetics* (New York: Oxford University Press, 2019); Daniel Morgan, *The Lure of the Image: Epistemic Fantasies of the Moving Camera* (Oakland: University of California Press, 2021); Jordan Schonig, *The Shape of Motion: Cinema and the Aesthetics of Movement* (New York: Oxford University Press, 2021).

[2] David Bordwell, 'Camera Movement and Cinematic Space', *Ciné-Tracts*, 1 (1977), 19.

[3] Vivian Sobchack, 'Toward Inhabited Space: The Semiotic Structure of Camera Movement in the Cinema', *Semiotica*, 41 (1982), 317–335 (317).

[4] Bordwell, 24.

[5] Adriano D'Aloia, 'The Character's Body and the Viewer: Cinematic Empathy and Embodied Simulation in the Film Experience', in *Embodied Cognition and Cinema*, ed. by Maarten Coëgnarts and Peter Kravanja (Leuven: Leuven University Press, 2015), 187–199; Kristen Whissel, 'Parallax Effects: Epistemology, Affect and Digital 3d Cinema', *Journal of Visual Culture*, 15 (2016), 233–249; Ryan Pierson, 'Whole-Screen Metamorphosis and the Imagined Camera (Notes on Perspectival Movement in Animation)', *Animation*, 10 (2015), 6–21; Tom Gunning, '"Nothing Will Have Taken Place – except Place": The Unsettling Nature of Camera Movement', in *Screen Space Reconfigured*, ed. by Susanne Ø. Sæther and Synne T. Bull (Amsterdam: Amsterdam University Press, 2020), 263–281; Morgan, 17–19.

[6] Pierson, 17.

[7] D'Aloia.

[8] Richmond.

[9] Philippe Bédard, 'L'espace exo-centrique au cinéma', *Écranosphère*, 4 (2020), 7–23; Bédard, 'Going Beyond the Human Perspective: GoPro Cameras and (Non)Anthropocentric Ways of Seeing', in *Versatile Camcorders: Looking at the Gopro Movement*, ed. by Winfried Gerling and Florian Krautkrämer (Berlin: Kadmos, 2021), 45–61; Bédard, 'Un regard hors de soi : Étude des rapports entre corps, caméra et espace dans l'histoire des techniques de prise de vues au cinéma' (Ph. D. thesis, Université de Montréal, 2021).

[10] Bordwell, 21.

[11] Schonig, 121.

[12] For an in-depth study of the narrative functions of exo-centric images, see Bédard, 'Situating the Camera: Third-Person Images and the Question of Point of View in Narrative Cinema' (Master thesis, Concordia University, 2015). Note that while what I call here 'exo-centric images' can be found in almost any type of moving image media — as long as there are a body, a camera, and a space – I have limited my examples and sources to narrative films here simply for the sake of efficiency.

[13] Here too, we can find exceptions to this definition. The camera can be attached to a vehicle, an animal, or any other nonhuman body. For the sake of clarity and because there are more prevalent, I will focus on exo-centric images that feature the human body.

[14] Like Steadicam, Kodak, GoPro and so many other genericized trademarks, the name Snorricam is often used indiscriminately to describe 'a camera device used in filmmaking that is rigged to the body of the actor, facing the actor directly, so when they walk, they do not appear to move, but everything around them does'. <https://www.snorricam.com/home> [accessed 23 April 2022].

[15] Most films use the frontal arrangement, as seen in *Requiem for Dream*, *Mean Streets*, and *The Hangover*. Cameras mounted behind the actor in this exo-centric position would produce an over-the-shoulder perspective reminiscent of third-person points of view in video games, as showcased in *Seconds* (John Frankenheimer, 1966). Finally, still fewer films have used a rotating exo-centric perspective, with only *Angst* (Gerald Kargl, 1983) coming to mind. However, this orbiting exo-centric point of view is much more common in GoPro videos. See 'Situating the camera'.

[16] Pierson, 9.

[17] Bordwell, 20, emphasis in the original.

[18] Patrick Keating, *The Dynamic Frame: Camera Movement in Classical Hollywood* (New York: Columbia University Press, 2019).

[19] See Antoine Gaudin, *L'espace cinématographique: Esthétique et dramaturgie* (Paris: Armand Colin, 2015), 7–8.

[20] In navigational sciences, these would be called egocentric and exocentric, respectively. For a more sustained discussion of these concepts and their relation to camera movement, see 'Un regard hors de soi'.

[21] Morgan.

[22] Sobchack, 317.

[23] James J. Gibson, 'The Visual Perception of Objective Motion and Subjective Movement', *Psychological Review*, 101 (1994), 318–323 (318).

[24] Jacques Paillard, 'Les déterminants moteurs de l'organisation de l'espace', *Cahiers de psychologie*, 14 (1971), 261–316 (272), emphasis added. My translation of: 'le mouvement de l'image rétinienne résultant du déplacement commandé de l'œil serait interprété au plan perceptif comme un mouvement du corps par rapport à un univers stable et non comme une mobilité de l'univers extérieur par rapport au corps'.

[25] Maurice Merleau-Ponty, *The Phenomenology of Perception* (New York: Routledge, 2010), 324.

[26] Ibidem.

[27] Indeed, Merleau-Ponty issues a warning that 'to say that motion is a structural phenomenon is not to say that it is 'relative'. The very peculiar relationship which constitutes movement does not exist *between objects*', ibidem, 323–324. Nevertheless, I insist on calling 'relative' this perception of movement which imparts on this object or that the movement an individual perceives, according to whether they are focussing on this or that.

[28] Ibidem, 324, emphasis added. Another instructive example in this regard is Merleau-Ponty's description of a patient with paresis of the oculo-motor muscles: 'A subject whose oculo-motor muscles are paralysed sees objects moving to his left whenever he believes that he is turning his eyes towards the left', ibidem. 55. Convinced that they have moved their eye to the left, the patient's perception of their surrounding shifts to account for the expected movement; they attribute to the outside world the movement they want to accomplish themself.

[29] Gibson, 318.

[30] Ibidem, 319.

[31] Merleau-Ponty, 326. The illusory subjective movement will be proportionally inverse to that of the visual stimulus caused by the moving train in peripheral vision, so that a neighbouring train that 'retreats' (which goes in the opposite direction to that which one is facing) will give one the impression that they are moving forward.

[32] Ibidem.

[33] Kurt Koffka, 'Perception: An Introduction to the Gestalt-Theorie', *Psychological Bulletin*, 19 (1922), 531–383 (578).

[34] My translation of: 'S'agit-il d'un mouvement de caméra par rapport au fond du plan, ou bien d'un plan fixe sur les personnages (avec un décor mouvant) ?', Gaudin, 129.

[35] Bordwell, 22.

[36] Art historian Ernst Gombrich quotes J. R. Beloff to the effect that: 'Perception may be regarded as primarily the modification of an anticipation', to which Gombrich adds, still about perception: 'It is always an active process, conditioned by our expectations and adapted to situations'. Ernst H. Gombrich, *Art and Illusion: A Study in the Psychology of Pictorial Representation* (Princeton: Princeton University Press, 1961), 136.

[37] Bordwell, 21.

[38] Gaudin, 129; Schonig.

[39] Bordwell, 20–21, emphasis in the original.

[40] Pierson, 7.

[41] In a way, these questions are a continuation of those asked by Gibson, namely 'How do we see the motion of an object? How do we see the stability of the environment? How do we perceive ourselves as moving in a stable environment?', Gibson, 318.

[42] Indeed, as Sobchack cleverly articulates, 'we can see the film's seeing as the seeing of another who is like myself, but not myself'. Vivian Sobchack, *The Address of the Eye: Phenomenology of Film Experience* (Princeton: Pinceton University Press, 1992), 136.

[43] Rudolf Arnheim, *Film as Art* (Berkeley, Los Angeles and London: University of California Press, 1957), 30.

[44] Ibidem, 30–31, emphasis added.

[45] Ibidem, 32, emphasis added.

[46] Ibidem.
[47] Bordwell, 22.
[48] Keating would call these images 'semi-subjective', following Jean Mitry's use of the term. For an in-depth analysis of exo-centric image through the lens of the Mitry's semi-subjective point of view, see 'Situating the Camera'.
[49] Arnheim, 32, emphasis added.
[50] Bordwell, 22.
[51] Schonig, 121.
[52] See Mike Jones, 'Vanishing Point: Spatial Composition and the Virtual Camera', *Animation*, 2 (2007), 225–243.

A Gestalt Theory for 'Disorder': From Arnheim's Ordered Chaos to Brambilla's Entropic Art

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The article revisits the concept of entropy in art as discussed by Gestalt psychologist and art theorist Rudolf Arnheim. His discussion of artworks and their reception as complex dynamic fields where the forces of entropy and orderliness counter and complete each other, are brought into dialogue with newer approaches, from the perspective of complexity theory and neuroscience, to the dynamics of perception and to entropic processes in the brain. I will argue that even though Arnheim's observations can still be valuable for contemporary art criticism they need to be updated as they tend to overstate the tendency for order as well as the visual aspects of reception in the expense of multimodal and embodied aspects. In light of these observations, I will discuss contemporary cases of 'entropic' art through the moving image works of Marco Brambilla, their aesthetics as well as the 'structural themes' arising and the Gestalt processes involved in their reception.

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Entropy as a measure of uncertainty in information theory and as an indication of the tendency for disorder through energy loss according to the second law of thermodynamics could be considered synonymous with dissolution and disintegration of form. In this sense it is antithetical to Gestalt theory's interest in form and the process of its emergence. This contradiction is the reason we are drawn to prominent art theorist and Gestalt psychologist Rudolf Arnheim's interest in entropy and its connection to Gestalt principles, as well as its application to art. His contribution is further important as it strengthens the thread that links Gestalt psychology, through the dynamics of perception, with more recent approaches like dynamical systems neuroscience, which is also interested in the concept of entropy and how it plays out in cognitive processes.

Following physicist Max Planck,[1] Arnheim associates entropy with 'elementary disorder' that irreversibly increases and ultimately drives a system and its surroundings towards total degradation. On the notion of disorder he also quotes Gestalt psychologist Wolfgang Köhler: 'The word disorder applies suitably to physical states in which a multiplicity of elements pursue mostly independent paths but, for short times, come into physical connection'.[2] So Arnheim applied this notion of entropy-as-disorder to art: 'A visual parallel can be found in works

of art that appear to consist of unrelatable units. The components strain to adapt to one another, fight each other, come apart. The disorderly pattern is perceived as a combination of independent units locked in unreadable conflict'.[3] But what would be an entropic artwork for Arnheim? As opposed to the tendency for artistic simplicity, he writes,

> *The other tendency, relying on accidental or deliberately produced disorder, can be traced back to a predilection for compositions of randomly gathered subject matter in Dutch still lifes, untidy scenes of social criticism in the generation of Hogarth, groups of unrelated individuals in French genre scenes of the nineteenth century, and so on. In modern painting we note the more or less controlled splashes and sprays of paint, in sculpture a reliance on chance textures, tears or twists of various materials, and found objects.*[4]

His examples here come mainly from painting, although we could also find such in film — notably in Soviet Montage in which conflict played a key role, and multiplicity manifested in space (due to compositional elements maintaining their heterogeneity and certain 'independence') as well in time (due to frequent cutting resulting in a high number of shots). Steve Odin refers to Eisenstein's 'monism of ensemble'[5] at the core of his conception of montage, where shots are juxtaposed to create a total impression, not just accompanying each other but functioning as 'elements of equal significance'.[6] Even though Arnheim writes on entropy as disorder, his main interest is in the way the increase of entropy can build a higher level of order. He refers to order as a process rather than as a set property of a form, being mostly interested in order as emergent from randomness and disorder. No matter how complex a structure, it can show a certain degree of 'orderliness'. Homogeneity is the simplest way of ordering material ('the most elementary structural scheme')[7] — and from there various degrees of ordering can emerge. Artistic creation thus becomes a self-regulatory process of ordering — and the same applies to the reception of art. Only from a macro-perspective can order be discerned, as Arnheim argues: 'only when we look at macrostates rather than at the single elements that comprise them'.[8] In this sense, entropy can also be created through repetition, which might be redundant for information theory but useful for art, as it might contribute to the emergence of a structural theme. For example, Arnheim refers to 'the processions of almost identical human figures on the walls of San Apollinare Nuovo in Ravenna';[9] their grouping makes a new form emerge, that of a multitude of worshipers different than the sum of its parts, which affects the beholder perceptually as well as emotionally. While Gestalt psychology's concept of 'Prägnanz', interpreted (wrongly for Arnheim) as 'good form', has been well known and rather influential, Arnheim is critical of confusing the notion of order with Prägnanz. As he argues,

> *Order can be analyzed with the tools of Gestalt psychology, which, in principle, has ways of determining levels of complexity as well as degrees of orderliness. This does not mean that a high level*

> *of order is the same as a 'good Gestalt' — an unfortunate term, which, in some of the early Gestalt writings, burdened a purely descriptive concept with a value judgment and made a definite structural condition look subjective and vague. The term was used to describe the tendency toward regularity, symmetry, simplicity, best named 'the law of simplicity' or perhaps 'the law of dynamic direction,' as Köhler called it in 1938. Because of the vagueness of the term, 'good Gestalt'. the law of simplicity was readily confused with 'praegnanz', meaning clear-cut structure, or with whatever else may be perceptually and aesthetically enjoyable, interesting, appropriate, or useful. [...] [T]he law of simplicity refers only to orderliness attained by tension reduction.*[10]

As it becomes apparent from this passage, Arnheim's view of order is dynamic, aligned with a tendency for tension reduction, rather than a finite state — and much less, indeed, a value judgement associated with 'good' Gestalt. Artworks are not interesting only when they offer harmonic compositions and well-recognizable shapes, but when they invite perception to respond with 'acts of recognition',[11] through a dynamic movement that makes forms emerge. Here Arnheim of course stays faithful to the basic tenets of Gestalt theory, and to Köhler's 'law of dynamic direction' expressed in field processes where wholes and parts interact, and where the tendency for tension reduction coexists with 'a tension-increasing articulation'.[12] Despite this, however, Arnheim insists on the necessity of order, not only in art (where he finds it 'a necessary although not a sufficient condition of aesthetic excellence'),[13] but also in life, as 'order is a prerequisite for survival; therefore the impulse to produce orderly arrangements is inbred by evolution. [...] A pervasive striving for order seems to be inherent [...] in the human mind — an inclination that applies mostly for good practical reasons'.[14] Artistic striving for order is embedded in this wider tendency. Entropy is still fascinating for Arnheim as it brings forward these dynamics of orderliness that counter entropy's drive towards disorganization, homogenization and shapelessness.

ENTROPIC ART

Arnheim finds art that engages with chance and contingency and contains units coexisting in tension to be in dialogue with entropy, countering its formless tendencies. He insisted that in order to be meaningful, contingency should be subsumed to a certain structural theme 'anabolically' established (referring to anabolism as a molecular process of building complexity through energy storage), 'which *introduces and maintains tension*'.[15] He was thus rather critical of artistic attempts to create the impression of randomness and entropy without subsuming it to a structural theme. He particularly refers to 'certain avant garde attempts in film editing [insisting on this point since the 1930s when in his writings on film, he criticized Carl Theodor Dreyer's *La Passion de Jeanne d'Arc* (1928) for the same reason],[16] or the multiplication or mixing of

media to combine disparate elements more or less at random. [...] [B]ut mere randomness of combination does not suffice to create readable complexity'.[17] Such works are not entropic for Arnheim, as they do not involve the anabolic process of spending energy and building tension through the process of organization:

> *A mind released from the demands of organized experience may content itself with the shapelessness of accidental materials, happenings, or sounds. Mere noise involves a minimum of structural tension and therefore calls for a minimum of energy expended by producer and recipient, in spite of creating the illusion that much is going on. In the extreme case, again, it will reach the emptiness of homogeneity.*[18]

He concludes that artistic techniques used to create noise in art, when not handled with competence, lead to chaos, 'which is very close to saying nothing'.[19] A good sense of form on behalf of the artist can bring forth interesting and even beautiful structural themes, but 'mere randomness of combination does not suffice to create readable complexity'.[20] Neither, however, a complex order, even if it corresponds to a level of complexity that the human mind can handle is for Arnheim a sufficient condition to make an artwork valuable. What is mostly important, he remarks, 'is that this order reflect a genuine, true, profound view of life'.[21] We should not interpret Arnheim's remark as a call to naturalism or representational realism (Arnheim was after all a devoted formalist), but rather as a call to art that, as he writes, 'makes visible or audible' a particular form of order of the human condition. Art that becomes a message exactly because of this coupling with the human observer or listener — and not because of its complexity *per se*, but because of its profound meaning communicating something anew, or offering a new perspective on life: 'A structural theme deserves to be ordered, to become a message, because of what it says about man and world'.[22]

GESTALT THEORY AS COMPLEXITY THEORY?

Arnheim's fascination with entropy and his discussion of it in the context of artistic complexity is insightful and important in that it brings the Gestalt theory of art in dialogue with complex systems theory. A number of points he makes is compatible with approaches that were developed in later decades — even though it could be said that complexity theory was not unknown to the art and humanities in the 1970s, for example in the work by Gene Youngblood on expanded cinema or Buckminster Fuller's 'synergetics'.[23] Particularly, Arnheim places emphasis on the independence of elements out of which wholes emerge rather than on wholes alone. In this sense, to an extent his analysis in *Entropy and Art* could be considered to share the perspective of what Ian Bogost calls 'new complex systems theory'.[24] The latter differs from earlier 'classical' systems theory in that it privileges bottom-up approaches, placing emphasis on

the way units interact and form aggregates that are different than the sum of their parts, further becoming themselves subsystems of larger organizations in a process of growing complexity. In a later essay from 1990, Arnheim confirms his earlier stance defending with a greater awareness Gestalt theory as a complex systems theory and insisting on a two-way determination of Gestalt wholes, as 'any description uniquely favoring the role of either the part or the whole will fail to do justice to the richness of field processes'.[25]

Arnheim's emphasis on dynamics of orderliness that use energy to create structure out of disorder is compatible with a paradigm change that according to Katherine Hayles took place in systems theory after the 1970s, according to which randomness is not 'simply [...] the lack of pattern [...] but [...] the creative ground from which pattern can emerge'.[26] Pattern and randomness are found in a productive dialectic, as systems achieve higher levels of complexity with the 'infusion of noise'.[27] Even though Arnheim might not have embraced chaos as a force of emergence so enthusiastically, he nonetheless regards it as a necessary condition for order and meaning to emerge, thus his perspective is quite progressive in this respect, and reveals how Gestalt theory —on which his thinking is based, more than it is based on physics and thermodynamics — is linked to these later developments. Moreover, Arnheim's view of making meaning is compatible with ideas emerging around the time of *Entropy and Art* on autopoietic coupling of system and environment — as proposed by Humberto Maturana and Francisco Varela in 1972 in their theory of autopoiesis.[28] In their seminal work on cognitive neuroscience and philosophy, *The Embodied Mind* (1992), which drew on autopoiesis, Varela, Evan Thompson and Eleanor Rosch point out that the constitution of patterns is fundamental to the way a system 'couples' with its environment, and is associated with the way autopoietic organisms self-organize by relating and dealing with external complexity: 'over time this coupling [of a system with its milieu] selects or enacts from a world of randomness a domain of distinctions [...] that has relevance for the structure of the system. In other words, on the basis of its autonomy the system selects or enacts a domain of significance'.[29] The meaning Arnheim looks for in an artwork does not have to do so much, as already pointed out, with its technical competence and formal complexity per se, but with its ability, through its structural theme or pattern, to create a domain of significance, and therefore a world that is meaningful to the beholder, who, in this perspective, would be a system as well, coupling with the work.

FROM ENTROPY TO ORDER AND BACK TO ENTROPY: THE COMPLEXITY OF SYSTEMS FROM GESTALT TO DYNAMICAL SYSTEMS THEORY

Even though, as Wagemans et al. argue, the Berlin School of Gestalt psychology, the teaching of which Arnheim follows in *Entropy and Art* (particularly that of Köhler), 'tended to emphasize properties of the system above properties of the system elements' and to consider form superseding its elements in a 'one way global to local determination',[30] they recognize that Gestalt theory's ideas paved the way for later theories of dynamic cognitive organization, such as dynamical systems neuroscience. Arnheim's reference to the neuronal basis of Gestalts in art's reception is through Köhler's electromagnetic field theory of brain functioning. Perceived forms, for example in a visual composition of an artwork — a dynamic field in itself according to Arnheim — corresponds to a neuronal cortical field that is isomorphically dynamic, 'because only when the forces constituting a process are sufficiently free to interact can a pattern organize itself spontaneously according to the structure prevailing in the whole'.[31] Even though it is debatable whether Köhler's particular theory still has bearing in modern neuroscience (with some claiming it has been disproved while others that it is compatible with newer theories of consciousness),[32] field theory takes a holistic and dynamic perspective on neuronal organization; but its tendency to consider these dynamics tending always to a certain equilibrium is less supported when taking a contemporary dynamical systems theory perspective that sees brain dynamics inherently entropic and considers instability the fundamental state of neuronal functioning. Ordered areas, represented by attractors in the brain's state-space, are never stable, as the mind's dynamics is 'metastable', meaning that its normal condition is to drift, as neuroscientists Emmanuelle Tognoli and Scott Kelso note, between and away from stable regions (represented by 'attractors' in the brain's state-space). [33] The concept of the 'entropic brain' that has been recently proposed by Carhart-Harris et al. is based on states of 'disorganization' of the brain's function. Such are states of 'criticality', 'the property of being poised at a "critical" point in a transition zone between order and disorder'.[34] Entropy increases when the mind-brain is under the influence of substances (such as hallucinogenics) but also in different conditions and states of uncertainty, which can be reached through different avenues, ranging from dreaming to art. When the brain system's entropy increases, the multiplicity of potential states rises, and the system acquires a 'maximum sensitivity to perturbation',[35] which means that it can easily and unpredictably switch to different directions. In this perspective, processes of formation of Gestalts in perception and consciousness are never complete or stable. Carhart-Harris et al. distinguish between the secondary 'waking'

consciousness and the 'primary' brain states of risen entropy. Secondary consciousness shows an 'entropy-suppressing function' that 'serves to promote realism, foresight, careful reflection and an ability to recognize and overcome wishful and paranoid fantasies. Equally however, it could be seen as exerting a limiting or narrowing influence on consciousness'.[36] It is interesting how both Arnheim in his discussion of entropy in the early 1970s as well as the entropic brain theorists (re)turn to Freud: Arnheim in stressing the need for 'tension reduction', expressed in suppression of drives as well as in the drive towards order and structure, and Carhart-Harris et al., from the opposite end, in arguing that the entropic brain in its primary states corresponds to the Freudian unconscious, with the rise in criticality releasing tension that the secondary, normal waking consciousness suppresses. A similar attitude, open to the destabilizing forces of entropy as a positive organizing force, can be discerned in both cases, however more emphatically and decisively in the case of Carhart-Harris et al. because of the change of paradigm that took place in cognitive science during the past few decades.[37]

NEW ENTROPIC ART? THE CASE OF MARCO BRAMBILLA' S MEDIA ART

Arnheim's observations on art and entropy can be useful when considering contemporary works representing the 'tendency for disorder' through multiplicity and randomness in their composition. One could argue that complex compositions, which resemble the 'French genre scenes of the 19th century' Arnheim mentions but have also evolved in their complex and mixed-media environments such as those I will shortly discuss, resist macrostructure, or rather offer dynamic and unstable macrostructures, because from the beholder's perspective, engaging with different parts of the work might make new macrostructures and patterns emerge.

This is not, of course, a characteristic of new media art only. Such dynamics bring to mind works in the tradition of op art, for example Bridget Riley's *Composition with Circles 2* (2001): the more you look at its multiple, almost identical patterns, the more constellations and shapes you can discern, while old ones fade and new ones emerge continuously. The dimension of time is fundamental in the experience of such dynamic artworks, and becomes even more so in the arts of the moving image. It would thus not be entirely accurate to call these dynamic and transitive macrostructures 'order'. Moreover, even orderliness as a tendency for Gestalt ordering might not be the most essential aspect of the beholder's experience, as the mind-body is engaged and challenged in different ways in works that surpass the pictorial.

Contemporary media artworks such as those of Marco Brambilla make an interesting case to explore such issues. Brambilla produces moving image work that is quite versatile in terms of styles, techniques and media used, ranging

from large-scale 3D video collages and panoramas (e.g., the *Megaplex* series: *Civilization, Evolution, Creation*, 2008-2012) to music videos (for rapper Kanye West's song 'Power' (2010)) or the stage video-projections for Debussy's opera *Pelléas et Mélisande* (2018) produced by Opera Vlaanderen and directed by Aviel Cahn.

Brambilla's work Civilization, the first piece of the *Megaplex* trilogy, is a piece originally commissioned by the NYC Standard Hotel and designed to be installed on the side of its elevator shaft which would thus function as projection surface for the work to be watched from the lift's interior. The shaft's long vertical surface became a tableau populated with an excessive multiplicity: hundreds of videos projected and overlaid to compose baroque collages. Brambilla worked with Photoshop in his studio to make the collages as still canvases on which, aided by technicians and VFX artists (Crush studio), he overlaid sampled clips from Hollywood movies projected in loops on these canvases. Over four hundred video clips thus composed a huge 'video mural', which the elevator passengers could experience as a trip from hell to heaven, as the lift goes up, and from heaven to hell as it goes down.[38]

Brambilla often adopts in his work the technique of collage, consisting of — in Arnheim's expression — 'unrelatable units' which bring into dynamic interplay the unit with the whole. As he explains in an interview, 'Collage is the point of departure, juxtaposing imagery then superimposing looping visuals onto one another and setting cuts from various films into each other to create original narratives. They function much like the parabolic style of Hieronymus Bosch who layered fables and proverbs as detailed notes within a big picture'.[39]

As already noted, the piece *Civilization* gave birth to a trilogy of large-scale 3D video installations called *Megaplex* to evoke the homonymous cinema theaters in the US, hinting at Brambilla's background as a filmmaker and his passion for cinema. The embodied engagement of the beholder in this series of works (in the case of *Civilization*, ascending — or even descending in the case of the elevator projection — on a journey to heaven) presumably changes the affect of the images as well as the emerging Gestalts and narratives each time a visitor takes a journey.

Experiencing *Civilization* in an elevator differs from experiencing this and the other vivid 'tableaus' of the series in a museum or gallery space — which has been the case, as *Megaplex* was exhibited in various places internationally. Following the regular, steady and mechanical movement of the elevator differs from the less restricted bodily engagement of the gallery visitor, who, unlike the hotel visitor, can experience the work in 3D. The three parts of the trilogy involve camera movement in three different axes: *Civilization* as already noted moves on the vertical axis, *Evolution* on the horizontal axis (as it unfolds like a pre-cinematic panorama, scrolling sideways), while *Creation* is a 'cosmic pull back' on the z-axis. These types of movement are conceptually linked to the works (*Civilization* for example evokes religious themes while *Evolution* refers to historical and chronological development), building embodied metaphors that make such concepts felt on a precognitive level.

Areas of orderliness are certainly present within this multiplicity, as the swarm of looping videos in each moving mural is placed in a certain way with an intention to form patterns discerned from a vantage point. In all cases, however, there is an effect of 'excess' — not only spatial (due to the multiplicity of scenes, the large scale of the installation and the high number of these 'detailed notes' contained in the canvases) but also temporal, as what the viewer 'catches' each time is dependent on the speed of the images' (as well as the viewer's own) movement — which is never enough to properly attend to the work, and makes it hard to remember it in detail. In *Megaplex*, as described on Brambilla's website, 'The hyper-saturated tableaus test the limits of visual overload, looping and interlacing in a way that confounds the temporal parameters of the moving image'. Brambilla's work as a whole often evokes the sense of visual overload which certainly exceeds the 'visual' itself, involving the whole sensorium. This also applies to the music video Brambilla made for artist Kanye West's song 'Power', where influences from Renaissance paintings are here too discernible in the multiplicitous composition and arrangement of elements. The visual, or rather 'sensory',[40] overload consists of trying to include as much as possible within the limits of a projection surface, experimenting with its form, as well as extending it in time.

Brambilla's interest in excess, as well as in infinity, becomes manifest through the use of multiplicity and superimpositions, looping elements and kaleidoscopic elements, as well as formal and mathematical infinite multiplication, as in his other work under the title *Constellation* (2015), described as 'a computer-generated video sculpture' performing a multiplication based on the recursive series of Fibonacci numbers, creating a fractal shape through a sphere 'surrounded by a tryptic of projections', and 'replicated many times in space'.[41] The multiplicity and heterogeneity that characterizes Brambilla's moving-image work challenges, as already broached, the formation of Prägnanz. In fact, entropy seems more dominant here, as well as the dynamical processes of formal change rather than equilibrium. Brambilla's works can in this sense be considered contemporary combinations of order and chaos.

The relationship between this excessive multiplicity and entropy becomes perhaps even clearer in Brambilla's recent kinetic sculpture *Winklevii: Bigger Than Both of Us* (2021). In this digital animated sculpture, the busts of Cameron and Tyler Winklevoss, twin brothers considered among the early adopters and ambassadors of the bitcoin cryptocurrency, are shown back-to-back, rotating, inflating, deforming, multiplying and dissolving. The work, inspired by the paintings of Francis Bacon, uses digital morphing to visually alter the form of the avatars, while it is accompanied by sampled audio pieces of speech, soundbites from interviews with the brothers containing their most used words and phrases representing the terminology of cryptocurrency. These make a soundtrack that, in Brambilla's words, 'becomes a mantra, and when you repeat and you loop it and you cycle it, it becomes almost hypnotic'. Thus the aural modality of the work matches the visual one's tendency for excess and oversaturation. As a result its energy 'becomes more and more about entropy', 'a cyclone of

information'.[42] As arts editor Virginia Valenzuela remarks in her article about the piece for *SuperRare* magazine, entropy in this sense represents 'a decline into disorder, a theme which permeates throughout Brambilla's *Winklevii*:[43] 'the artwork reaches its manic climax of revolving figures and mantras before crashing back down to the start of its original aspirational anthem, only to build up again in a never ending cycle of rise and fall'.[44]

Winklevii might be dealing, as the artist intends, with entropy and seemingly resisting the tendencies for 'self-regulation', submitting to chaotic and dispersive drives. It would still, however, be of interest to a Gestaltist like Arnheim because of its processes of trans-formation: the initial forms of the brothers might be changing and deforming but they acquire new, albeit monstrous form — before indeed 'crashing' and reemerging in a loop. They are therefore subjected to processes of orderliness in a way, even though this term would not be doing merit to the work's continuously changing and looping nature. Any emerging forms as well as meaning is volatile and unstable, just like the mind that tends to be continuously drifting from established 'Gestalts'; thus a work not locking to a unifying principle of a structural theme might be more profoundly engaging with the dynamics of the entropic brain.

In any case it is important to keep in mind that orderliness does not emerge (only) in the work itself but in the mind of the perceiver, and is related to the emergence of meaning. One could say that some structural theme(s), even unstable and uncertain ones, can always emerge in the perception and interpretation of an artwork, even when the latter seems to actively resist a unifying principle, such as Brambilla's *Winklevii*. The meaninglessness of *Winklevii* reflects that of the crypto-jargon, in an isomorphic kind of way, which is a Gestalt principle after all. The work adopts the mode of communication of its subject, only to inflate and dismember as a result.

It is not only vision and hearing that contribute to such emergence of meaning (even if this meaning is meaninglessness). Arnheim's discussion of formal structure and meaning through an interplay of entropy and order in art includes the audiovisual but leaves out other non-visual and non-audible ways and modalities through which artworks make meaning, even if they are not subjected to visual or sonic 'orderliness'. For example, his criticism in his 1930s writings on film of Dreyer's *Jeanne d'Arc* for its pointless formalism can be understood, in the context of his later writings on entropy, as equivalent to his criticism of other ('avant-garde') works that create disorder without subsuming it to the powers of orderliness. However, in his criticism Arnheim seems to ignore the work's embodied impact upon the viewer. Effects of cinematography and montage are bodily affective (practiced and theorized as such since Eisenstein) without constructing a specific formal 'structural theme' — still, meaning can emerge through the body. Dismemberment, fragmentation of body and speech and subjection of the body to many different points of view from invisible lookers, as in the case of Dreyer's film, might as well constitute a meaningful message communicated by the choices of cinematography and editing, which invite the viewer to share the protagonist's experience in an embodied way.

When it is the proper image of the body that the work involves, if only to dissolve or dismember it either through editing or digital morphing, certain processes of mirroring are at play (following arguments like those posed by the theory of 'embodied simulation'),[45] as well as what Semir Zeki and Tomohiro Ishizu called a disruption of the 'inherited concepts' of face and body (discussed in the reception of Bacon's paintings) that creates a 'visual shock' and an abnormal neuronal reaction.[46] But techniques such as montage, collage-like juxtaposition, or flicker, also extensively explored in the 1960s avant-garde, primarily invite a bodily sharing of rhythms of image change, and secondarily of movements of actual seen figures and bodies. Thus the corresponding feeling of body of the beholder should not only be discussed from the aspect of 'mirorring' or simulating but also from that of an isomorphism addressing the very processes of image and sound movement and the energies and rhythms that bring the compositional units of the film — in their heterogeneity — into relation and conflict. Phenomenologically such isomorphism might be expressed as altered rhythms of breathing, heartbeat, changes in bodily posture and movements, interoception, etc. Something similar has been proposed by Ellen Esrock through the concept of 'transomatization'.[47]

While Arnheim saw the possibilities of multiplicity, heterogeneity, contingency, and redundancy in art (in various forms and examples from Renaissance to modern art) to increase entropy and thus build complexity through processes of ordering and self-organization, he did not escape some reservation towards what he saw as a misuse of such qualities, in 'avant-garde attempts to mix elements at random', as already broached. In Brambilla's digital works *Metaform No. 1, No. 2, No. 3* (2021), random objects chosen from a digital database compose dense animated collages. They shine, some slowly move or rotate, in compositions evoking the 16th century 'cabinets of curiosities', displays of significant or curious objects that collectors kept and demonstrated in their houses, before museums were established. Each of the *Metaform* collages suggests a multiplicity that does not assimilate or make any meaning as a whole, apart from seen as a collection visualizing that of the stock library of 3D assets it originates from — each object notably accompanied by its URL. It is the unit (as in Bogost's 'unit operations') that digital technology and culture builds upon, making it not only demonstrable as in these digital Wunderkammers Brambilla replicated, but also exchangeable.

In its properly meta-gestaltist title, '*Metaform*' invites us to reflect on what is art, what is left when entropy renders art and cultural objects into a 'heap', i.e. a collection of unrelatable units, and how this noise can again be turned into art that is somehow meaningful.

Notes

[1]See Max Planck, 'Entropy and Temperature of Radiant Heat' [Entropie und Temperatur Strahlender Warme], *Annalen der Physik*, 1.4 (1900), 719–737.

[2] Rudolf Arnheim, *Entropy and Art: An Essay on Order and Disorder* (Berkeley: University of California Press, 1971), 13; quoting Wolfgang Köhler from *Die physischen Gestalten in Ruhe und im stationären Zustand: eine naturphilosophische Untersuchung* (Braunschweig: Vieweg & Sohn, 1920).

[3] Arnheim, *Entropy and Art*, 13.

[4] Ibidem, 10.

[5] Steve Odin, 'Blossom Scents Take Up the Ringing: Synaesthesia in Japanese and Western Aesthetics', *Soundings*, 69.3 (1986), 256–281 (274).

[6] Ibidem, 276.

[7] Arnheim, *Entropy and Art*, 51.

[8] Ibidem, 28.

[9] Ibidem, 17.

[10] Ibidem, 51–52.

[11] Arnheim, *Visual Thinking* (Berkeley: University of California Press, 1997), 90.

[12] See Arnheim, 'The Two Faces of Gestalt Psychology', *American Psychologist*, 41.7 (1986), 820–824.

[13] Arnheim, *Entropy and Art*, 51.

[14] Ibidem, 3.

[15] Ibidem, 52, emphasis in the original.

[16] See Arnheim, *Film as Art* (Berkeley: University of California Press, 1957), 40–41.

[17] Ibidem, 19.

[18] Ibidem, 53.

[19] Ibidem, 19.

[20] Ibidem.

[21] Ibidem, 56.

[22] Ibidem, 55.

[23] See Gene Youngblood, *Expanded Cinema* (New York: P. Dutton & Co, 1970).

[24] See Ian Bogost, *Unit Operations: An Approach to Videogame Criticism* (Cambridge: The MIT Press, 2006).

[25] Arnheim, 'The Vanishing World and Köhler's Inkwell', in *The Legacy of Solomon Asch: Essays in Cognition and Social Psychology*, ed. by Irvin Rock (New York: Psychology Press, 1990), 271–278 (277).

[26] Katherine Hayles, *How We Became Posthuman* (Chicago: University of Chicago Press, 1999), 286.

[27] Ibidem, 25.

[28] See Humberto R. Maturana and Francisco J. Varela, *Autopoiesis and Cognition: The Realization of the Living* (Dordrecht: D. Reidel, 1972). It is worth noting that later Arnheim (in 'The Vanishing World' essay, 1990) criticized autopoiesis for what he saw as an exaggerated emphasis on the living organism as an operationally closed system, and insisted on the Gestalt perspective of a higher reciprocity between organism and environment.

[29] Francisco J. Varela, Eleanor Rosch and Evan Thompson, *The Embodied Mind: Cognitive Science and Human Experience* (Cambridge: The MIT Press, 1992), 155–156.

[30] Johan Wagemans, Jacob Feldman, Sergei Gepshtein, Ruth Kimchi, James R. Pomerantz, Peter A. van der Helm and Cees van Leeuwen, 'A Century of Gestalt Psychology in Visual Perception II. Conceptual and Theoretical Foundations', *Psychological Bulletin*, 138.6 (2012), 1218–1252 (11).

[31] Arnheim, *Entropy and Art*, 4.

[32] See Gerald C. Cupchik, 'A Critical Reflection on Arnheim's Gestalt Theory of Aesthetics', *Psychology of Aesthetics, Creativity, and the Arts*, 1.1. (2007), 16; also see B. I. B. Lindahl and Peter Århem, 'Consciousness and Neural Force Fields', *Journal of Consciousness Studies*, 23.7–8 (2016), 228–253.

[33] Emmanuelle Tognoli and Scott J. A. Kelso, 'Enlarging the Scope: Grasping Brain Complexity', *Frontiers in Systems Neuroscience*, 8.122 (2014), <doi: 10.3389/fnsys.2014.00122> [accessed 25 April 2022].

[34] Robin L. Carhart-Harris, Robert Leech, Peter J. Hellyer, Murray Shanahan, Amanda Feilding, Enzo Tagliazucchi, Dante R. Chialvo and David Nutt, 'The Entropic Brain: A Theory of Conscious States Informed by Neuroimaging Research With Psychedelic Drugs', *Frontiers in Human Neuroscience*, 8.20 (2014),

<doi:10.3389/fnhum.2014.00020> [accessed 25 April 2022].

[35] Ibidem.

[36] Ibidem.

[37] An indication of this much more favorable stance towards entropy is given, perhaps, by recent research arguing that increased brain entropy has been associated with increased intelligence; see Glenn N. Saxe, Daniel Calderone and Leah J. Morales, 'Brain Entropy and Human Intelligence: A Resting-state fMRI Study', *PLoS ONE*, 13.2 (2018), e0191582.

[38] Marco Brambilla and Sean Cochrane, 'Q&A with Marco Brambilla & Civilization – Notes from Crush Senior Artist Sean Cochrane', *Glossy*, <http://glossyinc.com/misc/civilization.html> [accessed 10 January 2022].

[39] Brambilla, 'Marco Brambilla: Astral Projections', *Elephant*, 3 February 2018, <https://elephant.art/marco-brambilla-astral-projections> [accessed 12 January 2022].

[40] Ibidem.

[41] As described on Brambilla's website, <https://www.marcobrambilla.com/work> [accessed 12 January 2022].

[42] Brambilla, excerpt from interview in article by Virginia Valenzuela 'Very Excited, Pumped, Excellent: Marco Brambilla and the Winklevii', *SuperRare*, 24 August 2021, <https://editorial.superrare.com/2021/08/24/very-excited-pumped-excellent-marco-brambilla-and-the-winklevii/> [accessed 13 January 2022].

[43] Valenzuela.

[44] SuperRare, 'Winklevii: Bigger Than Both of Us', <https://superrare.com/artwork-v2/winklevii:-bigger-than-both-of-us-27285> [accessed 12 January 2022].

[45] Vittorio Gallese and Michele Guerra, *The Empathic Screen* (Oxford: Oxford University Press, 2020).

[46] Semir Zeki and Tomohiro Ishizu, 'The "Visual Shock" of Francis Bacon: An Essay in Neuroesthetics', *Frontiers in Human Neuroscience*, 7.850 (2013), <doi: 10.3389/fnhum.2013.00850> [accessed 25 April 2022].

[47] Esrock J. Ellen, 'Body Forth in Narrative', in *Narrative Complexity: Cognition, Embodiment, Evolution*, ed. by Marina Grishakova and Maria Poulaki (Lincoln: Nebraska University Press, 2019), 270–290.

Gestalt, Animation, and the Culture of Design

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This article explores the affinities between animation practice and experiments in perception by Gestalt psychologists. By drawing out a Gestalt style of seeing — a sensitivity to the visual forces that scaffold an image — we can better describe movements, figures, and spaces in animation. Although these affinities make Gestalt appropriate for discussing animation, they do not necessarily imply that animated films merely illustrate or independently verify Gestalt laws of perception. Rather, they suggest two branches of cultural practice sharing what philosopher of science Ian Hacking calls a 'style of reasoning': a regularized procedure whose consistent results form a basis for knowledge in a given culture. This article argues that Gestalt and animation are co-participants in the 'culture of design': a project of shaping sensory arrangements in order to shape populations, which began in the nineteenth century and has gained force through the present day. It is this culture of design, which includes the exploration of cinema as an art of graphic arrangement, that has become all-but-ubiquitous in the twenty-first century and has led to the ubiquity of animation.

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Some scholars have begun using the term 'Gestalt' when they refer to certain effects related to animation. Hannah Frank describes an inky patch on a card in Robert Breer's *Blazes* (1961) as bearing a certain 'Gestalt', one that suggests 'a bird flapping its wings'.[1] Elsewhere she calls Breer's film *Fuji* (1974) an 'experiment in Gestalt', wherein we are invited to see that all it takes for us to recognize Mount Fuji is a triangle, or an upside-down V with a certain obtuse slope.[2] Andrew Johnston describes an early experiment in electrical image reproduction (a predecessor of the CRT technology in television sets) which brought an image into resolution 'through a pointillist Gestalt'.[3] Jordan Schonig describes the effect of a compression glitch in Chairlift's music video for 'Evident Utensil', wherein an abstract collage of colour begins to move like a man's face, as a 'perceptual effect where we seize a recognizable form from the temporal Gestalt of its movement'.[4]

As these authors use it, the term is not being used in a very technical sense; aside from Schonig, none of these authors cite Gestalt psychologists in their work. Yet it's significant that these authors choose the word 'Gestalt', rather than a cognate like 'shape' or 'form'. Each author is describing something *like*

a shape, but not something that is fixed or assured. In each example, there is a sense that the percept in question is fragile, contingent. It might have been perceived otherwise. The inky patch might not make a bird; a triangle or an upside-down V might not make Mt. Fuji; an abstract collage might not make a face. Each of these percepts might have remained a chaotic visual soup, bearing no configuration at all. A kind of work is required, on the part of the perceiver, to complete the impression in question. Each example yields something that feels like it 'holds together' before our eyes, and not because we are directly seeing conditions in the physical world. These conditions are created out of whole cloth, or heavily technologically mediated, such that their visual coherence is an open question. The 'togetherness' of these examples is not a given. It must be earned, by being arranged before our eyes just so. Each of these arrangements forms one half of a kind of perceptual agreement, an agreement that a viewer will complete by grasping the arrangements as being organized just so.

It is precisely these kinds of perceptions — perceptions that might be grasped otherwise, and which therefore seem to tell us something about how we grasp things in the world through our senses — that Gestalt psychology was constructed to explain. In this article, I argue that Gestalt psychologists and animators found many of the same perceptual effects, implying a similar picture of human nature as primarily tasked with organizing the world and organizing ourselves in concordance with it. Because Gestalt and animation have been so historically preoccupied with how sensory arrangements must be 'earned', Gestalt turns out to offer an excellent framework for describing animation — especially a period and class of animation practice that explicitly toyed with the limits of perception.[5]

However, I will hold back from claiming that animators ended up 'proving' the theoretical claims of Gestalt psychology. (They certainly did not prove any of Gestalt's more controversial theories, such as brain isomorphism). Rather, I wish to draw out some historical implications of the overlap between Gestalt and animation as *styles* of manipulating or knowing the world. Ultimately, I want to suggest, Gestalt and animation were silent partners in what we might call the 'culture of design': a dual obsession with shaping arrangements of the senses and shaping arrangements of populations, an obsession that begins in the nineteenth century and continues to this day. It is the ubiquity of design, and not merely the ubiquity of digital imagery per se, that has allowed animation to saturate moving image culture so thoroughly today.

How then is animation generally conceived, and how does Gestalt offer a helpful alternative? By and large, animation has been written about in its distinctness from live-action film — in the fact that its movements, figures, and spaces are not recorded in real time but created from scratch. Writers on film such as Siegfried Kracauer, Erwin Panofsky, and Lewis Jacobs celebrated cartoons (especially Disney) for achieving sights and sounds that seemed effortless when drawn, but which would have been awkward or even impossible to achieve through direct photography.[6] Cartoons were often conceived as bearing their own kind of medium-specificity — a specificity that lie *within* the technical possibilities of

moving pictures, yet stood apart from 'cinema' proper. This opposition between synthesized movement and recorded movement has persisted to this day. Notably, it helped set the terms for many of the debates around the status of digital film.[7]

From noting that animation is different live-action, it is but a small step in logic to argue that animation *should be as different as possible* from live-action. This hidden value judgment lay in many critics' assessments of Disney's early feature films, when the unruly physics that had once dominated cartoon worlds gave way to more rigid principles of movement and suggestions of three-dimensional space.[8] That value judgment also underlies the most well-known feature of animation: plasmaticness. First coined by Sergei Eisenstein, plasmaticness is the sense of freedom from worldly constraints that we sometimes feel when we watch animated figures stretch themselves or change their shape.[9] For Eisenstein, this was an imaginary freedom Americans felt from the tedium of industrial production. Though the concept was originally intended only to describe Disney cartoons of the 1930s, plasmaticness has been so commonly cited, inside and outside of animation studies, that it has nearly been hypostatized into a timeless essence of frame-by-frame filmmaking more generally.[10]

There is an obvious problem here. If we assume that a film is more animated the less less resembles live-action, we risk ignoring all the ways that animators acknowledge or embrace the secular world. Examples of animators doing exactly this are numerous. Before the digital era, almost all animation had to be photographed; this meant that matters of camera and lighting were essential to animation aesthetics.[11] In addition, animators often *studied* photographed human and animal motion, and their studies resonated with — and in some cases were directly inspired by — scientific studies of motion.[12] Moreover, since World War I animators have made liberal use of the rotoscope, a tool for tracing recorded movements; the Fleischer studio's 1920s hero Koko the Clown was traced from reference footage of Max Fleischer in a clown suit, and the Out of the Inkwell shorts that featured Koko were celebrated in part because those traced movements looked *more* 'animated' than customary cartoon movements.[13] Finally, animation techniques have long been a part of scientific study itself, diagramming all manner of unseen processes.[14] Animation's powers of visualization and reduction formed a cornerstone of animation practice during and after World War II, most famously by the United Productions of America studio.[15]

Animators don't just study the world around them, though. They study perception, albeit often indirectly. This is where Gestalt becomes helpful.

Recall that I said about the opening examples that their holding-together, their manifoldness as unified perceptions, must be 'earned'. This is a logical consequence of how animation, as movement and space constructed frame by frame, works. In a live-action film, a filmmaker can create the impression of a character walking across a room simply by filming an actor walking across a room. As viewers, we would explain our impression of the event by describing

the event itself; if the walk had some idiosyncrasy, we would attribute that idiosyncrasy to the actor. In animation, none of these things is a given. The manner of the walk, the size and shape of the character, even the dimensions of the room — any of these can change at any time.

Hume's problem of induction looms large over animation technique. Thinking within a framework of plasmaticness, we might be inclined to celebrate this openness as a liberation from the impositions of earthly physics; but Hume conceived induction as a problem precisely because it leaves us unprotected from vertiginous, chaotic meaninglessness. In animation practice, we get a perceptual analogue of this problem: how does an animator make anything look like anything at all? When physical forces do not hold in an aesthetic world — when gravity, friction, inertia, and the properties of chemical compounds will not hold together a walking figure or the room it wants to walk across — how does an animator create forces that *will* hold?

The answer, arrived at by animators and Gestalt psychologists alike is, by exploiting the forces within the sensory field itself: the intuitive impressions of attraction, repulsion, and coordination among units of perception that seem to spontaneously arise from within a picture. Like a square that emerges from an array of dots —

— movements, figures, and spaces can emerge from relations of spacing and timing within and across frames.

Some animated films do this more self-consciously than others. Take a film by Norman McLaren, *Blinkity Blank* (1952). In this film, McLaren scratches figures into the emulsion of a film strip, often leaving frames completely black. The early part of the film is, in part, a kind of test to see how frames can be arranged so that, even though we see black frames, we still see movement. McLaren uses blank frames in a number of ways. Sometimes he alternates blank frames with figured frames, which slows down the movement into a fragile kind of stutter. Sometimes he places a few blank frames in a row after a quick movement, as if the figure has sped up beyond our threshold of vision. Sometimes he 'cuts' to black after a burst of action, only to have a figure wander back into the blank frame; it is as if the cut to black turned into an empty space, right before our eyes.

In all these cases, the black frames are plainly visible. And yet, we are amazed that movement still holds across those gaps — that McLaren can even make a gap *add* to the impression of movement. Collectively, these optical tricks demonstrate that a blank frame is not just a blank frame. How we see it will depend on how the frames around it are arranged. Any given blank frame will look more like the figured frames surrounding it than like other blank frames.

This demonstration is remarkably similar to a set of experiments in motion that Gestalt psychologist Max Wertheimer published in 1912. Wertheimer used a tachistoscope to show test subjects three phases of a movement: a vertical

strip, a blank space, and a horizontal strip. By playing with the interval at which the middle phase — the blank space — was presented, Wertheimer got subjects to see a variety of impressions. Most famously, subjects saw *phi*: a 'movement that did not appear to belong to either strip but hovered faintly between the two'. Presented with a differently-timed interval, subjects would see one strip moving and the other strip standing still; this was described as 'dancing'. With yet another interval, a subject would see two *phi* motions simultaneously, one on the left and one on the right.[16] As in McLaren's film, a blank interval is not just a blank interval. Manipulating that interval will alter the impression of motion.

We can see more remarkable similarities in another pair of examples: McLaren's *Animated Motion* instructional series (1976–1978) and Gestalt psychologist Albert Michotte's experiments in the impression of causality. In the third *Animated Motion* video, McLaren uses two circles to demonstrate that when an animator manipulates the number of frames it takes for one thing to hit another. Depending on what the other thing does upon impact, the animator can suggest different kinds of movement: a punch, a gentle push, a cautious touch. Underneath each movement is a set of tick-marks that show the frame-by-frame positions of each circle, demonstrating that what appears seamless and spontaneous is a series of precisely-measured distances.

Albert Michotte experimented with impressions of moving squares hitting each other. Using a 'paper disc' method, Michotte manipulated the timing of each square's movement and found that different timings yielded qualitatively different impressions. If one square approached slowly and the other square shot off quickly upon impact, the impression of causality was especially strong (despite this motion behaving contrary to the laws of physics). If there was a short time lag between the moment of impact and the second square skittering off, it looked as if some mysterious force had been triggered inside the second square.[17]

In both films, McLaren is intentionally isolating simple movement effects (for experimental and pedagogical purposes, respectively); most animated films contain figures, movements, and spaces that are considerably more complex. Yet the similarities between McLaren's presentations of movement and Gestalt experiments seem to indicate something deeper, precisely because they are so stripped down.

One thing we might want to say here is that animators have independently verified Gestalt laws of perception. This is more or less what Rudolf Arnheim asserts. He describes an experiment by Fritz Heider and Marianne Simmel, wherein subjects viewed a short film of two triangles and a circle interacting in various ways. Subjects described the larger triangle as 'aggressive' and 'belligerent', solely from its movements. Arnheim notes similarly expressive movements by geometric figures 'in the more elaborate "abstract" films of Oskar Fischinger, Norman McLaren, Walt Disney, and others', taking them to demonstrate the Gestalt theory of expression.[18]

I believe a more fruitful path of inquiry, however, might lie in taking Gestalt seriously for animation criticism and history. Arnheim writes of Gestalt as a

'style…of science', likening it to art.[19] Philosopher of science Ian Hacking has picked up on something like this when he theorizes, following A.C. Crombie, 'styles of reasoning'. Broadly speaking, a style of reasoning is a set of procedures that creates its own standards for correctness.[20] Like styles of art, styles of reasoning can coexist within a given historical period, and they can accumulate over time. (Statistical analysis, for example, is a style of reasoning).

Speaking to the area of criticism: one of the biggest challenges in animation scholarship is simply describing what we see and hear. Our inherited vocabulary of formal film analysis was forged in the 1960s and 1970s to describe live-action films. It offers little help when we want to capture what is most striking about a piece of animation, save for some CGI films that are constructed to resemble live-action feature films. (And unlike live-action, animation has precious little of a tradition of criticism for us to rely on). We are often left with what animation theorist Suzanne Buchan calls 'the inarticulate "mmm…" that is often the response to what we see on screen'.[21] This is one of the reasons plasmaticness has proven to be such an appealing concept: it's easy to apply. It saves us the trouble of having to closely describe how things are moving. Paraphrasing or summarizing what we see, noting the fantastical elements, we glide past the initial 'mmm…' and go straight to interpretation.[22]

Gestalt gives us a way to push *into* the initial 'mmm…' and come out the other side with a firmer grasp of perceptual subtleties. In the experiments described above, we can discern something like a style of Gestalt experimentation — and, by extension, a Gestalt style of looking at animation. Designing Gestalt experiments, such as the *phi* experiments, required a special sensitivity to the organizational features and thresholds of perception, tweaking an apparatus or a presentation such that one impression would become something else. Gathering the results for these experiments involved soliciting spontaneous, open-ended responses from subjects. Wertheimer, Michotte, and Heider and Simmel collected lively self-reports of what viewers saw — they reported 'dancing', or 'a sort of two-stroke', or, 'It is as if A in touching B induced an electric current which set B going' — and these reports make for some of the most convincing evidence of the effects the authors are arguing for.

Putting these factors together, we can note that a Gestalt style of seeing involves being sensitive to the ways that picture and sound organize themselves before us, describing those ways as closely as we can, however counterintuitive the descriptions might be. We are prompted to pay greater attention to the qualities of visible movements, figures, and spaces themselves. By using our intuitions about organization as our primary means of description and asking questions like, *how does this figure, movement, or space fit together?, what forces seem to scaffold it? how am I seeing it as one configuration and not another?*, we can perform criticism with more precision, staying with the surfaces of what we see and hear without falling back on simply paraphrasing what happens. In this manner, Gestalt becomes less like a science than like formalist art criticism or ordinary language philosophy.

I stress that this way of looking at animation need not be limited to looking for

Gestalt principles in animated figures (similarity, continuity, closure, Prägnanz, and so on).[23] If we look more generally for figures and forces in what we see, we gain new insights into animation techniques throughout history.

Take the line, one of the most basic units of two-dimensional animation. Traditionally, the moving or transforming line has been conceptualized as the formal analogue of plasmaticness. Vivian Sobchack, for one, argues that when the line moves, it effectively rebels against its own form. Whatever a line may represent at any given time, the line itself is always visible as a mark on a surface, irreducible to that representation. That moving, irreducible mark always threatens to overtake the figure, asserting its own power as a sort of inbetween-ness of lively being:

> *Thus the animated line never 'flattens' itself out into something geometrically 'straightforward' – nor does it ever become pure figure. Recursive, it insists on the mobility of its becoming, on its unfixing of and separation from itself, on its capacity to simultaneously both posit and negate itself.*[24]

Taking as her privileged example Raimond Krumme's 2000s commercials for Hilton hotels, in which a single line metamorphoses into various scenes of travel, Sobchack hints that the power of this single transformative line is 'perhaps, the DNA of animation'.[25]

I don't want to directly argue with the claim that some originary hint of this transformative power is present anytime we see a moving line, but because the claim is so totalizing, it leaves us unable to describe any other functions a line might have. A theoretically posited 'essence' makes it more difficult to perform specific criticism.

Instead of assuming that this power of the line is found everywhere, we may do better to ask: what makes us want to *attribute* this power to the line in cases like these? Why does the line seem to be moving or transforming itself? Why doesn't it look like it's being transformed by something else? Here, the 'pure' line against a blank space seems to be enacting a mysterious power to change itself not because that is a natural property of the moving line but because there are no other visual forces competing with it. A solid line, with nothing around it to make us see it any other way (such as a repeating pattern of the same line), appears to hold itself together. It appears as an abstract version of what Gestalt psychologist Fritz Heider calls a 'thing': a manifold whose parts attract each other more strongly than they attract outside forces or entities.[26] Things are, by and large, solid and stable: persons, trees, rocks. When we see a manifold whose parts do not strongly attract each other, we grasp it as what Heider calls a 'medium': a loose arrangement of parts. In everyday life, fluids and gases are mediums. In pictorial terms, if we see a tangled layer of intersecting lines (such as the whorls of a Jackson Pollock painting), rather than a spare line against a blank background, we will be inclined to grasp that tangle as a medium. A thing is that which we press *against*; a medium is that which we press *through*.

Because a thing holds itself together, it tends to move as a single, whole

entity. Push a rock and the entire rock will move. Because a medium does not hold itself together, its parts will move in different ways, and at different rates of speed. Push a volume of water and it will re-form around your hand, making temporary whirlpools or folds, eventually resettling itself.

It is clear that we do not see a naked line in empty space as a medium. When it moves, it moves as one. When it transforms, it does not appear to be transforming according to an outside force, as happens with the volume of water. Its principle of transformation is active: it seems to be changing its own shape. What matters for this description is that the line is *holding* shape *as* it is changing shape. We can observe that the line seems to have transformative powers not because of properties within the line itself, but because the line is being depicted as a unified thing that holds itself together whose force of alteration comes from within itself.

We can usefully contrast this kind of line with another kind of line: the outlines of Disney characters after the mid-1930s. Over the course of the 1930s, animators at Disney thought of outlines less as fixed boundaries of bodies than as flexible skins that contained a principle of movement within them. Disney animation instructor Donald Graham appropriately refers to this change as going from 'animating forms' to 'animating forces'.[27] When an animator is animating by forces, the 'essence' of a character is not in its shape but in a kind of linear scaffolding held within the character, a flexible vector of movement. The role of the outline is to register the forces of this movement. Thus, the outline of the duckling in *The Ugly Duckling* (Burt Gillette, 1939) is extremely flexible, but we are hardly inclined to attribute powers of transformation to it, because its changes appear to be under the sway of an internal motive principle, unseen but palpable.

We can even note that the camera itself — not the physical apparatus on the animation stand that photographs drawings, but the internally-coherent view of a diegetic animated world — functions as a kind of *figure* in two-dimensional animation. Certain visual conditions, such as parallax, must hold in order for a camera movement to manifest itself. The things onscreen must move in a special synchronization with each other. When this happens, we intuit something *inside* the space taking views of it. Animators like Caroline Leaf and Kathy Rose have played with these conditions, creating strange and nonsensical camera movements. These movements cannot be described in live-action terms; they offer a feeling of movement through space without offering a coherent space. With an eye toward the visual forces of configuration, we can also see other animation techniques in new ways, such as sound synchronization and rotoscoping.

What is implied by this overlap between Gestalt experimentation and animation technique? We can use Gestalt to describe things closely, making animation more amenable to formal analysis; but descriptions are rarely, if ever, epistemically neutral. They entail certain philosophical and political commitments. As philosopher of science Thomas Kuhn has demonstrated, even our descriptions of something as simple as the swing of a pendulum will

imply some overall picture of the world around that pendulum. An adherent of modern physics will see it primarily as a revolution around a center, which is being interrupted by the force of gravity. An Aristotelian would see it as a fall toward the earth, interrupted by the arm of the pendulum.[28] What might taking Gestalt seriously commit us to? What happens when we see a labile line in blank space as a thing with the power to remain itself through change, or when we see a labile line around a cartoon duck as a skin being reshaped according to a vector of forces inside it?

Even if we stop short of taking the Gestalt style of seeing all the way to its proponents' most extreme theoretical conclusions, by its very nature of seeking out perceptual arrangements the style will incline us toward a view of perception *as* arrangement. Somewhat like the way phenomenological film criticism tends to take the camera as a model of phenomenology's own picture of being-in-the-world, attending to Gestalt forces leads us to reflect on ourselves as arrangements of forces that organize themselves in relation to the world and each other.[29] One upshot here is that instead of modeling political engagement as an opposition between dominant structures of power and acts of resistance to those structures — a kind of binary thinking that may lead us to resist the idea of 'structure' altogether, potentially slipping into what feminist author Jo Freedman has called the 'tyranny of structurelessness'[30] — we may think about structure itself as an ally and a weapon. Instead of, 'how do we resist?' our primary question becomes, 'how might we organize?'.

This is precisely the way many animators of the middle twentieth century thought about their medium. Animators of this period took inspiration from graphic design — a field that itself took inspiration from Gestalt psychology.[31] György Kepes's seminal design textbook *Language of Vision* argued that the graphic arts provided a kind of sensory education that could unite the public. By encouraging citizens to see themselves in terms of relationships with others, Kepes argued, designers provided a defense against the threats of fascism and haphazard technologism; not coincidentally, Kepes openly acknowledges an intellectual debt to the Gestalt psychologists.[32] (To this day, Gestalt laws are routinely included in graphic design textbooks). While the high modernists of the postwar era were growing disenchanted with collectivist politics and turning to esoteric aesthetic forms, postwar animators working outside the American studio system held a commitment to organizing with a public.[33] In 1975, the International Association of Animated Film issued a manifesto that read, in part:

> *We must prove that apart from being an art media of its own, a useful tool in entertainment and in advertising, animation could also contribute to the understanding of basic human and social problems. [...] In fact, given a chance, animation can contribute to serve humanity on a far broader level than it has done in the past.*[34]

This is not to say that mid-century animators made especially radical films or held to an especially radical politics; by and large, they did not. By extension, engaging with Gestalt psychology will not automatically produce a radically

new kind of world. But the affinity between animation practice and Gestalt by means of design should give us pause. Dealing with that affinity can help us see historical conditions to which we already find ourselves committed.

> *What might those historical conditions be? More pointedly, why did Gestalt principles seem like an appropriate tool for graphic design? I want to suggest here that Gestalt offered clear applications for a project that designers were already engaged in by the time Kepes was writing: the project of arranging the senses in order to arrange populations. As philosopher Jacques Rancière argues, design plays a major role in what he calls the 'distribution of the sensible'.*[35] *Politics for Rancière always involves the construction of a world that is both sensuously direct and held in common. Aesthetics intervenes in politics by pressing at the scaffolding of that sensorial construction. With the growth of mass production in the nineteenth century, the designer gained an enormous amount of power over this construction (for the simple fact that anything that is mass produced, by definition, must be designed).*[36]

Some of the first major critiques of industrialization, in fact, came around concerns of design — namely, from the British Arts and Crafts movement. For art critic John Ruskin and designer William Morris, the effects of industry were visible not only in labor conditions but in the homes and everyday objects of the citizenry. The Arts and Crafts movement argued for social change through, in part, making the built environment more beautiful.[37] By the early twentieth century, designers were routinely recognized as crucial political actors. For the major design schools of this time (the Deutscher Werkbund, the Constructivists, the Bauhaus, and so on), envisioning a set of products or surfaces was inseparable from envisioning an entire society.[38] For someone like Kepes, then, Gestalt was appealing because it wove design into human nature itself: even in perception, we are all organizing our environments to find the most balanced relations with it.

This is why I didn't want to argue that Gestalt gets at some timeless 'truth' of human nature that animators merely stumbled upon: paradoxically, Gestalt, as an attempt at a scientific psychology, makes arranging — and, by implication, rearranging — the primary task of the human. To think with Gestalt in a historically robust manner is to acknowledge that we live in a culture of design. This has been the case for the overdeveloped West since the late nineteenth century, but the importance of this fact has become more and more important, as professional design has encroached into more and more areas of life: with software, with web and app design, and with the rise of 'design thinking'.[39]

Film scholarship has so far been limited by its tendency to think about animation as a certain kind of film — and, by extension, to think about the animator as a certain kind of filmmaker. We can see, however, than an equally fruitful path of inquiry opens up when we think about the animator as a certain kind of designer — a *designer of movements*. Several consequences follow from this.

First, the field of animation practice stretches beyond the realm of 'cinema' in a way that cannot be ignored. Animation takes its place not only in the history of narratively-driven works, such as theatrical cartoons, feature films, and television programs, but in the histories of advertisements, propaganda, scientific visualizations, station identifications, video games, apps, and more.

Second, the ubiquity of animation in media culture, which it has become cliché to note, takes on a different tenor. Rather than the 'return of the repressed' narrative often told of animation, wherein visuals produced by hand are initially pushed to the margins of cinema's dominant 'machine vision' (i.e., photography), only to come back and become the dominant mode of filmmaking, we can view animation techniques in conversation with the broader expansion of design into everyday life.[40] (This has manifested itself in cinema outside of animation techniques as well: note the rise of the sound designer in the 1970s, and the close relationship between film and fashion.[41])

Finally, we can view animation's tendency to play with the organization of our senses as bearing at least as much significance as its representational content. As an art that arranges our sensory impressions, animation, whether its practitioners know it or not, bears some of design's cultural function of arranging populations. Moreover, animation has the ability to arrange these sensory impressions self-consciously. Recall the 'Gestalts' that I began with: an impression of a bird or Mt. Fuji or a human face whose arrangement appears fragile, which appears to need something from us in order to be seen properly, which makes salient the fact *and* the task of organization. As a mode of thinking that mainly concerns itself with the organizational fit between the human and the world, Gestalt is basically an ethos of design. As such, it makes the task of design apparent in ways that other modes of thinking, such as psychoanalysis and phenomenology, do not. It does not in itself promise resistance or utopia.[42] But it does hold out the possibility of alternative ways of being and forces us to be specific about what those ways of being might be. Which returns us to the question: how are we to organize?

Notes

[1] Hannah Frank, *Frame by Frame: A Materialist Aesthetics of Animated Cartoons*, ed. by Daniel Morgan (Oakland: University of California Press), 22.

[2] Ibidem, 54.

[3] Andrew Johnston, *Pulses of Abstraction: Episodes from a History of Animation* (Minneapolis: University of Minnesota Press, 2021), 158.

[4] Jordan Schonig, *The Shape of Motion: Cinema and the Aesthetics of Movement* (New York: Oxford University Press, 2021), 166–167.

[5] Of course, each of the arts relies on some kind of organizational principles to achieve coherence; but the kind of 'holding-together' I'm referring to is a more basic perceptual matter than the sense of wholeness often implied by an aesthetic judgment (such as the complementarity of colours in a painting, or the sense of 'rhythm' that E.M. Forster notes as a unifying force of a novel).

[6] See Kracauer quoted in Frank, 154–155; Erwin Panofsky, 'Style and Medium in the Motion Picture', in *The Visual Turn: Classical Film Theory and Art History*, ed. Angela Della Vacche (New Brunswick: Rutgers University Press, 2003), 69–64 (75 and 84); and Lewis Jacobs, *The Rise of the American Film* (New York: Teachers College Press, 1968 [1939]), 496–505.

[7] For examples see Lev Manovich, 'What Is Digital Cinema?' reprinted in Shane Denson and Julia Leyda, eds., *Post-Cinema: Theorizing 21st-Century Film* (Falmer: REFRAME Books, 2016), 20–50, and D. N. Rodowick, *The Virtual Life of Film* (Cambridge: Harvard University Press, 2007), and Dudley Andrew, *What Cinema Is!: Bazin's Quest and Its Charge* (Malden: Wiley-Blackwell, 2010).

[8] Gregory A. Waller, 'Mickey, Walt, and Film Criticism from *Steamboat Willie to Bambi*, in *The American Animated Cartoon: A Critical Anthology*, ed. by Danny Peary and Gerald Peary (New York: E.P. Dutton, 1980), 49–57.

[9] Sergey M. Eisenstein, *Disney*, trans. by Dustin Condren and ed. by Oksana Bulgakowa and Dietmar Hochmuth (San Francisco: Potemkin Press, 2012), 15.

[10] The most thorough exploration of plasmaticness remains Scott Bukatman, *The Poetics of Slumberland: Animated Spirits and the Animating Spirit* (Berkeley: University of California Press, 2012). I am not arguing against the concept itself: only its hypostatization.

[11] See Frank.

[12] Alla Gadassik, 'Assembling Movement: Scientific Motion Analysis and Studio Animation Practice', *Discourse*, 37.3 (2015), 269–297.

[13] Donald Crafton, *Before Mickey: The Animated Film*, 1898-1928 (Cambridge: The MIT Press, 1982), 158.

[14] Scott Curtis, 'Animated Images in a Media History of Science', *Journal of Cinema and Media Studies*, 61.1 (2021), 147–152.

[15] Ryan Pierson, 'Postwar Animation and Modernist Criticism: The Case of Annette Michelson', *Journal of Cinema and Media Studies*, forthcoming. On UPA see Dan Bashara, *Cartoon Vision: UPA Animation and Postwar Aesthetics* (Oakland: University of California Press, 2019).

[16] Max Wertheimer, 'Experimental Studies on Seeing Motion', trans. by Michael Wertheimer and K.W. Watkins, in Id., *On Perceived Motion and Figural Organization*, ed. by Lothar Spillman (Cambridge: The MIT Press, 2012), 1–92.

[17] Albert Michotte, *The Perception of Causality*, trans. by T.R. Miles and Elaine Miles (New York: Methuen, 1963), 121.

[18] Rudolf Arnheim, *Art and Visual Perception* (Berkeley: University of California Press, 1974), 403.

[19] Arnheim, 'Gestalt and Art', *The Journal of Aesthetics and Art Criticism*, 2.8 (1943), 71.

[20] Ian Hacking, '"Style" for Historians and Philosophers', in Id., *Historical Ontology* (Cambridge: Harvard University Press, 2002), 178–199.

[21] Suzanne Buchan, 'The Animated Spectator: Watching the Quay Brothers' "Worlds"', in *Animated 'Worlds'*, ed. by Suzanne Buchan (Eastleigh: John Libbey Publishing, 2006), 36.

[22] This, of course, isn't to disparage the act of interpretation. Subtle and powerful interpretive claims have been made using plasmaticness — particularly by Nic Sammond, who notes that the freedom of movement in cartoon figures has a history in blackface minstrelsy. See Nic Sammond, *Birth of an Industry: Blackface Minstrelsy and the Rise of American Animation* (Durham: Duke University Press, 2015). My point here is that

limitations in our powers of description will in turn limit the scope of our interpretations.

[23] Max Wertheimer, 'Investigations on Gestalt Principles', trans. by Michael Wertheimer and K. W. Watkins, in Wertheimer, 127–182.

[24] Vivian Sobchack, 'The Line and the Animorph, or "Travel Is More Than Just A to B"', *Animation*, 3.3 (2008), 251–265 (258).

[25] Ibidem, 261.

[26] Fritz Heider, 'Thing and Medium', in Id., *On Perception, Event Structure, and Psychological Environment* (Ann Arbor: International Universities Press, 1959), 1–34.

[27] Gadassik, 286.

[28] Thomas Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 2012), 111–134.

[29] On the importance of the camera (especially the moving camera) for phenomenological film criticism, see Schonig, 'Seeing Aspects of the Moving Camera: On the Twofoldness of the Mobile Frame', *Synoptique*, 5.2 (2017), 57–63.

[30] Jo Freedman, 'The Tyranny of Structurelessness', *Berkeley Journal of Sociology*, 17 (1972–1973), 151–164.

[31] Bashara, 14.

[32] György Kepes, *Language of Vision* (Chicago: Paul Theobald & Co., 1944).

[33] On high modernism's disenchantment with public engagement, see Marci Kwon, *Vernacular Modernism: Joseph Cornell and the Art of Populism*, Ph.D. dissertation (New York University, 2016), 17–18, and Robert Genter, *Late Modernism: Art, Culture, and Politics in Cold War America* (Philadelphia: University of Pennsylvania Press, 2011), 24. Annette Michelson follow this narrative when she theorizes American avant-garde filmmaking in 'Film and the Radical Aspiration', *Film Culture*, 42 (1966), 34–42 and 46.

[34] Quoted in 'Report on the Lucca Meeting', *ASIFA NEWS*, 1 (1976), 2.

[35] Jacques Rancière, *The Politics of Aesthetics: The Distribution of the Sensible*, trans. by Gabriel Rockhill (New York: Continuum, 2004), 12–13.

[36] Matthew Holt, 'Baudrillard and the Bauhaus: The Political Economy of Design', *Design Issues*, 32.3 (2016), 55–66 (57–58).

[37] Rancière, *Aisthesis: Scenes from the Aesthetic Regime of Art*, trans. by Zakir Paul (London: Verso, 2013) 133–153.

[38] On these respective movements see Frederic J. Schwartz, *The Werkbund: Design Theory and Mass Culture before the First World War* (New Haven: Yale University Press, 1996); Victor Margolin, *The Struggle for Utopia: Rodchenko, Lissitsky, and Moholy-Nagy*, 1917-1946 (Chicago: University of Chicago Press, 1997), and T'ai Smith, *Bauhaus Weaving Theory: From Feminine Craft to Mode of Design* (Minneapolis: University of Minnesota Press, 2014).

[39] On the spread of design thinking see Annemarie Rose Ennis Dorland, 'Doing Design Thinking: An Ethnography of the Digital Graphic Design Studio' (Ph. D. dissertation, University of Calgary, 2018), 33–43.

[40] Manovich offers the most popular version of the return-of-the-repressed narrative.

[41] On sound design see William Whittington, *Sound Design and Science Fiction* (Austin: University of Texas Press, 2007); on film and fashion see, for example, Lucy Fischer, *Designing Women: Cinema, Art Deco, and the Female Form* (New York: Columbia University Press, 2003).

[42] Relatedly, I want to emphasize that there is nothing inherently progressive about design in itself, and I believe Rancière overstates its liberatory potential. See, for example, Arden Stern and Sami Siegelbaum, 'Special Issue: Design and Neoliberalism', *Design and Culture*, 11.3 (2019), 265–277.

Paul Fraisse's Psychology of Rhythm: A Case for Filmology?

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This essay aims to discuss the topic of rhythm as presented by the classic psychologist and filmologist Paul Fraisse (1911-1994) in his founding studies, to understand its scope, and to consider the possible inheritance to be spent in contemporary research on film. I will first outline Fraisse's contribution to the psychology of rhythm, a model grounded both on the value of Gestalt organisation and on related dimensions of sensory-motor activation. Secondly, I will investigate contemporary thinking in this field, showing on the one hand how Fraisse's contribution still helps the psychology of music in defining rhythmic listening experiences, and on the other how the French scholar's multilayered notion of time perception finds legitimation in neuroscientific research on timing. Finally, I will delve into film theory. In particular, I will put forward the assumption that the sense of rhythm, due to its values of Gestalt organisation, plays a fundamental role in narrative and event-based viewing, enhancing it; yet, due to the dimensions of sensory-motor activation, sound rhythms, in particular, can induce both bodily and neural entrainment and constitute in film an auditive analogon of those embodied and enactive visual processes recognised by the most recent neurofilmological approaches.

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Rhythm is a Gestalt, but it is much more: a preferential mode of uniting perception and action, thze source of social manifestations and the basis of arts of succession and movement.

Paul Fraisse, *Is Rhythm a Gestalt?*

PAUL FRAISSE

Paul Fraisse (1911-1994), a French psychologist, who was a pupil of Albert Michotte van den Berck in Louvain and a collaborator with leading exponents of the French school of psychology of perception, made his mark on research into the experience of time as few other scholars of his age did, significantly contributing to founding the studies which after him came to be known as chronopsychology. In *The Psychology of Time* (1957) he demonstrated the existence of a multiplicity of temporal structures in the life of the individual, and shifted the attention of then nascent chronobiology from endogenous mechanisms to external conditioning,

making explicit the dimension of adaptation to periodicities connected both 'with the main biological activities of the organism, namely motility, rest and food' and with induced rhythms, 'which bear no relationship with organic alterations', hence induced in the laboratory or, hypothetically, attributable to social activity.[1]

Among social activities, Fraisse always attributed an important role in his studies to creative practices, such as music, supremely considered the art of time. Moreover, he also followed his master Michotte in the years of his filmological adventure, when between the end of the Second World War and the early 1960s he tried to establish a first methodological study with categories of the experimental psychology of the new media, primarily cinema.[2] Together with Germaine de Montmollin, another of Michotte's students, Fraisse conducted research into the understanding and memorisation of films for the Sorbonne filmology laboratories. As its starting point the research took the famous studies by Frederic Bartlett on the understanding of narrative and, as in this case, it strongly emphasised the active role of the subject in the cognitive process.[3]

Fraisse did not continue his film studies, but these early researches were useful to focus attention on the themes of the perception of time.[4] In *The Psychology of Time* he succeeded in defining some essential traits that are still the basis of research today: the twofold nature of the experience of time, based on both immediacy and duration, in fact on multiple durations (as we shall see in §3), and the organised nature of this experience directed towards synchrony and succession, such that the tick-tock of the clock would never become a tock-tick nor a waltz change its tempo.[5] The unity of the perceived succession between two minimum intervals, our clock or dance pattern, then forms what Fraisse calls 'the psychological or perceived present'.[6] The study of the experience of time would from then on focus on the measurement on the one hand of the subjective and intersubjective perception of duration, as a factor that qualifies every temporal experience,[7] and on the other of the dimensions relating to rhythm and repetition, as its structuring element.[8]

Indeed, in keeping with his chronopsychological studies, Fraisse recognised rhythm as being above all a perceptual process with its basis in Gestalt reorganisation. The perception of time, in relation to rhythmic phenomena, recognises pregnant forms, which tend to be perceived first or produce a greater perceptual impact. 'The reorganization takes the following two forms: differentiation, which sharpens the differences, and assimilation, which tends to diminish or suppress minor differences. Rhythmic reproductions are constituted by intervals having two values: short durations and long durations, which have a ratio of approximately 2/1; within each category, intervals are equal.'[9] The short duration acts as a structural basis of rhythmic understanding, close to the limit of immediacy and perceptible in the form of the 'collection' of stimuli; the long duration is constituted in relation to the short duration. It is the place of duration and the constitution of multiple durations.[10]

The repetition of the formal scheme in a succession of homogeneous groups separated by pauses, tending to last for long durations, is fundamental in the recognition of rhythms. The pause, as Fraisse notes, is conceptually different

from the interval, even when it consists of an identical time span. It is a linkage, at the limit 'analogous to the role of frame [...] in the case of spatial figures'.[11] While the structure in intervals of the single measure is related to the relationship between background and figure, the grouping and rhythm, albeit operating on the same Gestalt bases, through the pause-repetition mechanism, transfer the formal dynamism of the single unit to series of complex units that may require sensory-motor involvement by the subject. Psychological historians such as Fernández and Travieso have strongly emphasised this latter component in Fraisse's thinking about rhythm, namely the motor basis of rhythmic experience.[12]

We can distinguish three steps in Fraisse's research that establish the rhythmic experience as eminently linked to body motor sequences. Firstly, in his laboratory experiments, Fraisse recognized a spontaneous motor rhythm, which was set within the temporal arc of the perceived present, i.e. on average within the band between 15/20 and 150/200 hundredths of a second, with a preference for intervals close to 60 hundredths of a second.[13] A sort of basic rhythm, that of rocking or tapping the foot to the rhythm of music, that enables the subject to physically enter the rhythmic experiential field.[14] Next, he demonstrates that spontaneous rhythmisation is the result of a sensory-motor response or 'motor induction' at regular intervals that activates a precise system of anticipation of bodily movement with respect to the rhythmic beat. Cadences lower than 20 hundredths of a second and higher than 180 hundredths of a second, on the other hand, require conscious intervention and memory recall to maintain synchronisation.[15] Finally, he describes each rhythmic fraction included in the motor rhythm band as a place of spontaneous grouping, which allows its overall perceptual organisation on the basis of precise logics of intensity (accent) and succession (pause). The idea is that the accent elicits the repetition also of complex isochronous groups (the rhythmic experience) and that the rhythmic movement, or its outline, is synchronised with the accent.[16]

THE PSYCHOLOGY OF RHYTHM

The correspondence or circularity between a perceptual mechanism that generally responds to Gestalt laws of perception and a sensory-motor activation system that intervenes on the level of basic rhythmic synchronisation seems to lead us back to the contemporary debate. The psychological field today implicitly or explicitly refers to cognitive theories of time, generally based on the notion of an internal clock at the neurophysiological level and on attentional and decisional mechanisms at the psychological level.[17] But even researchers who share this paradigm address the problem of the relationship with the pre-cognitive dimension of experience, supplementing their research through a comparison with theoretical approaches of a markedly phenomenological nature, in which time on a psychological level is a function of the neurophysiological response or arousal.[18] Understandably, the latter have a strong impact on studies in the cultural field, where case studies raise issues that are difficult to relate

to the rigid protocols of laboratory research. A constructivist vision, based on the recognition of qualitatively different processes, such as that of Paul Fraisse, could certainly assist the dialogue. Three key concepts taken from the psychology of music should be reconsidered after neuroscientific verification.

Entrainment. The synchronisation of the sensory-motor response with the sound stimulus, especially in the presence of complexity or variations of the stimulus, is an emblematic case of this. Today we know that synchronisation, which we now refer to with the term entrainment, can occur at both a sensory and a neural level. Jones and Large, while working within an attentional model, conjecture, in the Dynamic Attending Theory, that the experience of listening to rhythmic stimuli develops a continuous and cyclical temporal experience, a transition from state to state and an internal resonance that dynamises the attentional effort.[19] More recently, Chen, Penhune and Zatorre shored up the idea that different motor areas underlie the perception of rhythms, while rhythm fosters functional connectivity between auditory and motor networks; in these fMRI-based studies, musical rhythm processing has been shown to activate (also) neural mirroring, in analogy to visual perception.[20] In the psychology of music, an attempt has recently been made to redefine the notion of entrainment by relating it to the associated experience of the topical and exciting moment of listening, and measuring it in terms of peak experience.[21] The peak can also be reached through other paths, for instance melodic ones, but a fundamental key seems to be that of rhythmic beat timing, and the system of rhythmic accents identified by Paul Fraisse comes across as a good example of the construction of peak experiences.

Anticipation. The most recent studies have also confirmed Fraisse's intuition of the anticipatory character of the sensory-motor response to the rhythmic stimulus. David Huron, in his influential ITPRA model, strongly insists on the centrality of the expectation-prediction system as a cue to understanding the music experience.[22] Working in an evolutionary perspective, Huron stresses that rhythm not only concerns low-order relationships (short rhythmic motives) but also higher-order relationships (meters), whereas 'the basis for temporal perception is not periodicity — but predictability', as it is an accurate prediction of the biological goal of expectation.[23] A fundamental part of contemporary research rests on this premise. More specifically, the actual coupling between the auditory system and the dopamine system (referred to as the reward system) has been theorised, and in particular the two-phase structure of this coupling. In laboratory tests, a peak of pleasure felt while listening to a much-loved piece of music was connected to the activation of one sub-portion of the striatum. But a first anticipatory phase occurred a few seconds before in a different sub-region of the striatum.[24] This occurrence indicates that the pleasure of the musical experience is to all intents and purposes built, at the neurophysiological level, on the interplay between expectation and resolution, an interplay that rhythm and repetition can expand and reiterate endlessly.

Attention. The complexity of higher-order structures or musical meters has been widely debated. For Justin London, metrical experience 'involves our

initial perception as well as subsequent anticipation of a series of beats that we abstract from the rhythm surface of the music as it unfolds in time'.[25] London interestingly proposes a model, the Many Meters Hypothesis, which considers meter as a kind of "learnable" entrainment, a synchronization of our attention and response to the rhythms of the musical environment which we are exposed to. London openly admits his debt to Paul Fraisse. Thus, physical involvement can develop within metrically complex compositions and a universe of different possible interpretations, styles, and arrangements.[26] From a purely neurophysiological point of view, it has also proved possible to describe a double circuit that integrates a typically bottom-up path, that of listening to music, with a typically top-down path, that of memorisation and recall.[27]

THE NEUROSCIENCE OF TIMING

At this point, we need to delve into the core component of our rhythmical experience, assuming with contemporary research that the notion of timing describes our ability to live in time through the perception of rhythms and intervals. At this point the topic stops being purely a musicological one.

Today we define the rhythmic perception that arises from the constant interaction between the auditory and motor systems of our mind, directed towards the recognition and anticipation of temporal organisations of experience, as beat-based timing.[28] The beat is understood as the value of the psychological response to the rhythmic sequence and therefore epitomises in itself the organising value of the clicking of the metronome and that of a sensory-motor activation mechanism.[29] In beat timing, succession and repetition seem to be a training ground for many important challenges that arise from it. These challenges above all concern the temporal structuring of perception itself, first, and clearly describe some characteristics of our involvement, namely a) the predictivity of experience. We already know that one of the 'miracles' of human cognition of time is the ability to anticipate rhythms (which enables us to dance, for example);[30] b) its duration: the cyclical nature of the rhythm makes it possible to prolong the sensory-motor response and timing;[31] and c) its permanence: we are capable of maintaining the sense of the rhythm that we have experienced for many cycles after the stimulus has ceased.[32]

The pattern of repetition, as we have seen, is not attributable only to the simplest rhythms, but also to complex meters and events stimulating predictive or attentional behaviours. We need to introduce a second timing level, called interval timing, in which one analyses the system of recognition of complex rhythmic temporal experiences and assesses their duration.

As concerns this dimension, to date we have far fewer laboratory observations. We can still only consider this issue on the level of hypotheses. However, in recent years, scientific research has widely explored different scales for assessing the passing of time (or in general the experience of time). In particular, while musical rhythm, like the rhythm of language, is related to a scale of

milliseconds/seconds, many activities in our daily lives are related to the scale of seconds/minutes, which psychologists often refer to in terms of interval timing, and which recurs in the most explicitly aware activities involving the cognitive system.[33] Studies of this kind, again, tell us of the central role played by memorisation and learning processes in the musical experience.[34]

The sense of individual time is therefore constructed starting from the synchronisation of different time frames, which include times of long-duration (such as the circadian rhythms regulating the alternation between sleeping and waking), all of which, in the light of recent analyses of neuroimaging, work on a semi-autonomous basis.[35] In any case, in a logic of layering of the neural activation systems of the rhythmic and temporal sense, the perception of temporally organised stimuli is reinterpreted in terms of a binary functioning in different neural regions: on the one side an accumulation mechanism, which can correspond to the traditional internal clock, rhythmically organises the entry of stimuli (though they may not be rhythmic in origin), and therefore it can activate attentional and/or memorisation mechanisms. On the other side a comparison mechanism re-processes the data of the internal clock in the light of analogue or parallel systems and of the mnestic activity, and allows for an estimation of different complex intervals.[36]

If this is the case, despite the methodological issues that exploring the level of interval timing raises, perhaps it is not out of place to take as a first working hypothesis that the idea of enjoying audio-visual media (listening to music or watching a movie) is an essential training ground for a psychology of rhythm and apply it to complex segments and repetitions with a duration of seconds and minutes: meters and hyper-meters on the one hand, shots, scenes, sequences, musical insertions on the other. Music and film share the power to accumulate modules organised by rhythm but based on intervals and durations organised in the order of seconds and minutes (the order of our internal clocks engaged in interval timing), and to refine our power of comparison (of rhythmic-temporal dimensions).

Starting from these strongly embodied images and sounds we shall nonetheless finally restore a cognitive dimension of the sense of rhythm, especially where the perception of durations and times implies evaluations. Evaluating and deciding, hence reasoning on a temporal basis, is a process that in turn acts on the neurophysiological mechanisms of timing, in keeping with a logic that could be defined as re-entry: the decision-making system ultimately intervenes on the internal clocks — whatever their form or scale — and modifies their computation.[37]

FOR A FILMOLOGY OF RHYTHM

The basic assumption of this essay actually concerns the usefulness of reference to Fraisse's work in contemporary research on film and the moving image. Film culture has always dealt with the problem of rhythm, both as a

question of style, and as a tool to get the audience involved. Cultural historians have shown how there is a qualifying link between the sense of modernity embodied by cinema and its avant-gardes in the first half of the 20th century, and the visual rhythms with which directors and editors experimented on multiple levels.[38] The 'founding fathers' of film theory all gave ample space to reflection on rhythm, influencing subsequent debates: Béla Balázs' film aesthetics, on which generations of directors were trained, prescribes a relationship of a musical type (harmony, counterpoint) between the 'rhythm of the shots', that is the degree of dynamism of the image, and the 'rhythm of the montage'.[39] In the sound era, by the mid-1930s, film rhythm was widely understood as the product of editing sound and image and of synchronizing multiple layers or strata of temporal development in an effort to gain control over the image.[40] Film semiotics was later able to systematise the many possible regimes of inner- and inter-textual relationships apt to govern narrative film rhythm.[41]

Sergei Eisenstein has proposed the broadest and most refined reflection on cinematic rhythm, integrating the different rhythmic codes into a unitary concept of vertical editing. Vertical editing aims to involve the viewer 'mechanically' in a sensuous experience. The Russian director found his first inspiration in the primordial and tribal rhythm of the drum, and then broadened his observation to more complex rhythms of multiple cultural expressions. The most evident break with respect to Balázs and the classic style of montage can be found in the principle of the 'opposite movement' (*otkaznoe dviženie*) or mutual contrast between the elements, which enhances the impact of film rhythm by emphasizing its own dialectical process.[42] The Eisensteinian perspective influenced later reflection on the potential of film for rhythmic involvement. We can distinguish between broad categories of intervention: one of a meta-psychological nature, one of phenomenological inspiration, and one in the cognitivist area.

The first, which probably arises from Christian Metz's founding observations on the fetish of technology,[43] is best defined in Raymond Bellour's most recent work.[44] For Bellour, film has a corporeal quality that produces the constant illusion of a sensory, almost hypnotic 'agreement' with the spectator's body. Bellour relies on Daniel Stern's concept of the 'present moment', which is in turn indebted to French phenomenology and Paul Fraisse's 'psychological present'. In Stern a timing correspondence stems from the immediateness of any relationship, starting from the first face-to-face contacts of the child.[45] For Bellour, film gives us the illusion of a similar immediate, bodily correspondence. Rhythm defines here the 'transmodal character' of this correspondence, ensuring the coordination of sound and image.[46]

The conclusions of the authors of the second line of thinking are indeed not far off: for example Vivian Sobchack also stresses the embodied character of rhythmically expressed 'temporal reciprocity'.[47] And already according to Jean Mitry the phenomenological perspective accounts for the subjective and sensorial value of rhythmic experience: rhythm is an intentional structure, which opens up to the construction of meaning through a perceptual experience. Notably, Mitry states that this experience must be interpreted with psychological tools

like those enunciated by Paul Fraisse, from the subjective value of rhythmic perception to the binary Gestalt principle of assimilation and differentiation (see earlier in §1).[48]

The psychological implications of the experience of rhythm have also been considered in the third area of study. In this case, a multi-layered notion of rhythm, as inherited from Paul Fraisse, could offer a point of balance between models for understanding film experience which, by analogy with what happens in the more general framework of the psychological and neuroscientific debate, underline the cognitive challenge of film comprehension and narrative,[49] and models that have strongly reassessed the pre-cognitive and embodied dimensions of the act of viewing.[50] The Event segmentation theory postulates that continuity editing matches our brain's use of discrete representation to predict the immediate course of events, and to create an internal, interconnected representation in memory.[51] David Bordwell, though, from a clear cognitivist point of view, has insisted on the affective intensification effects of modern editing rhythm in terms of cutting pace,[52] while Torben Grodal has brought back the effectiveness of the filmic experience to the body rhythms ('fluctuations') of the viewer.[53] On this basis, Karen Pearlman has suggested reconsidering the work of the editor as a real technique of the body, assigning to rhythm the task of raising tension and release.[54] This reflects also Walter Murch's influential considerations on the 'natural' cut, based both on the actor's movement and the viewer's blinking of the eyes.[55] In this respect, research into mirror neurons has had a strong impact and enabled authors like Gallese and Guerra to strongly anchor film viewing to a Simulation theory: mirror neuron activation pushes us to an embodied simulation of the character's action and camera movements.[56] The work of Eugeni, Balzaretti, Cavaletti, and D'Aloia demonstrates how in film viewing 'the body schemata of movement and action possess an intrinsic temporal dimension', and that this temporal dimension is expressed 'both in terms of speed and duration'.[57] The Italian authors questioned the influence of different editing rhythms (neutral, classical, intensified) on time perception.

All these contributions solicit a 'somatic intelligence' of rhythm in film and the moving image,[58] allowing us to extend its semiotics from a logic of control and sense strata to a logic of dynamic resonance and 'production of affects'.[59] Overall, though, they prevalently come across as being focused on visual factors, probably the most immediate and the easiest to test. An additional strand of research we need to consider is therefore research on film music. On the one hand, related studies place great weight on the aspect of emotional activation of the original musical soundtrack.[60] On the other hand, general reflections on affective intensification have been also related to dimensions such as those of the spatialisation of sound[61] and the amplitude of usable frequencies following the introduction of noise reduction. The richness of timbre and sounds and noises of the contemporary film soundtrack, and, last but not least, the volume of sound in the cinema seem to enhance the emotional involvement of the audience.[62]

Conversely, there are few specific and dedicated in-depth laboratory studies

on the auditive dimensions of film rhythm, or on multimodal and cross-modal rhythm processing, an exception being the recent work by Swenberg and Carlgren. Here, once again, it has been proved that 'the relationship of the visual beat to the musical beat affects human viewers' visual perception of the edits', by enhancing both continuity and discontinuity effects.[63] Carol Vernallis also aptly described the particular 'responsiveness' of video music editing to musical rhythms.[64] This allows me to take a step further.

Paul Fraisse had already studied the relationships between visual stimuli and sound stimuli, and his consolidated starting point lay in the basic differences between the two sensory systems: e.g., the response to the sound stimulus is faster than the visual one, the sound stimulus seems longer than a visual one of equal duration.[65] These observations are substantiated by contemporary psychological and neuroscientific studies, which confirm the greater accuracy of the timing in auditory stimuli than in visual ones. Sound appears to be a more immediate instrument, but also a more precise mechanism.[66] The signals of the visual organisation require a longer time to re-process and also a longer time to learn in childhood.[67] We could refer to an auditive efficiency, in respect to visual perception. The French scholar further reported a fundamental qualitative difference between visual rhythm perception and sound rhythm perception. Listening allows a direct connection and synchronisation between the bodily response and rhythmic stimuli (entrainment), while vision allows only formal recognition of repetitions and symmetries that tend not to lead to a synchronised bodily response.[68] Jean Mitry confirmed this view, affirming that film bases its rhythm on "discontinuous forms", and therefore cannot achieve bodily synchronization through visual means only, if not on very particular occasions. An example of this would be the master sequence of the Teutonic Knights in *Alexander Nevsky* (Sergei Eisenstein, 1938).[69] Eisenstein himself, criticising the complex scene of the religious dances in *Storm over Asia* (Vsevolod Pudovkin, 1928), noticed that in this case the visual editing just foregrounded an abstract cadence of spatial repetitions and combinations (metric montage, in his terms). He explicitly asked here for a musical track, in order to gain real rhythmical effectiveness.[70]

We can then put forward a second working hypothesis regarding the role of sound rhythms in film and the moving image. Rhythmic aptitude in listening, due to the automatisms of sensory-motor activation and synchronisation that constitute it, seems to be functional to film experience in the same way as the embodied and enactive visual processes recognised by the most recent neurofilmological theories are. That is, not only as simple emotional reinforcement, as in the case of a melodic commentary, but as a bodily scheme of action and movement, which allows an embodied and enactive response to the stimulus. The differences between the visual and the auditive-induced involvement need, indeed, to be stressed: in the first case, neural mirroring and simulation involve a personal relationship with a represented subject or action, while rhythmic entrainment does not require it. Furthermore, we might think that this response is not simply simulated but shared, with the body of the

text and the spectator community's bodies. An impulse of extreme power and intensity. The limitation of the hypothesis lies in the lack of laboratory evidence, but the studies mentioned previously in support of the Dynamic attending theory (§2) seem to confirm at least its legitimacy. For now, we have confirmation of phenomena of both sensory and neural entrainment.

CONCLUSIONS

We have enough material to draw a conclusion, in a first attempt to delineate a Rhythmic Involvement Theory for audiovisual Media Experience (RITMEx). According to Fraisses' founding definitions, and later debates on the psychology of rhythm, the neuroscience of timing, and the theory of film and the moving image, RITMEx can state at least that:

1. Rhythmic involvement in audiovisual media experiences is grounded both on a value of Gestalt organisation and on related dimensions of sensory-motor activation (§1) and is generally to be interpreted as a training ground for our multilayered *timing* skills (§3).

2. Rhythmic involvement can be traced back to two different ways of experiencing audiovisual media: on the one hand, a dynamic mode, closely but not necessarily related to style-centered filmmaking, music videos, and social media contents, where rhythm itself ensures *entrainment* and embodied *anticipation* (§2). On the other, a narrative or event-related one, closely but not necessarily related to continuity editing, that exploits the enhancing effects of rhythmic stimuli in order to reinforce *attentional focusing* and low and high-order cognitive *prediction skills* (§2 and 4).

3. *Sound* rhythms are more effective than visual ones in beat timing and short interval timing; they can induce both bodily and neural entrainment and consequently a dynamic mode of experience. They are a grounding element in a 'somatic' relationship to the body of the film or any moving image viewed. They can nonetheless also have enhancing, empowering, or even contrapunctual value in narrative or event-based experiences (§4).

Notes

[1] Paul Fraisse, *Psychologie du temps* (Paris: Presses Universitaires de France, 1957), eng. ed. *Psychology of Time* (New York: Harper and Row, 1963), 28.

[2] On the filmological enterprise in post-war Paris and its relationship with psychology, see at least *Cinémas*, 19.2-3 (special issue *La filmologie, de nouveau*, ed. by François Albera and Martin Lefebvre, 2009).

[3] Paul Fraisse and Germaine de Montmollin, 'Sur la mémoire des films', *Revue Internationale de Filmologie*, 9 (1952), 37–69 (69). See also Frederic Charles Bartlett, *Remembering: A Study in Experimental and Social Psychology* (Cambridge: Cambridge University Press, 1932), 64–84.

[4] In the course of the above-mentioned study, Fraisse collected data on the judgment of duration that enabled him to subsequently demonstrate that the judgment of duration of single actions which one is called on to make directly tends to underestimate the time taken. This contrasts with the judgment of duration of complex activities, not clearly addressed and of which in particular one is a spectator: 'For a spectator the interest, although real enough, does not give the task unity. The act of perception has its end in itself and not in an objective to be reached or a task to be carried out.' Fraisse, *Psychology of Time*, 228.

[5] Fraisse, *Psychology of Time*, 98. 'Humans tend to perceive an isochronous stream of identical sounds as having alternating strong and weak notes — the "tick tock" phenomenon'. J. Daniel Cameron and Jessica A. Grahn, 'Perception of Rhythm', in *The Cambridge Companion to Rhythm*, ed. by Russel Hartenberger and Ryan McClelland (Cambridge: Cambridge University Press 2020), 20–38 (21).

[6] Fraisse, *Psychology of Time*, 84–85.

[7] Fraisse, Estimation and Perception of Time, *Annual Review of Psychology*, 35 (1984), 1–36.

[8] Fraisse brought together all of his studies on rhythm in a monograph published in France in 1974, *Psychologie du rythm*e, which was soon translated into Italian, of which only an abridged version is available in English, collected by Diana Deutsch in the first edition of her influential Psychology of Music: Paul Fraisse, 'Rhythm and Tempo', in *The Psychology of Music*, ed. by Diana Deutsch (New York: Academic Press, 1982), 149–180. We will refer here to the Italian edition: Fraisse, *Psycologie du rythme* (Paris: Presses Universitaires de France, 1974), it. ed. *Psicologia del ritmo* (Roma: Armando, 1979).

[9] Fraisse, 'Is Rhythm a Gestalt?', in *Gestalttheorie in der modernen Psychologie*, ed. by Suitbert Ertel, Lilly Kemmler and Michael Stadler (Darmstadt: Steinkopff, 1975), 227–232 (231).

[10] Fraisse, *Psicologia del ritmo*, 82. Note that the distinction between a short and a long time is still the basis of one of the fundamental tasks in psychological research into time, termed temporal bisection: John Wearden, *The Psychology of Time Perception* (London: Palgrave Macmillan, 2016), 71–83.

[11] Fraisse, 'Is Rhythm a Gestalt?', 229.

[12] Marcos Fernández and David Travieso, 'Paul Fraisse y la psicología del ritmo', *Revista de Historia de la Psicología*, 27.2-3 (2006), 31–43.

[13] Fraisse, *Psicologia del ritmo*, 52.

[14] Ibidem, 43–47.

[15] Fraisse particularly stresses that they involve systematic errors in response, ibidem, 50–58.

[16] Fraisse, *Psicologia del ritmo*, 67–68. 'These productions would have a perceptual regulation (grouping and structuration) but the basis would be motoric', Fraisse, 'Is Rhythm a Gestalt?', 232.

[17] In general, I refer to John Wearden's compendium, and to the page he devotes to the relation between attention and timing, 88–102.

[18] The works of Droit-Volet stress the importance of sensory-motor states in the perception of time, e.g. Sandrine Gil and Sylvie Droit-Volet, 'Emotional Time Distortions: The Fundamental Role of Arousal', *Cognition and Emotion*, 26.5 (2012), 847–862, and in general the discussion in Wearden, 105–115.

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[22] 'A mnemonic for the sequence of five expectation-related responses: Imagination response, Tension response, Prediction response, Reaction response, Appraisal response.' David Huron, *Sweet Anticipation: Music and the Psychology of Expectation* (Cambridge and London: The MIT Press, 2006), 7–18 and 416.

[23] Ibidem, 199.

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[25] Justin London, *Hearing in Time: Psychological Aspects of Musical Meters* (Oxford and New York: Oxford University Press, 2004), 4.

[26] 'A listener's metric competence resides in her or his knowledge of a very large number of context-specific metrical timing patterns', ibidem, 152–153.

[27] Yue Ding, Yang Zhang, Wenjing Zhou, Zhipei Ling, Juan Huang, Bo Hong and Xiaoqin Wang, 'Neural Correlates of Music Listening and Recall in the Human Brain', *Journal of Neuroscience*, 39.41 (2019), 8112–8123.

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[29] Cameron and Grahn, 'The Neuroscience of Rhythm', in *The Oxford Handbook of Music Psychology*, ed. by Suan Hallam, Ian Cross and Michael Thaut (Oxford and New York: Oxford University Press, 2016), 357–368.

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[31] 'If a sound is predictably repeated, induced responses may be observed around the time of the expected sound, and may occur even if the sound is omitted', ibidem, 363.

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(76).

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[44] Raymond Bellour, *Le corps du cinéma. Hypnoses, émotions, animalités* (Paris: P.O.L., 2009).

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[58] Pearlman, *Cutting Rhythms*, xvii.

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[63] Simon Carlgren, 'On-Beat/Off-Beat: Visual Responses to Audio-Visual Asynchrony in Music Videos', *Projections: The Journal for Movies and Mind*, 1 (2021), 28–54 (28).

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[65] A classic test of cross-modal interference in temporal and rhythmic perception to which Fraisse refers concerns the superimposition of a sound stimulus on an interval between visual stimuli in the so-called 'Kappa effect', an illusory perceptual time dilation. Fraisse, 'Estimation and Perception of Time', resp. 6 and 14.

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[68] Fraisse, *Psicologia del ritmo*, 56–57.

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The Aha, Ha! Moment: A Gestalt Perspective on Audiovisual Humour

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In my previous work about film music, I had adopted Gestalt as a theoretical framework to explain the functions and effects of music in film, from a perspective that did not stem from musicology but from film studies. I developed what I call 'micro/macro configurations' analysis. In films, music contributes to the overall form with its specific Gestalt (the configuration of the musical structures), and such musical Gestalt meets the Gestalt of some other cinematic device/s. Besides music, any device (light design, colour schemes, dialogue, acting, camerawork, cutting...) has a specific micro-configuration that can fuse with those of the other devices, and it can be analysed in terms of micro/macro-configuration. The product of the fusion of these micro-configurations is a macro-configuration in which the devices create an audiovisual whole that is 'something else than the sum of its parts'. In this article I apply this Gestalt-inspired analytical approach to audiovisual humour, more specifically to 'audiovisual puns', 'sight gags', and 'perceptual pranks'. The bulk of the examples come from the cinema of the Zucker-Abrahams-Zucker trio, whose comedy is largely based on a clash of incongruous micro-configurations, on perceptual accumulation that creates results similar to multistable figures, and even on comical optical illusions. Closing the article is a proposal that links Gestalt to the Release Theories of humour, explaining the laughter engendered by humour as a 'Aha, Ha! moment'.

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In this article I start by surveying the contribution that Gestalt theory can give to film analysis; then I present my Gestalt-inspired approach of 'micro-configuration/macro-configuration analysis'; finally, I offer a Gestalt perspective on audiovisual humour. Given the film-studies oriented nature of this discussion, I shall not consider 'found humour' — situations we can find humorous in everyday life — but 'invented humour', which is the one we find in film comedies.[1] I employ the Law of Prägnanz ('good configuration'), the Theory of Amodal Completion (which stems from the Law of Good Continuation), and the Theory of Problem Solving (the 'insight' or, perhaps more famously, the 'Aha! Moment'), which all derive from Gestalt Theory. I principally refer to the works of Wolfgang Köhler and Gaetano Kanizsa, instead of Rudolf Arnheim, whose theories are already more renowned in film and media studies.[2] It is important to point out that this article is inspired by the conceptual framework of Gestalt Theory but it has no pretence to pass itself as a work pertinent to the 'hard sciences': its disciplinary

area is Film Studies, and its concern is the analysis of humour in films. Hence Gestalt is employed in looser terms than it would be in a Psychology journal.[3]

GESTALT AND FILM ANALYSIS

In 1979, the Italian Gestalt Psychologist Gaetano Kanizsa wrote: 'today Gestalt theory does not have much credit as an explanatory theory'.[4] In Film Studies too, Cognitivism has proven more popular in the last decades, at least as an alternative to the post-structuralist and culturalist approaches.[5] Yet, the interest for Gestalt Theory has seen some resurgence lately, perhaps as a consequence of the discovery in the 1990s of the mirror neurons, whose action seems to resemble the 'Psychophysical Isomorphism' postulated by Gestaltists in the 1910s.[6] A renewed interest has consequently emerged in film studies too, especially in the area of sound and music, for example in the work of K. J. Donnelly and Danijela Kulezic-Wilson.[7]

Gestalt can provide a more holistic view of the audiovisual experience than the more modular view of Cognitivism.[8] Often, the computer-like processing of perceptual data appears too central in Cognitivism, with cognition being given a predominant importance. Gaetano Kanizsa, in his works on visual perception, argued for a neater separation between the perception process and the cognition process, calling the two 'primary process' and 'secondary process', respectively. Primary process, though not exactly immediate — because 'the organisation is not contained in the stimuli (even if the latter contains the conditions), but is added by the organism' — is arguably more independent of cognition than Cognitivism would posit.[9] In watching a film, for example, the perception of movement and the figure/ground separation would be a matter of primary processes — and not much cognitive processing is required — while the mental reconstruction of the 'fabula' from the 'syuzhet' would be a matter of secondary processes.[10]

The primary process, a 'preconscious process', is precisely what the Gestalt theorists have concentrated on, and it responds to organisational rules that were categorised into the Gestalt laws.[11] An experiment that supports the separation of the two processes is the 'Ames Room Illusion': even when one is made aware of the 'trick' behind it, the illusion is still perceived, a sign that cognition has little or no effect on that specific perceptual experience.[12] Gestalt-oriented film studies have similarly advocated for a neater separation of the two processes. K. J. Donnelly explains:

> *Stimulus recognition takes place* before *cognition. Unconscious affect always creates emotion, whereas conscious cognition does not necessarily do so. [...] Cognitive Psychology's notion of perception is that there is a small amount of stimulus and the 'work' all takes place as a cognitive process in the brain. This so-called mental model affirms that stimulus requires the considerable brain input of 'enriching' through hypothesis-testing. [...] [T]here are distinct aspects of the aesthetic process (for film especially) that are poorly accounted for by such an approach.*[13]

Within film studies, my own work has also been influenced by Gestalt, in particular in my research on the functions and effects of music in films.[14]

From this research I developed, from Gestalt Theory, what I called 'micro/macro configurations' analysis.[15] In film, music contributes to the overall form with its specific 'Gestalt' (the configuration of the musical melody, harmony, timbre, etc.... is such that music is perceived as threatening, for example), and such musical 'Gestalt' meets the 'Gestalt' of some other cinematic device/s (say, a close-up of a smiling face).[16] From the encounter of these micro-configurations (threatening music x smiling face) a macro-configuration is produced in which the two devices fuse to create an audiovisual whole (a 'creepy' person). The 'creepiness' configuration is neither in the image (the face is smiling) nor in the music (the music is threatening), but it appears as the product of the fusion of the two elements.[17] This fusion responds to the Law of Prägnanz: in the apparently incongruous pairing of these two divergent elements, our mind searches for some sense, some stability, some meaningful relation between the two, until an interpretation emerges — that person appears creepy because behind the positive smiling facade some negative intent is hidden — and the percept is thus stabilised.

If the perception of the smiling face and the threatening music can be a matter of 'primary processes', the interpretation of this apparently incongruous pairing seems to be calling for some higher-level processing, a secondary process more cognitive than perceptual. Yet, in keeping with Gestalt Theory, the secondary process of film interpretation can also be theorised with Gestalt's theory of problem solving. In ordinary film *comprehension*, we usually apply 'reproductive thinking', that is 'the application of tried-and-true paths to a solution. The thinker reproduces a series of steps that are known to yield a workable answer'.[18] With *interpretation*, we are faced with a *problem* that requires an act of 'productive thinking' on our part, which is 'characterized by shifts in perspective which allow the problem solver to consider new, sometimes transformational, approaches'.[19] If film interpretation is conceptualised as a problem-solving activity, and if a problem is considered like an unstable configuration, then the Gestalt theory of problem solving can be profitably used.

According to this theory, a solution is found when the configuration of the problematic object is made stable. To achieve this, the 'relations' between the elements of the problem at hand have to be examined, we have to gain an 'insight': 'we may now discover other relations in the material which make the difficulty disappear. In some instances, we are at first unable to see any relations in the material which are relevant to our task. When this happens, we have to inspect the given situation until, eventually, it does exhibit relations from which a solution can be derived'[20]

Gestalt tackles problem solving not only as a secondary process, and not so much as a *cognitive* effort of hypothesis-testing, but as a *perceptual* effort of relation-seeking — 'seeing relations', 'insight'... The problem has to be observed from different angles until the right one is found from which we can see a relation between the elements that can reveal a solution. This is the 'Aha! Moment', the

moment in which the solution to a problem presents itself to the mind: all the pieces fall into the right place all of a sudden because we have found the right angle of observation.

Back to our example of the creepy person macro-configuration, we are confronted with a juxtaposition of two micro configurations (threatening music and smiling face) that, taken singularly and compared, are not isomorphic at all: reproductive thinking would expect 'happy' music to go with a smiling face. This is the interpretive problem: why the juxtaposition of these two incongruous elements? When we apply productive thinking and find a relation between the elements, a stability of the percept is reached: the two micro-configurations (smiling face, threatening music) reconfigure one another and a macro-configuration of 'creepy person' finally emerges. We perceive an incongruity between the two micro-configurations, the incongruity is made noticeable as a problem, which alerts us that interpretation (problem solving through productive thinking) is needed. When we eventually have an insight into the relation between the apparently incongruous micro-configurations — music is not incongruous: music is telling me that something threatening is hidden behind that smiling face — then the incongruity itself is removed and a macro-configuration is stabilised: arguably, a creep is about to perpetrate something disturbing.

GESTALT AND AUDIOVISUAL HUMOUR

I have used the word 'incongruity' to describe micro-configurations that do not seem to fit together. And 'Incongruity Theory' is precisely the principal orientation currently employed to explain why we experience 'comic amusement', the emotional state produced by 'humour' in all its forms.[21] According to Incongruity Theory, 'human experience works with learned patterns. [...] The core meaning of 'incongruity' in standard incongruity theories is that some thing or event we perceive or think about violates our normal mental patterns and normal expectations.[22] Faced with such incongruities, our mind at first turns to a state of alert, because any deviation from normalcy might entail a potential danger; but soon after, when the incongruity is assessed as a jocular and unthreatening one, we experience comic amusement for the humorous contestation of normalcy.

It is cognitive psychology that has been largely employed to explain the mechanics of humour. Verbal comedy, in particular, has a substantial scholarly literature rooted in Linguistics or Cognitivism, largely falling within the Incongruity Theory — for example, Delia Chiaro's Pragmatics and Descriptive Linguistics or Victor Raskin's Script Theory.[23] Such explanations — according to which humour is produced through a play with our mental scripts, schemata, and through a set-up that leads us to formulate false inferences that are then subverted by the punchline — are in line with Cognitivism's focus on the secondary process, and indeed Incongruity Theory is the most popular amongst cognitivists.[24] Yet, in the processing of *visual* and *audiovisual* humour there is

arguably a stronger agency of the primary processes than in the more cognition-driven effort of processing *verbal* humour, which is based on symbolic language that needs stronger cognitive elaboration.

Visual humour can be registered, *perceived*, with a higher level of immediacy than verbal humour: if a written joke in Swedish is read by people who are not able to enact a secondary processing of the language, the humour is not registered at all; on the contrary, the cartoon of some pompous self-important man spectacularly slipping on a banana peel has the potential to elicit comic amusement trans-culturally, because it is registered through primary processing. Hence, Gestalt can perhaps offer some complementing perspectives on *audiovisual* humour, specifically applying Gestalt's problem-solving theory.

When we experience an instance of humour, we are presented with a problem — an incongruous situation — and we are required to find a solution. In terms of problem solving, there is a resemblance here between what happens with comprehension through reproductive thinking (the approach we apply in regular situations) and the need to apply productive thinking to something unusual. A Gestalt-based explanation had already been given in 1932 of 'the relevant mental processes of the humorous experience', an explanation that gave perception a stronger role: the meaning of a set of elements depends on the specific configuration of said elements; when a sudden change in configuration is experienced — as happens in the incongruous punchline of jokes — the result is a sudden change of meaning.[25] More recent contributions directly linked the pleasure that is experienced in solving a problem to the one experienced when understanding a joke: both entail a 'revelation experience' and 'pleasures of the mind' that are characterised by 'surprise, violation of expectations and [...] a feeling of mastery or virtuosity'.[26] While most of these studies focus on verbal jokes or the visual humour of cartoons, I shall direct my attention to the audiovisual humour of films.

Steve Neale and Frank Krutnik singled out some categories of comedic devices in film and television: *comic events* (humorous actions that are built into larger narratives, for example all the ludicrous troubles triggered by the rejuvenating potion in *Monkey Business* (Howard Hawks, 1952); *gags* (isolated humorous moments in the 'field of visual, physical action'); *jokes* and *wisecracks* (isolated humorous events and actions that 'imply a *control* of language'), and, within the latter, *visual puns* ('one of the forms taken by the comic interplay between language and action').[27] Here, I leave aside the comic events and the jokes and wisecracks and concentrate on the gag and the visual pun.

The *gag* is also known as 'sight gag', which in films often 'derives from exploiting the magical properties of cinema, a comedy of metaphysical release that celebrates the possibility of substituting the laws of physics with the laws of the imagination.'[28] A classic example of such 'comedy of metaphysical release' is the delivery man in *Hellzapoppin*' (H.C. Potter, 1941) who is recurrently seen trying to deliver a potted plant to one Mrs. Jones in the most absurd situations — always unsuccessfully. Moreover, every time he appears, the plant has grown in size, and in the later attempts it has reached the dimension of a tree. The

recurring gag has the core of its humour in the *sight* of the paradoxical rate of growth of the plant and of the delivery man's increasing exasperation and fatigue for carrying around the item.

The *visual pun* consists in a humorous play with double-meanings and the ambiguities of language, like the verbal pun, but it is realised in the visual domain.[29] An oft-cited example is in *Horse Feathers* (Norman Z. McLeod, 1932) where Groucho Marx, president of a university, inspects an official document before signing it. He stops, alarmed, 'Wait a minute there's no seal here. Where's the seal?'. And Harpo, promptly, brings in a sea seal instead of the expected piece of stationery. Though Maltin's coinage of 'visual pun' for this example is justified by the fact that this is a pun whose punchline takes place visually, I think that *audiovisual pun* is a fitter qualification. The pun works by means of one *visual* and one *aural* element, and it works only because the two are fused together. The visual micro-configuration (Harpo bringing in a sea seal), though certainly bizarre, is not per se humorous. The aural micro-configuration is not humorous at all (a character asks for a stamp). It is the fusion of the two that creates a humorous macro-configuration. Whereas the traditional pun is a wordplay in which the comic effect is produced by a double meaning within the same sensory modality — 'All calendar's days are numbered' — in audiovisual puns the verbal part typically functions as a first leg of the joke (set-up) while the second leg (pay-off) is offered visually.

Film comedy typically employs the visual *and* aural modalities in combination to produce humour. Even in *sight* gags, sound constitutes an important micro-configuration: consider the various gags about music shifting from the non-diegetic to the diegetic level — what Biancorosso calls 'epistemological jokes'.[30] Viewers are tricked into believing that music is non-diegetic (coming from outside the narrative world) but then they suddenly realise it is in fact diegetic (it comes from some source within the story-world). A classic example is from Mel Brooks's *Blazing Saddles* (1974). We see the sheriff riding his horse in the prairie to the sound of Count Basie's 'April in Paris' — a choice that is per se already incongruous with the western-film setting, but motivated by the incongruous designer's saddle sported by the sheriff. Yet, as the camera pans to follow the horse ride, we discover that Count Basie and his orchestra are actually there, playing the music from a stage incongruously placed in the middle of the prairie. The music we assessed as non-diegetic accompaniment (following the patterns of reproductive thinking as per our film-viewers' experience) is actually a diegetic performance.[31] Both modalities are actively involved in the production of the gag's macro-configuration: the aural micro-configuration (Basie's song) and the visual micro-configuration (the sheriff meeting the orchestra in the prairie). If this had been a silent film, we would have had the surprise of finding an orchestra in the middle of nowhere, but the non-diegetic/diegetic humorous trickery is made possible precisely by the *audiovisual* fusion. Like this, a sizable number of sight gags involve an aural component, and they are based on some trickery of our *perception*, not only of our mental schemata and scripts: first we perceive the music as non-diegetic, and then the perception is suddenly shifted

to another angle — diegetic.

Observed from this perception-oriented angle, audiovisual humour of this kind is similar to multistable images, in which 'sensory information is ambiguous and consistent with two or more mutually exclusive interpretations'.[32] The Duck/Rabbit, the Old Lady/Young Maid, or the Rubin Vase are famous examples: 'such figures provide the experience of looking at a constant external stimulus whose perceptual appearance changes from one viewing to the next, or indeed from one moment to the next in continuous viewing'.[33] In such figures, two co-existing sets of stimuli are juxtaposed, liable to be arranged into two or more different macro-configurations; we try to stabilise one macro-configuration, but that macro-configuration would not really stabilise, some tension remains, something unusual is perceived in the image. Then, we eventually 'solve the problem' by noticing, from another angle, that there is another relation between the micro-configuration sets of stimuli.

The reaction when we are presented with a multistable figure and we realise the trick it plays on our perception, can be one of smile and comic amusement. An example of such effect produced by this multistability — at least on me — is a particular version of the Rubin Vase.[34] It is not a drawing but a photorealistic rendering of a vase with the British royal family crest on it. At first, I see the vase, and that seems the way the macro-configuration is stabilised. But there is something weird about this vase: it is asymmetrical and odd-shaped, it does not conform to the Law of Good Form — nor to basic standards of good pottery. By inspecting the vase for solutions to the oddity, the perception suddenly flips to another side: now the profiles of Queen Elisabeth and Prince Philip can be seen, which explains the odd contours of the vase. A new macro-configuration is reached in which what I perceive is not a slovenly shaped vase but a humorous homage to the Royal couple.

Kanizsa studied other types of optical illusions, the so-called 'impossible figures', like Penrose's triangle or fork.[35] He too detected reactions of comic amusement when people were confronted with such odd images. Kanizsa, also a painter, discussed some of his works in which he created configurations that can be obtained in the bidimensional world of the canvas but that would be impossible in the tridimensional world of real life — as happens in Escher's lithographies. In Kanizsa's paintings, the absurd effects are produced by confusing our perception about the distinction between figure and ground through the flatness of bidimentionality, the juxtaposition of bright and dark areas, and a play between thick and thin elements, cues which all tend to be configured automatically, driven by the primary-process Gestalt laws. The result is that elements of the characters in the foreground seem to absurdly fuse or intersect with the objects or characters in the background: 'The fishing rod is thinner than the sail, so it is "forced" to pass behind [...], the fencer's sword pierces the referee several meters away, the umbrella is threaded through the girl's hair, and the man and the woman are strangely entangled in the fence. All these figures seem absurd'.[36] These absurd paintings suggest 'a humorous effect to the observer'; the first impression is one 'of oddity and absurdity,

because the effect is both unexpected on the basis of everyday experience and in conflict with the perspective information on depth given by the figure' and one can also notice 'the surprise of the observers and their saying, as they did in the case of the fisherman and of the fencer, that there must be some mistake in the picture'.[37]

Audiovisual gags like Count Basie in the prairie function somewhat like multistable figures: we first see something and then suddenly our perception is flipped to something else, and when we realise the trickery at the base of the image, we experience amusement.[38] Apart from the amusement for the sudden switch of perspective, multistable figure-like humour can also derive from the perception of the presence at the same time of two contrasting configurations — like in the Old Lady/Young Maid image. For instance, the humour might lie in the contrast between one serious micro-configuration and one ridiculous micro-configuration: in the same macro-configuration we have two different sides, as in a multistable image. The oeuvre of David Zucker, Jim Abrahams, and Jerry Zucker is exemplarily replete with gags based on this multistable 'audiovisual disjunction'.[39]

One gag in ZAZ's TV show *Police Squad!* (S01xE05, 1982) sees Lieutenant Frank Drebin — in an undercover mission — paying a visit to a mob chieftain in his office. As customary after the James Bond films, the stereotypical villain is at his desk, cuddling a white cat on his lap. As the dialogue proceeds on serious tones, the mobster puts the cat away by sticking it inside one of the desk-drawers, and then opens another drawer to grab a gun, but we can peek a white toy poodle inside this other drawer. As these animal gags run, the tone of the dialogue is threatening and confrontational, and the music too accompanies it in a serious mood. Moments later, the mobster opens a file cabinet to put in a document while he assigns to Drebin — who pretends to be wanting to join the crime organisation — a murder as an initiation test. The music punctuates the words 'I want you to kill him' with a dramatic figure of the trombones, but as the mobster opens the file cabinet, doves fly out of it, continuing the series of stored-animals gags. If we *hear* only, the scene seems to belong to the drama genre; if we *watch* only, it clearly belongs to the comedy genre. The humorous macro-configuration is produced by the multistable tension of the two contrasting micro-configurations.

If we consider audiovisual puns, these are not only interpretable in terms of multistability — the flipping from one meaning to another — but they have also a component of trickery played upon our 'amodal completion' processes, that is one of the two modalities through which we interpolate non-visible parts to create a good form and stable configuration in our percepts. In Kanizsa's words:

> *we have phenomena of totalization, of completion, of integration, of 'filling in the gaps' — that is, of making present what is absent. The interpolation in the primary process can be modal or amodal. Examples of modal completion are [...] the formation of anomalous contours and surfaces. In all these cases the filled-in parts have the characteristics of visual modality [...]. Much more numerous are the*

> *cases of amodal completion. By 'amodal presence' we mean that type of perceptual existence [...] that is not verified by any sensory modality. [...] One need only recall the fundamental fact of figure-ground segmentation in the construction of the phenomenal world, in which the articulation always implies the completion (precisely amodal) of the continuous background existing behind the figure.*[40]

Audiovisual puns play with our tendency to anticipate the continuation of an event, to fill the gaps according to the normal expectations that reproductive thinking suggests us. We perform an amodal completion of elements that we suppose are going to come next, even if evidence of this has not been ostensibly presented yet by any modality. In the case of the Marx Brothers' seal audiovisual pun, the normal amodal completion suggested by reproductive thinking — how we mentally see the event progressing — is the anticipation of an office seal to appear soon; instead, something else appears, which is not in line with the prediction.[41]

In *Police Squad!* again we have a number of such instances. For example, in one episode (S01xE04), Hocken and Drebin pay a visit to a night-club to question the resident starlet. They found her in the dressing room, with the scant costume still on. As they talk, she asks, 'Do you mind if I change' and then moves behind a dressing screen. Presently, she comes out as a totally different actress, a complete *change*, not a tall red-head but a petite blonde. Despite the absurd twist, the conversation continues undisturbed, as per the style of Zucker, Abrahams, and Zucker [fig. 1].

A less evident audiovisual puns is in ZAZ's *Top Secrets!* (1984): at a performance of Tchaikovsky's ballet *The Nutcracker* (1892) we see the male dancers sporting exceptionally prominent crotch bumps in their leotards; as they stand in line, the female dancers leap in the air and continue dancing by stepping on the male anatomical protrusions — a veritable 'nutcracker' ballet, for those who recognise the title of the musical piece.

There are cases of sight gags that are specifically based on tricks played on our perception. These 'perceptual pranks' are abundant in the cinema of Jacques Tati and of Zucker, Abrahams, and Zucker.[42] In both, the comedic style is typically based on a play with the viewer's perception — not only through off-centred, background, or multi-layered gags — but also through veritable optical illusions. A Tati example from *Play Time* (1967) is the doorman who bends down to open the floor latches of a large glass door, and in doing so the ornate handles of the door gets superimposed to his head and look like a massive pair of antlers. Tati's films are an examples of 'parametric cinema' which 'exploits the very limits of the viewer's capacity'.[43] Also, 'the strongly parametric film, in departing from the classical system, must create a degree of perceptual uncertainty'.[44] While in classical cinema we can rely on reproductive thinking, with parametric cinema we have to resort to productive thinking to solve the perceptual challenges, like when we are faced with humour. Comedies in the parametric style are thus most interesting from a Gestalt perspective.

Within the 'nonsensical accumulation' typical of ZAZ's works, we find numerous

Fig. 1:
'Do you mind if I change?', from *Police Squad!* (David Zucker, Jim Abrahams, Jerry Zucker, 1982), Episode 4

perceptual pranks at the expense of the viewers.[45] A particularly rich repository is *Top Secret!.* A striking instance of an articulate and technically complex perceptual prank is the Swedish bookstore scene, which I have analysed elsewhere.[46] Another is the departing train station: the protagonist is sitting in a train that has just stopped at a station. We hear the whistle signal, the engine warms up, and we see, from inside the wagon, that the train is leaving the station… until we realise that it is actually the station that is leaving the train. The false movement is confirmed when the narration cuts to the exterior of the wagon and we see the station, bizarrely mounted on a wheeled platform, departing from the stationary train — to add more absurdism, a late-coming passenger chases the travelling station.

Other gags in *Top Secret!* deceive the viewer by playing on the flatness of the bidimensional film image, in a way similar to Kanizsa's paintings. As the leader of the underground fighters is observing through binoculars the meadow in front of the prison they are about to infiltrate, we cut to a point-of-view shot: we see the typical reverse-eight-shaped black matte of binoculars framing the meadow, in which some cows are roaming. Suddenly, the cows jump over the black matte as if it were a fence, tilting our perception of the different planes of

the space, as in a *trompe-l'oeil* [fig. 2].

In another scene, the perceptual prank is played through forced perspective — the same trick used to make objects or people look bigger or smaller depending on their position between the camera and the set, a sort of Ames

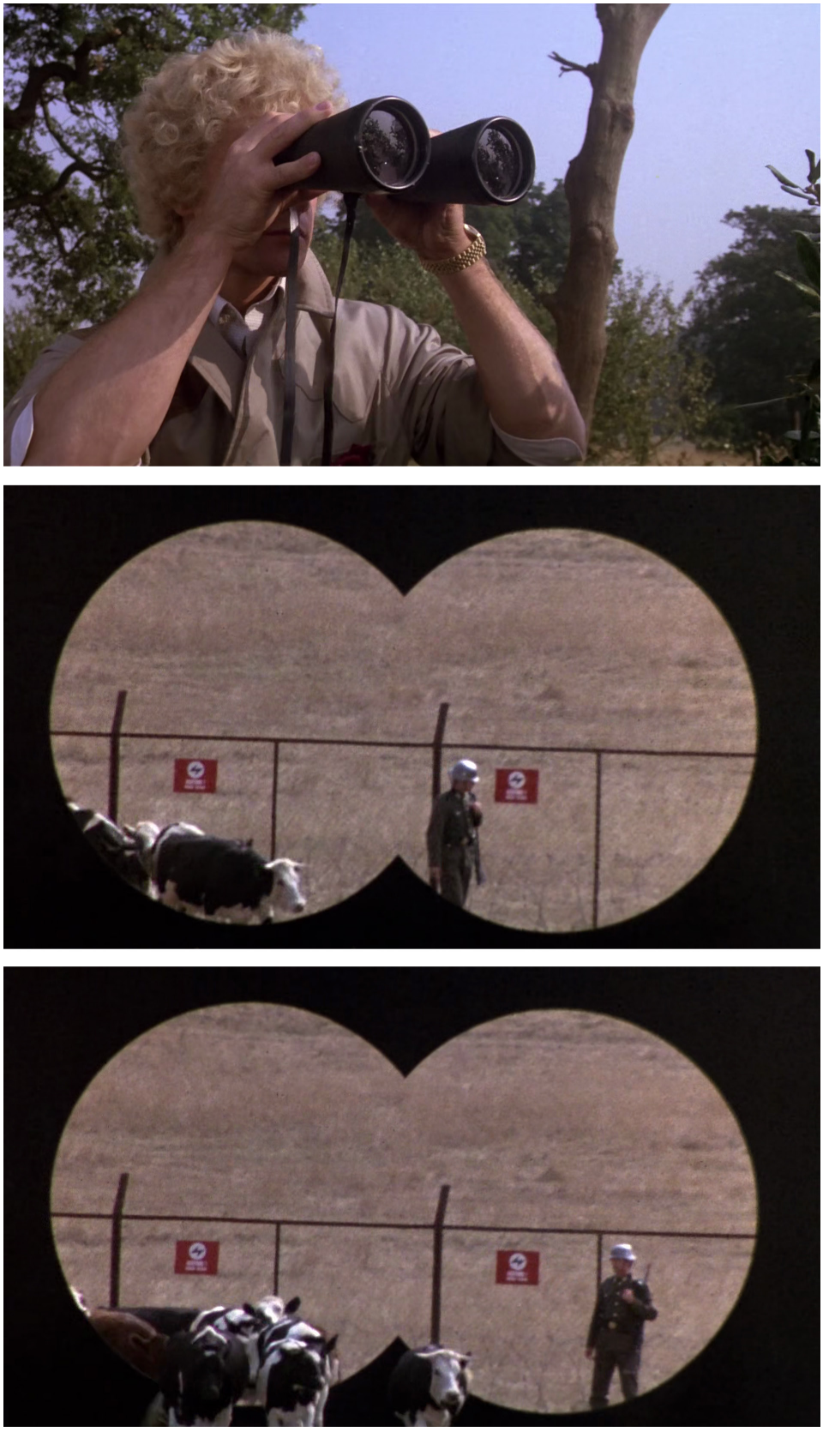

Fig. 2:
Trespassing Cows, from *Top Secret!* (David Zucker, Jim Abrahams, Jerry Zucker, 1984)

room, as employed in *Darby O' Gill and the Little People* (Robert Stevenson, 1959).[47] The scene starts with a phone ringing in a large salon with people in the background. The phone is very close to the camera and appears magnified because of its placement. The East-Germany commander walks to the phone to

Fig. 3:
Big Phone, from *Top Secret!* (David Zucker, Jim Abrahams, Jerry Zucker, 1984)

Fig. 4:
Boots, from *Top Secret!* (David Zucker, Jim Abrahams, Jerry Zucker, 1984)

picks it up, and as he walks our perception changes: we realise that the phone is actually oversized [fig. 3].

Perceptual amodal completion is at the base of other gags. The East-Germany commander is seen reading a book in his office, his boots lying on the desk. We are distracted by the book's title: 'Hermann Goering's Workout Book', and we are led to think that this is the sight gag here. When the attendant enters the office, the commander stands up and his boots keep staying on the desk: they were fake boots, disconnected from his body. At the sight of boots on a desk and a person behind it, we amodally complete the image by filling in the missing parts — we see boots, we see a person, we connect the boots with the person, imagining legs that we do not actually see, as per the Law of Good Continuation. These gags make fun of our routinised perception: do not presume the presence of legs only because you see boots! [fig. 4]

In a later scene, the protagonists knock at the door of the underground-movement headquarters. A little sliding window opens on the very top of the door and a man peeks outside suspiciously, asking for the password. Given the high position of his head, we prepare ourselves to see an abnormally tall person. As the newcomers provide the correct password, the door is open... to

reveal that the peeking man was in fact a 'little person', evidently standing on a high stool. Because of our routinary amodal completion process, we imagined a person as tall as the door window, filling the non-visible parts supposed to lead up to the visible head [fig. 5].

The types of sight gags that can be called perceptual pranks are not as

Fig. 5:
Tall/short, from *Top Secret!* (David Zucker, Jim Abrahams, Jerry Zucker, 1984)

common as audiovisual puns and the 'regular' sight gags, but when one finds them, these are ideal for the application of Gestalt, because they rely more on the primary process than on the secondary process: they do not disrupt our knowledge of norms and conventions; they disrupt our perception.

THE 'AHA, HA! MOMENT'

As a conclusion, an important question of Humour Theory might be tackled, even if only tentatively: Why we often laugh when faced with audiovisual humour, multistable figures, or perceptual pranks? In the case of the Royal Couple Vase, the first reaction is one of weirdness, and weirdness can be a threat to normalcy and stableness, so we muster psychic energies to solve the problem. When the weirdness is found to be innocuous and deliberately created to play on our perception, then a re-configuration of the energies happens and comic amusement is the effect of this sudden mental switch. This comic amusement might produce the physical reaction of a smile or even a burst of laughter. Why?

Release Theories concentrated on this: What is laughter? This is admittedly 'something left unexplained by the [...] Incongruity Theories'.[48] The Incongruity Theories focus on the mental processes, and the *psychic* reward is a 'mental pleasure' similar to the one gained from solving puzzles, 'but when we engage in genuine puzzle solving [...] we aim at discovering the right answers and take pleasure in that, whereas with things such as jokes, we are happy — really happy — with the wrong answers', notes Noël Carroll.[49] From the angle of Release Theories, the *physical* reward is the pleasure deriving from a discharge of pent-up energy.

Release Theories posit that laughter is a discharge of energy: when we are confronted with a puzzling situation, we muster psychic energies to face the potential problem, and when we realise that the puzzling situation is nothing serious, then the accumulated energy is released in the form of the laughter. Quoting John Dewey, Morreall succinctly expresses the point: 'the laugh is thus a phenomenon of the same general kind as the sigh of relief'.[50] In Gestalt terms, an energy pattern in the brain is suddenly reconfigured into a different one. When the new macro-configuration stabilises, the sudden switch from one macro-configuration to the other creates a release of the energy summoned for the problem-solving effort. A burst of laughter ensues: it is a type of problem solving in which we experience a 'Aha, Ha! Moment'.

Release Theories are largely dismissed nowadays because of the mental model they posit, 'based on an outdated hydraulic theory of the mind',[51] and they have a 'tendency [...] to proliferate unwarranted mental entities and/or processes'.[52] The critique about 'outdated theories of the mind' and 'unwarranted mental processes' reminds of the principal critique against Gestalt theory, and specifically against the already-mentioned psychophysical isomorphism.[53] The cognitive psychologist Alan J. Parkin sums it up in these words: 'While Gestalt demonstrations are very powerful, the theory that went along with them

was rather weak. [...] Their principal idea was that of isomorphism, in which a particular Gestalt was thought to set up a corresponding electrical force in the brain which served as the basis for perception'.[54]

The energy fields that flow in the brain posited by Gestalt's psychophysical isomorphism might look, to the contemporary eye, quite similar to the 'hydraulic' theory of the mind on which the Release Theories are based. Energy patterns in the brain are triggered and shaped in specific ways by the external stimuli, and the configuration of such energy patterns in our brain determines the configuration in which the stimuli are organised into shapes and objects in our resulting perception. In his 'maluma/takete' experiment, Köhler demonstrated that the perception of a 'Roundness' Gestalt is share by both a round figure and the non-word 'maluma', and the perception of a 'Sharpness' Gestalt is shared by a spiky and angular figure and the non-word 'takete'.[55] Both image and sound are perceived as curvy or spiky, respectively. Apparently, certain stimuli, whether visual or aural, activate the same energy patterns in the brain, and such energy patterns produce the same specific perception in either modality. The Gestaltists could never demonstrate this theory convincingly. Yet, the way in which we react to multistable figures seems to suggest that there seems to be some sudden switch in perception that has little or nothing to do with cognition, exactly like an energy field that suddenly changes configuration: when we flip from one configuration to the other, there is like a mental 'click' that commutates the configurations. Indeed, some current neurological studies explain the shifts in multistable perception on the ground of 'perceptual alternations [that] derive from the autonomous oscillations of a circuit within the visual areas'.[56]

It is not my intention here to defend psychophysical isomorphism or outdated 'hydraulic' views of the mind but to submit that it would be perhaps enriching to integrate the Incongruity Theory with the Release Theory, to explain the 'Aha, Ha! Moment' as a sort of tickling of our brain induced by the sudden shift of energy fields. I am not the first one to propose such integration. For example, an attempt to reconsider Release Theory from a cognitivist's perspective was made by Noël Carroll: 'when presented with an anomaly — such as the punchline of a joke — one is affronted with a challenge, an incongruity which may be appraised as threatening, annoying, in need of a solution, or amusing, the difficulty is removed. From being primed for effort, a sense of effortlessness, ease, and relaxation ensues. An initial intuition that something is being demanded of us disappears, resulting in relief'.[57] We do not have to worry about finding a solution for the anomaly because the anomaly is there just for fun, and hence we experience a 'mental experience of being unburdened cognitively'.[58] What I propose here is an approach to audiovisual humour that employs Gestalt Theory not only as an analytical tool but also as a sort of Release Theory, to be integrated to the more diffused approaches based on Cognitivism and Incongruity Theory. As in the case of film music in my previous works, I see Gestalt as a fruitful addition that can add new implements to our film-analysis toolbox. Instead of discarding tools because of their supposed obsolescence or because of current fads in the academe, it is more productive to enlarge the set of tools at our disposal.

Moreover, the more resources we can mobilise to study humour, the better it is, given humour's centrality in our lives and its socio-cultural importance. Not dissimilarly to multistable and impossible/unthinkable figures, humour often constitute a challenge not only to our normal *understanding* of things — 'to disrupt the heuristics we deploy in everyday life' and to single out the 'cognitive bugs'[59] — but also to our normal *perception* of things. Besides procuring us comic amusement, humour has also a central function as a 'source of social information about the norms that govern the culture we inhabit' because it 'alerts us to the relevant social norms and serve to reinforce them. [...] In some cases, humour may even function to *enforce* norms — to serve as a corrective'.[60] By contravening the expected results and disrupting the norms, humour highlights those norms and expectations that are often so common that become invisible to us in everyday life.

This social function of making us look at everyday life from another perspective is also the key social function of all the arts according to the Russian Formalists. As explained by Kristin Thompson:

> *Art is set apart from the everyday world, in which we use our perception for practical ends. We perceive the world so as to filter from it those elements that are relevant to our immediate actions. [...] Films and other artworks, on the contrary, plunge us into a non-practical, playful type of interaction. They renew our perceptions and other mental processes because they hold no immediate practical implications for us. [...] The nature of practical perception means that our faculties become dulled by the repetitive and habitual activities inherent in much of daily life. Thus art, by renewing our perceptions and thoughts, may be said to act as a sort of mental exercise, parallel to the way sports is an exercise for the body.*[61]

As Viktor Shklovsky puts it, 'as perception becomes habitual, it becomes automatic' and 'habitualization devours work, clothes, furniture, one's wife, and the fear of war. And Art exists that one may recover the sensation of life; it exists to make one feel things, to make the stone stony'.[62] What Art does is 'defamiliarise' the world for us, making our perception of it 'roughened' so that habitualisation and automatisms are removed and we can appreciate the world anew. By aesthetically transforming the 'materials' of the world and making fun of them, humour too operates such defamiliarisation and constitutes an indispensable instrument not only for the *cognitive* consolidation of the societal cultural norms but also to 'break the glass armour of familiarity' of our routinised *perception*.

Notes

[1] Noël Carroll, *Humour* (Oxford and New York: Oxford University Press, 2014), 37.

[2] For example, Meraj Dhir, 'A Gestalt Approach to Film Analysis', in *Arnheim for Film and Media Studies*, ed. by Scott Higgins (New York: Routledge, 2011), 89–106.

[3] I would like to thank the editors of this issue and one of the two anonymous peer-reviewers for their constructive criticism and suggestions.

[4] Gaetano Kanizsa, *Organization in Vision: Essays on Gestalt Perception* (New York: Praeger, 1979), 3.

[5] See Gregory Currie, 'Cognitivism', in *A Companion to Film Theory*, ed. by Toby Miller and Robert Stam (Malden, MA: Blackwell, 2004), 105–122.

[6] Psychophysical Isomorphism is a central, though controversial, tenet of Gestalt, according to which the energy patterns in the brain configure in such a way that a correspondence exists between the perceptual phenomena and the mental processes — more on this below. On Psychophysical Isomorphism, see Abraham S. Luchins and Edith H. Luchins. 'Isomorphism in Gestalt theory: Comparison of Wertheimer's and Kohler's concepts', *Gestalt Theory*, 21.3 (1999), 208–234. On 'mirror neurons' — neurons that fires both when an action is performed and when the same action is merely observed — see Giacomo Rizzolatti, Luciano Fadiga, Leonardo Fogassi and Vittorio Gallese, 'Resonance Behaviors and Mirror Neurons', Archives italiennes de biologie, 137.2 (1999), 85–100. The relation between the two is surveyed, for example, in Morris N. Eagle and Jerome C. Wakefield, 'Gestalt Psychology and the Mirror Neuron Discovery', *Gestalt Theory*, 29.1 (2007), 59–64, and Carmelo Calì, 'Isomorphism and Mirror Neurons', *Gestalt Theory*, 29.2 (2007), 168–173.

[7] Danijela Kulezic-Wilson, *The Musicality of Narrative Film* (Basingstoke: Palgrave MacMillan, 2015).

[8] Cognitivism, more than a 'specific theory', has been called a 'program' for the difficulty to establish a unity of and general consensus on the doctrines at its base: see Currie, 106.

[9] Kanizsa, *Organization in Vision: Essays on Gestalt Perception* (New York: Praeger, 1979), 5.

[10] On fabula and *syuzhet* in films, see David Bordwell, *Narration in the Fiction Film* (Madison, WI: University of Wisconsin Press, 1985), 49–62.

[11] Ibidem, 3.

[12] Kanizsa, 4.

[13] Kevin J. Donnelly, *Occult Aesthetics: Synchronization in Sound Film* (Oxford and New York: Oxford University Press, 2014), 18–19.

[14] Emilio Audissino, *Film/Music Analysis. A Film Studies Approach* (Basingstoke: Palgrave Macmillan, 2017).

[15] Audissino, 'A Gestalt Approach to the Analysis of Music in Films', *Musicology Research*, 2.1 (2017), 69–88.

[16] The word 'gestalt' is sometimes translated as 'form' but I see this as potentially confusing with the more vague concept of 'form' that is used in everyday parlance — the outer aspect of something, or the 'vehicle' of contents in the form/content-split discourses — or the 'form' as used in formalist approaches. I employ the term 'configuration' to translate Gestalt's specific concept of a dynamic process of organisation and reciprocal relation amongst the parts of a system. This distinction is also essential to clarify that I do not claim that the overall form of a film should be equated to the concept of 'gestalt': the film has its own formal system (in formalist terms) and to analyse the functions and effects of the devices within the film form, I employ the Gestalt-inspired micro-configuration/macro-configuration method to study the function and effect of the single device at hand.

[17] This type of fusion is similar to the 'widow concept' discussed by Sergei Eisenstein in *The Film Sense*, trans. and ed. by Jay Leda (New York: Meridian Books, 1957), 7–8. The Kuleshov effect can also be interpreted as two micro-configurations (Close-Up of Mozhukhin observing something x Detail Shot of the observed object/person) producing a novel macro-configuration: Mozhukhin is hungry; Mozhukhin is mournful; Mozhukhin is lustful. On the Kuleshov Effect, see *Kuleshov on Film: Writings of Lev Kuleshov* ed. by Ronald Levaco (Berkeley and Los Angeles: University of California Press, 1974), 200.

[18] Ronald T. Kellogg, *Fundamentals of Cognitive Psychology* (Los Angeles and London: Sage, 2012), 246.

[19] J. Burton Cunningham and James N. MacGregor, 'Productive and Re-productive Thinking in Solving Insight Problems', *Journal of Creative Behavior*, 48 (2014), 44–63. While they are often considered synonyms in the post-structuralist or culturalist approaches, where films are 'read', I distinguish 'film analysis' — which also considers 'film comprehension' — from 'film interpretation': 'interpretation is only one part of

analysis', Kristin Thompson, *Breaking the Glass Armor: Neoformalist Film Analysis* (Princeton: Princeton University Press, 1988), 34n25.

[20] Wolfgang Köhler, *The Task of Gestalt Psychology* (Princeton: Princeton University Press, 1969), 143–144, 147–153.

[21] Carroll, *Humour*, 4.

[22] John Morreall, *Comic Relief: A Comprehensive Philosophy of Humor* (Chichester: Wiley-Blackwell, 2009), 10–11.

[23] Victor Raskin, *Semantic Mechanisms of Humor* (Dordrecht, Boston and Lancaster: D. Reidel, 1985); Delia Chiaro, *The Language of Jokes: Analyzing Verbal Play* (New York: Routledge, 2006).

[24] Carroll defends it as 'the most fruitful', after having traced the deficiencies of the competing theories — Carroll, *Humour*, 8.

[25] Norman R. F. Maier, 'A Gestalt Theory of Humour', *British Journal of Psychology*, 23 (1932), 69–74 (69).

[26] Ivana Bianchi, Erika Branchini, Carla Canestrari and Roberto Burro, 'On Pleasures of the Mind Related to Humour and Insight Problem Solving: An Investigation of People's Awareness of What They Like and Why', *Journal of Cognitive Psychology* (2022) <doi: 10.1080/20445911.2022.2047058>. Other articles in the past had already connected insight and problem solving with humour: for example, Ori Amir and others, 'Ha Ha! Versus Aha! A Direct Comparison of Humor to Nonhumorous Insight for Determining the Neural Correlates of Mirth', *Cerebral Cortex*, 25.5 (2015), 1405–1413, and Aaron Kozbelt and Kana Nishioka, 'Humor Comprehension, Humor Production, and Insight: An Exploratory Study', *Humor — International Journal of Humor Research*, 23.3 (2010), 375–401.

[27] Steve Neale and Frank Krutnik, *Popular Film and Television Comedy* (New York and London: Routledge, 1990), 48–51.

[28] Carroll, 'Notes on the Sight Gag', in Id., *Theorizing the Moving Image* (Cambridge: Cambridge University Press, 1996), 146.

[29] Leonard Maltin, *Of Mice and Magic: A History of American Animated Cartoons* (New York: New American Library, 1987), 291.

[30] Giorgio Biancorosso, 'The Harpist in the Closet: Film Music as Epistemological Joke', *Music and the Moving Image*, 2.3 (2009), 11–33.

[31] The scene is analysed in terms of 'syn-diegetic perspective' in Emile Wennekes, 'Out of Tune? Jazz, Film and The Diegesis', in *Cinema Changes: Incorporations of Jazz in the Film Soundtrack*, ed. by Emile Wennekes and Emilio Audissino (Turnhout: Brepols, 2019), 3–18 (12–14).

[32] Philipp Sterzer, Andreas Kleinschmidt and Geraint Rees, 'The Neural Bases of Multistable Perception', *Trends in Cognitive Sciences*, 13.7 (2009), 310–318 (310).

[33] Andrew J. Parker and Kristine Krug, 'Neuronal Mechanisms for the Perception of Ambiguous Stimuli', *Current Opinion in Neurobiology*, 13.4 (2003), 433–439 (433).

[34] Reproduced in Benjamin B. Lahey, *Psychology: An Introduction* (New York: McGraw-Hill, 2012), 148.

[35] Kanizsa, 21–22.

[36] Ibidem, 41.

[37] Ibidem, 41–45.

[38] Multistability has been employed elsewhere to study verbal and visual comedy: for example, respectively, Daniel Kjellander, 'Gold Punning: Studying Multistable Meaning Structures Using a Systematically Collected Set of Lexical Blends', *Lexis Journal in English Lexicology*, 14 (2019), 1–28; Karin Kukkonen, 'Adventures in Duck-Rabbitry: Multistable Elements of Graphic Narrative', *Narrative*, 25.3 (2017), 342–358.

[39] On Zucker-Abrahams-Zucker, see Audissino, 'New Hollywood's "Zany Godards": A "Shirley" Serious Assessment of Zucker-Abrahams-Zucker', in *New Wave, New Hollywood: Gender, Reassessment, Recovery and Legacy*, ed. by Nathan Abrams and Gregory Frame (New York: Bloomsbury Academic, 2021), 79–100, and Audissino, '*Police Squad!*. The Zucker-Abrahams-Zucker Style VS the Substance of Traditional Television', in *Substance/Style: Moments in Television*, ed. by Sarah Cardwell, Lucy Donaldson and Jonathan Bignell (Manchester: Manchester University Press, 2022), 178–201.

[40] Kanizsa, 6.

[41] Of course, one might argue that, since we are dealing with a Marx Brothers film, expectations are oriented towards abnormality rather than normality, so the appearance of the sea seal might not be entirely unexpected. Nevertheless, the humorous effect is produced precisely because the normal amodal completion of the event constitutes the term of reference that anchors our perception of abnormality in the

deviant development of the scene.

[42] ZAZ and Tati are compared in Audissino, '*Police Squad!*', 186–187.

[43] Bordwell, 306.

[44] Thompson, 251.

[45] The comedic mechanics of non-sensical accumulation are exemplified in Audissino, 'New Hollywood's "Zany Godards"', 86.

[46] Ibidem, 95.

[47] Fiona M. C. Dorward and Ross H. Day, 'Loss of 3-D Shape Constancy in Interior Spaces: The Basis of the Ames-Room Illusion', *Perception*, 26.6 (1997), 707–718.

[48] Morreall, 16.

[49] Carroll, *Humour*, 36.

[50] Quoted in Morreall, 17.

[51] Morreall, 23.

[52] Carroll, *Humour*, 41.

[53] Some of the misunderstandings of Gestalt Theory are discussed in Riccardo Luccio, 'Gestalt Psychology and Cognitive Psychology', *Humana Mente*, 17 (July 2011), 67–128.

[54] Alan J. Parkin, *Essential Cognitive Psychology* (Hove and New York: Psychology Press, 2000), 7.

[55] Köhler, *Gestalt Psychology: The Definitive Statement of the Gestalt Theory* (New York: Liveright, 1947), 224–225.

[56] David A. Leopold and Nikos K. Logothetis, 'Multistable Phenomena: Changing Views in Perception', *Trends in Cognitive Sciences*, 3.7 (1999), 254–264 (254).

[57] Carroll, *Humour*, 41.

[58] Ibidem.

[59] Ibidem, 70.

[60] Ibidem, 76.

[61] Thompson, 8–9.

[62] Quoted in ibidem, 10.

BEYOND CINEMA

Rhythm Beyond the Cinematic Medium/ The Pixel Beyond the Movie Theatre[1]

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Gregory J. Seigworth and Melissa Gregg write about Roland Barthes's splendid notion of 'shimmer': an 'exhaustively nuanced space' that may be inventoried as patho-logies (by which to contemplate *pathos*) of bodies (human and nonhuman). In Alex Garland's 2018 film *Annihilation*, a refracting effect — the Shimmer — which has appeared around a lighthouse and is slowly spreading outwards, is being studied. A group of female scientists enter the Shimmer and begin to inventory the strange organic duplicates of form within it. These organic structures, while extraordinarily nuanced, are also patho-logies of organic life as they are refracted by the Shimmer. This article will consider the 'exhaustively nuanced space' of cinema and its patho-logies via the conditions of the rhythm of the pixel in cinema, and beyond, in social media. In an examination of the rhythm of the pixel beyond the cinematic medium, I consider the energetic 'becoming' of the spectator/operator and the digital image (text and image in social media) as they act *in relation*. In an examination of the rhythm of the pixel beyond the movie theatre, I consider the infinite intensities in the *aisthetic* encounter of body and text/image in social media and its correlation to the politics of a mass-art.

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An 'exhaustively nuanced space' is the way Roland Barthes describes 'shimmer' in his series of published lectures, *The Neutral: Lecture Course at the Collège de France (1977–1978)*.[2] In *The Affect Theory Reader*, Gregory J. Seigworth and Melissa Gregg outline the affects that would constitute an 'inventory of shimmers' in 'neutrally inflected, immanent *pathos* or "patho-logy"'.[3] In Alex Garland's 2018 film *Annihilation*, the Shimmer is a refracting effect that causes the area around a lighthouse to become populated with organic duplicates of existing organic structures. The Shimmer in *Annihilation* allows for a way of thinking about the shimmering energetic plane in and of the digital image. My interest is in how 'shimmer' as an 'extreme changeability of affective moments, a rapid modification'[4] characterizes an *aisthetic*, as well as ethical, encounter with the image, and how such an encounter may be considered in spectator/operator interactions with media texts beyond cinema.

With the rise of nationalist movements and authoritarian governments, and digital hostility in social media, a return to the study of the sensory and sensuous body is more important than ever, for in our *aisthetic* encounters

we may apprehend an ethics beyond a politics of inadequate ideas. Referring to Gilles Deleuze's citation of the Second World War as 'a violent encounter to thought', Nadine Boljkovak, in her book *Untimely Affects: Gilles Deleuze and an Ethics of Cinema*, points to Deleuze's contention that the 'war machine', beyond its violence, comprises 'revolutionary movements' such as are found in art's creative invention and resistances.[5] Thinking about affect's potential — and the creativity and resistance that it inspires — this article seeks to examine social media text and image through infinite intensities by which we may recognize the conditions for a patho-logical interaction in this 'exhaustively nuanced space'.[6]

This article will consider relations of affect in the development of cinema to the digital image and beyond, in social media, via the rhythm of the pixel. In a consideration of the pixel beyond the movie theatre, that is, in the relocation of the pixel from cinema to social media, it is necessary to recognize the affective and energetic relations that exist between social media text and image and social media operator. The rhythm of the pixel in both cinema and social media generates an energetic relation between the media text and the spectator/operator. I want to consider this energetic relation as an ethical one through the media text and the spectator/operator's 'capacities to affect and be affected'.[7] To think about relations of affect in the rhythm of the pixel beyond the cinematic medium, I first establish what this means for cinema. I analyse *Annihilation* to understand the affective and energetic force of the pixel in cinema that acts *in relation*. To consider the rhythm of the pixel beyond the cinematic medium is to consider an affective acting in *relation*. Such an acting *in relation* is an energetic exchange between media text and spectator/operator in a mutual 'becoming'.[8] In my consideration of the place of affect in these encounters, my intention is to locate an ethics of care, compassion, and empathy in our engagement with cinema and beyond, in social media.

ANNIHILATION

In Garland's *Annihilation*, Lena (Natalie Portman) is an academic who works in biology at John Hopkins University. After her husband, Kane (Oscar Isaac), is quarantined at a science facility after a military mission, Lena decides to join the next mission into what is called the Shimmer (fig. 1). The mission is to reach the purported source of the Shimmer — the lighthouse — enter the lighthouse, acquire data, and return. As Dr Ventress (Jennifer Jason Leigh) explains to Lena, the Shimmer is: 'A religious event, an extra-terrestrial event, a higher dimension. We have many theories, few facts.' Dr Ventress's party consists of five women, all scientists — herself, Cass Sheppard (Tuva Novotny), Anya Thorensen (Gina Rodriguez), Josie Radek (Tessa Thompson), and Lena.

Once inside the Shimmer, the group of women find mutated organic structures — flowers, plants, and animals. The Shimmer provides the conditions and process (is the patho-logy) for the blooming of life. Lena explains the organic structures to Lomax (Benedict Wong) at the science facility on her return: 'The

Fig. 1:
The Shimmer
in *Annihilation*
(Alex Garland, 2018)

mutations were subtle at first. More extreme as we grew closer to the lighthouse. Corruptions of form, duplicates of form.' Lomax: 'Duplicates?' Lena: 'Echoes.' Lomax: 'Is it possible these were hallucinations?' Lena: 'I wondered that myself, but they were shared among all of us. It was dream-like.' Lomax: 'Nightmarish?' Lena: 'Not always. Sometimes it was beautiful.' However, it is Josie who more fully explains the Shimmer and the organic structures that are present within it when she says to Lena: 'The Shimmer is a prism, but it refracts everything, not just light and radio waves, animal DNA, plant DNA, all DNA.' The refracting effect of the Shimmer is observed when Cass is taken by a bear-like creature and after she is found dead, the creature returns with a growl that sounds like Cass's death cries. Josie reflects upon it: 'It was so strange hearing Sheppard's voice in the mouth of that creature last night. I think as she was dying, part of her mind became part of the creature that was killing her.' In consideration of the refraction of DNA through the medium of the Shimmer in *Annihilation*, this article will examine the refraction of affect in cinema and beyond, in social media, via the 'exhaustively nuanced space' of what Barthes calls 'shimmer'.[9] What is also refracted through this 'exhaustively nuanced space' is the (human and nonhuman) patho-logies of our digital interactions by which media text and spectator/operator engage in a mutual 'becoming'.[10]

AESTHETICS AND ETHICS

The aesthetics, and even ethics, of the digital image (text and image in social media) — as an affective and energetic force — can be found in the organic rhythms of life. In an early scene in the film, Lena describes the evolution of a cell/of all life to her classroom of students:

> *This is a cell. Like all cells it is born from an existing cell. By extension, all cells were ultimately born from one cell. A simple*

> *organism alone on Planet Earth, perhaps alone in the universe. About 4 billion years ago, one became two, two became four. Then 8, 16, 32. The rhythm of the dividing pair, which becomes the structure of every micro blade of grass, sea creature, plant creature, and human. The structure of everything that lives and everything that dies. […] The cell we are looking at is from a tumour.*

The rhythm of the dividing pair is an organic rhythm (fig. 2). Thus, the rhythm of the dividing pair has a '*thisness*' found in relations of movement and affect. Such a 'thisness' is the way Deleuze and Félix Guattari describe a body as a 'mode of individuation very different from that of a person, subject, thing, or substance'.[11] Deleuze and Guattari write: 'They are haecceities in the sense that they consist entirely of relations of movement and rest between molecules or particles, capacities to affect and be affected.'[12] Thus, a body, for Deleuze and Guattari, is defined by haecceities:

> *A body is not defined by the form that determines it nor as a determinate substance or subject nor by the organs it possesses or the functions it fulfils. On the plane of consistency,* a body is defined only by a longitude and a latitude: *in other words, the sum total of the material elements belonging to it under given relations of movement and rest, speed and slowness (longitude); the sum total of the intensive affects it is capable of at a given power or degree of potential (latitude).*[13]

The organic structures in the Shimmer are mutations of form precisely because they are first of all *a relation*: the refraction of 'animal DNA, plant DNA, all DNA'. The voice of the bear-like creature is the sign of a relation and an intensive affect having taken place: the sonic intensities of Cass's death-cries have affected the bear-like creature in the same moment that Cass has been affected by the bear-like creature, which has also resulted in her death. Equally, it could be said that the rhythm of the pixel has a '*thisness*' found in relations of

Fig. 2:
The rhythm of the dividing pair in *Annihilation* (Alex Garland, 2018)

movement and affect. The intensities of the digital image affect the spectator/operator, and the expression of the affect in the spectator/operator is the sign of a relation and an intensive affect having taken place. For cinema, 'capacities to affect and be affected' are found in the 'automatic movement' of the movement-image.[14] As Deleuze writes:

> *It is only when movement becomes automatic that the artistic essence of the image is realized:* producing a shock to thought, communicating vibrations to the cortex, touching the nervous and cerebral system directly.[15]

Thus, what is found in the 'automatic movement' of cinema — in the vibrations of movement that '*touch[…] the nervous and cerebral system directly*'[16] — is a communicating ripple of affective intensities '*producing a shock to thought*'.[17] Deleuze gives as examples the work of Dziga Vertov, Sergei Eisenstein, Abel Gance, and Élie Faure.

In Vertov's 1929 film *Man with a Movie Camera*, the use of shot and montage constructs a 'rhythmic montage'.[18] The operation of Eisenstein's montage is not simply one of the 'communication of movement in images', but of the development of montage 'from the image to thought'.[19] Montage has the capacity to produce a '*shock to thought*', which gives rise to what Deleuze calls the 'spiritual automaton' in the spectator.[20] The '*spiritual automaton*' does not come about through 'logical or abstract' thought by 'formally deducing thoughts from each other' to think 'determinate substance or subject'.[21] Just as a body has 'capacities to affect and be affected',[22] '*[a]utomatic movement* gives rise to a *spiritual automaton* in us, which reacts in turn on movement'.[23] That is, the '*spiritual automaton*' comes about in 'the circuit into which they [the spectator] enter with the movement-image, the shared power of what forces thinking and what thinks under the shock; a *nooshock*'.[24]

The intensive vibrations of the movement-image ripple outwards, causing change, like the rippling outwards of the Shimmer's refractions that is causing, as Lena says, 'giant waves in the gene pool'. The '*shock to thought*' of the movement-image can be conceived as an encounter with energetic and material qualities in the image/world that 'gives rise to sensibility'.[25] As Deleuze writes in *Difference and Repetition*:

> *Something in the world forces us to think. This something is an object not of recognition but of a fundamental* encounter*. […] The object of encounter […] really gives rise to sensibility with regard to a given sense. It is not an* aisthêton *but an* aisthêteon*. It is not a quality but a sign. It is not a sensible being but the being* of *the sensible. It is not the given but that by which the given is given. It is therefore in a certain sense the imperceptible [*insensible*].*[26]

When 'something in the world forces us to think' it is to think the 'unthinkable in thought'.[27] That is, it is a 'thinking' in haecceities — an encounter with the sensible, and even imperceptible — 'the grey, the steam and the mist' in Akira

Kurosawa's *Cobweb Castle* (also known as *Throne of Blood*, 1957).[28] Such an encounter is an *aisthetic* encounter: that is, an encounter with sensation prior to our recognition of it, where subject and object are instead engaged in a mutual 'becoming'.[29] As Boljkovak writes: 'This shattering of stable constructions by force enables intensive perception and new approaches to life, seeing and being.'[30] Haecceities of 'movement and rest, speed and slowness' while 'unthinkable in thought' 'touch[...] the nervous and cerebral system directly'.[31] In the *aisthetic* encounter, a body — defined not by 'form', 'substance or subject' — has the potential for 'becoming-intense, becoming-animal, becoming-imperceptible'.[32] In *Annihilation*, the voice of a bear becomes Cass's voice, leaves grow from the skin of Josie's arms and as she disappears amongst a stand of human-shaped trees we understand that she becomes a tree, and energy pours from Dr Ventress's mouth until she becomes the imperceptible energy that swirls around Lena to form a throbbing vortex.

Cinema provides a valuable resource for challenging ways of thinking. *Aisthetic* encounters with media texts, bodies, characters, and social and cultural situations, can provoke consideration of how we can engage ethically with others and the world. In *Expressionism in Philosophy: Spinoza*, Deleuze invokes what Baruch Spinoza says in his book, *Ethics:* 'We do not even know of what a body is capable.'[33] In consideration of 'intrinsic determinations' such as intensities of colour,[34] we can begin to understand an ethics whereby the expression of a body may affect other bodies. While the rhythm of the dividing pair sets 'intrinsic determinations' or 'intensive qualities' for a body that may be affected by other bodies/the world,[35] it also announces the potential whereby the expression of a body may also affect other bodies. According to Spinoza's *Ethics*, it is in the expression of, and relations between, bodies where communities are formed. As Bruce Baugh writes, 'a community or an association, corresponds to a collective power of being affected, and results in collective or communal affects'.[36] It is through intensities of colours and the qualities, sounds and textures of moving bodies, that cinema can express the power that bodies have to affect other bodies, and also, an ethical engagement with others and the world. My article seeks to understand 'communal affects' through intensity's difference in cinema and beyond, in social media.[37]

THE *AISTHETIC* ENCOUNTER AND MASS-ART

How do we understand the *aisthetic* encounter that attends mass-art as entertainment? In this article, the convergence is represented by the affective force of cinema in communication with its spectators via a sensory manifold. I contend that the image and the spectator are components in the flow of energy and are simultaneously invested: in the circuit of the movement-image, the image and the spectator each have 'capacities to affect and be affected'.[38] And yet, precisely because of this affective relation between the spectator and the image, mass spectatorship retains heterogeneity. As Deleuze writes: 'What

theatre and especially opera had unsuccessfully attempted, cinema achieves (*Battleship Potemkin, October*): to reach the Dividual, that is, to individuate a mass as such, instead of leaving it in a qualitative homogeneity or reducing it to a quantitative divisibility.'[39] The *aisthetic* encounter with the image is a heterogeneous experience. The viewer of cinema *thinks* and *feels* intensities in a particular way. As Deleuze notes in *Expressionism in Philosophy*: 'Intensive quantity is infinite, and the system of essences an actually infinite series. We are here dealing with infinity "through a cause."'[40] On the other hand, the capacity of bodies 'to be affected' can only be in 'a very great number of ways'.[41] Thus, the particularity of intensities *thought* and *felt* by the viewer is of intensities in the *aisthetic* encounter — the event as 'cause' — for spectators of mass art.

In light of these intensive quantities, we may understand the cinematic event as 'cause' for the conditions, or patho-logies, that arise in the encounter between body and image/world. According to Seigworth and Gregg in their introduction to *The Affect Theory Reader*, patho-logies are accounted for in an 'inventory of shimmers':

> *What should follow as critical practice, Barthes argued, is a neutrally inflected, immanent* pathos *or "patho-logy" that would be an "inventory of shimmers, of nuances, of states, of changes (*pathè*)" as they gather into "affectivity, sensibility, sentiment," and come to serve as "the passion for difference."* [42]

In this 'exhaustively nuanced space' 'of shimmers, of nuances, of states, of changes (*pathè*)' as they are inventoried, we may further consider the viewer's relation to — and the patho-logies that would be an inventory of — the shimmers, nuances, states, and changes of the pixel in the digital image.[43]

And yet, in thinking about cinema as the 'cause' for infinite patho-logies, Eisenstein's work on *pathos* in cinema suggests something more about the empathic bond that is formed between the film and the spectator. Eisenstein notes that this bond of *pathos* is not one of mimesis, that is, of 'impelling the spectator to reproduce the perceived action, outwardly'.[44] Rather, Eisenstein suggests that 'the affect of a work of pathos consists in whatever "sends" the spectator into ecstasy [...] *ex-stasis* — literally, "standing out of oneself", which is to say, "going out of himself", or "departing from his ordinary condition"'.[45] In this sense, *ex-stasis* in cinema, for Eisenstein, implies more than a patho-logy in the 'departure from a condition'.[46] As Eisenstein writes: 'To go out of oneself inevitably implies a transition into something else, to something different in quality, to something opposite to what was.'[47] In *Annihilation*, the refraction of Lena's DNA for the formation of the Lena double (Kristen McGarrity) implies a transition of Lena out of herself. The refractions caused by the Shimmer are a 'breaking up', deflection or a 'change in direction' of DNA as in the *Oxford English and Spanish Dictionary* definition of refraction: 'light, radio waves, etc. being deflected in passing obliquely through the interface between one medium and another or through a medium of varying density'.[48] The 'transition into something else', it could also be said, is a 'power or degree of potential' of the

body in its affective 'becoming'.[49] In *Annihilation*, the 'transition into something else' of the body in its affective 'becoming' is even an annihilation of the self.

CINEMA BEYOND THE CINEMATIC MEDIUM: THE SHIMMER

Beyond the cinematic medium of celluloid, 'shimmer' characterizes the pixel in digital cinema. In *The Cinema Effect*, Sean Cubitt writes of the pixel: 'Movement starts in non-identity, the unstable zero pixel at origin.'[50] In *Annihilation*, the Shimmer refracts; that is, the Shimmer is the deflection of light waves, radio waves etc. as it passes through different mediums.[51] In his series of lectures published as *The Neutral*, Barthes writes of the 'shimmer' as an 'exhaustively nuanced space' 'whose aspect, perhaps whose meaning, is subtly modified according to the angle of the subject's gaze'.[52] As a 'conjunction of intellect and affect', Barthes further writes about the 'shimmer' that it is a 'hyperconsciousness of the affective minimum, of the microscopic fragment of emotion [...] which implies an extreme changeability of affective moments, a rapid modification, into shimmer'.[53] Seigworth and Gregg develop Barthes's notion of shimmer in 'An Inventory of Shimmers': 'It becomes then a matter of accounting for the progressive accentuation (plus/minus) of intensities, their incremental shimmer: the stretching of process underway, not position taken.'[54] Like the 'shimmer' as 'process' rather than 'position taken', the pixel 'starts in non-identity'.[55] For Cubitt, 'pixels are temporal, not spatial. That cinematic present, like the point of origin of graphs, can be given a number: zero. Zero is not a quantity so much as a relation.'[56] It is the energetic relation between the image and the viewer that I am interested by which we can describe the digital image. I am particularly interested in the way the energy of the pixel — as a 'stretching of process underway' — acts *in relation*.[57]

Rosalind E. Krauss characterizes the energetic renewal of each pixel that makes up the image of the television set as the electric 'pulse' of the (analogue) televisual image.[58] Seigworth and Gregg's description of 'shimmer' as a 'progressive accentuation (plus/minus) of intensities' is much like the on/off of pixels that Krauss describes, where plus/minus determines the progress of pulsing intensity and its relation.[59] The digital image, composed of moving (vibrating) and energetic pixels and sound, has the force of an energetic field. The digital image does not have the indexical recuperability of the photographic image, rather, in its moving pixel terrain, it has the behaviour and expression of an *opening out* of the energetic plane.

Garland's film *Annihilation* demonstrates the force of intensity that opens out the body to the image/world. When Lena enters the lighthouse, she finds a deep pit surrounded by a coral-like webbing and makes her way inside. She finds Dr Ventress in a cave at the bottom of the pit. As Dr Ventress says to Lena before energy begins to pour from her open mouth: 'Our bodies and our minds will be

fragmented into their smallest parts until not one part remains: annihilation.' Dr Ventress's body disperses in a cloud of swirling energy and, as the energy swirls around Lena, it forms a vortex that opens like an eye in front of Lena (fig. 3). The vortex is composed of throbbing energetic and material particles. The throbbing vortex draws a drop of blood from Lena's eye, and, within the opening of the vortex, the blood cells divide and multiply until a Lena double is formed.

Cinema is found in these throbbing energetic and material particles. In a 1927 issue of *Close Up*, the poet and cineaste H. D. refers to cinema as having the therapeutic powers of a mind cure.[60] H. D. describes the experience of cinema spectatorship: 'We depended on light, on some sub-strata of warmth, some pulse or vibration [...] We sank into this pulse and warmth and were recreated.'[61] The encounter with cinema is an encounter with vibrations of energy — as light — that 'recreates', which we can see extending, for H. D., from the nineteenth-century belief in the restorative powers of electricity. It is interesting to note the similarities in the mind cures alluded to in H. D.'s description of cinema as 'pulse or vibration' and what Deleuze says about the vibrations of 'automatic movement' that 'touch[...] the nervous and cerebral system directly'.[62] The behaviour and expression of an *opening out* of an energetic plane in cinema and beyond, in the digital image, coincides with what Seigworth and Gregg call a 'bloom-space' for '*affectivity*, sensibility, sentiment'.[63] They write: 'In fact, as much as anything, perhaps that is what such a "neutral" bloom-space offers: the patho-logy of a body intersecting with the pedagogy of an affective world.'[64] What is found in the *patho-logy* of a body in its intersection with the world, indeed, at the intersection of spectator/operator and media text, is, as Barthes writes, 'the passion for difference',[65] or what Deleuze calls 'infinity "through a cause"'.[66]

Thinking about cinema beyond the cinematic medium of celluloid is a thinking about event as opposed to narrative.[67] The digital event is a *relation*. Cubitt writes: 'The verb "relates", however, should be understood to mean "establishes

Fig. 3:
The throbbing vortex of energetic and material particles in *Annihilation* (Alex Garland, 2018)

a relationship", not as "tells a story."'[68] Working within the digital event as a relation, the encounter with the digital image is an encounter with the energy of the pixel. The pixels that form the throbbing vortex in *Annihilation*, alongside the pulsing electronic soundscape takes cinema beyond the cinematic medium to something like a music video. As Cubitt writes: 'It is important to recognize that narrative is neither primary nor necessary to cinema, and it forms no part of any putative essence of the medium.'[69] The importance of the digital event as a medium is of *relation* and not of story.

In *Annihilation*, the Shimmer refracts. Like the energy of the pixel that acts *in relation*, what is found inside the Shimmer is an acting in relation via duplicates of form and refractions of movement and sound. The Shimmer is a reification of Jenelle Troxell's explanation of how Henry Wood's 1893 manual *Ideal Suggestion through Mental Photography: A Restorative System for Home and Private Use* describes: 'invisible threads, which connect us with each object which makes up our environment. Vibrations are ever passing over these connections, backward and forward, and it is for us to control their purpose and quality.'[70] Like the vibrations of 'automatic movement' that 'touch[...] the nervous and cerebral system directly',[71] the 'invisible threads, which connect' in *Annihilation* are of movement, force, and pressure. When a Lena double is formed in the pit beneath the lighthouse, Lena runs for the door. The Lena double in mirroring her movements, produces a corresponding pressure against the door, such that Lena is pressed between the door and the Lena double. It is only when Lena releases her own pressure against the door and *falls* that the Lena double falls with her. However, this acting *in relation* is also what leads to the Lena double's demise. In corresponding movement with the Lena double, Lena places a grenade between their hands — a gift given — and pulls the pin with her thumb. She runs as it explodes. Fire engulfs the Lena double. As the lighthouse catches alight, the Shimmer surrounding the lighthouse dissipates and the organic structures begin to collapse.

THE PIXEL BEYOND THE MOVIE THEATRE

With the rise of nationalist movements and authoritarian governments that give way to digital hostility in social media, we can begin to consider the energetic power of the pixel beyond the movie theatre. Indeed, in 1985 in *Cinema 2: The Time-Image* (translated into English in 1989) Deleuze identified the effects of the rise of nationalist movements in the treatment of the cinema spectator:

> *Cinema is dying, then, from its quantitative mediocrity. But there is a still more important reason: the mass-art, the treatment of the masses, which should not have been separable from an accession of the masses to the status of the true subject, has degenerated into state propaganda and manipulation, into a kind of fascism which brought together Hitler and Hollywood, Hollywood and Hitler.*[72]

How might the effects of cinema as mass-art be aligned with social media? What is interesting to consider is the ways that social media may be aligned with 'bad cinema', which, according to Deleuze, *represents* violence to produce shock. Deleuze writes: 'The shock would be confused, in bad cinema, with the figurative violence of the represented instead of achieving that other violence of a movement-image developing its vibrations in a moving sequence which embeds itself within us.'[73] We could, however, ask of Deleuze what happens when the 'figurative violence of the represented' and the 'violence of a movement-image' are both at once in the image? [74] What happens when the 'violence of a movement-image' — the vibrations of the energetic pixel '*touching the nervous and cerebral system directly*' — is the affect of the image (as well as text in social media), precisely because it appears in a violent representation?[75] This is to extend the consideration of 'bad cinema' and indeed, social media, beyond the 'violence of the represented' to consider its *thought* and *felt* vibrations: vibrations that constitute, for Deleuze, the 'automatic movement' of the movement-image.[76] The importance for me in this argument, is the way by which violence is perpetuated in social media then, not simply in a representation of violence, but in the *thought* and *felt* vibrations of violence as an outcome of the energetic relation in digital communication. Certainly, social media has the potential for representing violence, such as the violence in the case of the raping of legba and Starsinger by Mr Bungle in the text-based virtual world LambdaMOO.[77] The 'violence of the movement-image' in social media is also in the rhythm of vibrations and the energetic relation — the 'shock to thought' of text and image.[78] Such a '*shock to thought*' is as Deleuze notes: 'a recognition of powerlessness [...]. What cinema advances is not the power of thought but its "impower."'[79] The *aisthetic* encounter, in its sounds, textures, rhythms, movements, and affects, is the source of an 'unthinkable in thought'.[80] As Deleuze writes: 'if it is true that thought depends on a shock which gives birth to it (the nerve, the brain matter), it can only think one thing, *the fact that we are not yet thinking*, the powerlessness to think the whole and to think oneself, thought which is always fossilized, dislocated, collapsed'.[81] In *Annihilation*, thinking is not found in a thinking of the whole from the outside, but in the encounter: 'Unfathomable mind', Dr Ventress says with her eyes sealed shut by skin to Lena. 'We spoke. What was it we said? That I needed to know what was inside the lighthouse. That moment's passed. It's inside me now.'

The affective nature of 'bad cinema' — and the same could be said of social media — suggests a philosophising potential as it relates to the kind of subject-spectator/operator generated in the encounter; that is, in the energetic relation of the pixel in communication with its spectators/operators. Just as Kieran J. O'Meara contends that feminism should be understood as a tradition rather than an ideology, *thinking* and *feeling with* cinema, or social media for that matter, cannot be found in an 'all-encompassing logic of life and history'.[82] The pixel communicates. However, what the pixel communicates is an affective force in the *aisthetic* encounter of body and image. In our *aisthetic* encounters we may apprehend an ethics beyond a politics of inadequate ideas. As O'Meara writes:

'the Feminist tradition challenges us to think corporeally, to consider life as a bodied subject, where norms collide to cluster around our bodied existence, and how our experiences of these bodies encounter "the political"'.[83] Sensory images do not produce metaphorical allusions or engage in politically divisive debate, but 'demonstrate' the power of affect in their political dimension.[84] An attention to the *aisthetic* encounter suggests a kind of affirmative (rather than divisive) politics, whereby care, compassion, and empathy may be considered as an outcome of the affective intensities and connectives of the movement-image.

DIGITAL HOSTILITY

Like mass spectatorship in cinema, it is possible to see how social media retains heterogeneity. The particularity of image and text is the cause of infinite intensities in the *aisthetic* encounter. The iterative and participatory qualities of social media — which is also the cause of the energetic relation in social media — means that the pixel is more event than narrative.[85] For multi-user dimensions (MUDs) or MOOs (MUD, Object-Orientated) on the internet such as LambdaMOO, textual descriptions of the virtual world and the commands given for how you want your character to appear and act, puts your character in energetic relation with other characters. However, the energetic relation in social media — via the affective force of the virtual and energetic pixel — is one of emotional entwinement with our real-life selves. Thus, we may think about the affective force of virtual intensities in the way that Boljkovak writes:

> *Deleuze again insists upon an act of replaying or redoubling, upon foldings, unfoldings and refoldings that expose not only the actual events of our lives but also their underlying virtual intensities and affective significances.*
> *To counter-actualise, then, is to refold, break open and recombine thought, not to sense a totalising, homogeneous world but to strive to explore fragmentary, imperceptible relationships, to become imperceptible, neither actual nor virtual, this nor that, but always becoming, differing.*[86]

Such 'fragmentary, imperceptible relationships' are the stuff of haecceities in the *aisthetic* encounter — of sounds, textures, rhythms, movements, and affects that do violence to thought.[87]

In *Annihilation*, Lena describes to her husband, Kane, the rhythm of the dividing pair by which the cell becomes immortal and never dies, whereby the cell is coded with its own destruction — a fault in the genes with old-age as the result. Equally, our interaction with social media could be said to be coded with its own self-destruction wherein digital hostility arises. Self-destruction is the sentiment with which the film *Annihilation* sets its biological premise. As Dr Ventress says to Lena: 'Almost none of us commit suicide, and almost all of us self-destruct in some way, in some part of our lives. We drink or we smoke.

We destabilize the good job or the happy marriage. These aren't decisions, they are impulses. [...] Isn't self-destruction coded into us, programmed into each cell?' The 'violence of a movement-image' is a violence to ourselves — as one of self-destruction; however, it is also the vehicle for violence by and to others.[88] Deleuze writes: 'the movement-image was from the beginning linked to the organization of war, state propaganda, ordinary fascism, historically and essentially'.[89] Moving from mass-art to ubiquitous social media and the effect of digital hostility on bodies, I want to argue that the violence of the movement-image when imposed by others can also be recognized as wrapped up in a politics of inadequate ideas when affect is exchanged for passion.

Greta Olson writes in her essay 'Love and Hate Online: Affective Politics in the Era of Trump' about how the Trump campaign inspired hate as well as love in Trump's followers: the Trump campaign was an affective one.[90] As Olson writes: 'political sentiments are determined by viscerally experienced sentiments and a physically imagined sense of rightness or wrongness, rather than one that is worked out through rational means'.[91] In a politics of inadequate ideas it would not simply be affective engagement that forestalls such ideas — in fact, they may be made up of it — but rather an ethics that extends from 'capacities to affect and be affected'.[92] We must be careful to note that, as Deleuze writes:

> *An affection is not a passion, except when it cannot be explained by the nature of the affected body: it then of course involves the body, but is explained by the influence of other bodies. Affections that can be completely explained by the nature of the affected body are active affections, and themselves actions.*[93]

Where Trump's campaign is considered to be an affective one that inspired hate as well as love, to confuse affect with the passion inspired is to limit the ethical relation in affect. The Trump campaign was built on a politics of inadequate ideas by conjuring a divisive binary of winners and losers — 'us' versus 'them' (where the 'them' is often the media).[94] What is refracted through our digital interactions in social media is patho-logies of passion found in divisive debate. In Spinoza's *Ethics*, it is not simply that the body has a power for being affected:

> *The more power a thing has, or the greater its power of existence, the greater number of ways in which it can be affected. Bodies are affected by different things, and in different ways, each type of body being characterised by minimum and maximum thresholds for being affected by other bodies: what can and what cannot affect it, and to what degree.*[95]

What can be noted is that, as Baugh writes: 'a body's power of acting and being affected' is also a 'relation of parts'.[96] In consideration of what defines a body's potential, Deleuze writes: 'A body's structure is the composition of its relation. What a body can do corresponds to the nature and limits of its capacity to be affected.'[97] For a community, as Baugh writes, this is the 'collective power of being affected, and results in collective or communal affects'.[98] Thus, a

thinking and *feeling with* affect — the 'unthinkable in thought'[99] of affect — is not a depiction of a particular kind of speech act as exemplified by Andrew Anglin when he writes: 'One of the unifying marks of the Alt-Right sensibility is the assumption that no speech act is beyond the pale.'[100] A *thinking* and *feeling with* affect is an ethical engagement for a harmonious collective.

In her book *Untimely Affects*, Boljkovak considers the events of the Holocaust and Hiroshima in an examination of films by Chris Marker and Alain Resnais. Boljkovak describes a kind of 'creative becoming' through art's resistance to violence.[101] She writes: 'As Deleuze and Guattari repeatedly insist, destructive forces double each possibility for flight; caution must be taken to pursue the line of greatest resistance and creativity.'[102] Thus, there is another way by which we might consider mass-art as a 'war machine'. Vertov's *Man with a Movie Camera* is just one example of a 'revolutionary movement' in cinema's creative invention.[103] Revolution is also the revolving action of transport and industrial machinery in Vertov's film and entails new perceptive capacities for the spectator. However, 'revolutionary movements' also require resistance. Deleuze writes: 'The work of art is not an instrument of communication. [...] The work of art strictly does not contain the least bit of information. To the contrary, there is a fundamental affinity between the work of art and the act of resistance.'[104] When considering affect and the body's potentials, it is worth considering what the body is *open* to, or indeed, where there is resistance. As Seigworth and Gregg write: 'affect is persistent proof of a body's never less than ongoing immersion in and among the world's obstinacies and rhythms, its refusals as much as its invitations'.[105] Beyond a politics of inadequate ideas, we can take affect's 'demonstration' to mean a revolution of sorts: a revolution by which care, compassion, and empathy may be considered as a resistance — or refusal — to hostility.[106] For Boljkovak, art's potential is found in Marker's 'things that quicken the heart': perhaps an energetically pulsating pixel by which we may consider affect in all its ethical compassion.[107]

Notes

[1] I would like to thank Luke Robinson for endorsing the publication of my article and Gabrielle Lowe for her feedback on my article, as well as the anonymous peer-reviewers for their very helpful comments on an earlier draft of this article

[2] Roland Barthes, *The Neutral: Lecture Course at the Collège de France (1977–1978)*, trans. by Rosalind E. Krauss and Denis Hollier (New York: Columbia University Press, 2005), 51.

[3] Gregory J. Seigworth and Melissa Gregg, 'An Inventory of Shimmers', in *The Affect Theory Reader*, ed. by Melissa Gregg and Gregory J. Seigworth (Durham, NC and London: Duke University Press, 2010), 1–25 (11); quoting from Barthes, 77.

[4] Barthes, 101.

[5] Nadine Boljkovac, *Untimely Affects: Gilles Deleuze and an Ethics of Cinema* (Edinburgh: Edinburgh University Press, 2013), 18, 13; quoting from Gilles Deleuze, *Negotiations*, 1972–1990, trans. by Martin Joughin (New York: Columbia University Press, 1995), 172.

[6] Barthes, 51.

[7] Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. by Brian Massumi (Minneapolis and London: University of Minnesota Press, 1987), 261.

[8] Deleuze and Guattari, 232–309.

[9] Barthes, 51. It is thought-provoking to compare Barthes's notion of 'shimmer' with the way that Deborah Bird Rose describes 'shimmer' through the event of 'reciprocal capture' in which 'different ways of being and doing find interesting things to do together'. Deborah Bird Rose, 'Shimmer: When All You Love is Being Trashed', in *Arts of Living on a Damaged Planet*, ed. by Anna Tsing, Heather Swanson, Elaine Gan and Nils Bubandt (Minneapolis: University of Minnesota Press, 2017), G51–G63 (G51). In her analysis, Rose gives the definition of the Australian Indigenous Yolngu term *bir'yun* as: 'shimmer, the ancestral power of life [that] arises in relationship and encounter' (Rose, G52–53). Rose writes: 'The term *bir'yun* — which does not distinguish between domains of nature and culture — is characteristic of a lively pulsating world, not a mechanistic one. *Bir'yun* shows us that the world is not composed of gears and cogs but of multifaceted, multispecies relations and pulses' (Rose, G55).

[10] Barthes, 51; Deleuze and Guattari, 232–309.

[11] Deleuze and Guattari, 261.

[12] Ibidem.

[13] Ibidem, 260.

[14] Ibidem, 261; Gilles Deleuze, *Cinema 2: The Time-Image*, trans. by Hugh Tomlinson and Robert Galeta (Minneapolis: University of Minnesota Press, 1989), 156.

[15] Deleuze, *Cinema 2*, 156.

[16] Ibidem, 156.

[17] Ibidem.

[18] Anna Lawton, 'Rhythmic Montage in the Films of Dziga Vertov: A Poetic Use of the Language of Cinema', *Pacific Coast Philology* 13 (Oct 1978), 44–50 (49).

[19] Deleuze, *Cinema 2*, 157.

[20] Ibidem, 156.

[21] Ibidem, 156; Deleuze and Guattari, 260.

[22] Deleuze and Guattari, 261; Deleuze, *Cinema 2*, 156.

[23] Deleuze, Cinema 2, 156.

[24] Ibidem, 156.

[25] Gilles Deleuze, *Difference and Repetition*, trans. by Paul Patton (New York: Columbia University Press, 1994), 139.

[26] Ibidem, 139–40.

[27] Deleuze, *Cinema 2*, 168.

[28] Ibidem, 169.

[29] Deleuze and Guattari, 232–309.

[30] Boljkovak, 18.

[31] Deleuze and Guattari, 260; Deleuze, *Cinema 2*, 168, 156.

[32] Deleuze and Guattari, 260, 232.
[33] Gilles Deleuze, *Expressionism in Philosophy: Spinoza*, trans. by Martin Joughin (New York: Zone Books, 1990), 226.
[34] Deleuze, *Expressionism in Philosophy*, 196.
[35] Ibidem.
[36] Bruce Baugh, 'Body', in *The Deleuze Dictionary*, ed. by Adrian Parr (Edinburgh: Edinburgh University Press, 2005), 35–37 (37).
[37] Baugh, 37.
[38] Deleuze and Guattari, 261.
[39] Deleuze, *Cinema 2*, 162.
[40] Deleuze, *Expressionism in Philosophy*, 197.
[41] Ibidem, 218.
[42] Seigworth and Gregg, 11; quoting from Barthes, 77.
[43] Barthes, 51, 77.
[44] Jenelle Troxell, 'Mind Cure and Ecstasy on the Pages of *Close Up*', *Screen* 58.3 (Autumn 2017), 349–71 (364); quoting from Sergei Eisenstein, 'Methods of Montage', in *Film Form*, ed. and trans. by Jay Leyda (New York: Harcourt Brace, 1977), 80.
[45] Troxell, 364; quoting from Sergei Eisenstein, 'The Structure of the Film', in *Film Form*, ed. and trans. Jay Leyda (New York: Harcourt Brace, 1977), 166.
[46] Troxell, 364; quoting from Eisenstein, 'The Structure of the Film', 167.
[47] Ibidem.
[48] 'Refraction', in *Oxford English and Spanish Dictionary* <https://www.lexico.com/definition/refraction> [accessed 9 March 2021].
[49] Troxell, 364; quoting from Eisenstein, 'The Structure of the Film', 167; Deleuze and Guattari, 260.
[50] Sean Cubitt, *The Cinema Effect* (Cambridge, MA and London: The MIT Press, 2004), 41.
[51] 'Refraction', in *Oxford English and Spanish Dictionary*
[52] Barthes, 51.
[53] Barthes, 101.
[54] Seigworth and Gregg, 11.
[55] Ibidem, 11; Cubitt, 41.
[56] Cubitt, 33.
[57] Seigworth and Gregg, 11.
[58] Krauss writes: 'Or, and why not, there is the television set itself, this impassive eye that nonetheless exudes a constant visual beat since its image is produced by an electric current scanning upward along the hundreds of lines that cross the screen, generating an "image" through the continual renewal of its pulse, becoming all the more apparent when the set goes out of calibration and the whole image is wiped upward again and again as though pushed by an insistently reappearing black, horizontal bar'. (Rosalind E. Krauss, *The Optical Unconscious* [Cambridge, MA and London: The MIT Press, 1993], p. 202).
[59] Seigworth and Gregg, 11.
[60] Troxell, 354.
[61] Ibidem; quoting from H. D., 'Cinema and the Classics III: The Mask and the Movietone', *Close Up* 1.5 (1927), 23.
[62] Troxell, 354; quoting from H. D., 23; Deleuze, *Cinema 2*, 156.
[63] Seigworth and Gregg, 9; Barthes, 77.
[64] Seigworth and Gregg, 12.
[65] Barthes, 77.
[66] Deleuze, *Expressionism in Philosophy*, 197.
[67] Cubitt, 38.
[68] Ibidem.
[69] Ibidem.
[70] Troxell, 356; quoting from Henry Wood's *Ideal Suggestion through Mental Photography: A Restorative System for Home and Private Use* (Boston, MA: Lee and Shepard, 1893).
[71] Deleuze, *Cinema 2*, 156.
[72] Ibidem, 164.

[73] Ibidem, 157.
[74] Ibidem, 157.
[75] Ibidem, 156–57.
[76] Ibidem.
[77] Julian Dibbell, 'A Rape in Cyberspace. How an Evil Clown, a Haitian Trickster Spirit, Two Wizards, and a Cast of Dozens Turned a Database into a Society', *Village Voice*, 23 December 1993, 36.
[78] Deleuze, *Cinema 2*, 156.
Katleen Gabriels and Marjolein Lanzing also note how 'instances of online vitriol can be conceptualized as onlife violence: violence that transgresses and affects both the offline and online world'. Katleen Gabriels and Marjolein Lanzing, 'Ethical Implications of Online Vitriol', in *Violence and Trolling on Social Media: History, Affect, and Effects of Online Vitriol*, ed. by Sara Polak and Daniel Trottier (Amsterdam: Amsterdam University Press, 2020), 197–214 (197).
[79] Deleuze, *Cinema 2*, 156, 166.
[80] Ibidem, 168.
[81] Ibidem, 167.
[82] Kieran J. O'Meara, 'On Feminism as Tradition, Not Ideology', poLit: *Discussion Political Thought* (10 March 2021), <https://thinkpolit.blogspot.com/2021/03/on-feminism-as-tradition-not-ideology.html?fbclid=IwAR346cmixPHN40632He6uUixqtbc_pT69jTCWkh3nV5NxPzn1FT9-DCSsTE&m=1> [accessed 15 March 2021] (para. 9 of 9).
[83] O'Meara, para. 9 of 9.
[84] Deleuze, *Cinema 2*, 183.
[85] Greta Olson, 'Love and Hate Online: Affective Politics in the Era of Trump', in *Violence and Trolling on Social Media: History, Affect, and Effects of Online Vitriol*, ed. by Sara Polak and Daniel Trottier (Amsterdam: Amsterdam University Press, 2020), 153–77 (173).
[86] Boljkovac, 20.
[87] Boljkovac, 20, 29.
[88] Deleuze, *Cinema 2*, 157.
[89] Ibidem, 165.
[90] Olson, 160.
[91] Ibidem, 154.
[92] Deleuze and Guattari, 261.
[93] Deleuze, *Expressionism in Philosophy*, 218–19.
[94] Ibidem, 162–63.
[95] Baugh, 36.
[96] Ibidem, 36–37.
[97] Deleuze, *Expressionism in Philosophy*, 218.
[98] Baugh, 37.
[99] Deleuze, Cinema 2, 168.
[100] Olson, 172; quoting from Andrew Anglin, 'A Normie's Guide to the Alt-Right', *Daily Stormer*, 31 August 2016.
[101] Boljkovac, 13.
[102] Ibidem, 21.
[103] Ibidem, 13; quoting from Deleuze, *Negotiations*, 172.
[104] Gilles Deleuze, 'Having an Idea in Cinema (On the Cinema of Straub-Huillet)', in *Deleuze and Guattari: New Mappings in Politics and Philosophy*, trans. by Eleanor Kaufman, ed. by Eleanor Kaufman and Kevin Jon Heller (Minneapolis: University of Minnesota Press, 1998), 14–19 (18).
[105] Seigworth and Gregg, 1.
[106] Deleuze, *Cinema 2*, 183.
[107] Boljkovac, 93.

REVIEWS/COMPTES-RENDUS

Daniel Morgan

The Lure of the Image: Epistemic Fantasies of the Moving Camera

Oakland: University of California Press, 2021, pp. 244

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If film is an inherently ephemeral object, the mobile camera is perhaps its most elusive aspect. Accordingly, Daniel Morgan's theorization of camera movement in *The Lure of the Image* explores a topic film theory has hitherto largely ignored in favor of Ontology and Montage. The book sets out to articulate a systematic account of camera movement, venturing beyond Film Studies' disciplinary boundaries while keeping a close eye on film itself. It comprises seven chapters and is divided into two parts. Morgan engages with an impressive number of scholars and (both high-brow and low-brow) films, drawing from a wide range of sources, including filmmaking manuals. His prose is devoid of jargon and illustrates theoretical concepts with analytical precision. In addition, Morgan builds his arguments through the close study of film, interweaving careful descriptions of the way the camera articulates spatial arrangements and interpretations tying aesthetic operations to narrative meaning.

While the first three chapters raise the book's film-theoretical stakes, the second section mobilizes its newly minted conceptual tools to authorial case studies centered on canonical directors such as Fritz Lang (examined comparatively alongside Guru Dutt), Max Ophüls (a privileged site in discussions about virtuosic film style), and Terence Malick. In contrast, the final chapter returns to theory, shifting its focus to the proliferation of camera movement and cameras themselves in digital cinema. Rather than taking the most obvious route, Morgan aptly downplays the rhetorical calls for a paradigmatic shift by gesturing towards the use of animation techniques throughout the pre-digital 20th century — "this long history matters [...] New technologies of the moving camera do not necessarily produce new conceptual problems" (pp. 221-222) — from *Star Wars* (1977) to early phantom rides. The chapter's unexpected turns encapsulate the book's conceptual richness, as Morgan jumps (swish-pans?) from discussions on New Media and military drones to stereoscopy, Late Godard's 3D films, Orson Welles and cinéma vérité.

The author begins his discussion by offering a survey of the existing scholarship on the subject, situating himself in relation to Patrick Keating's examination of camera movement and the ideas about it in classical Hollywood.[1] Morgan's key insight is that "not all the ideas are good ones" (p. 4) and the all-pervasive notion of the camera-eye is a particularly bad — or "deeply flawed" (p. 5) — one. The book's opening movement endeavors to erode this fatal misconception from its dominant position by unraveling the

conflation of theories of camera movement and point of view. The chief target of his critique here is phenomenologically-inflected film theory, which Morgan characterizes as reductively built around a specific formal operation: subjective shots in which the camera moves forward. As he rightly puts it, while certain narrative films operate according to the conventions of point of view, this is not always the case. Rather than uphold film as an embodied experience, Morgan puts our ability to identify with the camera into doubt and gestures towards many instances in which we sympathize with the characters on screen — Morgan mentions mirror neurons in passing but the topic warrants a deeper engagement with neuroimaging. In addition, he upholds shots in which characters presumably 'doing' the looking emerge in the frame — but fails to mention Roberto Rossellini's fascist war film *Un Pilota Ritorna*'s (1942) mobilization of this aesthetic operation notwithstanding the implications that its panning shot of a Prison-of-war camp would have in relation to Neorealism and, as a consequence, to Bazinian and Deleuzian film theory — or are revealed to have not been 'with' the camera, as in Horror films tricking us into believing 'subjective' shot approaching an oblivious victim belongs to a serial killer.

According to Morgan, rather than identify with the camera, we merely desire to be with the camera while knowing full well that this is impossible, a process he describes as an epistemic fantasy. This immediately raises the stakes as it questions much that has been written about film. Morgan takes the work of various film scholars to task for relying all too heavily (explicitly or implicitly) on the assumption that the camera's position corresponds to that of the spectator. He makes a persuasive claim and reiterates it across various paragraphs. At the same time, this repetition slows down the flow of his argument. We remain bogged down in the pars *destruens* long after recognizing the need for an alternative model, gripped by a sense of totalizing skepticism. Indeed, Morgan develops this model only after a lengthy meta-analysis of the reception of an 'infamous' shot in Gillo Pontecorvo's *Kapo* (1960) in French film criticism. This allows him to dispel Brechtian, Platonic, and Barthesian anxieties underpinning politicized cinephobia (p. 40). It is interesting that Morgan's discussion of the aestheticization of the dead body does not consider Pontecorvo's framing of tortured bodies accompanied by a liturgical tune in *The Battle of Algiers* (1966) and thus its possible links to Catholic iconography, an intertext corroborating his relativization of bad taste as context-specific.

In place of identification, the book invites us to think about our relation to the worlds films construct in terms of imagination, "buttressing" Richard Wolheim's conceptualization of the "internal spectator" (p. 76) who is attuned to diegetic characters without being aligned to their optical perspective, with Cristopher McCarrol's Sartrean work on "observer memories… in which we see ourselves from the outside" (pp. 80-81).[2] This Frankensteinian "path around" the impasse of identification (p. 81) may initially appear convoluted but is immediately clarified through the analysis of two film moments featuring camera movement which "attune" us to the characters' experience (p. 82). At the same time, by resorting to Wollheim and especially McCarrol's work, Morgan undermines his self-professed attempt to produce an organic theory stemming from the critical analysis of films (an approach advocated by Dudley Andrew) in opposition to the reductive imposition of frameworks from above. In fact, Morgan too ultimately relies parasitically on exterior conceptualizations — in this case developed in Art History and cognitive science via the Philosophy of Mind. The fantasy of an unmediated approach to film remains liable to the same critique Hegel moved against empiricism for (unconsciously) reading the subject into the object rather than the unmediated object itself.

With regards to empiricism, the book would benefit from a deeper engagement with the science of vision and the phenomenon of motion

sickness. If we genuinely identified with the moving camera, would we not feel sick? This is not unusual in first-person and third-person videogames, and while Morgan mentions videogames in passing, he does not consider this distinction. In addition, moments of cinephilic appreciation — such as the description of a crane shot as "gorgeous" (p. 236) — feel unnecessary, and Morgan could have dedicated a few words to dispel Lacan's theorization of the mirror stage rather than bypass him via Ovid. Further research could be developed in dialogue with work emerging outside the boundaries of Anglophone film scholarship, such as Masaki Kondo's Derridean analysis of the Cartesian logic of Samuel Becket's film about eyes and non-being *FILM* (1965).[3]

Nonetheless, the book is quite brilliant. It is both innovative and rooted in tradition, remaining deeply committed to film as film. Accordingly, it should be required reading for any film theory course which aims to (re)think "seriously" (p. 244) about camera movement and, more generally, film aesthetics.

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Notes

[1] Patrick Keating, *The Dynamic Frame. Camera Movement in Classical Hollywood* (New York: Columbia University Press, 2019).

[2] Cristopher McCarrol (*Remembering from the Outside: Personal Memory and the Perspectival Mind*, Oxford: Oxford University Press, 2018).

[3] Masaki Kondo, 'The Eye and the Gaze: Peering into Samuel Beckett's Film', *Screen*, 61.3 (2020), 423–435 (427).

Enfin le cinéma! Arts, images, spectacles en France (1833–1907)

sous la direction de Dominique Païni, Paul Perrin, Marie Robert

Paris: Musée d'Orsay / Réunion des Musées Nationaux – Grand Palais, 2021, pp. 331

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'It is not a question here of telling the story of the invention of cinema but rather of evoking what it invents: the modern spectator that, for the most part, we are still' (p. 26): the unequivocal statement by film theorist and historian Dominique Païni – curator, together with Paul Perrin and Marie Robert, of the catalogue of the exhibition *Enfin le cinéma! Arts, images, spectacles en France (1833-1907)*, which recently took place at Musée d'Orsay, makes explicit, from the very beginning, the underlaying assumption that guides the text's structure. The adoption of an alphabetical order by the editors of the book is the pretext for the organization of an atlas of modernity: a portolan chart drawing the tangle of routes that crosses 'a bit haphazardly', not without risks, and drifts towards the unknown – a *pêle mêle*, to use Païni's words (p. 15) –, the handful of years during which the new techniques of the modern observer arose.

By the beginning of the XIX century, the modern metropolis had grown thanks to the engineering of iron as a building material, granting new views above and beyond human perception; simultaneously the urban fabric became lightened and enriched with new *recadrages* due to the replacement of masonry with large glass panels. A city intersected by passages and railways, lifted by the Eiffel Tower, intoxicated by the sensorial richness of universal exhibitions is what emerges from the words and images of the volume.

Subjected to the optical and motion stresses provoked by the new urban landscape, illuminated day and night by electric light and accelerated by modern modes of transportation, modern women and men demanded a visual entertainment equal to the urban phantasmagoria. The convergence of scientific discoveries, technical achievements, industrialization and rising capitalism, the desire for ever more extreme sensory stimulations and the availability of a portion of free time that had previously been unknown to peasant living led to the invention of optical instruments capable of opening the gaze towards the boundless amplitudes of the world or, on the contrary, concentrating it into an unprecedented, spectacular extraordinariness. This provided the *thrills* and *shocks* that constituted the armamentarium of effects aimed at producing that *aesthetic of astonishment* which, according to Tom Gunning, among others, characterized the production of moving images until 1907.[4]

The book includes a large number of renowned scholars from various disciplines engaged in writing short essays which compose a heteroclite lemmary. The entries of this abecedary account not only for this technical marvel, but also for the

social construction of modernity, its less obvious manifestations that are nevertheless crucial in outlining the profile of a demanding and shrewd audience, still open to wonder and amazement for the sake of discovery and sensation.

As the editors affirm, in the opening texts of the volume, it is not a question of reconstructing the umpteenth history of cinema or sanctioning its ultimate truth, but of recovering the dimension of *movement*, one that is enthusiastic and often fortuitous, at times even frightening; that is understood not as mere mobility but in terms of *change*, the true index of modernity. Out of time and off the screen, the world continues to happen and cinema, within the boundaries traced by the luminous rectangle of the frame, resigns itself to intercepting a constant absence, chasing after what Jacques Aumont calls 'the feeling of an interminable anecdote' (p. 40), that happens a little further away or a little before, perhaps a little after.

The defining apparatus makes use of concepts consolidated in the field of Film Studies, such as, for example, *screen*, *space* and *montage*, (respectively: *Écran* by Vanessa R. Schwartz, p. 92; *Espace* by Michel Frizot, p. 102 and *Montage* by François Albera, p.158); these are always illuminated by a multidisciplinary gaze that gives an account of the mutual influence between arts, languages and techniques on which the aesthetics of modernity and the new way of looking pivot.

The lemma 'montage', for example, is not only described as intrinsic to the film, but is used to determine a new mode of fruition: the expository form of the *screening program*, which lines up heteroclite fragments. *Movement*, one of the main categories guiding the book, is investigated – in painting, photography, as well as in the early Lumière's vedutist cinema – as a fortuitous and uncontrollable *accident*: the unexpected that frees bodies from the stasis of Étienne-Jules Marey's chrono-photography and captures the instantaneous nature of action (see, for example, the entries *Aléa* by Jacques Aumont, p. 39; *Animé* by Paul-Louis Roubert; *Populaire* by Valérie Vignaux, *Hors-champ* by Marie Robert, p. 118; *Immersion* by Livio Belloï, p. 208, *Temps* by Michel Frizot, p. 272; *Vue* by Érik Bullot, p. 292).

The theatre of the world, understood as an *inventory* of images and *repertoire* of experiences (see the entry compiled by Paul Perrin *Inventaires*, p. 134 and Jean François Staszak's definition of *Monde*, p. 154), is Paris: the *city-screen* portrayed in its discontinuity by the Nabis painters.

Félix Valloton and Pierre Bonnard, abandoning the classical framing, break down the vision by highlighting its episodic and fragmentary nature, transforming painting and print into a *proto-cinema*, a synchronic repertory of the attractions that make Paris the *city-spectacle* par excellence, where everything is *on display* (on this subject: *Discontinuité* by Isabelle Cahn, p. 86 and *Nabi* by Mathias Chivot, p. 170).

Moreover, Parisian architecture, the epitome of which is the Eiffel Tower, is a tool for the creation of a composite horizon of views that constantly allude to its outliers, as in Henri's lithographs and plates (see *Hors-champ* by Marie Robert, p. 118).

The body, the inescapable protagonist of the cinematographic language — as much in its presence as in its noisy absence — is narrated as a comic agent (*Corps Comique*, by Laurent Guido, p. 62) and as a pathological patient (*Corps Pathologique* by Rae Beth Gordon, p. 68); it is described as colonized by the Western imperialist gaze (*Exhibitions* by Stéphane Tralongo, p. 109) or by the equally imperialist male eye when it turns to the scrutiny of the female body as a sexual object, further eroticized through the cinematic mediation of keyhole masks or binocular lenses (*Voyeur* by Marie Robert, p. 286).

And if cinema is the place where death seems to be defeated, at least for the duration of a projection, the body is precisely that battlefield where the miracle of animation is accomplished. The cinema of origins takes up the myth of Pygmalion and Galatea, one of the iconographic

themes dearest to sculpture, and elaborates it thanks to its media specificity. (see *Sculpture* by Leah Lehmbeck, p. 242).

Pictorial and proto-cinematographic naturalism is complementary to spectacle, the artifice which aims to entertain the masses. The depiction of the act of seeing, traces of scrutinies and evidences of *cinetisme* are the counterpart of another colourful, blithe, abundant progeny: the one of the *dispositives amusant*, of the cheerful or gloomy technologies of vision which determine — or are determined by — the inception of the modern spectator.

Tricks borrowed from prestidigitation, as in the case of Méliès, the use of colour and light in the composition of panoramas and dioramas, stage construction in studios, the fairground attractions, Loïe Fuller's dance and, earlier, the plethora of optical toys and pre-cinematographic devices barely managed to satiate the optical hunger of the public at the turn of the nineteenth and twentieth centuries (see, among others, the entries *Attractions* by Martin Barnier, p. 53; *Dessin* by Dominique Willoughby, p. 78; *Lanternes* by Ségolène le Men, p. 147; *Studios* by Brian Jacobson, p. 262; *Trucs* by Frank Kessler and Sabine Lenk, p. 276).

Page after page, entry after entry, we observe the shaping of an atlas that is susceptible to continuous amendments and subsequent hybridizations, as if cinema — 'a technical precipitate' in Paini's words — could avoid taxonomies and rigid classifications and could be grasped, albeit for an instant, only in the breadth of a never-too-stringent, evocative map.

The volume is characterised by a composite structure that pushes us to move back and forth between the pages, definitions and tropes, creating a short circuit between the linearity that characterizes the classic construction of a book and the impossibility of harnessing cinema in a single trajectory. In short, the volume itself is in motion. This begins with the title, which defines, with a joyful assertiveness marked by exclamation, the conclusion of a process, a point of arrival that is also a roaring restart; at the same time it seems to indicate the resolution of an enigma or the occurrence of an alchemical transmutation. An end title, rather than a header, which follows that garble of events that constitute the emergence of modernity, whose brightest manifestation remains cinema.

The book, which can be intended as an autonomous publication, one that is not necessarily entangled with the Parisian exhibition, depicts the city as the perfect example of an intrinsically inter-media text, and indeed the appendix traces back the biographies of those inventors, actors, directors who wove the mesh of modernity into the new urban context.

The repertoire of images belongs to a basin which is, for the most part, urban: street views, perspectives taken from the top of modern construction, boulevard audiences and theatrical spectatorship, storefront windows and department store's display of goods, wall *affiches*, crowded film stills or empty studios in the outskirts of Paris, harbours and train stations: these are the great part of the buzzy visual population which inhabits the pages. The epitome of the cityscape's cruciality as the most powerful cinema incubator is the cover image: Henry Rivière's photograph of a couple caught entering a train station. They are not crossing the threshold of a *salle*, a proto-cinema theatre, they are entering the realm of movement, and, as modern subjects, they are most likely capable of grasping the spectacle of movement. Only there, in the end, at that stage of awareness, lies the cinema.

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Notes

[4] T. Gunning, 'An Aesthetic of Astonishment: Early Film and the (In) credulous Spectator', *Art and Text*, 34, (1989), 114-33.

La haute et la basse définition des images. Photographie, cinéma, art contemporain, culture visuelle

sous la direction de

Francesco Casetti et Antonio Somaini

Milano-Udine: Éditions Mimésis, 2021, pp. 363.

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Anyone who has delivered an article or volume with illustrations to a publisher will sooner or later have had one or more images sent back to them, accompanied by the prompt reprimand: 'the definition is too low. Please resend the file in higher definition'. The frustration of the author – who may have thought they could get away with a quick screenshot in .png format or who found themselves needing to reproduce an image that exists only as a lightweight .jpeg on the web – is usually followed by a frantic series of attempts to improve the source image by using image enhancement or image upscaling software (such as DeepImage), upgrading the original information so as to achieve an editorially acceptable result.

Low is bad, high is good. And not only in the merely numerical and quantitative sense of measuring the pixels contained in a digital file. The definition of images thus adapts to the millenary tendency to load the fundamental relations of space (high/low, but also right/left and front/back) — relations that are rooted in the *anthropos* as an oriented and situated body — with axiological and symbolic values: 'to start off on the right/wrong foot', 'to report a sinister', 'to be always one step ahead', 'low blow', 'to walk tall', 'State of right' (and not of wrong)...

Philosophy (Ernst Cassirer), phenomenological psychiatry (Erwin Straus) and cultural anthropology (Robert Hertz) have laid the foundations of an investigation that aims to explore those value investments and show their natural and cultural roots. The volume *La haute et la basse définition des images. Photographie, cinéma, art contemporain, culture visuelle*, edited by Francesco Casetti and Antonio Somaini, effectively collaborates with this investigation at the level of the theory and practice of images, with particular (but not exclusive) reference to technical and digital images, contributing to a problematization of that same polarity and the values associated with it (rich/poor, clear/confused, precise/imprecise etc.).

As the editors argue in their *Introduction*, the distinction between the definition of high and low takes on a meaning that is not only technological, but also aesthetic, epistemological, economic and political. At the *technological* level, the progress in devices for recording, encoding, transmission and manipulation of images constantly reshapes the high-low relationship. At the *aesthetic* level, the possibility of appreciating or not appreciating certain details of the image, according to its resolution, has an impact both on our sensory experience (aesthetics as *aisthesis*) and on our

artistic experience (aesthetics as art theory); it also has an impact to the point that we might even question whether we are dealing with the same image and the same work in the case of different definitions of the same one. At an *epistemological* level, the level of knowledge to which we have access depends directly on the informational content of the image. At the *economic* level, financial investments in increasingly sophisticated technologies make the pace of device obsolescence ever faster ('today's high definition inevitably tends to become tomorrow's low definition'). At the *political* level, the distinction between high and low definition negotiates the dialectic between the regimes of visibility and invisibility, with inevitable consequences for information accessibility (the investigations conducted by Eyal Weizman and the Forensic Architecture group he coordinates at Goldsmiths in London are a striking example of this with regard to military/civilian opposition).

These are levels that we can certainly distinguish in the analysis, but which are evidently intertwined in the concrete practices of the production and reception of images today. The contemporary situation, however, does not jump out of the blue; its archeology is inscribed in a *longue durée* that the editors propose to designate as the polarization between 'neat' and 'flou', crucial for the history of pre-digital images. They recall in this regard — in addition to the poetics of flou in the history of analogue cinema, and the difference between photographic pictorialism and New Objectivity — also the Renaissance opposition between linear perspective (based on the rigorous geometrization of the represented space) and aerial perspective (played instead on pictorial shading and atmospheric effects). We could add here that distinction between images to be observed from close up and images to be appreciated from afar, which was made famous by art historians such as Heinrich Wölfflin and Alois Riegl respectively for the transition from Renaissance to Baroque and the transition from Egyptian to late Roman art, but which had already surfaced in Plato's *Parmenides*. Once again, then, a dialectic that we could define as aesthetic-pragmatic, aimed at inducing in the observer a sensorimotor behavior of approaching or moving away from the image, and of lesser or greater perceptual integration on the part of the observer (a theme that would later become central to the mediological approach of McLuhan, not by chance a reader of Wölfflin).

The volume brings together contributions from specialists in film theory, media and visual culture studies (in addition to the curators, Erika Balsom, Raymond Bellour, Emmanuel Burdeau, Enrico Camporesi, Arild Fetveit, Filippo Fimiani, Jacob Gaboury, André Habib, Frédéric Monvoisin, Roger Odin, Peppino Ortoleva, Marie Rebecchi, Lina Maria Stahl, Peter Szendy). And, significantly, it gives voice to artists (Hito Steyerl, Jacques Perconte, Thomas Hirschhorn) who have placed at the center of their practice and reflection the questions of image definition and of the multiple senses — from the aesthetic to the political — produced by the dynamics of compression/decompression, impoverishment and pixelization.

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PROJECTS & ABSTRACTS

A World of Imprints: The Epistemology of Visual Evidence Between Digital and Virtual Media-Ecologies

Rosa Cinelli/Ph.D. Thesis Abstract[1]
Ph.D. in co-direction:
Università di Milano
ERC Advanced Project "An-Iconology. History, Theory and Practices of Environmental Images"
Université Côte d'Azur
Extended reality research and creative Center xr²c²

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Throughout the history of mechanical images — the first of which is surely photography — the capacity of the image to adhere to its object or referent has influenced its positioning within aesthetic, artistic, and semiotic theories. Referentiality, understood as the 'founding order of photography',[2] was considered the cornerstone of a precise ontological definition of the image and has contributed to creating a link between mechanically generated images and the realm of veridiction.

Nevertheless, today, new mediatic practices like Virtual Reality, CGI, and AI-powered images (such as machine vision) are increasingly challenging the epistemological paradigm of what counts as visual evidence. From immersive and visual journalism to forensic practices and data-driven investigations, a vast panorama is taking shape in which photographic images are more and more blended with computer-based ones, creating uncanny configurations which are reshaping the regimes of visuality as well as our information economy. At times, this polymorphic class of composite images may be defined as a visualization, composition, or assemblage: all of these are complex concepts entailing different theories and archaeologies. A new type of imaginary challenges the traditional tools commonly used to describe photographic and filmic images, such as, for instance, Peirce's very concept of the index.[3] While it is true that a complete feeling of scepticism towards the image — often prophesied by the detractors of the digital revolution — has not completely taken over, it is possible to state that the procedure which allows for an image to be regarded as a visual fact seems more often to derive from a context-based rhetorical mechanism[4] than to be guaranteed by the technical genesis of the image. This seemingly very subtle change, since it does not entail a radical transformation from the pragmatic point of view, is nevertheless a very theoretically rich node as it suggests a shift from the ontological to the rhetorical plane of discourse. Must the traditional ontology of the photographic image as a truthful — or even sacred — imprint be discarded for good?

Ethical concerns may also be raised when

this hybrid visual regime is considered in its socio-political agency. Contemporary journalism practices, such as visual journalismi[5] and the emerging fields of forensic aesthetics[6] are imposing new challenges to research. Making broad use of so-called 'algorithmic' devices,[7] these experimentations are aspiring to confer full visibility to complex socio-political phenomena, ranging from humanitarian conflicts and migrations to the ecological crisis. Re-signifying what Paul Virilio already referred to as 'the vision machine',[8] a very problematic posthuman dimension is added to the very human relevance of visual evidence.

This 'forensic turn' in visual studies[9] — or, rather, the 'visual turn' of forensics — is proposing revisions of aesthetics and media theories, since an important part of such investigations aims to make sensible and evidential what so far has been considered as a 'mere' thing, such as the dust that is lifted in an explosion, the cracks in the walls of a building, or the growth patterns of trees in forests.[10]

On the other hand, looking at what seems to constitute a more sensationalist pole of the scope, the experiences proposed by the field of Virtual Reality immersive journalism[11] are characterized by the idea of reporting on news episodes, providing the viewer not only with a hyper-realistic rendering of their object but also to make him or her feel as if she or he were assisting at the scene of the event. The verisimilitude of sensorimotor movements allowed by the head-mounted device, the plausibility of the reconstruction and the emotional and empathic response of the experiencer confer a sense of quasi-reality that is linked to a very strong sense of presence. The feeling of almost 'being there'[12] suggested by these 'out-of-frame'[13] images creates a perpetually unfolding present, which seems to re-actualize the 'has been' of Barthesian memory with forms of immediacy: 'I am there', 'that *is*', 'this *is* happening'. However, this sense of presence does not come without the risks of what has been regarded as 'toxic' forms of empathy,[14] raising again the question of the representability of others' sufferings as well as issues in power and gaze distribution.

When contemplating this spectre of practices, many questions can be raised: are we witnessing the affirmation of a new kind of visual regime regulating the realm of veridiction by simultaneously hyper-stimulating an empathic response and completely eluding the percipient subject? What kind of images are now worth believing in, at a time of an increasing hybridization between 'traditional' photography and new technological imageries? How do these new developments in the realm of the image affect the slippery relationship between the document and the artistic genre of the documentary? And more generally, is it still possible to talk about *images* at all, or should we give up this concept in favour of a different one?

This doctoral project aims to try to answer these questions by considering photography's *episteme* and its remediations in the contemporary media ecology. Particular attention will be paid to the semiotic concept of index as well as to those of trace, imprint, and document. Drawing from visual culture studies and media-archaeology approaches, this project aims to articulate a theoretical framework that will fill these research gaps, and it intends to do so by adopting an interdisciplinary methodology combining the field of aesthetics, semiotics, and theory of photography.

Notes

[1] Ph.D thesis supervised by Barbara Grespi (Università di Milano) e Matteo Treleani (Université Côte d'Azur). For information: rosa.cinelli@unimi.it.

[2] Roland Barthes, *Camera Lucida*, trans. By Richard Howard (New York: Hill and Wang, 1981), 77.

[3] B. Grespi, 'L'evidenza dell'immagine. Postfotografia e idea documentaria', *Dalla parte delle immagini. Temi di cultura visuale*, ed. by Barbara Grespi and Luca Malavasi (Milan: McGraw Hill, 2022), 61–104.

[4] André Gunthert, *L'image partagée* (Paris: Textuel, 2015).

[5] Some examples are, The Citizen Evidence Lab held by Amnesty International, the visual journalism section in the New York Times online journal, or the website Bellingcat.com.

[6] Eyal Weizman, *Forensic Architecture: Violence at the Threshold of Detectability* (New York: Zone Books, 2017), Eyal Weizman and Matthew Fuller, *Forensic Aesthetics. Conflicts and Commons in the Politics of Truth* (London, New York: Verso, 2021).

[7] Ruggero Eugeni, *Capitale Algoritmico. Cinque dispositivi postmediali (più uno)* (Brescia: Scholé, 2021).

[8] Paul Virilio, *The Vision Machine*, trans. by Julie Rose (Bloomington: Indiana University Press, 1994).

[9] Cf. David Houston Jones, *Visual Culture and the Forensic. Culture, Memory, Ethics* (London: Routlege, 2022); Thomas Keenan, Eyal Weizman, *Mengele's Skull. The Advent of a Forensic Aesthetics* (London: Sternberg Press, 2012).

[10] Weizman, *Forensic Aesthetics*.

[11] Some of the most famous examples are: *Hunger in Los Angeles* (Nonny De la Peña and others, 2012); *Project Syria* (Nonny De la Peña et al, 2014); *The Protectors* (Catherine Bigelow, 2017); *Omni* (Ai Wei Wei, 2017); *Home After War* (Gayatri Parameswaran, 2018); *Reeducated* (Sam Wolson, 2021).

[12] Matthew Lombard and others, *Immersed in Media. Telepresence Theory, Measurement & Technology* (Berlin: Springer, 2015).

[13] Cfr. Andrea Pinotti, *Alla soglia dell'immagine* (Torino: Einaudi, 2021), and Pietro Conte, *Unframing Aesthetics* (Milano-Udine: Mimesis, 2020).

[14] Lisa Nakamura 'Feeling Good about Feeling Bad: Virtuous Virtual Reality and the Automation of Racial Empathy', *Journal of Visual Culture*, 19.1 (April 2020), 47–64.

In-Transit Televisions: Productive Patterns and Urban Imageries of Mobility

Emiliano Rossi/Ph.D. Thesis Abstract[1]
Università di Bologna

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From the early 2000s, in Italy, too, the installation of video-communication systems within transportation terminals (i.e., rail and underground stations, airports, waiting shelters, highway rest areas) has progressively affected the urban mediascape, posing new challenges for the design of public infrastructures. This doctoral thesis explores so-called 'go-television' screen networks located in Italian high-flow hubs, mainly — but not exclusively — in metropolitan areas: such real-time broadcasting circuits are conceived to entertain and inform spectators caught in the time of waiting and transit (e.g., 'captive audiences'), through displays and video-totems which interact with synchronised and spatially assembled viewers. As a result, transportation facilities seem nowadays to be characterized by a combination of news stream, recorded image loops, audio announcements, advertisement, multi-screen live relays which became structural components of their *genius loci*: being containers of audiovisual experiences, these interstitial settings shed light on the multiple ways media interconnect with architectures of transport, forging what scholars have defined the 'media-architecture complex'.[2] Outlined thus, go-TV stands for the result of collective efforts: not only there are specialized companies in this market, but transportation companies and local authorities are also included in the intricate production chain of the video contents taken into account in the thesis, blurring the line between editorial clips, marketing materials, traffic bulletins and public utility alerts directed to travellers. Through a mapping of the major national cases of in-transit television, the inquiry aims to deepen the commercial and professional practices implied in the functioning of such audiovisual channels: acting as a last-mile medium, go-TV appears to work as a window on the travelling habits of thousands of daily passengers as well as *en-passant* spectators, generating and reflecting a particular experience of mobility.

This research attempts to situate its object of analysis within the Italian media environment, demonstrating how these networks have grown relevant in virtue of their complex creative drives, the strategies of the professionals involved as well as their proprietary assets and the various purposes of their wide range of stakeholders. First, the thesis positions go-television on a theoretical level, showing how mobility and visual cultures have interwoven since the beginning of the entertainment industry. The double logic of transportation as a material and symbolic carrier is deepened, given that television itself has repeatedly been assessed as a technology of dynamism. Furthermore, this study deals with the connections between the small screen and the urban environment, reflected in the particular socio-topological status of go-TV's

consumption settings: attention is reserved, therefore, to the ecological dimension of this medium, to its supposed space-making effects, to its site-dependence — or context-sensitiveness — which operates on a centripetal basis, anchoring the transmission of video contents to the specific spatial frames where they are received. Assuming that the impact of audiovisual media outside the home relies on such a site specificity, the second aim of the thesis is to provide a comprehensive definition of go-television, adequate for the whole range of actors entailed in its production. Third, considering that television developed for travel venues typically aggregates hybrid media forms, the project examines the mediological profile of go-TV: in spite of the growing importance of out-of-home communication, television studies have rarely dealt with video networks outside the domestic sphere (with the notable exception of Anna McCarthy's inquiries),[3] which remains a blind spot of scholarly research. Far from consisting in a mere relocation of TV sets away from the household, in-transit video screens seem to strengthen the televisual specificities at the core of their editorial (and professional) manufacturing, while fostering original devices of brand urbanism and geolocalized marketing, as well as inheriting some specific characteristics of cinema and radio (i.e. large screening surfaces, attractionality, voice-centrism and schedules mainly structured upon a 'clock' template). The following section of the thesis features an overview of the commercial and professional habits underlying this channel of distribution, as part of corporate trends which were sampled in the wake of media production studies: the mapping provides an insight on fourteen different companies operating in Italy (beside the profiles of ten now-defunct place media corporations), together with three case studies (Grandi Stazioni Media, Telesia, video portals onboard high-speed trains). These latter cases are not only historicized, but the thesis also proposes a focus on their 'productive cultures'[4] and a modelling of their on-screen contents. In this respect, the inquiry integrates a cultural and industrial approach, and is the result of structured and informal interviews with insiders and company specialists, on-site observations (severely limited by the Covid-19 outbreak) and a review of promotional paratexts, trade press, consultancy reports, internal use documents and journalistic sources. The access, when possible, to semi-public documents as contracts, budget plans, financial statements and commercial agreements — in addition to industrial portfolios, consultancy reports and white papers issued by industrial forums — completed the methodological framework, which also included attendance to business fairs and public initiatives.

One of the primary results emerging from this research is that, aligning itself to the 'mobile privatization', the 'TV of the stations' absorbs and re-mediates the context where it is positioned: the dissertation, therefore, deconstructs the main level on which mobility and its contraries are visualized and depicted on these circuits, exploiting the very same movement of spectators. From this perspective, the areas of in-betweenness examined act either as *containers* of *in situ* audiovisual experiences or as the subjects (*content*) of the messages shown by the screen themselves, reconfiguring notions of space, networks and border regimes. One of the arguments put forward is that, while negotiating distances and perceptions of speed through their moving contents, those video outlets embody and promote images of 'squared mobility' (i.e. mobility within mobility), generating multiple senses of place and offering a legitimating self-portrait of the experience of travel. Hence, mobility and its aesthetics work as a narrative trope, also when reduced to codified icons and electronic signs, essential as orientational and wayfinding appliances, rerouting passengers' movement in public spaces. This fetishization of mobility is functional both for the tourism and transport industries, which capitalise their corporate images, becoming direct publishers of

televisual contents. In conclusion, this research points out how go-TV can be evaluated also by the prospects of public communication practices: due to the scheduling of collective interest inserts, in-transit video screens are increasingly called to reinvigorate civic engagement of citizen, as well as sustain the participatory processes of modern smart cities, rehabilitating the public role of the televisual medium.

Notes

[1] Supervisor: Prof. Luca Barra. For more information: emiliano.rossi5@unibo.it

[2] Scott McQuire, *The Media City. Media, Architecture and Urban Space* (London: Sage, 2008).

[3] Anna McCarthy, *Ambient Television. Visual Culture and Public Space* (Durham: Duke University Press, 2001).

[4] John T. Caldwell, *Production Culture. Industrial Reflexivity and Critical Practice in Film and Television* (Durham: Duke University Press, 2008). See also Vicky Mayer, Miranda Banks and John T. Caldwell (eds.), *Production Studies. Cultural Studies of Media* (London: Routledge, 2009). In the Italian context, see Luca Barra, Tiziano Bonini and Sergio Splendore (eds.), *Backstage. Studi sulla produzione dei media in Italia* (Milan: Unicopli, 2016) and Marco Cucco and Francesco Di Chiara (eds.), "I media industry studies in Italia: nuove prospettive sul passato e sul presente dell'industria cine-televisiva italiana", *Schermi. Storie e culture dei media in Italia*, 3.5 (2019).

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