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

Maria Poulaki, Hellenic Open University

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.

Keywords
Rudolf Arnheim
Entropy
Marco Brambilla
Gestalt
Dynamical systems
Media art
DOI
10.54103/2036-461X/17087

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.