

## Generative Music as a Framework for Cinema: How can generative music work with, and instruct, other (generative) medias?

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### Abstract

If film is dead, what is next for cinema? Generative medias flourished in the late 20<sup>th</sup> century and continue to do so into the 21<sup>st</sup> due to our complete submersion into a digital age. Generative music has settled in multiple environments, from commercial albums to public spaces, yet, by comparison, generative cinema remains absent from such popular or commercial spaces. In this light I explore how the frameworks of generative music can be applied to create a more widespread generative cinema. However, such cross-modal comparisons are rife with complication if we are in search for a truly medium-specific generative *cinema*. Similarly, the blanket terms ‘generative media’ and ‘visual arts’ provide ways to circumvent the entire public concept of generative cinema—removing it from cinema proper. As such I delve deeper into the very semantics of *cinema*, questioning where we do (and should) place its boundaries to ensure it survives in the 21<sup>st</sup> century.

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Generative medias are heavily associated with the emergence of the computer in the late 20<sup>th</sup> century, and thus will continue to sprout throughout the 21<sup>st</sup> century as the abilities of computational processes (from automation to machine learning) continue to grow and become more readily available. Generative processes have permeated many of the traditional arts such as music, sculpture and even literature with varying degrees of success. Generative music has found places in commercial albums, installations, video games and public spaces; but is yet to find a foothold in a cinematic sound-scape.<sup>1</sup> By comparison generative cinema itself is relatively absent, with its quiet existence being isolated in galleries or the avant-garde. Thus, we must question what makes the ‘generative’

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<sup>1</sup> Paul Weir in Colin Joyce, “How One of 2016’s Most Talked-About Video Games Brought Generative Music to the Masses”. *Vice*. (October 2016) web.  
<[https://www.vice.com/en\\_us/article/mgw548/paul-weir-no-mans-sky-audio-generative-music-interview](https://www.vice.com/en_us/article/mgw548/paul-weir-no-mans-sky-audio-generative-music-interview)> [Accessed Dec 2018]

framework so incompatible with cinema. Is it possible to translate the framework of generative music to cinema? And, finally, if this is possible, are we adding to the landscape of cinema proper or are we creating a wholly new medium lying under the blanket term of the visual arts?

## Foundations of Generative Music

Before addressing these questions we must first understand generative music and as many scholars have traced its genealogy back to generative linguistics let us begin there. Noam Chomsky describes generative linguistics as “[t]he generative grammar...internalized by someone who has acquired a language”.<sup>2</sup> In this way generative linguistics (grammar) can explain both the production of sentences by a speaker, and the understanding of sentences by a listener.<sup>3</sup> And thus a linguist can construct a “formal theory, or grammar” which can predict and permit the emergence of meaningful sentences.<sup>4</sup> In this way, a groundwork of formal and informal ‘rules’ are made from which an organically varying language can spring from. This is the part of generative linguistics that births the foundations of generative music.

Jackendoff and Lerdahl insist that although this framework is key to generative music, it should be “*translated*” in “purely musical terms, uninfected by the substance of linguistic theory” in order to create a framework of generative music.<sup>5</sup> Here, the use of the term of *translate* is key. It enforces the adoption of an ideology into a new framework but without also applying the surrounding medium-specific baggage.<sup>6</sup> Simply, we must remember music is a completely different medium to language and must treat it as such.

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<sup>2</sup> Noam Chomsky. *Current Issues in Linguistic Theory* (The Hague: Mouton, 1964) p.10

<sup>3</sup> Jane Singleton. “The Explanatory Power Of Chomsky’s Transformational Generative Grammar.” In *Mind* (83:331,1974) 430

<sup>4</sup> John M. Carroll. “A Program for Cinema Theory” in *The Journal of Aesthetics and Art Criticism* (35:3, 1977) 338. Italics mine.

As I will not discuss generative linguistics further refer to this article for a thorough overview.

<sup>5</sup> Ray Jackendoff and Fred Lerdahl. “Generative Music Theory and Its Relation to Psychology” in *Journal of Music Theory* (25:1, 1981) 47

<sup>6</sup> See: Jackendoff and Lerdahl 86

Eric Clarke establishes our primary distinction between generative music and linguistics, explaining the term “generative” in reference to music as fundamentally linked to the process of *generating* “something” rather than a set of principles that can describe the process of generation.<sup>7</sup> This is in stark contrast to Chomsky’s definition, which described principles and not generation itself, *per se*. This slight ideological shift means that generative music utilises the *rules* of a system as a framework to generate unforeseen outcomes, and resultantly often omits any human component after these *rules* are created.<sup>8</sup>

Alan Dorin provides a phenomenally simple way to understand generative music through wind chimes.<sup>9</sup> A composer specifically designs the physical properties and placement of the chimes (the *rules*) but, once placed, the generation of the music is caused by the natural blowing of the wind—entirely independent of the composer. Therefore, instead of directly producing music, generative music relies on “the concept and organization of *metamusical* ideas into a system” which will then produce the music.<sup>10</sup> A wholly human-centric example of such music is Terry Riley’s piece *In C*. This piece is a performance of 52 bars whereby the performer is instructed to play each bar as many times as they choose and with any variation they choose.<sup>11</sup> Accordingly, generative music is wholly dependent on the *rules* or inputs to direct the unpredictability of the final product—i.e. a wind chime will only create certain sounds but the final soundscape is unpredictable. This approach is wholly expanded through

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<sup>7</sup> Eric F. Clarke. “Generative Principles in Music Performance” in, John Sloboda (ed.) *Generative Processes in Music: The Psychology of Performance, Improvisation, and Composition* (Oxford: Clarendon Press/Oxford University Press, 2005) p. 1

<sup>8</sup> Whereas generative linguistics seeks to explain *how* linguistic structures appear by creating rules, which then govern both creation and understanding.

<sup>9</sup> Alan Dorin. “Generative Processes and the Electronic Arts” in *Organised Sound* (6:1, 2001) 50

<sup>10</sup> Also see: Joshua D. Sites and Robert F. Potter “Everything Merges with the Game: A Generative Music System Embedded in a Videogame Increases Flow” in *The International Journal of Computer Games Research* (18:2, 2018) web. <[http://gamestudies.org/1802/articles/sites\\_potter](http://gamestudies.org/1802/articles/sites_potter)> [Accessed Dec 2018] p. 2

<sup>11</sup> See: Brian Eno. “Generative Music: “Evolving metaphors, in my opinion, is what artists do.” In *In Motion Magazine* (July 7, 1996) web.

<<http://www.inmotionmagazine.com/eno1.html>> [Accessed Dec 2018]

This example could be argued to not be wholly generative. Much live-musical performance sits on the edge of generative media.

For more on this argument see: Sites and Potter.

computer technologies capable of complicated algorithmic processes and Markov chains.<sup>12</sup>

Although a number of scholars argue that generative music (and thus media) must be produced through a “non-human” or “autonomous system”, in the above examples we have found this not to be the case.<sup>13</sup> Instead the practice encourages us to simply “move away from the idea of the composer as someone who creates a complete image”.<sup>14</sup> It has an emphasis on *process* being an indirect creative driver between artist and art, ultimately forming a kind of “metacreation” (in the words of Mitchell Whitelaw).<sup>15</sup> In other word “machines are not, in and of themselves, essential to generative art” but instead it is the algorithmic and structural mind-set synonymous with computers that facilitates the generative arts.<sup>16</sup>

With our current understanding of generative music we can now explore its successful application into other art forms—specifically sculpture/installation and video-games, focusing primarily on the latter. Installations like *Halo* by Semiconductor or Gilberto Esparza’s *BioSoNot 1.2* incorporate inputs of live data (from Cern’s Large Hadron Collider and the sculpture’s internal water-system respectively) to generate ever-changing music-scapes.<sup>17</sup> While video-games such as *Spore*, *No Man’s Sky* and *Proteus* all utilise generative systems drawing from sound libraries to produce a patchwork of sounds that are unlikely to ever repeat themselves.<sup>18</sup> But what permits the framework of generative music to work within these settings? For these given installations the answer is simple; they are generative audio-visual devices in and of themselves. However within

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<sup>12</sup> A Markov chain is a probability-based method of transitioning between system states.

<sup>13</sup> Lukasz Mazurowski. “Generative Electronic Background Music System” in *AIP Conference Proceedings* (Rhodes; Greece, September 2014. AIP Publishing; 2015) p. 1

<sup>14</sup> Brian Eno “Generative Music”

<sup>15</sup> Whitelaw, Mitchell. *Metacreation: Art and artificial life*. (Cambridge, MA: MIT Press, 2004)

Also see Andrew R. Brown and Andrew Sorensen. “Interacting with Generative Music through Live Coding” in *Contemporary Music Review* (28:1, 2009) 18-20

<sup>16</sup> Angela Ferraiolo. “Generative Film and Theories of Montage” on *Gasathj.com*. web. <[http://www.gasathj.com/tiki-read\\_article.php?articleId=53](http://www.gasathj.com/tiki-read_article.php?articleId=53)> [Accessed Dec 2018]

<sup>17</sup> Respectively see: <http://semiconductorfilms.com/art/halo/> and Gilberto Esparza. “BioSoNot 1.2” in *Leonardo* (50:4, 2017) 419

<sup>18</sup> See: Paul Weir in Joyce Colin *Vice*.

Also see: Sites and Potter p. 4

video-games it isn't so simple as, similarly to generative music in cinema, it becomes a generative medium working within the framework of another medium.

Video-games, as has been extensively discussed, rely on at least some level of player involvement/control. Thus almost all music in games responds to this player interaction in one way or another—be it a complex interaction of encountering objects in the game-world or a simple one like pressing 'start' to begin the menu-music. This music has been given many slightly varying names by scholars—player-generated, game-generated, dynamic, adaptable, variable—with each definition intrinsically providing its own slightly varied criterion. But for the sake of this article let us refer to them all as generated game music (GGM).<sup>19</sup>

Zach Whalen states “video games express meaning through their interplay of their compositional units...rendered in real time”, proposing a very similar framework to generative music.<sup>20</sup> This can be most clearly seen through what has been termed the *systemic* game, a game which includes many systems (weather, day/night, AI) which interact dynamically through their various inputs and outputs within the system.<sup>21</sup> This creates emergent (or generative) gameplay through the interacting systems, essentially enacting the generative ideology within the game medium. As such, Whalen and the systemic game implicate the use of *time* as a fundamental of video-games, and thus also suggest its importance within generative music. Through this we can begin to

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<sup>19</sup> For definitions see

Karen Collins. *Playing With Sound*. (MIT Press, 2013) p. 32

Karen Collins. 'An introduction to the participatory and non-linear aspects of video games audio.' In, S. Hawkins & J. Richardson (Eds.), *Essays on sound and vision* (Helsinki: Helsinki University Press. 2007) pp. 263–298

Jesper Kaae. 'Theoretical approaches to composing dynamic music for video games' in Karen Collins (Ed.), *From Pac-Man To Pop Music: Interactive Audio In Games And New Media*. (Hampshire: Ashgate Publishing, 2008.) p. 84

<sup>20</sup> Zach Whalen. "Case Study: Film Music VS. Video-Game Music: The Case of Silent Hill" in Music, Jamie Sexton (ed.) *Sound and Multimedia: From the Live to the Virtual* (Edinburgh: Edinburgh University Press, 2007) p. 79

<sup>21</sup> Penelope Sweetser and Janet Wiles. 'Scripting Versus Emergence: Issues for Game Developers and Players in Game Environment Design' in *International Journal of Intelligent Games and Simulations* (4:1, 2005) 1-9

understand why generative music compliments some mediums while being relatively incompatible with others.

J.M.E. McTaggart spearheads a distinction in the modern philosophy of time—between A-series and B-series time.<sup>22</sup> Both can easily be understood by the analogy of a timeline. B-series time is as if we are looking at the timeline from the outside—all events are static at given points. By contrast, A-series time is much closer to time-as-lived, as if we are on the timeline moving *with* time. Thus for A-series time events move from the future into the present then into the past in a *dynamic* form, while B-series time remains *static*.<sup>23</sup> In such a way we can place different media into these different forms of time. Cinema and other recorded (set) media utilise *static* B-series time, whereby we can replay the exact same happenings, while video-games and generative media utilise *dynamic* and ever-changing A-series time.<sup>24</sup> With this framework we can easily understand why generative music, at least in theory, would suit video-games, among other medias, but not cinema. However, is this truly the case? Or is there a way we can apply generative music, in itself or as a framework, to cinema?

## Towards a Generative Cinema

Grba states “generative cinema is understood as the development and application of generative art methodologies in working with film both as a medium and as the source material”.<sup>25</sup> Although tremendously clear this statement reduces to *generative cinema is generative art using cinema*—which provides us with next to no real information, requiring definitions of both *generative* and *cinema*. Taking *generative* much as we have described it above; a process whereby a piece builds itself (facilitated by either man, machine or

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<sup>22</sup> See: J. Ellis McTaggart, “I.—The unreality of Time” In *Mind* 12:4 (Oxford University Press, 1908) pp. 457-474.

<sup>23</sup> I have borrowed these terms *static* and *dynamic* from Jesper Kaae p.76.

<sup>24</sup> This distinction may initially seem strange as cinema and recorded media, unlike painting or unchanging *static* media, they require time to elapse in their viewing. However the distinction is not regarding time elapsing but interacting dynamically with time to create unique instances each and every time—although we will address this fully later.

<sup>25</sup> Dejan Grba. “Avoid Setup: Insights and Implications of Generative Cinema” in Leonardo (50:4, 2017) 385

otherwise) through a rigid structure of foundational rules, let us explore how others have attempted to apply this to cinema and thus discover a definition of *cinema* within this context.

Edmonds observes that fundamental to generative time-based arts are “the rules to be used in determining in which order and at which pace the image sequence should develop”, however a visuo-centric approach is only half the story of cinema’s audio-visual medium.<sup>26</sup> Nevertheless, Edmonds’ approach is largely what we find in the current generative cinema which, generally, merges databases using interpretive tools to create new cinema from existing images.<sup>27</sup> Grba creates a formidable list of differing techniques artists have used to create generative cinema. These range from the “supercut” (extracted film clips chosen and edited based on specific criterion, i.e. visual compositions or components, such as DuBois’ *Acceptance*) to the “synthesized” (“real-time procedural audio-visual synthesis from an arbitrary sample pool” such as Sven König’s *sCrAmBled? HaCkZ!*).<sup>28</sup> Although we will not go farther into Grba’s categories here, they all very clearly adhere to Edmonds’ framework of generatively ordering and pacing audio-visuals.

But contemporary generative cinema goes deeper. Chavez and Liu suggest that “machinima”, the use of real-time computer graphics engines to create cinema (e.g. recording within video-game environment), is potentially generative.<sup>29</sup> Contrastingly, Broad and Grierson suggest “deep generative models” which they used to generate *Blade Runner—Autoencoded* by training an autoencoder (a computational generative network) to recreate the film *Blade Runner*.<sup>30</sup>

However, here we become stuck at an impasse, as generative cinema begins to incorporate too many disparate ideals. On the one hand, cinema, taken in its

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<sup>26</sup> E. Edmonds, “Logics for Constructing Generative Art Systems,” in *Digital Creativity* (14:1, 2003) 24

<sup>27</sup> See Steve Anderson. “Soft Cinema: Navigating the Database (review)” in *The Moving Image* (6:1, 2006) 137

<sup>28</sup> See Grba p. 385-390 for the comprehensive list and explanations.

<sup>29</sup> Mark Chavez and Lin Liu Yi. “Cinematics and Narratives: an exploitation of real-time animation” in *2010 International Conference on Cyberworlds Proceedings* (Singapore: Singapore, October 2010. IEEE Computer Society CPS 2010) 287

<sup>30</sup> Terence Broad and Mick Grierson, “Autoencoding Blade Runner : Reconstructing Films with Artificial Neural Networks” in *Leonardo* (50:4, 2017) 376/7

fundamentals, seems generative. One can set a digital camera on a stable tripod with a given lens (the rules/inputs) and press record to generate infinite cinema of what lies in front of it—perfectly enacting Dorin’s wind chime analogy for generative music. But is this generative cinema? Personally I am unsure. One could argue either way, but I am inclined to reject it on the foundation that if true all cinema would become generative.

Furthermore, our previous discussion of A-series and B-series time suggested that all generative mediums must remain within A-series time. This opens up a question asking whether time-based mediums such as music and cinema must continually be *generating* in order to classify as a generative piece, or whether they can have been *generated*. Galanter postulates that any “art practice that uses a dynamic complex system to create what is ultimately a static object or recording is still generative art”, but such a definition reduces generative cinema back to B-series time becoming *generated* instead of *generative*.<sup>31</sup> Instead, I am more inclined to accept Sites and Potter’s harsher definition that it must be created in “real time...never repeat[ing] itself exactly”—much like the systemic games we discussed earlier.<sup>32</sup> However, according to Tarkovsky the fundamental of cinema is capturing and expressing the course of time within the frame—thus we must question whether such a process is even a form of cinema.<sup>33</sup>

## Generative Cinema; or [Insert Name Here]

Lev Manovich, as both a theorist and creative, explains there are two vectors of inquiry here—first from cinema to new media (under which he categorises many emergent boundary-defying computer-driven arts) and second, from computers to cinema.<sup>34</sup> He highlights the fact that “most discussions of cinema in the

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<sup>31</sup> Philip Galanter, “What is Generative Art? Complexity Theory as a Context for Art Theory” in *GA2003—6<sup>th</sup> Generative Art Conference* (Rhizome: Italy, September 2003) p. 19

<sup>32</sup> Sites and Potter p. 17

Here I would also potentially provide a division between a *static* generated piece and a *dynamic* generative piece. Both hold merit within the greater framework of generative cinema but with many fundamental differences.

<sup>33</sup> See: Andrei Tarkovsky. Kitty Hunter-Blair (trans.) *Sculpting in Time: Reflections on the Cinema* (USA: University of Texas Press, 1989)

<sup>34</sup> Lev Manovich. *The Language of New Media* (USA: MIT Press, 2002)p. 244



computer age have focused on the possibilities of interactive narrative”.<sup>35</sup> However, as Christian Metz argued in the 1970s, all narrative films are part of one “super-genre” and are by no means the boundaries of cinema.<sup>36</sup> As such we should not doubt that generative cinema might lie outside our general understanding of what constitutes cinema, both narratively and historically. Furthermore, just as generative music dissociated itself from much of the medium-specific baggage of generative linguistics, we can foresee generative cinema differing significantly from the framework of generative music.

Retracing Manovich’s vectors let us begin with the latter, viewing what the computer provides to generative cinema. Although we previously defined generative music as not necessarily needing a computer, that isn’t to say the computer doesn’t provide unique frameworks. Frameworks such as Markov chains, randomisation algorithms, synthesis algorithms and simply storing video/film in a coded format all provide unique starting points for generative cinema—both allowing ease of production and the conceptualisation of new ideas.<sup>37</sup> For example, the aforementioned *sCrAmBIEd? HaCkZ!* and *Acceptance* both utilise synthesis algorithms to create cinema by rearranging a clip’s audio to mirror live or pre-recorded audio inputs. But let us step back from this complicated nomenclature for a moment and look at a fundamentally simple form of computer-generative cinema—the screensaver.

For simplicity’s sake, let us analyse the familiar bouncing DVD logo. This screensaver creates a near-perfect generative cinema, it follows simple computational ‘rules’ across all displays (speed, relative size, change colour on bounce etc.), each presentation is different depending on the dimensions of the given display, and, as it is live generated, it is everlasting.<sup>38</sup> Brian Eno recalls being fascinated by a similar screensaver, however terming it a “visual

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<sup>35</sup> Manovich, p. 249

<sup>36</sup> Christian Metz. “The Fiction Film and its Spectator: A Metaphychological Study,” in, Theresa Hak Kyung Cha (ed.), *Apparatus* (New York: Tanam Press, 1980) p. 402

<sup>37</sup> See: Julia Stefan and Andrew R. Brown. “Generative music video composition: using automation to extend creative practice” in *Digital Creativity* (26:2, 2015) 122

<sup>38</sup> To be perfectly reflective of cinema it would also ideally include sound; thus one can imagine a tone every time it hits an edge—completing the generative wholly cinematic piece.

generative piece” with no mention of cinema.<sup>39</sup> Of course, the majority of us would not equate a screensaver to cinema—but this is exactly where Manovich’s vector from cinema to new media becomes instructive. In other words when does cinema stop being cinema?

Of course, this is a question far too broad for this, or any, singular writing. So let us instead simply look at what cinema-cum-new-media exists as a result of this technological exchange between cinema and computers. Firstly, in quite a basic form, we see the films of John and James Whitney—John even explicitly shared his simple algorithms for the “emerging visual music art form” in his 1981 book *Digital Harmony*.<sup>40</sup> The Whitneys utilised computer interfaces to create images yet, due to their pre-digital period, used cameras to transfer the images onto traditional film-stock and add colour.<sup>41</sup> Although this form itself didn’t evolve, per se, it is an early application of computers to cinema—in turn pushing itself towards a new media. Furthermore the Whitney’s sit on the border of generative media, as their approach is heavily structural—but we will return to this shortly. Most contemporary examples of generative cinema are software based, either requiring the software to generate a set audio-visual sequence (*Acceptance*), or to actively generate a live sequence responding to live inputs (*sCrAmBled?*



**Figure 1: The generative bouncing DVD logo screensaver, which bounces off the edges of the screen changing colour on each bounce.**

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<sup>39</sup> Brian Eno, “Generative Music”

<sup>40</sup> Tom DeWitt. “Visual Music: Searching for an Aesthetic” in *Leonardo* (20:2, 1987) p. 116

<sup>41</sup> Bill Alves. “Digital Harmony of Sound and Light” in *Computer Music Journal* (29:4, 2005) 46-7

*HaCkZ!*). Further examples exist in Brian Eno's *The Ship*, which responded to live-tweets implementing historical imagery related to them, DuBois' *Academy*, algorithmically generating sequences from the Academy Award's previous Best Films, or Doukham's *Fractal Film*, where an autonomously programmed camera attempts to exhaust the possibilities of filming a given performed scene. Each of these strives towards generative cinema through differing means and thus each achieves a different definition of generative cinema. This highlights one of the key difficulties with contemporary generative cinema, the form is being defined by the creators who all use different methodologies and strive for different goals. Thus we are left with a scramble of works with, still, no coherent idea of what generative cinema consists of or excludes. Let us try to elucidate this.

While generative in principle, most structural film is not generative, including those of the Whitney Brothers, Michael Snow (*La Région Centrale*) and others. This is because it lacks the clear impartial process of its actual generation—however some structural films, such as Tony Conrad's *The Flicker* are generative, in the *static* generated sense, as they retain this impartiality during production. Galanter asks whether a lone process of randomisation of elements is generative concluding that conceptual art does satisfy a generative criterion.<sup>42</sup> This is because such art is “focused on exploring systems for their own intrinsic value”, Lewitt even references this explaining “[t]he idea becomes a machine that makes the art”.<sup>43</sup> Thus we return to the fundamental of generative art, and we can apply this to generative cinema, that the creator loses control after creating the parameters of the idea—and the cinema thus generates itself (either by hand or by machine). Anderson addresses the problem of “decentred authorship” that this creates, questioning who is the artist—the computer, the person with the idea, the programmer etc.—however this is largely a question for another day.<sup>44</sup> Our interest in this self-generation is the imposition of A-series time on cinema, forcing images to be constantly *generating* (not *generated* and recorded) via computational software. But the existence of generative cinema depends on

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<sup>42</sup> Such randomization has been exercised outside the cinema by John Cage, Marcel Duchamp, Sol Lewitt among other minimalist and conceptual artists.

<sup>43</sup> Galanter p.18

Sol Lewitt quoted in Galanter p.18

<sup>44</sup> Anderson, 137

whether, as Herbert Franke proposed in 1971, “works of art can be expressed in mathematical and...statistical terms” but more importantly whether we can accept them as art—as cinema.<sup>45</sup>

## Conclusions: Expanding, or diminishing, the scope of Cinema

As Abraham Maslow postulates—if the only tool you have is a hammer it is tempting to treat everything as a nail.<sup>46</sup> Our current and historical understanding of cinema relies on the legacy of celluloid-linear filmmaking, limiting itself to a B-series form of static time wholly incompatible with the concepts of generative music and generative cinema. Thus, the fundamental roadblock when incorporating generative cinema into the contemporary cinematic landscape is that its “processes [are] not socially associated with the institution of cinema” as the generative cinema that does exist remains in exclusionist spaces of the gallery installation and avant-garde film festival.<sup>47</sup> Sexton locates that this issue also underpins generative music, which is often referred to as “sound (or sonic) art, as opposed to the art form known as music”.<sup>48</sup> Although this article has been rife with distinguishing jargon this is one of the most fundamental as the sidelining of generative cinema into a category of ‘visual-art’ or ‘experimental film’ keeps it from flourishing due to its reduced exposure to both artists and public.

Manovich explains that “computer media redefines the very identity of cinema” through the new potentials we have discussed.<sup>49</sup> Similarly, Maureen Furniss explains the term “filmmaker” is becoming more irrelevant by the day due to the continual distancing from celluloid film.<sup>50</sup> Thus instead of pushing generative cinema into a marginalised sub-category I implore that we include it within the canon of Cinema.

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<sup>45</sup> H. W. Franke. “Computers and Visual Art” in *Leonardo* (4:4, 1971) 331

<sup>46</sup> A. H. Maslow. *The psychology of science: A reconnaissance*. (New York: Harper & Row. 1966) p. 15

<sup>47</sup> Mike Leggett. “Generative Systems and the Cinematic Spaces of Film and Installation Art” in *Leonardo* (40:2, 2007) 127

<sup>48</sup> Jamie Sexton. “Reflections on Sound Art” in *Sound and Multimedia: From the Live to the Virtual* (Edinburgh: Edinburgh University Press, 2007) 85

<sup>49</sup> Manovich, *Language*, p. 249

<sup>50</sup> Maureen Furniss. *Art in Motion: Animation Aesthetics* (London: John Libbey Publishing, 2008) p. 173

Franke, writing in 1971, posited that

“[t]he use of computers means breaking with some art traditions but, on the other hand, it may well lead to a break through in art and a better rational understanding of artistic phenomena.”<sup>51</sup>

Over forty years after this statement we still struggle to wholly accept computer-based arts due to out-dated frameworks. Thus we should relax our understanding of cinema that is based so heavily on celluloid and permit entry to a cinema that emerges “organically from the logic of the computer database”, suitably revising our patterns of production and consumption of cinema to include those that characterise the digital age.<sup>52</sup> Thus, in stark contrast to our current frameworks, we can expand the borders of cinema, preparing it for its inevitable evolution through the 21<sup>st</sup> century.

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<sup>51</sup> Franke, 331

<sup>52</sup> Anderson, 136/7

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*La Région Centrale*, dir. Michael Snow, Canada, 1971

*The Flicker*, dir. Tony Conrad, USA, 1966

*The Ship*, dir. Brian Eno, UK/Japan, 2016

## Mediography

*BioSoNot 1.2*, Gilberto Esparza, Mexico, 2017

*Halo*, Semiconductor (Ruth Jarman and Joe Gerhardt), Switzerland, 2018

*No Man's Sky*, Sean Murray/Grant Duncan/Ryan Doyle/David Ream, Hello Games, USA, 2016/2018

*Proteus*, Ed Kay/David Kanaga, Curve Digital/Twisted Tree, UK, 2013

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