

## Reconfiguring film studies through software cinema and procedural spectatorship

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### Abstract

The increasing use of software and database aesthetics in film and video production has created hybrid modes of spectatorship by altering the dynamic between media production and reception. Software-generated narratives (pre-programmed databases that create films through random selection and combination of discrete audio, visual, and/or textual tracks) remove the viewer from the actual algorithmic process, drawing his/her attention instead on interactions between hardware and software. Here, the element of unpredictability that is part of cinematic pleasure lies in the recombination of discrete elements (audio, visuals, subtitles, and so on) and the unexpected ways in which the software stitches those elements together. The subsequent reduction in the degree and compass of authorial control invites us to reconsider existing frameworks of spectatorship and narration within new contexts of mobility, performance, and databases. In this article I consider *Soft Cinema* films (Lev Manovich, Andreas Kratky, et al., 2003) as prototypical software-driven examples of this shift in viewing conditions and reception contexts. I argue that, despite its emerging and changing techniques and aesthetics, software-generated cinema retains one of the primitive socio-pedagogical functions of the cinema: training audiences to receive and buffer contemporary medial sensations. Just as early cinema prepared audiences and worked as a buffer for shocks of technological and industrial modernity, software cinema trains the viewer in new modes of film spectatorship and new modes of narrative and affective subjectivity that correspond to the hypertextual ways in which we interact with digital technologies. These viewing modes create a new form of procedural spectatorship that has been evident since the first pioneering experiments in generative cinema and a form that is, nonetheless, not entirely detached from existing theoretical paradigms of cinematic spectatorship and the development of the cinematic medium.

**Keywords:** procedural spectatorship, software cinema, , algorithmic authorship, expanded cinema, digital media, convergence, variable identity

## 1 Introduction

The increasing use of software and database aesthetics in film and video production has created hybrid modes of spectatorship by altering the dynamic between media production and reception. The reduction in the degree and compass of authorial control invites us to reconsider existing models of cinematic spectatorship and narration within new contexts of mobility, performance, and collaboration. Furthermore, it requires us to update and expand our approaches to film and media studies in order to more effectively account for changes in the conditions of film viewing in the digital age.<sup>1</sup>

In this article I consider *Soft Cinema* films (Lev Manovich, Andreas Kratky, et al., 2003)<sup>2</sup> as the prototypical software-driven examples that illustrate this shift in viewing conditions and reception contexts. *Soft Cinema* offers software-driven stories that are assembled and reassembled through (seemingly) random selection and combination of discrete audio, visual, and/or textual tracks. Here the element of unpredictability that is part of cinematic pleasure lies in the re-combination of discrete elements (audio, visuals, subtitles, and so on) and the unexpected ways in which the software stitches those elements together. In database narrative engines such as those envisioned by Manovich's collaborative *Soft Cinema* experiments the author function is perceived by the viewer as primarily procedural; the resulting film(s) appear to be spontaneously assembled in real time as the computer executes a set of rules dictated by the software that have been programmed by engineers.

Although these films have been discussed within digital humanities discourses, their actual narrative content as well as their place in the evolution of cinema have not been extensively analysed. Furthermore, even though there have been numerous software-centered art experiments (some of the most recent ones include works by software artists such as LIA, exhibitions like Poetic Codings in 2013, and HTML-coded music videos/commercials such as Chris Milk's *The Wilderness Downtown* [2010]), there are comparatively very few projects that successfully manage to create software that automatically or semi-automatically generates movies. *Soft Cinema* is pioneering because it consists of the first series of experiments where the vision of programming cinematic intelligence into a ma-



Fig. 1: *Soft Cinema* (first shown in 2003) by Lev Manovich, Andreas Kratky, et al.

chine is actually backed by the technological resources and engineering skills to make it a reality. Creating software to autonomously produce new narratives at the viewer's command (or at least give the illusion of doing so) speaks to the ever-present cultural desire to mass-produce and automate previously human-centric processes. Through close analysis of *Soft Cinema* and a consideration of earlier paradigms in film reception, I develop the notion of procedural spectatorship – an emerging mode of film-viewing that is appropriate for the cinema viewer of the digital age.

## 2 Code as creative design and narrative generator

Michael Mateas and Andrew Stern argue that the creative role of the new media author must extend to writing code and expressively using the procedurality of digital works. This 'procedurally literate authorship' enables artists to think within computational structures and 'understand the interplay between the culturally embedded practices of human meaning-making and technically mediated processes'.<sup>3</sup> Mateas and Stern consider code as a type of writing that produces its own procedural aesthetics, rhetoric, and poetics and argue that code should constitute an additional criterion to analysing the relationship between authorship and audience reception.<sup>4</sup>

The consideration of code in the critical interpretation of a work overlaps with the notion of generative art and expands the idea of procedural authorship to include non-digital contexts of algorithmic invention. Philip Galan-

ter defines generative art as any art practice where the artist uses a system such as a set of natural language rules, a computer program, a machine, or other procedural invention that is set into motion with some degree of autonomy contributing to or resulting in a completed work of art.<sup>5</sup>

Galanter's definition is not confined to computer art, it also includes art that adheres to pre-set instructions or imposed patterns such as those found in Islamic tile work, Tibetan mandalas, and various modes of textile production dating back to Jacquard's punch card loom in the 19<sup>th</sup> century. To this list I would add rule-bound constrained writing exercises (such as those devised by the Oulipo) and creative obstructions self-imposed by authors and filmmakers. An example of print-based generative poetry is the Oulipian Raymond Queneau's mathematically-inspired *Cent mille milliards de poèmes* (1961). In its most famous edition (by the French graphic designer Massin) the book is a collection of ten 14-line sonnets printed with each line on a separated strip of paper. The strips can be manually pulled back and forth to reveal new combinations of sonnet lines compatible across the entire textbase, resulting in 100,000,000,000,000 different sonnets. Lars Von Trier and Jørgen Leth's *The Five Obstructions* (2003) is an example of a regenerative film exercise to remake Leth's *The Perfect Human* (1967) five times, each time with a different obstruction or limitation imposed by von Trier, resulting in five different films of the 'same' narrative.



Fig. 2: Collage with examples of generative art: the Jacquard loom, Islamic tiles, poetry (Raymond Queneau's *Cent mille milliards de poemes* [1961]), film (*The Five Obstructions* [Lars von Trier and Jørgen Leth, 2003]), software art.

The *Soft Cinema* films employ similar algorithmic and constraining techniques, leaving to the viewer most of the cognitive work of making software into distinct narrative. In his introduction to *Absences*, one of the *Soft Cinema* movies, co-creator Andreas Kratky proposes that the software cannot prescribe an aesthetic – it simply provides ‘an associative tool’ for the artist to use as a platform for developing his or her own aesthetics.<sup>6</sup> Where Marsha Kinder has argued that that database narrative ‘exposes or thematises the dual processes of selection and combination that lie at the heart of all stories’,<sup>7</sup> Kratky emphasises the role of an authorial artistic vision in the generation of software narrative forms. His emphasis counterbalances the common assumption that authors of database narratives are more concerned with the ‘speed of engineering’ than the development of ‘possible genres’.<sup>8</sup> This approach to *Soft Cinema* suggests that even though the software-generated films appear to lack a unified authorial source (and thus actively resist auteurist interpretations), the author is still somewhere in the resulting work, most notably in its foundational aesthetic qualities. In this article I will be discussing the procedural nature and generative nature of *Soft Cinema* from the perspective of narrative design and engineering while also focusing on reception contexts in order to theorise how the film viewer might perceive these procedural works. Given that audience reception is an area that tends to get neglected in discussions of code and programming, I aim to critically reconcile these two often disparate forms of inquiry in order to propose a broader, cross-contextual approach to emerging forms of both cinema and software art.

Database operations antagonise classical narrative paradigms in *Soft Cinema* by omitting or minimising dramatic elements such as conflict, resolution, catharsis, and character development. Also, the convergence of narrative and database that is possible in software cinema may result in new understandings of the operations of cinematic narrative that coincide with Carl Boggs and Tom Pollard’s definition of postmodern cinema(s) as ‘characterized by disjointed narratives, a dark view of the human condition, images of chaos and random violence, death of the hero, emphasis on technique over content, and dystopic views of the future’.<sup>9</sup> The fact that *Soft Cinema* has an initially disorienting effect on its spectator because of its disjointed narrative fragments and the multiple windows of visual and textual data that appear simultaneously is indicative of postmodern anxiety regarding our over-stimulated society and the alienation of the individual from collective meaning-making processes. Much like the form of the postmodern films Boggs and Pollard have in mind (such as Mike Figgis’ four-way split screen film *TimeCode* [2000] and Christo-

pher Nolan's dual, backward-forward mode of narration in his film *Memento* [2000]), the code that comprises the software in *Soft Cinema* enacts the processes that induce the initial feeling of disorientation and alienation. Asynchrony, intermittent synchrony, juxtaposition, looping, and repetition all compete for the viewer's attention and impose a condition of alienation that resonates with the current moment. The ability of the *Soft Cinema* system to create and convey the affective state of disorientation and alienation of the (post)modern condition makes it a form of procedural rhetoric. Procedural rhetoric, according to Ian Bogost, for programmers is a method of 'making arguments with computational systems', while for users it involves 'unpacking computational arguments others have created' and, I would add, deciphering additional meanings that may or may not be intended by the creators.<sup>10</sup>

The loosely structured scenario of *Mission to Earth*, one of the more elaborate *Soft Cinema* narratives, fittingly complements the software film's disjointed and interrupted form. The synopsis accompanying the film gives the viewer an abstract sense of its narrative potential. The film is about the experiences and altered subjectivity of a female alien who is seeing, hearing, and reacting to Earth for the first time. Although the combinations and recombinations of discrete audiovisual elements might appear to be the results of fully random software operations, Manovich notes that some visual sequences are 'hard-wired' into the software *Mission to Earth* in order to generate predetermined combinations.<sup>11</sup> The experience of randomness is, therefore, partially constructed through specific algorithms that produce this seemingly random selection of narrative data.

Appropriately, the audio tracks are processed and sampled by the software as discrete data while the various screen windows are also seen as discrete; together these elements are combined in seemingly random configurations and grouped within the visual field of a single screen (the computer, television, or installation monitor) to be simultaneously presented to the viewer. This is an example of what Manovich identifies as 'spatial montage' that, unlike the temporal 'film cut' montage of narrative cinema, involves multiple images, usually of different proportions, appearing on the screen simultaneously.<sup>12</sup> Spatial montage fits the language of procedural media but is not limited to computer-based narratives (see for instance director Park Chan-wook's cinematic version of spatial montage that combines deep space composition with mise-en-abyme frames-within-frames in *Oldboy* [2003]). The non-linear fashion of spatial montage adds density and layers to the shot's composition as various narrative fragments compete for the viewer's attention.



Fig. 3: Timecode (Mike Figgis, 2000).

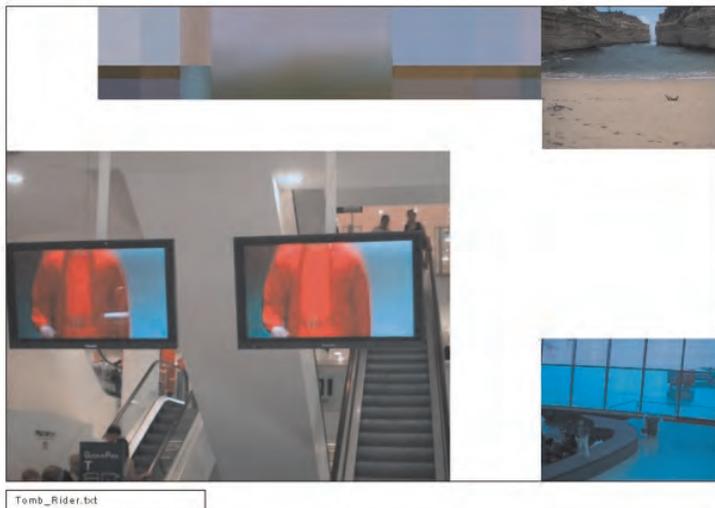


Fig. 4: Soft Cinema.



Fig. 5: Spatial montage in *Soft Cinema* film *Texas*.



Fig. 6: Spatial montage in the HTML-coded, web-based, Google Chrome commercial/music video hybrid *The Wilderness Downtown* (Chris Milk, 2010).



Fig. 7: Cinematic spatial montage that amalgamates deep space composition with a *mise-en-abyme* (frames-within-frames) effect in *Oldboy* (Park Chan-wook, 2003).

The spatial montage in *Soft Cinema* evokes a procedural type of viewing for the spectator; the viewer's narrative comprehension essentially converges with the modularity and automation of *Soft Cinema*. Procedural spectatorship prioritises the narration (how the story is told and how it materialises on the screen) over the narrative (the story itself), as the viewer has to sort through the narrative data – materialising as discrete windows, audio tracks, and text/ subtitles – in order to piece together a coherent storyline. It should be noted here that this procedural spectatorship also occurs to a different extent in other types of films that experiment with narrative form such as *Memento*, *Timecode*, *Babel* (2006), and even pre-digital examples like *Un Chien Andalou* (1929).<sup>13</sup> As with other examples of generative and interactive art, 'computational procedurality places a greater emphasis on the expressive capacities of the rules of execution', which in this case refers to the system controlling the execution of the *Soft* films.<sup>14</sup>

The computational procedurality that is at the core of procedural viewing then leads to what Manovich identifies as one of the chief characteristics of new media: transcoding. Transcoding basically means to translate an algorithmic/computational process into a different format in order to make it graspable and accessible to the user (as in the paintbrush icon used in image editing software that performs an equivalent function as an analog paintbrush). In the case of *Soft Cinema* the viewer has to first become

aware and used to the ‘computer layer’ (the mechanisms) of the work before interpreting its underlying ‘cultural layer’ (more profound cultural symbolism and narrative meanings).<sup>15</sup> Here, Katherine N. Hayles’ argument that a hypertext is materially performed before it is cognitively read is also applicable to software cinema, where the film begins as a process that unfolds in real time rather than as a finite object.<sup>16</sup>

### 3 Historicising procedural spectatorship

As viewers of the film we may initially be unable to follow a fully developed story but we are still able to have an immediate affective response to the sense of alienation and disorientation felt by the main character Inga (Ilze Black). This sense of alienation and disorientation is not narratively conditioned – we do not empathise with Inga because there is not sufficient character development or depth, but we can share something similar to her experience of lost bearings. In their introduction to the film, Manovich and Kratky mention that Inga’s alien experience is evocative of ‘both the Cold War era and of the contemporary immigrant experience that is so frequently the norm for inhabitants of ‘global cities’. The multi-frame and unpredictable layout of *Mission to Earth* appears intended to affectively correspond to nuances of ‘variable identity’, a fluid, nuanced, and elusive concept of subjectivity that encompasses ‘the trauma of immigration, the sense of living parallel lives, [and] the feeling of being split between different realities’.<sup>17</sup>

The explicit association of these encounters with the history of the Cold War adds allegorical depth to *Mission* – a depth that is probably not perceivable to the viewer if she is unaware of this intended metaphorical dimension to the film (and, in auteurist terms, Manovich’s personal investment in this topic). On purely technical registers, variable identity is formally constructed as the effect of algorithmic processes; it is a product of combinations of data/info-subjectivity in the digital field or post-industrial society. Also, some qualities of Inga’s culturally and technologically backward planet Alpha-1 suggest by way of the Cold War metaphor that hybrid identity is not always the result of new or progressive operations of mind and technology but may also encompass past psychological trauma, especially when that trauma (re)emerges as the result of a life-changing cultural, sociopolitical, and/or technological transition.

This juxtaposition of machinic and programmable processes with human-centric and historical concerns drives software film’s implicit argu-

ment that relatable feelings (human affect) can be stimulated – and possibly even simulated – by software operations. At the core of the *Mission* software are cultural and transnational (that is, human) concerns that resonate through the combination of formal and structural elements. The immigrant point of view in the film can thus be relatable in diverse reception contexts; it can be translated in broader terms as the experience of being in an unfamiliar place, the experience of navigating hybrid modes of subjectivity and, by extension, hybrid modes of spectatorship. In this respect, then, the narrative spills out into the affective realm as our bodies literally try to make sense of this new cine-software experience. Software cinema is thus, against all appearances of being driven primarily by inhuman computer operations, a cinema of effects and affects. While watching software cinema we are receptive to the primal, visceral appeal of moving pictures but, unlike cinema's first audiences, we work within new frameworks for relating to images that are not just moving but also pixelated, digitised, and interactive.

Tom Gunning's dismantling of the myth of the incredulous and frightened early cinema spectator has led to a wider critical awareness of not only the importance of film history in the formulation of film theory but also (as a secondary point that is nonetheless more significant here) a critical emphasis on the material conditions of spectatorship and how they influence reception.<sup>18</sup> As historians of early cinema have pointed out, the very conditions of early film projection and exhibition prevented the spectator's narrative or aesthetic immersion into the spectacle of moving pictures. Many early screenings took place in social settings such as plazas (or the Grand Café in Paris, famous for hosting the first documented public screening in 1895), which encouraged social interaction among spectators but not immersion into the world of the film. In addition, the film projector was noisy and its mechanical operations were impossible to ignore during screenings. The subsequent additions of an accompanying musician or orchestra were made not only to add sound to the image but also to conceal the sound of the image projection machinery. These distractions, I argue, had a counter-immersive impact on viewer responses comparable to that of the viewer's awareness of the procedural character of software cinema.

In *Soft Cinema* the procedural spectator does not slip into full narrative immersion because her attention is on surface mechanisms of the film's assemblage (the multiple navigation windows, overlapping soundtracks, and so on), which in turn are representative of internal operations of software and hardware and of graphical user interface (GUI) and human-com-

puter interactions. The overlapping sound and visuals in the software films correspond to – and for the viewer, appear to figure – transcoded operations of software database. Therefore, the viewer's attention is drawn to audiovisual evidence of the film's ongoing operations, manifest in the automatic generation and re-combination of multiple movie windows and overlapping audio tracks. Like the noisy projector and the noticeable surface of the projection screen in early shows, the transcoded materiality of the software mechanisms of digital projection in *Soft Cinema* makes viewers constantly aware of the apparatus' role in the performance of the film.

Thus, the *Soft Cinema* viewer is not absorbed into the film's projected space; she is fully conscious that there are working mechanisms and infrastructures producing that which audiovisually (de)materialises on the screen. The viewer occupies a liminal space; cinema here is neither a field of illusion nor, in conventional terms, narrative verisimilitude. In the context of *Soft Cinema* the procedural spectator takes on the additional role of reading data input as it appears on the interface. She engages in a hybrid practice of spectatorship that blends interface/screen reading with information processing and audiovisual, cognitive labor (on the viewer's part).

#### 4 Reorienting and remixing reception modes

Procedural spectatorship is thus not primarily temporally or narratively motivated, but it still does not fully elude the gradual process of accumulating narrative information. The primary source of narrative information about Inga's mission to earth comes from the main audio track rather than the visual elements and short clips that are asynchronously and (seemingly) arbitrarily paired with the audio. The fact that narrative information is accumulated aurally and progressively through the audio track sutures the viewer's experience to this register of continuity in the work while at the same time undermining the primacy of visual continuity. In *Mission* the overwhelming and disorienting images have a decentering and affectively disarming effect, while the consistent audio refocuses the viewer's narrative comprehension by shifting it to the realm of sound. This rehierarchised sensory mode of spectatorship nearly isolates narrative comprehension to the auditory aspects of the film.

Nevertheless, *Mission's* audio does not necessarily determine or limit the viewer's interpretation of the visual material, and vice versa; sometimes audio and picture appear to complement each other while at other

times the images veer off into a different direction than the more focused auditory narrative component. In fact, after prolonged or repeated viewing it becomes evident that some audio sequences of *Mission* have been hard-wired into the database so that they appear in predetermined orders. For example, all versions of Inga's story begin with an audio track that strategically conveys important background information about Inga. From the very first sentences we know that Inga the alien likes going through the automatic car wash because it reminds her of her home planet Alpha-1.

In all recombinant versions of *Mission* the opening scene remains the same. The more versions of the film that are watched the more information is accumulated about Inga's life on Earth. The information conveyed in each version does not contradict previous viewings; instead, the procedural viewer amasses more narrative information each time, chiefly through the audio track. This process of additive comprehension adds more complexity to the notion of procedural spectatorship. Neil Young's definition of additive comprehension (as summarised by Henry Jenkins), where new facts are gradually added to the main story through different media/texts and can challenge or revise previous assumptions regarding the story, applies in a slightly different way to the procedural viewing of *Mission*.<sup>19</sup> In the context of *Mission* additive comprehension refers to the gradual addition of new narrative information with every re-viewing of the film; this information does not challenge or cancel out earlier information accumulated about the narrative but instead adds to the fragments accumulated in previous versions of Inga's story.

Everything we can possibly know about Inga's personality and life on Earth is conveyed through a robotic and monotonous male voiceover. The monotone male voice brings to the surface power relations of patriarchal societies and makes them applicable to post-industrial societies in which human interactions are being replaced by and conveyed through electronic and digital processes of standardisation and automation. This also relates to processes of automation and standardisation in the Industrial Age, but in this case the apparent automated and mass production of narrative segments creates a work that will be uniquely perceived by each individual spectator. The repetition and overlap of audio and visual tracks results in a feeling of déjà-vu that contributes to the sense of circularity, repetition, and mundane routine that not only characterises Inga's earthly life but also organises the way her life is conveyed to the viewer through data repetition, looping, and algorithmic recombination. However, the response to the assembled narrative is not uniformly per-

ceived by all spectators alike due to its open-endedness and abstraction of meaning.

In a realm in which relations of data literally conjure the presentation of film subjectivity the creative production of cinematic art is organised according to the logic of the computer's database. Delegating a large portion of the assemblage of the film image and sequence to a computer results in a liminal media object that exists 'between narrative and a search engine'.<sup>20</sup> Thinking of filmic narrative as sufficiently quantifiable to be navigated with a search engine evokes other methods of data visualisation, distant reading, and macro-analysis that demonstrate, as Jose van Dijck notes, 'how software is increasingly quantifying and measuring our social and everyday lives; software helps translate our everyday actions into computer language and, vice versa, execute computer language into social action'.<sup>21</sup>

## 5 Data-subjectivity and posthuman awareness

In the case of software films, paratexts such as the online synopsis in *Mission to Earth* can provide narrative direction that helps the viewer forge causal links when other cues are missing. Trans- or cross-media additive comprehension, where information from multiple media is amassed to extend and enhance the comprehension of the principal film(s), is now the typical interactive way of understanding movies in our culture; software narratives are no exception, as viewers can discover background information from sources other than the films or their immediate paratexts with which to contextualise the (software) film experience. Even experimental movies such as Manovich and Krakty's *Absences* (another *Soft Cinema* movie) make more 'sense' when the viewer is aware of the artistic and theoretical aims of the work. The background knowledge that *Absences* does not have a predetermined narrative frees the viewer from hermeneutic expectations that circle back to authorial intention. This allows the viewer to respond to the sequences or the unexpected aggregates of visual and aural elements without having to figure out their significance within a narrative scheme.

The audio and visual tracks of *Absences* are usually abstract and difficult to decipher. The ambiguous text track accompanying windows on the screen and the overlapping ambient sounds determine our interpretation of the notional coherence of the film's projection. Although *Absences* is neither narratively nor logically conditioned the readable text track serves

as a (often-misleading) captioning device for what is seen and heard. For example, when the text underneath the window mentions that footsteps were heard this element is hard-wired with footage of the shadow of a man slowly walking toward an unknown destination (in one version the text mentions a wedding ceremony as a possible destination for the shadow that could belong to the groom). This is also accompanied by inscrutable ambient sound; once the text is read the sound begins to cognitively/associatively resemble footsteps because of the caption. In other words the text track narrows and specifies our perception of less decipherable ambiguous elements by suggesting associative connections between these aspects of the projection. This mode of spectatorship, which is almost the opposite of free association, could be considered as the software-simulated equivalent to the Kuleshov Effect, whereby audiovisual pairings assume meaning and tone through software-produced editing arrangements in this computer-age definition of montage.



*Fig. 8: Procedural spectatorship in Absences.*

Importantly, lags, loops, and glitches of the software are more easily perceived when narrative expectations have been suspended and disjunction becomes the defining mode of film reception. Are the lags, glitches, and loops of digital interactions software versions of affects, corresponding to how humans somatically and perceptively experience digital encounters?

Anna Munster, echoing Brian Massumi, locates affective bodily sensation in the lag or time period between the 'bodily beginning of an event and its completion in an outwardly directed expression of emotion'.<sup>22</sup> Here we might observe that the affective sensation that occurs in the in-between interval of an event's bodily-sensed beginning and its outwardly manifested emotional expression must resonate with the lag which occurs between the software sending the command to the hardware, the hardware's reception and execution of that command, and the human body's sensation of the performance of this process. Before theories of affect and digital embodiment gained academic momentum, Linda Williams predicted in her essay 'Film Bodies: Gender, Genre, and Excess' (1991) that the deployment of sensations in cultural forms such as the cinema is only just beginning to be understood and analysed.<sup>23</sup> She argued that filmic identification does not just involve the reproduction of the sensations displayed by bodies on the screen but also (or instead) encompasses a complex network of triggers and sensations that include the filmic apparatus. If, as Manovich has repeatedly asserted in his work, software is indeed the new cultural form and database is the metaphor through which our daily interactions are understood,<sup>24</sup> then the hybrid mode of spectatorship produced by software cinema further expands the nuanced meaning of embodied identification suggested by Williams.

Thus, if we regard the data-subjectivity simulated by and emerging from software cinema as an aspect of spectatorship at large then we may compare the screen's reproduction of the body of the software to Williams's notion of screen bodies. Our perception of the materialised (as in audio-visualised/transcoded) body of the software/database on the screen results in varying degrees of investment and detachment to what is shown and heard, which must vary considerably in relation to the sequences and disjunctions with which it appears. In light of this cinematic identification and procedural spectatorship are keyed to distanciation and difference rather than empathy and situational identification, and are accentuated by our perceptive and sensate awareness of the repetitive glitches and lags that mark the software as different from our biological processing of audio-visual information. By extension digital embodiment is a 'differentially produced mode of living or experiencing the body' because, as Munster argues, we are not just somatically experiencing forward-moving temporal speeds but also periods of asynchronicity punctuated by intervals or lags; 'these delays occur because both code and the body fall short of the other's speeds'.<sup>25</sup> The disjunction between code and body – as well as the possibility that, with repeated viewing, the body tends to (or learns to) internalise

those material and immaterial inconsistencies (just as mainstream cinema's editing conventions have been naturalised for audiences) – remind us of the paradox in digital computers and the quest for knowledge. This paradox, as Wendy Chun argues, is that of computers being both transparent and opaque because they promise knowledge of the world thanks to their information-capturing properties, yet the functionality of their internal mechanisms is largely unfamiliar to most users at the technical level.<sup>26</sup>

Peter Krapp argues that glitches and lags, rather than immediacy and seamless communication, are an integral part of an ongoing digital embodiment that is 'immanently capable of becoming both sensate and virtual'.<sup>27</sup> Krapp clarifies that he is not advocating technological determinism by proposing an understanding of human-computer interaction centered on the glitch or the software exploit. Appropriating Alexander Galloway, Krapp argues for a posthumanist approach that points out the cultural importance of 'any code that runs counter to the perceived mandates of machinic execution, such as the computer glitch or the software exploit'.<sup>28</sup> In other words, the analytical emphasis is not on a machine-centric logic that explains why malfunctions happen. It is rather on a posthuman understanding of how these perceived malfunctions productively help us conceptualise them as an integral part of the culture of mediation and interaction in the programmable and digital era. Glitches, lags, and loops establish their own rhythm, and through prolonged viewing of software films our bodies may become accustomed to that mode of interaction in the same way we have become acclimated to the lags and loading times of Internet surfing and, prior to that, to the 1990s MTV-style fast-paced editing patterns of television and film.

Although we become accustomed to this interrupted and hypertextual mode of watching movies the evidence on whether we fully internalise this mode in ways that permanently rewire our brain remains inconclusive. One view argues that the sensory overload of multiple and simultaneous non-linear operations places overwhelming demands that cannot be adequately processed by the human brain.<sup>29</sup> The counter-argument is that frequent exposure to new modes of processing information trains the mind and body to adapt to demands of new technologies. This argument has been taken up by scholars in disciplines ranging from the humanities to neuroscience, who support the line of research that is indicative of new technologies retraining and repurposing our neural circuitry in psychosomatic ways.

More recently, Katherine Hayles has applied this line of reasoning to electronic literature case studies in her book *How We Think: Digital Media and Contemporary Technogenesis*. Her approach partly draws from Andy

Clark's neural constructivist viewpoint which claims that in our habitual interactions with the world 'we remain open to quite profound kinds of neural (cortical) growth and rewiring' that render us adaptive cyborgs by nature.<sup>30</sup> The cognitive impact of hypertextual forms of reading on the learning process is being extensively researched, evaluated, and reassessed in light of new methods for interactive pedagogy and self-training tools.<sup>31</sup> In the near future genres of software cinema have the potential of stimulating similar academic inquiry on multi-modal film's impact on the human brain. Such investigations may productively expand theories of narrative comprehension in film to cover robustly hypertextual conditions of spectatorship.

At the risk of falling into the trap of historical and technological determinism or cinematic essentialism I would argue that, despite its emerging and changing techniques and aesthetics, software cinema retains one of the socio-pedagogical functions of the cinema – training audiences to receive and buffer contemporary medial sensations. Michael Cowan recently reiterated cinema's status as 'training ground for the modes of distracted and divided attention adapted to the conditions of the urban milieu' in light of his rediscovery of the Weimar rebus films (crossword puzzle films) of 1925 to 1927. According to Cowan rebus films 'used the onscreen game format, and the affective experience of play, precisely in order to facilitate the assimilation of that new milieu'.<sup>32</sup> Just as early cinema arguably prepared audiences and worked as a buffer for shocks of technological and industrial modernity, software cinema trains the viewer in new modes of film spectatorship and new modes of narrative and affective subjectivity that correspond to the ways in which we interact with digital technologies. Research has indicated that the habitual actions associated with web interactions (such as moving the cursor, clicking the mouse, and using multiple browser tabs) have the potential to retrain and repurpose our neural circuitry. Just as reading has been shown to profoundly impact brain functioning, learning to read (and in this case to watch films) differently can potentially rewire or expand the brain's cognitive abilities.<sup>33</sup> If we approach software cinema from this perspective then its objective of expanding viewers' cognitive skills by expanding the dimensions of spectatorship correlates to the expanded cinema objective of extending consciousness by expanding and ultimately transcending the apparatus of classical cinema.<sup>34</sup>

By stripping film narratives down to their raw elements of dialogue, images, and audio (or at least the digitised and processed equivalents of these), does software cinema also herald the death of cinema as we (think we) know it? Or, is software cinema expanding cinema in the way that flicker films expanded the definition of cinema by stripping it down to some of its

fundamentals? The most notable flicker film is Tony Conrad's *The Flicker* (1965), an experimental film consisting of only five frames, two of which are constantly alternated to create the flicker effect. The 'Warning' frame that opens the film, warning audiences that *The Flicker* may cause epileptic seizures or mild shocks, literally turns the metaphor of cinema as a buffer for the shocks of modernisation on its head. Instead of training audiences to tolerate the shocks of modernity *The Flicker* induces shocks to audiences through its flickering effects. By breaking cinema down to its elemental form (consisting of frame juxtaposition and light projection) flicker films expand the definition of cinema by contracting cinema to some of its basic elements and primal sensations.<sup>35</sup> Accordingly, *Soft Cinema* orchestrates the film experience around the contraction or distillation of the internal operations of software into visualised or transcoded aspects such as the appearance of multiple windows and the simulation of overlapping actions, thus expanding the language of cinema to include vicissitudes of the procedures of digital media.

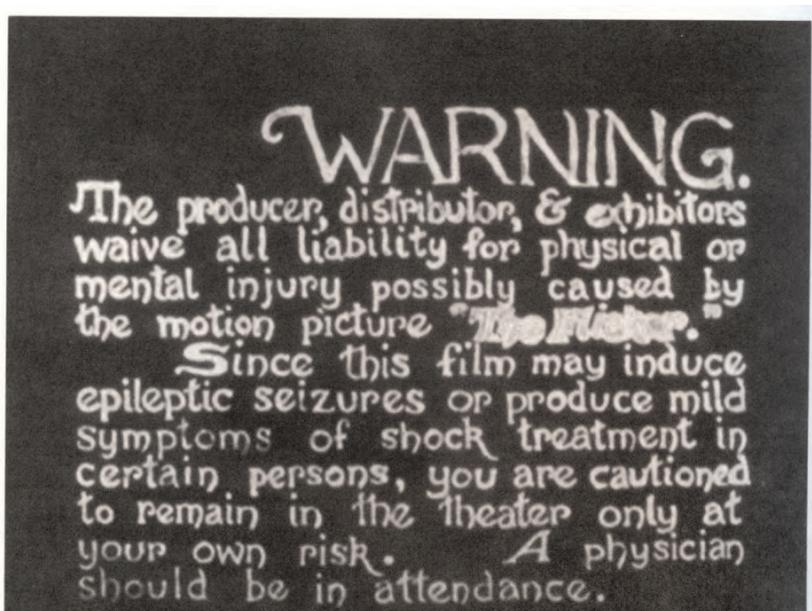


Fig. 9: The 'Warning' frame in Tony Conrad's experimental film *The Flicker* (1965).

Hayles notes that database technology relies on 'the interoperability of databases, whereas narrative is tied to the specificities of individual speakers, complex agencies, and intentions only partially revealed'.<sup>36</sup> She goes on to suggest that narratives resist the standardisation that characterises databases, and this resistance is what makes them a uniquely human invention.

*Soft Cinema* and the broader, nascent practice of software-generated films attempt to reconcile these two forms using the sorting and standardisation features of the database to generate malleable narratives that address the human condition. It remains to be seen whether the (almost) globally resonant aesthetics of the GUI will displace or even efface some of the cultural, social, economic, and political conditions that shape and distinguish unique filmmaking approaches. Perhaps, instead, those particularities and cultural specificities will become encoded – literally and figuratively – into the software-filmmaking process in different ways, such as in the narrative's procedural rhetoric. Although software has already replaced a diverse assortment of mechanical, physical, and electronic technologies (including most film technologies) it cannot replace the unique sensibility and vision of the filmmaker (as a collaborative/collective unit). However, it can expand the notion of film authorship to encompass software engineers and programmers and also include the procedural viewer that contributes to the ultimate, cognitive, and/or interactive assemblage of the (non)final product.

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## Notes

1. I have historicised the development of other emerging trends in digital cinema in a similar way, mainly focusing on the prototypical, pre-digital origins of interactive cinema. See Hassapopoulou 2013.
2. <http://www.softcinema.net> (accessed on 30 August 2014).
3. Mateas & Stern 2010, p. 183.
4. *Ibid.*, p. 184.
5. Galanter 2003.
6. Kratky, 'Absences'.
7. Kinder 2002, p. 120.
8. Rieser & Zapp 2002, pp. xxv-xxvi.
9. Boggs & Pollard 2001, p. 159.
10. Bogost 2010, p. 3.
11. Soft Cinema, 'Mission to Earth': [http://www.softcinema.net/mission\\_to\\_earth.htm](http://www.softcinema.net/mission_to_earth.htm) (accessed on 30 July 2014). I am incorporating background information on the making of *Soft Cinema* not to shut down the possibility of organic viewer responses but to indicate the extent of authorial intention (in this case in the form of software engineering) in the reception of software narratives.

12. Manovich 2001, p. 322.
13. For a thorough analysis of unconventional narration in contemporary cinema see Elsaesser 2009.
14. Bogost 2010, p. 5.
15. Manovich 2001.
16. Hayles 2006, p. 185.
17. Manovich & Kratky 2005, p. 20.
18. Gunning 2004.
19. Jenkins 2007.
20. Manovich 2004.
21. van Dijck 2013.
22. Munster 2006, p. 140.
23. Williams 1991.
24. Manovich 2008.
25. *Ibid.*, p. 64.
26. Chun 2011, p. 17.
27. Krapp 2011, p. 17.
28. *Ibid.*, p. 91.
29. For more information on how this reasoning pertains to digital and interactive forms of cinema see Shaul 2008.
30. Clark 2003, p. 31.
31. Rich, 'Literacy Debate: Online R U Really Reading?'
32. Cowan 2010, p. 209.
33. For a sample of diverse approaches to the benefits and drawbacks of new modes of reading and expanded cognition see Carr 2010, Palfrey & Gasser 2010, and Clark 2010.
34. Youngblood 1970.
35. A similar argument is developed by Chrissie Iles with regards to gallery films in the 1970s (Iles 2009).
36. Hayles 2012, p. 198.

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