Glitch, the Post-digital Aesthetic of Failure and Twenty-First-Century Media

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Abstract

This paper aims to understand how everyday life is affected by new technological conditions through an inquiry into glitch, a concept that signifies moments of faulty interference in the regular operation of a technology and that is often labeled a ghost in the machine. By drawing on two concepts from cultural studies – spectrality and post-digital culture – it demonstrates how the imperfection-oriented aesthetic of glitch is today complicated by the technological tendency to bypass human awareness. By developing this argument through a reading of German electronic music group Oval's influential glitch-based record *94diskont* (1995), the paper shows how glitch's signification of mediation, fragility and technological complexity has been modulated in recent years. This analysis is augmented through a consideration of Mark B.N. Hansen's concept of 'twenty-first-century media', which takes as highly significant the tendency of contemporary media to operate beyond the thresholds of human cognition and perception. The paper suggests that, as a result of these new medial forms, the subversive potential of glitch-based artworks is impacted severely, but also that glitch's status of ghost in the machine offers valuable resources for thinking through the media experiences afforded by 21st-century media. This paper thereby points to new potential modes of critique, and expands existing cultural debates about aesthetics, technology, and the constitution of everyday life.

Keywords

Glitch, imperfection, post-digital culture, spectrality, 21st-century media

> '"*We have lived for too long under the terror of the matchless perfection of the Demiurge*",
> *my father said. "For too long the perfection of his creation has paralyzed our own creative*
> *instinct. [. . .] The Demiurge was in love with consummate, superb, and complicated*

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materials; we shall give priority to trash. We are simply entranced and enchanted by the cheapness, shabbiness and inferiority of material".

(Bruno Schulz, 2008: 32–33)

Introduction

The above passage, taken from *The Street of Crocodiles*, a 1934 collection of short stories by Polish-Jewish author Bruno Schulz (1892-1942), reveals a valuation of frailty and trash over polish and perfection. As such, it can be read as a precursor to what, in the introduction to this cluster, has been described as the 'imperfect turn' (De Vos and Rutten, forthcoming). The imperfect turn registers a rising predilection – a predilection that is in itself not historically unprecedented – for objects that are broken, dirty, malformed, or subject to decay (Hughes, 2014; Kelly et al. 2021; Saito, 2017). This shift began to take shape roughly around the late 1980s, which – not coincidentally, as I will suggest – also marked the period when, in many places, digital technologies slowly began to pervade the fabric of everyday life. The imbrication of the digital and the aesthetically imperfect is nowhere clearer than in the figure of glitch. The term glitch signifies moments of faulty interference in the regular operation of a technology. It is around this concept, and specifically around the way it has been artistically repurposed, that this article revolves. Glitch can best be understood as a technological (usually digital) subset of the turn toward imperfection, and in this article I examine the appeal and power that it holds today. By empirically grounding my analysis in the influential 1995 glitch-based album *94diskont*, made by German electronic music group Oval, I will argue that the notion of glitch faced different digital conditions in previous decades than today, and that this change has far-reaching implications for glitch's aesthetic significance. It follows that the imperfect turn – at least when it comes to the potency of the glitch – is not a static and singular shift, but rather a fluid assemblage that responds dynamically to changing material and technological conditions.

In my inquiry into glitch I draw on two concepts from cultural studies: post-digital aesthetics and spectrality. The former term delineates a digital aesthetic of imperfection, and is important here because it tracks aesthetic reactions to a cultural situation in which lived experience is thoroughly mediated by digital technology. Moreover, the concept allows me to differentiate between the cultural atmosphere in which Oval's imperfection-oriented music rose to fame and the one in which it circulates today. Spectrality – a concept from cultural studies that explores how ghosts and specters have been taken up as analytic tools and metaphors – is crucial for two reasons. First, glitches are often framed as ghosts in the machine, and I will argue this spectral association is germane to understanding glitch's aesthetic of imperfection. Second, technology itself is often conceptualized as engendering spectral experiences, and it will be one of my main arguments that a specific sense of spectrality, stemming from the digital, has intensified significantly in past decades. In my conclusion, I return to the epigraph in order to argue that Schulz's words were, in a way, prophetic when it comes to capturing the experience of inhabiting today's changing digital mediasphere.

Glitch

Glitch theorist Rosa Menkman (2011) defines 'glitch' as follows: a glitch is an '(actual and/or simulated) break from an expected or conventional flow of information or meaning within (digital) communication systems that results in a perceived accident or error' (p. 9). A glitch is thus a seemingly faulty deviation from routine functionality, and this deviation can be communicated both visually and aurally (with glitch music long existing as an established genre).[1] Such deviations, when encountered in the wild, interfere with expectations and thereby have the capacity to rip the user from immersion. A glitch potentially reminds the user that they are engaging a technology and that this technology is fallible and opaque: 'Whether its cause is intentional or accidental, a glitch flamboyantly undoes the communications platforms that we, as subjects of digital culture, both rely on and take for granted' (Manon and Temkin, 2011). Glitches, for this reason, are often linked with the term imperfection (see, for example, Pérez, 2018). This discursive bond between glitch and imperfection plays out on two levels: imperfection can refer to the fractured aesthetic of glitch itself – as is the case in Iman Moradi et al.'s (2009) glitch art compendium Glitch: Designing Imperfection – and imperfection can point to the fragility of the underlying technology – as when Menkman (2011) suggests that a glitch reveals each medium to bear its own 'inherent fingerprints of imperfection' (p. 11).

Glitches are often also described as ghosts in the machine (Cubitt, 2017: 20). I will unpack this spectral association in more detail later, but here it suffices to note that the metaphor of the ghost is a way of pointing to the agency of technological powers that the user cannot fully grasp or command. When a machine functions smoothly there is little reason to linger on the black-boxed nature of technology, but when a glitch occurs one is reminded of the impossibility of complete control. Specifically, it is the glitch's aesthetic of imperfection that thwarts the transparency of the medium and thereby reveals the presence of technological ghosts. A glitch is, moreover, ghostly because it can only be defined as a glitch *after* it has disappeared: 'By definition, a glitch is an error that gets corrected' (Olivier, 2015: 261). Something can only be perceived as a glitch after a correction has taken place; in other words, a glitch is already dead when we name it. Before turning to Oval's glitch-based music, it is instructive to first stake out a preliminary answer to the question: how should the appeal and aesthetic potency of glitch be understood? In addition to whatever merely ornamental allure the aesthetic of this spectral artifact transmits, I argue that there are three dominant phenomena that a glitch can signify.

First of all, a glitch draws attention to the process of mediation. As already stated, by hampering a technology's conventional functionality, glitches potentially cause the user to be ripped from their immersion. The relevance of this revelatory potential is, for example, communicated by Olia Lialina and Dragan Espenschied's (2009) argument that 'the computer's ultimate purpose is to become an invisible 'appliance', transparent interface and device denying any characteristics of its own. Most computing power is used in an attempt to make people forget about computers' (p. 9). According to this dominant design philosophy, information technology should be something that remains transparent and imperceptible; the user should ideally not be aware that she is engaging a technology at all. A glitch makes visible or audible what was previously invisible or inaudible: the process of mediation. This is one of its core spectral qualities; like a ghost, it straddles

the line between perceptibility and imperceptibility – it can never fully show the technology that facilitates it, but it does render the process of mediation eminently perceptible, challenging the tendency of digital technologies to recede from view.

Second, a glitch reveals the fragility of technology. It is a palpable reminder that the technologies we rely on are always at risk of breakdown. While Marc Olivier (2015) argues that a glitch is 'like a ghost' (p. 262) because it is always-already dead, a glitch is at the same time ghostly because it carries the prospect of a future death: the eventual demise of the machine. A ghost is something that troubles linear time, often arriving both from the past and the future, and this strange temporality announces itself in glitch's constitution: on the one hand, as discussed, glitch is a term that necessarily describes a past event, but on the other hand it promises the coming of a future death insofar as it reveals that no technology can remain fully immune to breakdown.

Third, glitches reveal the underlying complexity and opacity of technology. Manon and Temkin (2011) suggest that '[w]hat makes good glitch art good is that, amid a seemingly endless flood of images, it maintains a sense of the wilderness within the computer'. In an analogous vocabulary, Menkman (2011) calls her audience to join the ranks of glitch practitioners and become part of the 'avant-garde of the unknown' (p. 11). Both statements locate an element of contingency and ambiguity in the digital's kernel. This sense of obscurity also underwrites the everyday usage of technology; as Friedrich Kittler (2013) already noted in reference to a growing technological complexity, 'we can simply no longer know what our writing is doing, and least of all when we are programming' (p. 221). A glitch can remind the user that there are operations underway of which one has no knowledge – no matter how seemingly in control of one's digital devices one is, a glitch reveals that there are always subterranean powers eluding one's grasp. This dynamic of control and contingency is, as Wendy Hui Kyong Chun (2011) explains, not a drama of antagonistic forces, but rather a co-constitutive logic that grounds computation (p. 67). The digital's fundamental obfuscatory gestures disclose a third way in which glitch is ghostly: like a ghost, glitch indicates the presence of powers that transcend human cognition. Similar to the twofold logic of imperfection, a glitch can thus be seen as spectral in a double sense: it is itself often framed as a ghost, but also speaks to the underlying ghostliness of the machine.

It must be noted that all preceding associations remain dependent on context. Michael Betancourt (2017) has criticized the tendency among glitch theorists to present glitch as *a priori* subversive and revelatory. This marks the need to situate any reading of glitch within the historical specificity of the object wherein the relevant glitch is encountered. In what follows, I will supplement my analysis of glitch with a close reading of Oval's 1995 album *94diskont*. Oval is a German experimental group often credited with introducing the sound of glitch to a wider, 'computer literate' (Kelly, 2009: 253) audience, thereby serving as progenitors to the aesthetic trends under scrutiny here. Oval's use of glitches, moreover, does not stand on its own: it resonates with how other artists at the time were incorporating the sounds of digital breakdown into their work – see, for example, the work of Yasunao Tone and Autechre (Toop, 2004). By implication, my argument is not that Oval's work singlehandedly established a new post-digital aesthetic that could carry broad generalizations, but rather that it should be read as representative of wider artistic practices that all reacted to the digital conditions of the time. Furthermore, as will

be argued, the rationale behind Oval's glitch-based work cannot be decoupled from the then-current experience of living and laboring among a wealth of new digital devices. As such, Oval's work also provides a fruitful lens through which to contrast the initial appeal of glitch with the dominant digital tendencies of today.

94diskont

Oval have been active since 1991 and originally consisted of members Frank Metzger, Sebastian Oschatz and Markus Popp (now its sole remaining member). Crafting oneiric scenes from technological ruptures, Oval belies rigid distinctions between the digital and the organic. Their 1995 album *94diskont* generally counts as their high-water mark and presents the listener with a constantly evolving expanse of ambient soundscapes that are rhythmically interspersed with brief clicks and glitches. The record's opening track, *Do While*, is illustrative: clocking in at over 24 minutes, it is built around a looped progression that feels as if it is constantly being undone and rewoven through the industrious presence of percussive glitches. The album's fifth track, *Commerce Server*, is another potent example, especially illustrative of Oval's distinctive aestheticization of 'the random nature of digital information' (Toop, 2004: 181). It offers a glitched melody that sounds as if the technology through which it is channeled persistently struggles to load its contents. These sonic imperfections are largely the result of Oval's distinctive practice of damaging the surface of a CD, and of recording and manipulating the resultant faltering sounds. This at the time innovative – although not entirely unprecedented[2] – gesture of destruction endowed Oval with their idiosyncratic glitch-based style. In the words of media theorist Caleb Kelly (2009), '[t]he sound of the glitch became Oval's signature sound' (p. 256).

This signature glitch-based sound falls in line with wider conceptualizations of glitch. Journalist Mark Richardson (2015), in a retrospective that riffs on *94diskont's* considerable influence, remarks that '[b]efore Oval, no one heard the CD'. What Richardson hones in on is exactly the logic of glitch as discussed above: glitches reveal that processes of mediation are underway that might otherwise go unnoticed. As Richardson (2015) describes, the compact disk was marketed to the masses with the mantra of 'perfect sound forever', and was designed to negate any distinctive audible traits. It was only through a material intervention that Oval could draw attention to the specificity of this medium. Appealing to the familiar link between glitches and the spectral, Richardson (2015) observes that Oval's work hints at a 'ghost in the machine' whose aesthetic appeal is part of a wider cultural logic in which 'digital perfection created a yearning for the mistake within listeners'. Fragility and breakdown were felt to transmit an aesthetic magnetism in the face of sterile digital production. Moreover, the tortuous and constantly morphing soundscapes realized by *94diskont's* glitches hint at the complex and flexible nature of the digital itself: 'In its glitches and drones we could hear the digital world breaking down and re-assembling itself' (Richardson, 2015). Richardson's take on Oval illustrates how the three defining significations of glitch's aesthetic of imperfection – the highlighting of mediation, breakdown, and complexity – coalesce in this record. It is for this reason that Oval's melancholic symphony of specters can be read as a prime example of a 'post-digital aesthetic', a notion I will now introduce.

Post-digital aesthetics

The term post-digital was popularized by American musician Kim Cascone (2002) in 2000, and his description of the concept is worth quoting at length:

> The 'post-digital' aesthetic was developed in part as a result of the immersive experience of working in environments suffused with digital technology: computer fans whirring, laser printers churning out documents, the sonification of user-interfaces, and the muffled noise of hard drives. But more specifically, it is from the 'failure' of digital technology that this new work has emerged: glitches, bugs, application errors, system crashes, clipping, aliasing, distortion, quantization noise, and even the noise floor of computer sound cards are the raw materials composers seek to incorporate into their music.

One should note right away that the post-digital thus does not imply a break with digital technology. On the contrary, it implies a condition of saturation – and in that sense it is more spatial than temporal – in which 'the tendrils of digital technology have in some way touched everyone' (Cascone, 2002). Of course, this observation does not apply globally: the affordances of digital technologies are unevenly distributed, and the experience that Cascone specifies is certainly not universal. It is important to recognize that the concept of the post-digital describes processes and experiences that, while perhaps indicative of globalizing technological tendencies, are always locally situated. Considering the theorists I draw on and my interest in the German group Oval, I write mostly from a Euro-American context. The arguments I develop here should thus not be seen to conjecture a fully globalized digital culture; different perspectives are always needed. In this regard, the recent work of Katja Müller and Rajkamal Aich (2019) is exemplary: they explore how the concept of the post-digital intersects with the local specificities of India, and conceptualize a form of 'Indian post-digital aesthetics'.

Furthermore, in speaking of 'the post-digital', theorists that draw on the concept are generally not proposing a logic according to which digital technologies, eliding all their respective idiosyncrasies, could somehow be distilled into a distinct unit of analysis. Rather, they are broadly interested in 'the digital' as a sensed and affectively experienced concept. They are interested, in other words, in how everyday lived experience is affected by the ubiquitization of digital technologies. A third point of note is that the concept of the post-digital describes both a situation and a response; it delineates the way that digital media permeate the cultural fabric, and it gathers a set of critical aesthetic reactions to this condition.

At the time of Cascone's writing, now two decades ago, the digital was already woven into the fabric of the everyday, and the post-digital emerged as an artistic sensibility that sought to repurpose this digital hegemony in creative ways. Detritus, digital trash, glitches, and unforeseen by-products of computational operations were all reconfigured in order to emphasize that noise and malfunction are endemic to even the most high-tech of devices. '[F]ailure', so Cascone (2002) remarks in what may be glossed as a preliminary theorization of the imperfect turn, 'has become a prominent aesthetic in many of the arts in the late 20th century, reminding us that our control of technology is an illusion, and revealing digital tools to be only as perfect, precise, and efficient as the humans who build them'. The aesthetic that Cascone outlines is a means of revealing and thereby

challenging the dominant vectors of human-technology interaction. By virtue of its material subversion of the sonic qualities of the CD, *94diskont* thoroughly embodies this type of approach, and Oval is explicitly named by Cascone as a prominent herald of the post-digital interest in failure. Oval's *modus operandi* of breaking and tampering can, moreover, also be seen as one response to the rise of a digital 'copypaste workstation environment' whose standardized applications often led to the production of music that was felt to be 'too mechanically perfect' (Kelly, 2009: 271).

While in Cascone's text this post-digital aesthetic is mostly reserved to the fringes of experimental music, I suggest that it actually symptomizes a sensibility that was much more culturally pervasive. This sensibility is best captured by Alan Liu's category of 'cool'. Analyzing the emotional toils of knowledge work around the turn of the century, Liu (2004) introduces this category to make sense of what it means to live in a world permeated by digital information technology. Similar to Cascone's description of office spaces composed of desktop computers and laser printers, Liu paints a post-digital moment (although he never explicitly uses the term post-digital) in which existing outside the material reach of digital informational technologies has become nigh impossible. His concept of cool denotes an affective strategy of dealing with this situation and it accommodates both an ethos *of* and an ethos *against* information (Liu, 2004: 181–185). What this means concretely is that what counts as cool is on the one hand immersed in the digital; because private and professional existence have become inextricable from information technology, any challenge to this digital saturation necessarily has to come *from within*. On the other hand, however, what counts as cool are acts and objects that repurpose information technologies in a way that challenges their dominant logic (and the corporate culture that, for Liu, information technology betokens). Specifically, the negatory strategies that Liu enumerates subvert digital technologies in order to hamper the intimate relationship between the corporate and capitalist mantras of productivity and efficiency, and the information-propagating qualities of the digital. What is cool, then, is an 'aporia of information', or 'information designed to resist information' (Liu 2004: 179). This practice of imbuing information with a unique and critical quality echoes the artistic logic of deviating from technological norms by highlighting detritus and malfunction that Cascone identified. What Liu's analysis demonstrates is that the post-digital sensibility, situated by Cascone in the context of niche artistic practices, in fact describes a general cultural attitude that took shape around the computational infrastructure underwriting everyday life as the 20th century was reaching its end.

Glitch adheres to the rubric of cool as it describes an often distinctively digital artifact that hampers technology's regular functionality (see also Menkman, 2011: 44). Oval's music provides an illuminative example of this logic, because it captures the congruent yet rebellious relation to digital information that Liu describes. As Kelly (2009) explains, Oval 'saw themselves as not so much the makers of music but rather as organizers of database systems and strategists for information management' (p. 267). Similarly, Richardson (2015) remarks that Oval's creative practice 'was, at base level, no different from an administrative functionary in a large office tracking inventory with Microsoft Access'. By appropriating the ICT-oriented professional vocabulary of knowledge work, the group explicitly positioned themselves within the field of information technology (an ethos *of* information). At the same time, however, they organized and manipulated

information in such a way that the normative technological paradigms of efficiency and transparency were challenged (an ethos *against* information). *94diskont's* tapestry of glitches, quilted from the sounds of technologies that struggle to relay their contents, was designed precisely by dint of a negation of the transparent and unfettered circulation of information.

The case of *94diskont* illustrates that the interest in imperfection that animated the post-digital may be seen to serve a twofold function. First, on a strictly aesthetic level, and following Cascone's text, the post-digital's exploration of the emotional resonance of fallibility and digital trash was spurred by the sleek and polished technologies that invaded home and workspace. Second, and more in line with Liu's cultural exegesis, the corporate logic of efficiency and productivity with which many digital devices had been invested was challenged by post-digital practices that sought to hamper the smooth flow of information transmission. Glitch works on both of these levels, embodying an aesthetic crafted from imminent breakdown *and* offering a spectral glimpse of the ubiquity of information technology. This is especially evident in Oval's ghostly summonings; *94diskont's* glitch-based specters serve to highlight the CD's materiality by wresting aesthetic pleasure from material disintegration, and thereby provide a critical view of the (desirability of the) purported transparency and efficiency of digital technology.

The post-digital: recent shifts

After its initial popularization, discourse on the term 'post-digital' dwindled. Recent years, however, have seen an upswing in academic interest in the concept (Berry and Dieter, 2015; Betancourt, 2017; Bishop, et al., 2016; Contreras-Koterbay and Mirocha, 2016; Müller and Aich, 2019; Openshaw, 2015). At face value, the definition of the term might seem to be consistent with its original usage – German media theorist Florian Cramer (2015), for example, has recently described the post-digital as a media aesthetic that challenges 'digital high-tech and high-fidelity cleanness' (p. 16). Let us recall, however, that the post-digital is about the everyday experience of living in a world permeated by digital technology and that two decades have passed since the publication of Cascone's seminal text. It stands to reason that the sense of the digital against which today's usage of the term 'post-digital' finds articulation is different than it was at the time when Cascone and Liu published their works. In their edited volume on post-digital aesthetics, David M. Berry and Michael Dieter (2015) describe today's enmeshment of everyday life and the digital as follows: '[W]e now appreciate that around us algorithms running on digital computers mediate our lives by creating and re-presenting a world that appears more comfortable, safer, faster and convenient – although this may paradoxically result in our feeling more stressed, depressed or drained of meaning' (p. 1).

This passage goes to the heart of what I will argue in the second part of this article. First, I will demonstrate that the most significant technological tendencies of the past couple of decades have resulted in a profound intensification of the spectral realms within the digital. Second, I will argue that the status of ghost in the machine attributed to the glitch (and, underlying it, the trajectory of the imperfect turn that glitch bespeaks) cannot be decoupled from this intensified spectrality. I will return to *94diskont* in order

to propose that, while the valuation of imperfection within post-digital aesthetics remains intact, the potency and implications of this valuation have changed significantly.

Spectrality, technology and 21st-century media

Before I discuss the dominant tendencies of the digital, the notion of spectrality needs some unpacking, with specific attention for its relation to technology. Spectrality is predominantly derived from Jacques Derrida's notion of hauntology. Derrida (1994) famously introduced this concept in *Specters of Marx* as a play on the term 'ontology' in order to deconstruct ontology's suggestions of presence and essence. Against the ontological presupposition that things have a fixed core and a linear genealogy, hauntology blurs the distinctions between presence and absence, visibility and invisibility, past and future, life and death. The specter or the ghost is a figure that traverses these boundaries and thereby testifies to their instability. As with similar Derridean concepts like *différance*, autoimmunity and the spacing of time, hauntology signifies that nothing can fully repose in itself – it designates a constitutive openness to alterity that cannot be exempted. Spectrality, in other words, first of all registers a metaphysical condition that reveals the logic of haunting to be general. Yet this logic in turn shapes the possibility of historically, culturally and technologically specific ghosts to emerge. The metaphor of the ghost and the specter, and the concept of hauntology itself, have been used to render palpable phenomena as varied as the ghostly existence of marginalized and precarized groups of people (Peeren, 2014); the ways in which the Anthropocene is haunted by the material persistence of what it has long deemed obsolete (MacFarlane, 2019; Tsing et al., 2017); and the tendency of societies to be frequented by the ghosts of lost futures that failed to fully materialize (Fisher, 2014).

Here, I am interested primarily in the intimate relation between technology and spectrality that grounds the common association of glitch and ghost. In their *Spectralities Reader*, María del Pilar Blanco and Esther Peeren (2013) argue that science and technology have a long history of eliciting metaphors referring to the spectral or the occult (p. 200). Jeffrey Sconce (2000) tracks this history in his book *Haunted Media* and offers an extensive demonstration of how, '[i]n media folklore past and present, telephones, radios, and computers have been [. . .] "possessed" by [. . .] "ghosts in the machine", the technologies serving as either uncanny electronic agents or as gateways to electronic otherworlds' (p. 4). This echoes my earlier description of glitch as doubly spectral: glitch is itself a ghostly figure, but is also indicative of spectral, technological 'otherworlds'. The designation of glitches as 'ghosts in the machine' is thus embedded in a wider lineage of ascribing supernatural powers to technology, usually because people have no full cognitive access to its operations or because it disjoints their experience of time. Yet as Derrida and Stiegler (2002) once remarked, '[m]odern technology, contrary to appearances, although it is scientific, increases tenfold the power of ghosts. The future belongs to ghosts' (p. 115). How should we understand this suggestion of an expanding technological spectrality, and how does it relate to glitches in general and to *94diskont's* glitch-based aesthetic in particular?

94diskont elicited spectral associations primarily because of the way its glitches drew attention to a previously occulted material context. Its glitch-based interventions were, in

other words, tied to a material interface whose degradation could be perceived, captured and repurposed. It is, however, precisely such a sense of perceptible materiality that is dislodged by contemporary digital technologies. Derrida already hinted at such processes, finding spectral qualities in the computational augmentation of virtual realms and the rampant tendencies of technological acceleration (Derrida, 1994: 79, 212). Recent years, however, have seen a veritable upsurge in media-theoretical works that take as highly significant the tendency of technology to progressively elude human perception and cognition (Ekman, 2013; Ernst, 2016; Greenfield, 2017; Hansen, 2015; Hayles, 2017; Parisi, 2013). This also bears implications for how the concept of the post-digital is mobilized and understood. David M. Berry and Anders Fagerjord (2017) have, for example, argued that the post-digital today reveals a situation in which everyday life is 'always already computational' (p. 16), and, pertinently, in which the full extent of this submersion in the digital remains necessarily opaque. The post-digital – as a concept that maps how everyday life is affected by digital technology and how this is received artistically – today must grapple with the situation that many people necessarily live embedded within constantly morphing informational architectures that partially elude them. This muddles the scope of *94diskont*: it owes its original status as a post-digital artwork to its aesthetic focus on the specifically material context of the CD, but it is precisely the notion of material context that is complicated by recent technological trends.

Mark B.N. Hansen's (2015) concept of 'twenty-first-century media' most cogently captures the elusive dynamic of contemporary technology and carries significant implications for the relation between glitch and spectrality. With this concept, Hansen defines what is unique about the lived experience afforded by contemporary media technologies: 'By twenty-first-century media, I mean to designate less a set of objects or processes than a tendency: the tendency for media to operate at microtemporal scales without any necessary – let alone any direct – connection to human sense perception and conscious awareness' (Hansen, 2015: 37). Today's media experience is, in Hansen's words, paradoxically marked by a multitude of media operations that circumvent consciousness: 'For the first time in history, media now typically affect the sensible confound independently of and prior to any delimited impact they many [sic] come to have on human cognitive and perceptual experience' (Hansen, 2015). Sensor technologies, high-frequency trading algorithms, ambient media, autonomous drones, blockchain technology, artificial neural networks, RFID chips – all of these technologies to some degree undermine the standing privilege of human consciousness in media operations.

Twenty-first-century media reveal a unique and twofold sense of spectrality that circumscribes humankind's relation to the digital today. First, they are defined by their propensity to function imperceptibly. To some degree, this is true of most technological applications, but 21st-century media are singular in the sheer extent to which their operations elude cognition and perception:

> The self-propagating, self-escalating increase in non-perceptual sensible data generated by twenty-first-century media profoundly affects the economy of experience, such that our (human) experience becomes increasingly conditioned and impacted by processes that we have no direct experience of, no direct mode of access to, and no potential awareness of. (Hansen, 2015: 8)

As Hansen (2015) posits, this technological de-centering of human consciousness signals an absolutely unique point in history (p. 37). Hansen's concept also returns us to the scene of the spectral. The power to act without being seen, the purported capacity to immaterially engender physical effects, the dilation of virtual realms that negate human cognition – these are core constituents both of Derrida's theorizations of the spectral and of the logic of 21st-century media. As Berry and Dieter's diagnosis of the post-digital – that we now live in a reality utterly mediated by algorithms – communicates, lived experience is necessarily animated, informed and delimited by invisible technological forces that surreptitiously steer people's actions and that continue to expand.

Second, and correlate to this element of imperceptibility, the spectrality of 21st-century media lies in their adherence to temporal regimes that are alien to our own. In Hansen's (2015) words,

> [B]ecause perceptual consciousness is simply left out of the loop when data-gathering and passive sensing capacities grasp the 'operational present' of sensibility at time frames from which conscious activity is excluded, this operational present can only be made available to consciousness in a future anterior time frame, by being presented *after the fact* to a consciousness that, with respect to the present's operationality, cannot but arrive too late on the scene. To put it more simply, consciousness has to be repurposed to function in the networked regimes characteristic of twenty-first-century media: no longer at the center of the present of *sensibility*, consciousness can only impact the actual happenings of sensory presenting *indirectly* and in a *proleptic* or *anticipatory* mode, by planning for new prescencings of sensibility in the future. (p. 25)

In one's experience of 21st-century media, time appears truly out of joint. Hansen even signals a necessary reconfiguration of consciousness that would more effectively attune it to the temporal asymmetries that sprawl between humans and contemporary digital media. What the concept of 21st-century media announces, then, is that our own registers of time-consciousness are no longer unilaterally dominant, and this knowledge is precisely what renders these new medial forms spectral. By functioning in the cadences of what Hansen calls microtemporality, 21st-century media operate according to time-frames that can never be grasped directly. Only occasionally do they irrupt into our present, always 'after the fact', as a ghostly residue of past activities that can only now become a content of our restricted consciousness.

Glitch, Oval and the post-digital revisited

What consequences does this twofold sense of spectrality carry for glitch and for Cascone's initial conceptualization of post-digital aesthetics? It is not so much that Cascone's (or Liu's) account of the tangible presence of digital media is thoroughly outmoded – digital devices, after all, still materially pervade (and erode)[3] our surroundings – but that today it only partially captures what is most pertinent about how the digital permeates human existence. The concept of the post-digital was developed to make sense of the perceptual, aesthetic imbrication of the digital with everyday life, and contemporary usages of the term still tend to associate the post-digital with artistic engagements 'with life after and *in the digital*' (Bishop et al., 2016: 11, my emphasis). 'In the

digital' has to be understood in a more literal sense today, though, as it reveals a recognition of the fact that we necessarily exist within transparent, informational webs that cannot be perceived directly.[4]

Historically, a glitch-based aesthetic has been framed as a means of drawing attention to the presence of mediation by perceptibly tainting an interface. But keeping in mind the tendency of 21st-century media to operate before they can be apprehended, a number of challenges that confront glitch as a technologically disruptive strategy emerge. For one, glitches necessarily operate within the narrow bandwidth of human perception. As Scott Contreras-Koterbay and Łukasz Mirocha (2016) suggest, glitches 'interfere with a particular software or device to an extent that they *cannot be ignored* by the user (altering media aesthetics, modifying the scope of software's operations logic), but [. . .] do not lead to a complete failure of a system / machine understood as a tool' (p. 97, my emphasis). According to this definition, the minimal condition for something to be labeled a glitch is that the user is aware of a moment of interference – think of the way Oval drew attention to the 'transparent' medium of the CD by damaging a disk's surface, thereby creating notable interference in playback. Yet with the growing environmental distribution of informational operations that elude perceptual awareness, the problem arises that a significant share of possible interference is now closed off to consciousness (or can, at best, only be grasped after the fact). When Contreras-Koterbay and Mirocha (2016) claim that even today the glitch harbors 'great critical and analytical potential' (p. 97), they downplay the fact that a glitch needs some sort of a material and perceptible basis to take shape for the user.

The case of *94diskont* is again instructive. The album was lauded for drawing attention to the materiality of the at-the-time ubiquitous compact disk. The CD has today, however, been almost entirely supplanted as a result of the rise of streaming services. While playing music via these services obviously still requires a material device, the music itself is no longer materially inscribed on a carrier that can be tampered with. Music is no longer tied to one material object but has become free-floating data. In an era in which music has become a liquid assemblage of ones and zeroes, what would a gesture similar to Oval's destruction of the compact disk look like? The twofold spectral logic at work within glitch (glitch itself being a ghost that in turn reveals technology's spectral powers) has been re-calibrated as a result of these recent processes. To appear as a ghost in the machine, the glitch relies on a material basis through which it can be conjured. But *because* 21st-century media function ever more spectrally, glitch's own capacity to arrive as a ghost has dwindled. Because the 'correlation of media and human experience can no longer be taken for granted' (Hansen, 2015: 38), the delimited sphere in which a glitch can materially appear to the user has shrunk in relation to the multitude of media operations that proceed imperceptibly behind it.

Does this mean glitch and its aesthetic of imperfection have been stripped of their critical power entirely? In order to answer this question, it is worth recalling the three dominant critical concepts that the material intervention of glitch signifies: mediation, technological fragility, and complexity. It has already been demonstrated that a problem emerges in the case of mediation: when media operations are not tied to a perceptible and material conduit through which one can apprehend them, there is no environment for a glitch to appear in. A similar conundrum emerges from the element of technological

fragility, as technological breakdown can only be communicated through a material instantiation (as Oval's destructive endeavors exposed). In the case of 21st-century media, any sense of fragility is necessarily tied to the technologies through which, after the fact, the operations of these media are made known, and not to the actual operations themselves. Moreover, as 21st-century media are embedded in networked topologies, their functioning tends not to be reducible to one specific material device whose breakdown would then threaten the entire operation. In the era of 21st-century media, then, the power of glitch to highlight mediation and to remind one of technological fallibility has attenuated. Yet I want to argue that the capacity of the glitch to reflect technology's complexity has attained a new sense of pertinence amid these conditions.

When encountered in the wild, glitch and its aesthetic of imperfection reveal the ongoing operation of imperceptible and complex technological processes beyond the smooth facade of the interface. This, let us recall, has led some theorists to argue that glitch also reveals the imperfections of the machine behind it (Menkman, 2011: 11). Yet in the era of 21st-century media, what is perhaps revealed is not so much the imperfection of technology as our own imperfect faculties in the face of these new medial forms. As Hansen argues, 'higher-order, complexly embodied human operations have been fundamentally displaced in a world of microtemporal computational media' (Hansen, 2015: 26). Glitch, while still relying on the narrow bandwidth of perception, reveals the existence of manifold complex media operations beyond the direct interface between human and machine. This complexity has, as discussed, only been augmented as algorithmic and data-gathering technologies have been allocated an ever-greater role in the constitution of everyday life. The capacity of glitch to attune one to technological complexity thus attains new relevance. A prime example of an artist who repurposes glitches and their ghostly qualities in this fashion is the internationally renowned Japanese sound artist Ryoji Ikeda, whose audiovisual performances besiege their audience with an array of glitches and sounds that have specifically been designed to operate below direct perception. Ikeda's compositions thereby attain a spectral countenance, veering between the perceptible and the imperceptible, that aesthetically approximates the imperceptible deluge of data that surrounds and constitutes one at any given moment.

Yet what does all this mean for the critical potential of Oval's *94diskont*? Oval's destruction of the CD is now no longer as radical a gesture as it once was, considering the fact that the compact disk has largely been confined to the dustbins of history. Yet there is another way in which Oval's use of glitches still proves capable of engaging the digital present. The rhythms of contemporary everyday life are, that is to say, aesthetically rendered by *94diskont's* glitchy soundscapes; the moderate pace of the organic melodies is constantly punctuated by the faster rhythms of the digital. Seen in the microtemporal light of 21st-century media, the album stages the feeling of a digital ecosystem in which technology is constantly operating and reassembling against the backdrop of a slower-paced organicity.[5] While the notion of 21st-century media delineates the tendency of media to operate *beyond* perception, the temporal gap that *94diskont* dramatizes – one between a gradually unfolding organic world and excessive technological activity – speaks to the polyrhythmic assemblage that life today is, accommodating conflicting temporal regimes. I believe this is what Mark Richardson gestures at when he states that Oval 'predicted our present', and that the collective created a 'glitch in time' that showed

us a glimpse of the thoroughly digital future that is now upon us (Richardson, 2015). While the post-digital and its aesthetic of imperfection were initially a material reaction to an equally material suffusion, this suffusion has now been overtaken by a spectral realm of invisible technological operations. *94diskont's* glitches no longer primarily speak to the material carriers of our music, but rather to a present that is rhythmically facilitated by the imperceptible operations of 21st-century media.

Digital demiurges

Let me, by way of a conclusion, return to this paper's epigraph, taken from The Street of Crocodiles, the famous modernist collection of stories by Bruno Schulz. This citation is part of an extensive passage in which the narrator's delirious father delivers a series of lectures to a bewildered audience on what is described as the Genesis of Creation. The father's doctrine is built on the tension between a 'matchless perfection' (Schulz, 2008: 32), emanated by his God-figure of the Demiurge, and the ultimate malleability and fallibility of matter (humanity included). Whereas 'the Demiurge was in love with consummate, superb, and complicated materials' (Schulz, 2008: 33), the narrator's father betrays an obsession with the run-down and the broken — 'we shall give priority to trash' (Schulz, 2008). This passage and its insistence on the material capture the logic behind the post-digital aesthetic of failure as Cascone initially conceptualized it: a creative reaction to the smoothness and efficiency of the at-the-time proliferating digital devices. Today, as discussed, these material technologies still abound, but their most significant qualities rest in their expanded autonomy and their growing evasion of human perception and cognition.

The narrator's father, however, also names a second trait of his Demiurge-figure. Even though the novel is almost a century old, this trait is presciently in line with the current media situation: 'Demiurge, that great master and artist, made matter invisible, made it disappear under the surface of life. We, on the contrary, love its creaking, its resistance, its clumsiness. We like to see behind each gesture, behind each move, its inertia, its heavy effort, its bearlike awkwardness' (p. 33).

This passage goes to the heart of the new conditions that post-digital practitioners face: their relation to 21st-century media. Like Schulz's demiurge in this latter passage, 21st-century media – endowed with generative powers, the exertion of which necessarily remains partially closed off to the human sensorium – transcend the human in a number of ways. Where the post-digital's canonical imperfection- and glitch-based strategies were designed primarily to engage with material instantiations of the digital, the contemporary artistic emphasis on glitch and imperfection is perhaps more about dealing with our own shifting status in the face of our opaque technologies, just as the father in Schulz's (2008) story opposes his own state of imperfection to the 'perfection' of the Demiurge (p. 32). Cascone (2002) originally presented the post-digital aesthetic of glitch, failure and imperfection as a means of showing our technologies to be 'only as perfect and efficient as the humans who built them', but today this is no longer the case (if, indeed, it ever was); humans remain necessarily 'awkward' and sluggish in contrast with the microtemporal rhythms of 21st-century media. None of this should give recourse to visions of human obsolescence as humans retain a fundamental role within media

operations. It does, however, point to a significant change in the make-up of everyday life: lived experience under contemporary digital conditions is increasingly constituted by spectral technological forces. Glitch, while its own status as ghost in the machine has waned due to the experiential de-centering of materiality, is one of the rare artistic moments that can reveal such ambient complexity. In seeking to understand the imperfect turn, it is thus crucial to remain sensitive to how technological transitions can affect everyday aesthetic proclivities, and to how post-digital artistic strategies of subversion are complicated and modulated by new technological conditions.

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Notes

1. The musical genre of glitch came into fruition in the 1990s. In addition to Oval, other pioneering artists include Yasunao Tone, Autechre, Aphex Twin and Ikue Mori.
2. See, for example, the earlier work of Christian Marclay and Alvin Lucier. Oval's destructive endeavors are ingrained in a longer history of artistic practices that revolve around the fetishization of failure, noise, and breakdown. This history is often thought to find its origins in the noise- and aggression-oriented ethos of the Italian futurists and binds later artistic forms like the Fluxus movement's practices of willful material tarnishing, the vibrant lineage of tape loop experimentation, and the abrasive genre of power electronics. For more general and historical accounts of noise and failure in the context of recorded music, see Kelly (2009); Thompson (2017). Also of note is the album Solo For Wounded CD (1997) by Japanese sound artist Yasunao Tone. Tone produced this work, which was, like *94diskont*, realized through damaging the material surface of CDs, independently from but almost coevally with Oval's first records.
3. I by no means intend to downplay the environmental and socio-economic havoc wreaked by the all-too-material proliferation of e-waste (see, for example, Dyer-Witheford, 2015). In fact, this is one of the main limits I see in Hansen's text: he does not really address the global material infrastructures that facilitate the implementation of 21st-century media. These infrastructures tend themselves to be spectral to the extent that they are sedulously kept from view, but they generate material effects that are attendant on precarious and undervalued labor, and they cause ecological damage (see, for example, Crawford and Joler, 2018). It would thus be wrong to think of the media experience afforded by 21st-century media as somehow legitimating a diminution of concerns with the material. It remains crucial to interrogate the material histories of exclusion and oppression that today still inform the ways in which technologies are manufactured and made obsolete, and in which data is collected, leveraged and politicized, whether through 21st-century media or other media forms.
4. It is no coincidence that the release of *across and beyond – A transmediale Reader on Post-digital Practices, Concepts, and Institutions* (2016) coincided with the 2017 edition of the Transmediale festival. This edition was themed 'ever elusive' and many of the weekend's presentations attended to the increasingly invisible agency of media(tion).
5. For a similar argument about *94diskont's sustained value in societies permeated by the digital, see* Church (2017).

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