

**Nina Gerlach**

A Brief History of Computer-Based Painting

**Erschienen 2021 auf ART-Dok**

URN: urn:nbn:de:bsz:16-artdok-72330

URL: <http://archiv.ub.uni-heidelberg.de/artdok/volltexte/2021/7233>

DOI: <https://doi.org/10.11588/artdok.00007233>

---

In the *Digital Creation Critical ANalysis* encyclopaedia, under ‘digitization’ we find a visual description of *La fillette électronique* (Fig. 1), a work by the physicist Albert Ducrocq.



**Fig. 1:** Albert Ducrocq, *La fillette électronique*, ca. 1950, digital random number generator and manual application, executed in eight colours on paper, colouring medium unknown, 15 3/4 x 17 1/3 in. (40 x 44 cm). Location unknown.

According to Pierre Berger who authored the entry, this qualifies as a ‘painted’ work.<sup>1</sup> Around 1950, Ducrocq created it by using a digital random number generator named *Calliope*. With this assumed link between painting and digital machines, Berger brings to light an early historical intertwining of both media – surely not without a sidelong glance at the cultural claims this would give rise to in the future.

Since Ducrocq’s homemade device lacked a visual output medium, he transposed the coded instructions by hand to a rastered paper. The contiguous fields he filled in condensed into lines here and there and combined with the areas he left blank to eventually form a vaguely female figure. Berger understands the pixel aesthetic that Ducrocq did in eight colours as a sequel to pointillism.<sup>2</sup> That situates *La fillette électronique* in a tradition of ‘atomistic’ approaches to painting, which, according to Lev Manovich, can be said to mark Modernist abstract painting

as well as its precursors and that lives on in the pixel-, voxel-, and polygon-based electronic images of the computer age.<sup>3</sup>

In this way, *La fillette électronique* tells us that certain of painting's design principles can be understood as antecedents of digital computer imagery and, vice versa, that they can be generated with digital technology. Ducrocq's work thereby also calls to mind that painting – like graphics, photography, or film – is a possible output medium for computer technology. Raymond N. Auger's machine-made paintings (1955-62) demonstrated early on that this output variation could also be automated.<sup>4</sup> They emerged under a programmed robot arm gliding over paper with brush and paint.

That we are unfamiliar with these early examples of electronic digital painting tells us how little we know in sum total about the conceptual synergy and the functional nexus of digital technology and painting. While a few current examples come to mind, among them Corinne Wasmuht's software-aided oil paintings or Gerhard Richter's digitally-printed *strip paintings*, we are still owe ourselves a systematic exploration and analysis of the discrete levels where painting and computers intersect.<sup>5</sup>

This circumstance it seems we owe foremost to the technological developments that started in the 1950s. Painting as an 'output medium' for digital technology was and still is a rarity. Printers, screens, and projectors let the computer appear as extraneous media contrasted with painting. But even were we to understand technology in this way, against the backdrop of the genre's history at least, we must assume an indirect computerization of painting taking place. Media innovations outside the genre time and again unloosed aesthetic and material novelties within it. We only have to recall the artistic pictorial practices that developed with the use of the *camera obscura* or *camera lucida*, as they are presumed for the works of Jan Vermeer van Delft or Jean-Auguste-Dominique Ingres, or call to mind Richter's overpaintings of photographs.<sup>6</sup> The so-called 'crisis of painting' in the waning 19th century, just like photo realism in painting, over and over is discussed against the backdrop of photography's alleged 'representational realism'.<sup>7</sup> Painting has always appropriated new techniques multimedially or intermedially, integrated them in its production processes, or reformed itself aesthetically by differentiation from them. As *picturesque style* or *painterliness* it has moreover aesthetically registered in the imagery of the medial 'other'.

That on the one hand media innovations can be understood as a 'motor' in the history of

painting and, on the other, that painting is a possible output medium for digital technology, makes of the latter a 1950s-vintage new element in the genre. Against this background, in the remainder of this article I attempt to lay out a first approach to the historiography of computer based painting. It addresses as much the art historical contexts of exemplary works as it also reflects on them against the backdrop of media discursive positions on the computer. I examine to which extent artists have been picking up, altering or questioning already known artistic practices of the genre using the computer since the 1980s and how in these processes they also registered in the academic and socio-political discourse on the computer.<sup>8</sup>

### **Digital revolution (1980s and 1990s): Experimental affirmation, social scepticism and artistic genre hierarchy**

Andy Warhol enthusiastically experimented with the first home computers starting in the mid-1980s. For example, in 1985, during a publicity event by Commodore International, the Pop artist in his capacity as a brand ambassador for that company reworked a photograph of singer Debbie Harry with the ProPaint paint program on the Amiga 1000 computer.<sup>9</sup> In 2014, floppy disks with further experimental work by Warhol surfaced, including a computer-based version of the Campbell Soup can (Fig. 2).<sup>10</sup>



**Fig. 2:** Andy Warhol, *Campbell's*, 1985, digital image, from disk 1998.3.2129.3.22. The Andy Warhol Museum, Pittsburg; Founding Collection (photograph provided by The Andy Warhol Foundation for the Visual Arts, Inc. © 2018 The Andy Warhol Foundation for the Visual Arts, Inc. / Licensed by Artists Rights Society (ARS), New York).

They can be regarded as a postmodern, playfully experimental encounter of key traits and interests of 1960s Pop art with the dawning of the computer age. With his appearance in the commercial, Warhol once more caused art and economics to move closer together, thereby once again challenging the Modernist notion of an art system operating autonomously as a high culture separate from the visual media realities of everyday social life. The *remediation* of one of his best known screen print motifs simultaneously updated the tension between Modernist conceptions of artistic individuality and originality on the one hand and mechanical or technological reproduction and seriality on the other.<sup>11</sup> Warhol's playful experiment with the computer immediately brings to mind his now-famous wish to make art like a machine: „The reason I'm painting this way is that I want to be a machine, and I feel that whatever I do and do machine-like is what I want to do.”<sup>12</sup> Against this background of affinity for consumer culture and technology, the computer took the stage as a tool with which the artist updated a central feature of Pop art, namely that of challenging Modernist conceptions of art, under changed media conditions.

No one knows of course how much closer Warhol actually hoped or believed he was getting to painting like a machine by using the computer. What we do have is documentation of how he created one of his computer images in a commercial as well as other outputs from his experiments with the new technology itself like the Campbell Soup can version he rendered on the Amiga 1000. Both show-case his work with the computer as the interplay of human creativity and mechanical production that the artist's subject ultimately dominates. It is already patently clear during the performance that the mechanical production translates the motoric horizontal movements of the mouse input device into a corresponding pixel structure accentuated by the choice of colours. In this process, the motif that invoked the experiment's conceptual framework, its colour, and formal design were left to Warhol's artistic discretion. Noteworthy is that Warhol executed the Campbell Soup can image's individual elements with different degrees of precision. The drawing of the can's contours and colouring appear to have been done carelessly. The screen's pixel structure hence can be traced back aesthetically to Warhol's tracking movements with the mouse and so to a personal originator of the phenomenon. This also applies to the signature. It contrasts with the much more precise rendering of the brand name, making the identification of a Pop art icon and hence of Warhol as its creator compelling.

Other Pop artists in the mid-80s experimented with digital technology and in doing so also

accentuated the artistic credit for their creations. So, David Hockney for instance in 1986 on the BBC television program *Painting with Light* painted a streetscape, portraits and interior views using the Quantel Paintbox graphic computer. In his running commentary, he mused about the interactions of program, touch pad and pressure-sensitive stylus compared to other manual artistic media. He explained in passing that it was in using the new medium that he had deliberately not resorted to the program's visual effects.<sup>13</sup> It appears he wanted to emphasize that it was the artist trying out the media-specific manual painting process. Under no circumstance should a programmed automation get credit for the aesthetic result.

By accentuating artistic authorship aesthetically and discursively, the 1980s Pop artists distanced themselves from a central paradigm of the historical computer discourse. Starting in the late 1950s, some in the artificial intelligence research community repeatedly assumed that replicating our understanding of human intelligence with technology would ultimately lead to both being ontologically indistinguishable. It would end up with having to conceive of the computer as an autonomous, intelligent entity as distinct from the human being.<sup>14</sup> John R. Searle in 1980 coined the term 'strong AI' for this notion.<sup>15</sup> The pioneering artificial intelligence researchers Herbert A. Simon and Allen Newell suggested in 1958 that a form of such a 'strong AI' had already been achieved when they said: "(...) there are now in the world machines that think, that learn, and that create."<sup>16</sup> This conception of the computer as independent of the artist, yet, like him, as a creatively active entity plays no role in the postmodern experimentation by Warhol and Hockney. Their works and statements point to an interaction with the computer in which the human subject assigns it the role of tool in the framework of an intentionally executed artistic practice. This difference from the ontological equivalence of human and computer correlated with postmodern discourses in the 1980s that characterized the belief in the progress of artificial intelligence research as overblown. So, in 1980 Searle published his by-now classic semiotic critique of the notion that computer programs were to be fathomed as functionally identical with the human intellect. While Searle conceded that even though humans and the machine both operated with signs, human manipulation of signs was tied to an intentionality that gave meaning to the signs; computer programs on the other hand, while they could operate rule-bound with signs, referred to nothing: „In the linguistic jargon, they have only a syntax but no semantics.“<sup>17</sup>

The link to the contemporaneous computer discourse in Sigmar Polke's work *The Computer Moves In* (1983/Fig. 3) is much easier to determine specifically, since his work points to its

source both visually and with its title. For image carriers the German artist used industrially-made materials whose rastered structure seems to dissolve under multiple superimposed layers of metallic spray paint and colour splotches. Through this diffuse texture, a figure emerges wraithlike from behind a desk on which sits a computer. Polke's work here appropriated the motif of a January 3, 1983 *Time* magazine cover story on *The Machine of the Year*. The American weekly magazine showed a plaster figure made by George Segal seated in front of a personal computer. The issue featured an article by Otto Friedrich under the heading of 'The Computer Moves In'.<sup>18</sup>



**Fig. 3.:** Sigmar Polke, *The Computer Moves In*, 1983, mixed media with manganese on fabric, 102 1/2 x 122 1/2 in. (260,4 x 311,2 cm). Saint Louis Art Museum, St. Louis.

Friedrich's magazine article speculated on the consequences the widespread use of computers in society could potentially bring with it. His article ranges over topics like human cognitive abilities, questions of corporate management, criminality and education and beyond to labour market and gaming culture effects. Friedrich ended his piece without drawing any firm conclusions about how the barely nascent digital revolution would pan out.<sup>19</sup> In Germany

too, the electronic collection and storage of personal data and launching of computer-aided dragnet by the Federal Criminal Police Office in the 1970s and early 1980s set off controversial debates on the societal opportunities and risks inherent in digital technology.<sup>20</sup> Paralleling the *Time* Magazine issue, the German weekly news magazine *Der Spiegel* also on 3 January 1983 titled *The Orwell State*.<sup>21</sup> Unlike Friedrich's open-ended, differentiated assessment, author Werner Meyer-Larsen in the German magazine took in his article the culturally pessimistic view that realization of the authoritarian surveillance state in George Orwell's dystopian novel 1984 was imminent in the guise of the 'electronic state' of the German Federal Republic in 1983.<sup>22</sup> Polke's work repudiates such time-diagnostic assessments and predictions. Instead, *The Computer Moves In* aesthetically reflects foremost the discursive uncertainty over the meaning of the digital revolution, which it alludes to by referencing the American magazine issue. The raster spray image oscillating in postmodern fashion between abstraction and figuration admits of no unambiguity.<sup>23</sup> Even as it proffers to the perception the motif of the staged scene opposing computer and human as expressing a kinship tie, it is also withdrawing the offer of an identifying clarification by the manner in which it is presented.<sup>24</sup> However, not only is the pictorial citation in the case of *The Computer Moves In* difficult to interpret, the raster is also obscured. Blotches and spray paint traces overlay it to the point of complete coverage in some places. For Polke, the raster structure was not only an aesthetic means for creating ambiguity but was also to be understood as hinting at a techno-logical affinity as well as linkages to political connotations like social and cultural standardization or fragmentation.<sup>25</sup> In this sense, it is possible to read Polke's work as visually transmitted scepticism about the allure of technology and the ideas for social organization arising from it. Moreover, it should be pointed out here that intermedial perceptual effects or references permeate Polke's painting. Especially after prolonged observation, the patchy decomposition and motif give rise to visual phenomena reminiscent of flickering computer bitmaps. Against the analytical backdrop of *The Computer Moves In*, it could be plausibly argued that an attitude of doubt about the digital organizing principles is amalgamated here with the media effects of computer-based visuality.

While Warhol and Hockney, counter to the visions of important artificial intelligence research protagonists, relegated the computer to a tool in the subject-driven artistic process, for his part, Polke with *The Computer Moves In* addressed the uncertainties inherent in this medium. These included the unclear social and political influence of digital organizing principles – an influence that possibly is already having its effect on fundamental perceptual levels. But, fast-forward to Germany in the 1990s, and we see that this painterly reprocessing of socio-political



scepticism ceded to artistic reflection on the new medium's aesthetic quality as an artistic genre.



**Fig. 4:** Albert Oehlen, *Eastern Nude*, 1996, silkscreen ink and oil on canvas, 75 1/5 x 106 3/4 in. (191 x 271 cm). Bavarian State Painting Collections, Brandhorst Museum, München.

It was during this decade that Albert Oehlen integrated computer-aided printing aesthetics into painting. Using a graphics program, he produced silk screens on the computer, enlarged them and combined their prints with paint applied by hand. In this manner, Polke's student let the visual total impression of a picture come together from several image planes made in part with different media.<sup>26</sup> In his *Eastern Nude* (1996, Fig. 4), for instance, against a white background on a first, lower image layer it is possible to discern printed sections of different black-white patterns that are partly separated and partly overlap each other slightly. These pattern arrays mostly have rectangular outlines and for the most part are placed in a horizontally-vertically oriented manner. The second image layer on top of them consists also of a printed, loose tangle of lines that might have been made by a hand moving a computer mouse. It traces sometimes meandering, sometimes linear hand movements that appear in the enlarged screen print as visual 'pixel transformations'. Such traces of manually executed flows also traverse the pattern arrays as white negative forms leading to an aesthetic entanglement of the described image layers. Computer-based image generation is hence presented by Oehlen's work as a printed combination of discrete patterns and lines with jaggies i.e., aliasing. The print had colour

added manually on the third layer. White paint for instance served for partially correcting the jaggies of the computer-based print, in as much as they appear to have been smoothed repeatedly. In other places, translucent paint covers the pattern arrays. With this only partial expungement that lets painterly corrections and digital aliasing exist side by side, Oehlen emphasized the pixelated aesthetic of machine-made images and revealed it as a media 'other'.

Thus, in *Eastern Nude* on the one hand computer imagery is put on a level with a printed graphic aesthetic, while, on painting's side, this contrasts with the manual application of colour. Durocq had already shown with his manually realized *La fillette électronique* that no such contrast exists between digital technology and painting. Oehlen's work on the other hand moreover suggests – like Polke's *The Computer Moves In* – that computer-based images would obtain their visuality through rastering or pattern formation from discrete marking elements. In this they differed from, for example, Auger's 'machine painting' that displayed a continuous line.

The medial otherness of the computer constructed in *Eastern Nude* is interpreted by the artist himself under the sign of a classic competition between genres, in which he ultimately regards painting as aesthetically superior to the computer: "First, I asked around, how to get rid of the blockiness and aliasing, but later it occurred to me how funny it really is that the machine can only handle it up to a certain point and the human hand then has to finish the job."<sup>27</sup> Yet, although the computer here is devaluated compared to painting, it should not hide the fact that the medium, while integrated into the latter's production processes, also became a respected artistic tool in painting. With Oehlen's simultaneous ennobling and devaluing in the service of traditional notions of painting's superiority, his computer images for instance distance themselves from the unambiguously culturally-pessimistic rejection of technology, such as could be found, for example, in painting in the 1960s and 1970s. Just such a position is articulated in paintings by Bettina von Arnim. Her dystopian views of machine people in monotonous landscapes done in the late 1960s turned against the contemporaneous belief in progress by showing cyborgs, "(...) androids (and) robots not as a desirable future of the 'perfect human' but as threat, deformation, and deindividualization (...)"<sup>28</sup>

### **Post-digital era (since ca. 2000): postmediality, hybridity and the fluid**

From a central perspective, Corinne Wasmuht's large-format oil painting *Ezeiza Bandog* (2003/ Fig. 5) shows the interior view of a modern hall architecture featuring mirror effects (The

painting's title alludes to the international airport at Buenos Aires). But this spatial impression is broken up by an abstract aesthetic that permeates the picture and dominates the picture foreground and its right portion. It is reminiscent of the results achieved with computer-based image processing with layering techniques. The method makes it possible to create a visual overall impression from several superimposed images, each of which can be worked on as pixel-based. Partially deleting picture information from an image layer allows blank spaces to open in which the picture information on other layers becomes visible. The areas to be worked on within an image layer are chosen with selection tools. Their parameter settings determine, among other aspects, the contours of these areas. Wasmuht's work shows primarily soft contour pathways. This effect is achieved in image editing programs by smoothing the pixel-based editing structure to bring out a stronger painterly effect. Where Oehlen still generated uniform contour lines manually, the image editing program's 'smooth edges' function does this automatically. Against this layering technique background, at least *Ezeiza Bandog's* abstract picture foreground appears as part of another picture after some time looking at it, i.e. as an aerial perspective on a landscape with streets. In this focus, Wasmuht's painting generates itself as a multi-perspective picture collage.



**Fig. 5:** Corinne Wasmuht, *Ezeiza Bandog*, 2004, three-piece painting, oil on wood, 101 1/5 x 168 4/5 in. (257 x 429 cm). Frieder Burda Museum, Baden Baden.

There is no hidden intermedial game behind this coupling of painting and computer imagery that would ironically reveal the media 'other' as its 'own'. In *Ezeiza Bandog* the computer

itself has actually turned into the media foundation for a manually generated painting. The oil painting was preceded by working up a template on an image editing program. The multi-perspectival aesthetic of *Ezeiza Bando* invoking a computer-based layering technique is therefore to be understood as a self-referential link to the specific production process of painting: one that unifies the traditional technique of using a brush with a software-aided one as inseparable from each other and non-hierarchical. On that score, Wasmuht's work blazes a trail toward a postmedial conception of the computer in painting that breaks with any construals of the medium as a less valuable 'other'. According to Peter Weibel, at stake in the "postmedial condition" is "creating for new media (...) the same artistic appreciation as for traditional media".<sup>29</sup> As it happens, Wasmuht's painting transcends Weibel's definition of the postmedial. For the artist and scholar, this artistic condition is also characterized by a mixture of "the media-specific individual worlds of the media".<sup>30</sup> In *Ezeiza Bando* the mixing happens at the cost of the medial specificities of painting and computer. It is no longer possible to untangle in which proportions the individual aesthetic impressions can be traced back to the computer-based model or the manual painting process. So, it is impossible to decide if the soft contours of the various picture elements were already generated for the template by employing a computer-based effect or if they are owed to an artistic decision that was only made during the manual process. *Ezeiza Bando* leaves open the question if the painterly impression is a manually executed copy of computer-based simulation of the painterliness or if the manual process "simulates" the computer-based simulated painterliness with painterly means. Here, the artist questions if the undifferentiability of reality and fiction, proclaimed during the 1990s among others by Vilém Flusser's "digital illusion" catchphrase, as a media trait characterizing computer technology is good for anything.<sup>31</sup> The deconstruction of the media-ontological difference discourses undertaken here at the start of the twenty-first century with aesthetic means moreover dovetails with the simultaneous discussions in media and art disciplines that, on the one hand, recognized historical picture strategies of painting as precursors of computer-generated imagery and, on the other, transmitted basic concepts of digital technology to painting. So, impressionism was studied as forerunner for pixel-based picture generation just as the algorithmic quality of central perspectivity constructions was pointed out.<sup>32</sup>

As is typical in the initial stage of new technologies, while artists initially may have reacted with culture-critical discrimination, social scepticism, and gleeful experimentation to the technology even while the 'digital revolution' was happening, in the postmedial age the basis for such stances dwindled. The impression of extraneousness that prompted

reactions ranging from deprecation, uncertainty, to euphoric playfulness ceded ground to the ubiquitous technology in all its ever more familiar, everyday usage. Now, the computer was integrated without value judgments into painting processes. Taking the place of a multimedia picture-making that classified the technology as a medial 'other' opposed to painting was a self-referential aesthetic that confidently proclaimed the apparatus to be 'part and parcel' of the genre. The highlighting of supposed contradictions was eclipsed by media analogies. As a result, the computer in the postmedial phase is revealed as a convergence medium that not only integrates older media by simulating them but simultaneously can be integrated with the latter's production processes.<sup>33</sup> This understanding of computer-based visuality production as a feasible painting tool requires a reading of the resulting aesthetic phenomena against the background of painting's history. This puts Wasmuht's multiperspectival *Ezeiza Bandog* squarely in the picture tradition of perspectivist syntheses. While Cubist praxis brought contemporized heterogeneous spatial aspects of objects into the picture, surrealist multiperspectivity contributed subjective spatial experiences.<sup>34</sup> Meanwhile, the linking of different observer viewpoints in Maurits Cornelis Escher's works allowed a playful reflection on perceptions. So, it seems that Wasmuht's multiperspectival collage reflects a contemporary everyday experience in which a growing simultaneisation of different perspectives is taking place. Our technologized present accelerates extreme spatial and perspectival shifts. Since the start of the new millennium not only air travel but also the zoom functions of software-enabled perceptions – see Google Earth – make it possible for a broad recipient base to experience heterogeneous perspectives that are more highly synthesized.

Another contemporary artist, Matthew Stone, also integrates the computer into the process of producing his paintings. Many of his works depict nudes that sometimes float in the picture space and sometimes, as in *The Fear of Not Being Respected* (2016/Fig. 6) for one, are placed in harmoniously unified groups on the ground where, sitting, half-reclining or squatting, they loll or stand awry while stretching the trunk from the picture foreground into the background. The naked bodies, moved close together as in Mannerist group portraits, are entangled with each other in complex ways, making immediate personal identification difficult. Hands reach for arms and thighs, backs lie in front of laps, legs on legs, arms and legs are crossed or linked. Solely the differing flesh tones seem to facilitate classification. But what at first seems to offer an identificatory criterion of difference, Stone immediately undermines with the painterly execution of his work. The flesh tone brush strokes defining the individual bodies do not complete the figure. Leaving gaps, they are laid about hollow body parts and so permit looking

through to what would be 'below' and 'behind'. There sometimes appears the darker flesh tone of a shadowed interior view of one hollow figure, but it may just as easily be the lighter or darker skin tone of another. By this use of different hue gradations, Stone shows the relational character of identity notions that can only be generated through the 'other', while at the same time he reveals this 'other' as an 'own.' Accordingly, personal identity in *The Fear of Being Not Respected* echoes the Postmodernist stance by not presenting it as a fixed homogeneous dimension but instead as generated in the networks of relationships with others as a non-judgmental relational hybrid.<sup>35</sup>



**Fig. 6:** Matthew Stone, *The Fear of Not Being Respected*, 2016, digital print and acryl on linen, 70 3/4 x 98 1/2 in. (180 × 250 cm). Location unknown.

Stone likes to say that his painting emerged from a critical argument with utopias.<sup>36</sup> However, it would miss the mark to believe that Stone is interested in revealing hybrid identities, that is, results of the postmodern deconstructions of formerly judgmental dichotomies, as the basis for a new utopia. *The Fear of Being Not Respected* on the contrary addresses not only qua title the social insecurity about whether or how these can become the basis for realizing a future community. As unified as the numerous entanglements make his figures out to be, upon closer

inspection the more isolated they seem to be. Lacking communicative contact, their expressions, for instance that of the figure at the picture's left edge, are hidden, they stare into emptiness, are turned inward behind closed eyelids, or seem to turn questioningly toward us. Stone here comes to terms with a socio-political blank space, to the extent that he puts the potential of opened postmodernist identity concepts up for negotiation for a utopia.

So, what does this question about a successful recognition of hybridity have to do with the computer? The process of making *The Fear of Being Not Respected* sheds light on it. Stone describes it as follows:

“In a practical sense I paint on glass, take photographs of it, photoshop it, cut out the individual brushstrokes and build an archive of them. I model and sculpt the figures as 3-D virtual models and pose them interacting. Then I use a 3-D painting program to apply the brushstrokes over the bodies as and where I see fit. From there I used a 3-D modelling program to apply the painted textures and light them, use virtual cameras to frame them and then render out these huge images which are then digitally printed onto linen.”<sup>37</sup>

Media formerly thought of and used separately, such as painting, photography, graphic design, and print, at first blush here seem to be unified into a media hybrid. The type of ‘interweaving’ in the creative process, however, transcends a combinatorial interplay such as we could observe for instance in Wasmuht’s generating pigment-based painting and computer-based images. In Stone’s work, painting is not just an element of a medial hybrid character, but also its prerequisite. By photographing the brush strokes, Stone translates the painting into a data set that lacks any specific material and aesthetic form allowing him to combine it with data sets of other medial information. But this also lets him newly define it aesthetically and materially, that is, medially.<sup>38</sup> In that vein, he reworks the photographed brush strokes in 3D programs with light and shadow effects, so that they appear partly sculptural and twisted in on themselves, after which he combines them with the hollow bodies also created on the computer. He adds free-floating, also more-or-less modelled brush strokes to the picture. These are located ‘behind’ the figures composed of recognizable brush strokes, wrap around their extremities or overlap. Their quality as objects, incidentally, also presents dichotomy to the eye aesthetically as a varied spectrum of hybrid constellations, in as much as representation and abstraction continually appear to blend into one another. Stone’s workflow ends when he decides to *map* the result on canvas.<sup>39</sup> This creates the impression of a flat impasto technique to the extent that the conspicuous peaks and valleys of the paint application merely represent

the printed photographic image of a pastose painting style but are no longer accompanied by any perceptible relief structure.

Accordingly, the computer in Stone's work is neither – as during the 'digital revolution' – a stand-alone medium alongside painting or simulates it, nor is it – as in the postmedial state – 'only' an element in a medial combinatorics that mixes painting and computer-based image generation. In the artistic practice of *mapping*, digital technology becomes a requirement for keeping painting itself from no longer being locked into just one medial form. Turned into a fluid mediality with multiple identities as a data set, its aesthetic and material states are mutable at will, that is to say, translatable into alleged 'other' media. With this practical and simultaneously non-judgmental dissolving of the difference between old and new media, Stone's mapping painting however not only co-generates a new form of painting, it also carries on the so-called post-digital approach to digital technology that we can already discern in Wasmuht's *Ezeiza Bandog*:

"Post-digital (...) now describes the (...) condition of art and media after digital technology revolutions. 'Post-digital' neither recognizes the distinction between 'old' and 'new' media, nor ideological affirmation of the one or the other. It merges 'old' and 'new', often applying network cultural experimentation to analog technologies which it re-investigates and re-uses".<sup>40</sup>

Whether these new conceptions of hybrid-fluid medial identities will become a recognized part of the history of painting is, like the opened personal conceptions of postmodern identities, socially dependent in as much as they, too, must fear being rejected.



## Credits:

**Fig. 1:** Albert Ducrocq, *La fillette électronique*, ca. 1950, digital random number generator and manual application, executed in eight colours on paper, colouring medium unknown, 15 3/4 x 17 1/3 in. (40 x 44 cm). Location unknown. In: Albert Ducrocq, *L'ère des robots* (Paris: Julliard, 1953), between p. 96 and p. 97.

**Fig. 2:** Andy Warhol, *Campbell's*, 1985, digital image, from disk 1998.3.2129.3.22. The Andy Warhol Museum, Pittsburg; Founding Collection (photograph provided by The Andy Warhol Foundation for the Visual Arts, Inc. © 2018 The Andy Warhol Foundation for the Visual Arts, Inc. / Licensed by Artists Rights Society (ARS), New York).

**Fig. 3:** Sigmar Polke, *The Computer Moves In*, 1983, mixed media with manganese on fabric, 102 1/2 x 122 1/2 in. (260,4 x 311,2 cm). Saint Louis Art Museum, St. Louis. In: E. Louis Lankford / Kelly A. Scheffer / Barbara Decker / Carlene Fullerton, *Instructional Resources: Quest and Questions: Learning in Our Time Selections from the Saint Louis Art Museum*, in: *Art Education*, 2003, Vol. 56, 1, pp. 25-32, here p. 28.

**Fig. 4:** Albert Oehlen, *Eastern Nude*, 1996, silkscreen ink and oil on canvas, 75 1/5 x 106 3/4 in. (191 x 271 cm). Bavarian State Painting Collections, Brandhorst Museum, München. In: Stephan Berg, *Cold Fever*, in: *Albert Oehlen. Terpentin 2012 Turpentine*, ed.: Stephan Berg / Kunstmuseum Bonn, Ostfildern 2012, pp. 29-46, here p. 35, exhibition catalogue, Bonn, Kunstmuseum Bonn, 2012.

**Fig. 5:** Corinne Wasmuht, *Ezeiza Bandog*, 2004, three-piece painting, oil on wood, 101 1/5 x 168 4/5 in. (257 x 429 cm). Frieder Burda Museum, Baden Baden.

**Fig. 6:** Matthew Stone, *The Fear of Not Being Respected*, 2016, digital print and acryl on linen, 70 3/4 x 98 1/2 in. (180 x 250 cm). Location unknown (photography provided by the artist).

\* I wish to thank my reader Elena Winkler and Miriam Berger, Yvonne Schweizer, Henry Kaap, Benedikt Fahrnschon, Elisa Kullmann and Tonio Nitsche for their important pointers. My special thanks also go to Stefan Hölscher, who grappled intensively with the article contents, steadfastly questioned and contributed to them.

This article is a translated and updated version of the German-language original: Nina Gerlach, “Malerei und das Malerische im (post-)digitalen Zeitalter,” *Kritische Berichte* 47 (2019): 17-33. Regarding the translation I thank the German Association of University Professors and Lecturers (Deutscher Hochschulverband, in short DHV).

1 “Computer bitmaps emerged in the 1970’s, with forerunners such as Albert Ducrocq (...), handmade paintings generated by his machine Calliope (a random generation electronic device using algorithms for binary translation to text or image)”, Pierre Berger, “Digitization,” *Digital Creation Critical ANalysis: The Dictionary of Digital Art*, n.d., [http://www.diccan.com/DU/DU\\_Digitalization.html](http://www.diccan.com/DU/DU_Digitalization.html) (accessed September 2, 2019). See also: Pierre Berger, “Digital Art History. The 1940–1950’s. Emergence of the True Digital,” *Digital Creation Critical ANalysis: The Dictionary of Digital Art*, n.d., [http://www.diccan.com/History\\_1950.html](http://www.diccan.com/History_1950.html) (accessed September 2, 2019). The portal developed by the journalist Berger in 2010 provides an overview of key concepts in digital arts. To date, there is no academic equivalent.

2 Berger, “Digitization”, n.p.. Ducrocq describes the design process as follows: “(...), l’emploi de la couleur ne soulève aucune complication spéciale, sauf que l’on doit établir un code en fonction des couleurs, le transcripateur devant, dans chaque région, établir une correspondance entre les signes binaires et la teinte correspondante. Par exemple, pour une région où le ton doit être rouge-orangé, on pourra donner au transcripateur des instructions telles que les suivantes: 000, 001 = blanc ; 010 = jaune ; 011,100 = orange ; 101, 110, 111 = rouge. A titre expérimental, nous avons composé un tableau en couleurs sur un tel principe : il représentait une fillette tenant un panier de fleurs, (...).

Au cours de toutes ces réalisations, les cases étaient peintes manuellement en suivant les indications du code.“, Albert Ducrocq, *L’ère des robots* (Paris: Julliard, 1953), 278.

3 Lev Manovich, “Avant-garde as Software,” *Artnodes* 2 (2002), <https://artnodes.uoc.edu/articles/10.7238/a.voiz.681/galley/3233/download/> (accessed September 2, 2019). Similar arguments are advanced by: Markus Brüderlin, “Von der analytischen Malerei zum digitalen Impressionismus,” in *Claude Monet ...bis zum digitalen Impressionismus*, exh. cat., Fondation Beyeler, Riehen (München: Prestel, 2002), 191–225, and Donald Kuspit, “The Matrix of Sensations,” *artnet*, 2005, <http://www.artnet.com/magazineus/features/kuspit/kuspit8-5-05.asp> (accessed

September 2, 2019). Since the turn of the millennium, numerous other historical image techniques of painting, besides avantgarde picture making, have been studied as evolutionary predecessors of the digital image: Oliver Grau, *Virtual Art: From Illusion to Immersion* (Cambridge, Mass: MIT Press, 2003, German Original: 2001); Christian Spies, “‘Nearly White Noise’: Zum Digitalen in der monochromen Malerei,” in *Analog/Digital – Opposition oder Kontinuum? Zur Theorie und Geschichte einer Unterscheidung*, ed. Jens Schröter and Alexander Böhnke (Bielefeld: Transcript Verlag 2004), 311–334; Meredith A. Hoy, *From Point to Pixel: A Genealogy of Digital Aesthetics* (Hanover, NH: Dartmouth College Press, 2017).

4 Anon, “1955 – 62 – Painting Machine – Raymond N. Auger (American),” *Cyberneticzoo. A History of Cybernetic Animals and Early Robots*, January 12, 2011, <http://cyberneticzoo.com/robots-in-art/1962-painting-machine-raymond-auger-american/> (accessed: September 2, 2019).

5 The subject is touched on for instance by: David Joselit, “Painting Beside Itself,” *October* 130 (2009): 125–134; Manuela Ammer, “How’s My Painting?” (Judge Me, Please, Don’t Judge Me),” in *Painting 2.0: Malerei im Informationszeitalter: Geste und Spektakel, exzentrische Figuration, soziale Netzwerke*, exh. cat., Museum Brandhorst, München; Museum Moderner Kunst Stiftung Ludwig, Wien (München: Prestel, 2015), 85–101, at 98–99; Achim Hochdörfer, “How the World Came in: Medien der Expression in der Malerei seit den 1960er Jahren,” in *Painting 2.0: Malerei im Informationszeitalter: Geste und Spektakel, exzentrische Figuration, soziale Netzwerke*, exh. cat., Museum Brandhorst, München; Museum Moderner Kunst Stiftung Ludwig, Wien (München: Prestel, 2015), 15–27, at 24–25. More extensive descriptions offer, for example: Kuspit, “The Matrix of Sensations”, n.p.; Luke Smythe, “Pigment vs. Pixel: Painting in an Era of Light-Based Images,” *Art Journal* 71 (2012): 104–118; Simon Colton, “The Painting Fool: Stories from Building an Automated Painter,” in *Computers and Creativity*, ed. Jon McCormack and Mark d’Inverno, (Berlin: Springer, 2012), 3–38; Maureen Nappi, “Drawing w/Digits\_Painting w/Pixels: Selected Artworks of the Gesture over 50 Years,” *Leonardo* 46 (2013): 163–169; Alex Bacon, “Surface, Image, Reception: Painting in a Digital Age,” *Rhizome*, May 24, 2016, <http://rhizome.org/editorial/2016/may/24/surface-image-reception-painting-in-a-digital-age/> (accessed September 02, 2019); Hoy, *From Point to Pixel*.

In addition, two exhibition catalogues exist: Dora Apel, ed., *Post-Digital Painting*, exh. cat., Cranbrook Art Museum, Bloomfield Hills (Bloomfield Hills: Cranbrook Art Museum, 2002); Annelie Lütgens, ed., *Painting Pictures: Malerei und Medien im Digitalen Zeitalter*, exh. cat., Kunstmuseum Wolfsburg, Wolfsburg (Bielefeld: Kerber, 2003).

6 Philip Steadman, *Vermeer’s Camera: Uncovering the Truth Behind the Masterpieces*, (Oxford: Oxford University Press, 2002, Original: Oxford, 2001); David Hockney, *Secret Knowledge: Re-*

*discovering the Lost Techniques of the Old Masters* (London: Thames & Hudson, 2006).

By contrast, faced with the new mediality, the theoretical ‘death of painting’ was also repeatedly proclaimed. For instance, in 1622 Constantin Huygens saw it as inevitable due to the *camera obscura* and in 1839 Paul Delaroche did so in comparing the genre with photography: Peter Weibel, “Der Ikonoklasmus als Motor der modernen Kunst: Von der Repräsentation zur Partizipation,” in *Ikonologie des Performativen*, ed. Christoph Wulf and Jörg Zirfas (München: Fink, 2005), 365–389, at 372, note 6.

7 Weibel, “Der Ikonoklasmus als Motor der modernen Kunst,” 376–377; Louis K. Meisel, *Photorealism* (New York: Abrams, 1980). However, the exhibition “Inspiration Fotografie: Von Makart bis Klimt” examined creative entanglements of photography with the techniques of 19th century painting: Monika Faber and Agnes Husslein-Arco, ed., *Inspiration Fotografie: Von Makart bis Klimt – Eine Materialsammlung*, exh. cat., Belvedere, Wien (Wien: Belvedere, 2016).

8 Of course, already before the 1980s a few artists differentiated the relationship of digital technology and painting further. So, for example, Zdeněk Sýkora began in 1964 using a computer to make mathematical models for his ultimately manually executed paintings. In 1973, Harold Cohen developed his *Aaron* painting program and David Em in 1975 experimented with an early painting program before Salvador Dalí in 1978 with his op-art work *Odalisca cibernética – Homenaje a Béla Julesz* referenced studies of the inventor of the computer-based random dot stereograms: Armin Medosch, *New Tendencies. Art at the Threshold of the Information Revolution (1961–1978)* (Cambridge, Mass.: MIT Press, 2016), 156. Yehuda E. Kalay, *Architecture’s New Media: Principles, Theories, and Methods of Computer-Aided Design* (Cambridge, Mass.: MIT Press, 2004), 278; Nappi, “Drawing w/Digits\_Painting w/Pixels,” 165; Béla Julesz, “Dialogues on Perception,” in *Beyond Art. A Third Culture. A Comparative Study in Cultures, Art and Science in 20th Century Austria and Hungary*, exh. cat., Ludwig Múzeum - Kortárs Művészeti Múzeum, Budapest; Neue Galerie Graz, Graz; Museum van Hedendaagse Kunst, Antwerp (Wien: Springer, 2005), 122–124, at 123.

9 Anon, press release on the exhibition “Warhol and the Amiga,” *The Andy Warhol Museum*, n.d., <https://www.warhol.org/exhibition/warhol-and-the-amiga/> (accessed: September 2, 2018).

10 The works were discovered by Cory Arcangel: Sarah Cascone, “Cory Arcangel Excavates Andy Warhol’s Digital Art from Ancient Floppy Disks,” *artnet*, April 26, 2014, <https://news.artnet.com/art-world/cory-arcangel-excavates-andy-warhols-digital-art-from-ancient-floppy-disks-11819> (accessed September 2, 2019).

For the following, I relied on Jonathan Flatley, *Like Andy Warhol* (Chicago: The University of Chicago Press, 2017), 89–135; Nina Tessa Zahner, “Kunst zwischen Kulturindustrie und

Hochkultur: Andy Warhol und die Transformation des Kunstfeldes in den 1960er Jahren,” *Österreichische Zeitschrift für Geschichtswissenschaften* 17 (2006): 189–218, at 195–204.

11 Jay D. Bolter and Richard Grusin by contrast use the term ‘*remediation*’ to describe the fundamental interweaving of new media with those that historically preceded them: “(...) a medium is that which remediates. It is that which appropriates the techniques, forms, and social significance of other media and attempts to rival or refashion them in the name of the real. A medium in our culture can never operate in isolation, because it must enter into relationships of respect and rivalry with other media.”, Jay D. Bolter and Richard Grusin, *Remediation: Understanding New Media* (Cambridge, Mass.: MIT Press, 1999), 65.

12 Andy Warhol in an interview with Gene Swenson, “What Is Pop Art? Interviews with Eight Painters (Part 1),” *Art News*, November 1963, re-released in *Theoria.art-zoo*, n.d., <http://theoria.art-zoo.com/interview-with-gene-swenson-andy-warhol/> (accessed September 2, 2019). This statement does not appear in the revised transcript of the interview published in 2018: Jennifer Sichel, “What is Pop Art? A Revised Transcript of Gene Swenson’s 1963 interview with Andy Warhol,” *Oxford Art Journal* 41 (2018), 85-100.

Sichel found out that many of the passages related to homosexuality were deleted from the original interview for the publication. She interprets his “‘fantasy’ about everybody being a machine“ as a „‘kind of different’ strategy“ to speak publicly about homosexuality: “The removal of every word surrounding Warhol’s statements ‘everybody should be a machine’ and ‘everybody should like everybody’ transforms them into wilfully ambiguous, blank statements about consumerism and serial production. But that is not what they were. These statements form the core of Warhol’s specific response to Swenson’s pointed question: ‘What do you say about homosexuals?’”, Jennifer Sichel, “Do you think Pop Art’s queer?’ Gene Swenson and Andy Warhol”, *Oxford Art Journal* 41 (2018), 59-83, at 70 and 67-68.

13 “I rejected some of the technical tricks (...), because it seems to me, what is much more interesting, making a picture with your hand.” Griffin Productions / BBC 2, *Painting with Light*, documentary, 44:22, at: 37:50–38:03, 1986, *YouTube*, August 2016, <https://www.youtube.com/watch?v=b-JpI4egl2o> (accessed September 2, 2019). Also experimenting with the technology in this broadcast were Richard W. Hamilton, Larry Rivers, Jennifer L. Bartlett, Sir Gordon H. E. Hodgkin and Sir Sidney R. Nolan: John A. Walker, *Arts TV. A History of Arts Television in Britain* (London: Libbey, 1993), 38–39. For David Hockney’s iPad and iPhone works see also Lawrence Weschler, “David Hockney’s New iPhone Passion,” in *David Hockney. A Bigger Exhibition*, exh. cat., ed. Fine Arts Museums of San Francisco and M. H. de Young Memorial Museum, San Francisco (München: Prestel, 2013), 43–47.

14 Regarded as the starting point of the research field on artificial intelligence is the workshop “Dartmouth Summer Research Project on Artificial Intelligence” held in 1956 at Dartmouth College in the Hanover, New Hampshire, USA: John McCarthy et al., “A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence,” August 31, 1955, re-released in *AI Magazine* 27 (2006): 12–14. An introduction to AI research is provided by: Keith Frankish and William M. Ramsey ed., *Cambridge Handbook of Artificial Intelligence* (Cambridge: Cambridge University Press, 2014).

15 “According to weak AI, the principal value of the computer in the study of the mind is that it gives us a very powerful tool. (...) according to strong AI, the computer is not merely a tool in the study of the mind; rather, the appropriately programmed computer really is a mind, in the sense that computers given the right programs can be literally said to *understand* and have other cognitive states.” John R. Searle, “Minds, Brains, and Programs,” *The Behavioral and Brain Sciences* 3 (1980): 417–457, at 417.

16 Herbert A. Simon and Allen Newell, “Heuristic Problem Solving: The Next Advance,” *Operations Research* 6 (1958): 1–10, at 8.

The natural science design of an aesthetics framed by information aesthetics makes it also possible to conceive of the computer as a creative entity. For an introduction to information aesthetics, see Christoph Klütsch, “Information Aesthetics and the Stuttgart School,” in *Mainframe Experimentalism: Early Computing and the Foundation of the Digital Arts*, ed. Hannah Higgins and Douglas Kahn (Berkeley, Calif.: University of California Press, 2012), 65–89. Max Bense, “Zusammenfassende Grundlegung moderner Ästhetik,” 1965, in *Alternative Traditionen: Dokumente zur Entwicklung einer empirischen Literaturwissenschaft*, ed. Reinhold Viehoff (Wiesbaden: Vieweg 1991), 151–166.

17 “(...) the formal symbol manipulations by themselves don’t have any intentionality; they are quite meaningless; they aren’t even *symbol* manipulations, since the symbols don’t symbolize anything. In the linguistic jargon, they have only a syntax but no semantics. Such intentionality as computers appear to have is solely in the minds of those who program them and those who use them, those who send in the input and those who interpret the output.” Searle “Minds, Brains, and Programs,” 422.

18 Otto Friedrich, “The Computer Moves In,” *Time Magazine* 121, January 3, (1983), 14–29, in *Time*, n.d., <http://content.time.com/time/subscriber/article/0,33009,953632-1,00.html> (accessed September 2, 2019).

19 “So the revolution has begun, and as usually happens with revolutions, nobody can agree on where it is going or how it will end.”, *ibid.*.

20 On the contemporaneous public media discourses, especially one in *Der Spiegel* among others, see Nicolas Pathes, “EDV im Orwellstaat: Der Diskurs über Lauschangriff, Datenschutz und Rasterfahndung um 1984,” in *Medienkultur der 70er Jahre*, ed. Irmela Schneider et al. (Wiesbaden: VS Verlag für Sozialwissenschaften, 2004), 57–76.

21 *Spiegel* 37, January 3, 1983, <http://www.spiegel.de/spiegel/print/d-14017938.html> (accessed September 2, 2019).

22 Werner Meyer-Larsen, “Die neue Welt von 1984,” *ibid.*, 19–30.

23 Nancy Grimes views Polke’s creative style in the mid-1980s as expression of a specifically “postmodernist dilemma”: “(...) how to articulate contemporary experience when the formal language of modernism seems inadequate and the figurative style of the past smack of cultural regression.” Nancy Grimes, “Sigmar Polke, Mary Boone” *Art News* 85 (1985): 136–137, at 136.

24 Polke on the ambiguity effect of the raster: “What I like then is the (...) blurring and setting in motion of the points, the change in knowability and unknowability of the motif, the indeterminacy and ambiguity of the situation, the lack of closure”. German Original: “Dann gefällt mir das (...) Verschwimmen und in Bewegunggeraten der Punkte, der Wechsel von Erkennbarkeit und Unerkennbarkeit des Motives, die Unentschiedenheit und Zweideutigkeit der Situation, das Offenbleiben.”, Sigmar Polke in an interview with Dieter Hülsmann, “Kultur des Rasters: Ateliergespräch mit dem Maler Sigmar Polke,” *Rheinische Post* 108, May 10, 1966, n. p..

25 “You see, my need to make raster images stems from my peculiarity, namely, my love for the purely technical, for the impersonal.” “Understood this way, I believe that the raster I used already reveals a very defined view, a general situation and interpretation: namely, a structure of my time, structure of social order, of a culture, normed, divided, divided up, segmented, grouped, specialized.” German Original: “...Sehen Sie, die Notwendigkeit für mich, Rasterbilder zu machen, rührt von einer meiner Eigenschaften her, nämlich von meiner Liebe zum rein Technischen, zum Unpersönlichen.” “So verstanden, glaube ich, dass mein verwendetes Raster schon eine ganz bestimmte Sicht aufzeigt, eine allgemeine Situation und Interpretation ist: nämlich Struktur meiner Zeit, Struktur einer Gesellschaftsordnung, einer Kultur, genormt, geteilt, aufgeteilt, eingeteilt, gruppiert, spezialisiert.” *ibid.*, n. p.

26 On this see Albert Oehlen in an interview with John Corbett, “Bionische Malerei,” in *Albert Oehlen*, ed. Hans W. Holzwarth (Köln: Taschen, 2017), 164–166, at 164.

27 “Zuerst habe ich herumgefragt, wie man den Treppen- und Klötzcheneffekt wegwirgt, aber später dachte ich, das ist eigentlich ganz witzig, die Maschine schafft es nur bis zu einem gewissen Punkt und fertig machen muss es dann die menschliche Hand.”, *ibid.*, 164. Luke

Smythe sees in Oehlen's multimedia works a critical revolt by artistic alienation against the ordering aesthetic of computer-aided images contextualized economically by him: "Wholly inverting the slick and seductive production values of most commercially oriented digital images, it is thanks precisely to their amateurish ineptitudes that they [Oehlen's computer paintings] can bring such a vivid semblance of liveliness and playful organicism to the coolly rationalized image space of the digital." Smythe, "Pigment vs. Pixel," 111–112.

28 "(...) Androiden [und] Roboter nicht als eine erstrebenswerte Zukunft des ‚perfekten Menschen‘, sondern als Bedrohung, Deformation und Entindividualisierung (...)," Wolfgang Längsfeld, "Zu den Werken von Bettina von Arnim (1981)," in *Bettina von Arnim: Ölbilder, Gouachen, Radierungen*, exh. cat., Neuer Berliner Kunstverein, Berlin (Berlin: NBK, 1985), n. p.

29 "Neuen Medien (...) die gleiche künstlerische Anerkennung zu schaffen, wie den traditionellen Medien (...)," Peter Weibel, "Die postmediale Kondition," in *Postmediale Kondition*, exh. cat., Neue Galerie Graz, Graz; Centro Cultural Conde Duque, Madrid (Graz: Neue Galerie, 2005), 6–13, at 12.

30 "medienspezifischen Eigenwelten der Medien," *ibid.*, 12.

31 Vilém Flusser, "Digitaler Schein," in *Digitaler Schein: Ästhetik der elektronischen Medien*, ed. Florian Rötzer (Frankfurt a. M.: Suhrkamp, 1991), 147–159.

32 Brüderlin "Von der analytischen Malerei zum digitalen Impressionismus", 191–225; Jens Schröter, "Analog/Digital – Opposition oder Kontinuum?," in *idem and Böhnke, Analog/Digital – Opposition oder Kontinuum?*, 7–30, at 26.

33 Wolfgang Coy, "Aus der Vorgeschichte des Mediums Computer," in *Computer als Medium*, ed. Norbert Bolz et al. (München: Fink 1994), 19–37, at 30.

34 Birgit Jooss, "Surreale Perspektiven als subjektivierte Wirklichkeitskonstruktion," in *Perspektiven: Blicke, Durchblicke, Ausblicke in Natur und Leben, in Kunst und Volkskunst*, exh. cat., Schloßmuseum Murnau, Murnau am Staffelsee (Murnau: Schlossmuseum, 2000), 91–99.

35 Hybridization does not have to be necessarily equated with *mixing*, to the extent that Wolfgang Welsch uses the concept of *interlacing* in which individual elements remain identifiable. Wolfgang Welsch, *Unsere postmoderne Moderne* (Berlin: Akademie 1993, Original 1987), 324.

36 "I felt that the images I'd made in the past sometimes implied neutral utopias that ultimately didn't reflect the complexities of real life. ... I have a strong desire to create positive images that promote social harmony, but I have also come to understand the extent to which overly positivistic [sic!] narratives can be patronising and become in themselves tools of oppression. These works come out of that thinking." Matthew Stone in an interview with



Felix Petty, "Revisiting the Past and Anticipating the Future with Matthew Stone," *i-D*, July 7, 2016, [https://i-d.vice.com/en\\_au/article/8xg73b/revisiting-the-past-and-anticipating-the-future-with-matthew-stone](https://i-d.vice.com/en_au/article/8xg73b/revisiting-the-past-and-anticipating-the-future-with-matthew-stone) (accessed September 2, 2019).

37 Matthew Stone in an interview with Melanie Khorshidian, "MOTHER Talks to Art Shaman Matthew Stone about his Current Exhibition *Healing with Wounds*. Discussing Neo-Liberalism, Structural Racism and the Shamanic Power of Art," *Mother*, n.d., <http://www.mother-magazine.com/interview-with-artshaman-matthew-stone/> (accessed June 12, 2019).

Numerous other artists, like say Gerhard Richter or Christopher Wool, also currently produce printed painting. Beyond that, the technique is also purposed for copying classical works of the history of painting: In 2015, the Prado put on an exhibition titled *Touching the Prado*. 3D prints of six of the museum's pieces on display, including works by Goya, El Greco and Velázquez, were made available to visitors for haptic exploration: Raphael Minder, "At Museo del Prado, Blind Visitors Can Touch Masterpieces," *The New York Times*, March 6, 2015, <http://www.nytimes.com/2015/03/07/arts/design/at-museo-del-prado-blind-visitors-can-touch-masterpieces.html>, (accessed September 2, 2019).

More rarely, painterly aesthetic is projected onto canvas, as is the case with Jeremy Rotsztain's series *Action Paintings (Masculine Expressionism)* (2008–2011).

38 "As data, the digital object has no intrinsic (...) form." Mitchell Whitelaw, "Representing Digital Collections," in *Performing Digital: Multiple Perspectives on a Living Archive*, ed. David Carlin and Laurene Vaughan (Farnham/Burlington: Ashgate 2015), 77–95, at 77.

39 "Our encounter with a digital object consists of a particular representation or rendering of that data; but other representations are always possible. In the field of data visualization, the (...) (process) of representing data is termed *mapping*;" *ibid.*, 77.

40 Christian Ulrik Andersen, Geoff Cox and Georgios Papadopoulos, "Post-digital Research: Editorial," *A Peer-Reviewed Journal About Post-Digital Research* 3 (2014), <http://www.aprja.net/post-digital-research-introduction/> (accessed September 2, 2019).

Florian Cramer likewise points to a 'fundamental' hybridity of the media that he clarifies using the concepts 'digital' and 'analog'. Thus he describes, for example, the LCD screen as a digital-analog system: "(...) its display is made of discrete, countable, single pixels, but the light emitted by these pixels can be measured on an analog continuum. Consequently there is no such thing as digital media, only digital or digitised information: chopped-up numbers, letters, symbols and any other abstracted units, as opposed to continuous, wave-like signals such as physical sounds and visible light." Florian Cramer, "What is 'Post-digital'?" *A Peer-Reviewed Journal About* 3 (2014), <http://www.aprja.net/what-is-post-digital/> (accessed June 13, 2019).

For Cramer's definitions of the 'digital' and the 'analog' see *ibid.*

An overview of the different definitions of the 'post-digital' concept offer Franz Thalmair, "Postdigital 1: Allgegenwart und Unsichtbarkeit eines Phänomens," *KUNSTFORUM International* 242 (2016): 39–53; Florian Cramer, "Nach dem Koitus oder nach dem Tod? Zur Begriffsverwirrung von ‚postdigital‘, ‚post-internet‘ und ‚post-media‘," *KUNSTFORUM International* 242 (2016): 54–67.