

# DRAWING CONNECTIONS – HOW INTERFACES MATTER

By Jan Distelmeyer

*“[...] interfaces carry – in every sense of the word – the global computerization of living conditions.”*

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A telling incident concerning computerization in 2017 took place on Friday, May 12: On the very day the Upper House of the German Parliament approved a law permitting self-driving cars, the *WannaCry* ransomware began its international outbreak. This coincidence makes it easy to imagine a future in which hackers can target computerized and networked cars without the need for suicidal drivers.

What does this, though, have to do with the question of interfaces? Interfaces are key to – or the carrier of, to be exact – these programmatic proceedings.

Since interfaces form the complex of connections and processes that both enables a computer to fulfill its promise of being a *general purpose machine* and establishes the connections we call networks, the question of interfaces becomes inescapable if we want to deal with the actual presence of various computers, no matter how seamless or “ready-to-hand”<sup>1</sup> they may appear. Human computer interfaces are important here but only as an aspect of a larger complex. That said, human computer interfaces and especially graphical user interfaces could indeed help address the aspect of programmability as crucial for the computerization of societies discussed as „algorithmic governance“.<sup>2</sup> To elaborate on this I would like to first reconsider the term interface.

## CONNECTIONS AND PROCESSES

Graphical user interfaces are but one of the multilayered aspects characterizing interfaces in terms of digital computing. These “symbolic handles”, as Florian Cramer and Matthew Fuller call them, “which [...] make software accessible to users”<sup>3</sup> depend on and are connected to other interface aspects and processes, such as hardware connecting humans /bodies to hardware, hardware connecting hardware to hardware, software connecting software to hardware, and software providing software-to-software connections. Embedded computers like in networked household appliances or combat drones could be said, then, depend primarily on hardware interfaces connecting computing hardware to non-computing hardware, whereby the computing and networked hardware is, of course, intertwined with and based on other networked software and hardware interfaces. Because the adjective “networked” has become a dulcet catchall for various interface processes between processing and protocol-driven systems.

This scope of the interface complex suggests the necessity of thinking about interfaces, if the current presence of diverse computers and their connections are to be grasped and reconsidered. Moreover, it is important

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1 Florian Sprenger, *Politik der Mikroentscheidungen. Edward Snowden, Netzneutralität und die Architekturen des Internets* (Lüneburg: meson press, 2015), 115.

2 Benjamin Bratton, *The Stack: On Software and Sovereignty* (Cambridge, MA: MIT Press, 2016).

3 Florian Cramer, and Matthew Fuller, “Interface,” in *Software Studies: A Lexicon*, ed. Matthew Fuller (Cambridge, MA: MIT Press, 2008), 149.

to remember that the term interface introduced in late 19<sup>th</sup> century by the physicists James and William Thomson originally described the transmission of energy.<sup>4</sup> Thomson's usage "would define and separate areas of unequal energy distribution within a fluid in motion, whether this difference is given in terms of velocity, viscosity, directionality of flow, kinetic form, pressure, density, temperature, or any combination of these"<sup>5</sup>. This enables a description of a computer's "interior telegraphy"<sup>6</sup> (its inner processuality and flow of signals) and its connections, its relations to us, and its incorporations.

Bearing this in mind, the question of the sought-after ubiquity and networked embeddedness of computing that relies on electrical transmissions of signals is even more obviously a question of interfaces. Hence, the ongoing development of dissemination, interconnection, and the implementing of computers can be investigated only through interface processes. Interfaces induce the diverse procedures of connectivity and transferences, marking the current presence of computers often as ubiquitous.

## INTERFACE POLITICS

Today's interface culture is undoubtedly very much shaped by various forms of interfacing. N. Katherine Hayle's remark that, "[m]obile phones, GPS technology, and RFID (radio frequency identification) tags, along with embedded sensors and actuators, have created environments in which physical and virtual realms merge in fluid and seamless ways"<sup>7</sup>, sums up some forms of interfaces that construct and organize "seamless" processes of connectivity. But this development – mirrored recently by the term "Post-Interface"<sup>8</sup> and Mark B.N. Hansen's perspective on "twenty-first-century media" ("no longer a delimited temporal object that we engage with focally through an interface such as a screen, media became an environment that we experience simply by being and acting in space and time"<sup>9</sup>) – should not be mistaken for a vanishing of interfaces.

Firstly, the complex outlined above emphasizes that the promoted ubiquity of computers – including the promise of seamless processes in the

4 See Peter Schaefer, "Interface: History of a Concept, 1868-1888," in *The Long History of New Media: Technology, Historiography, and Contextualizing Newness*, ed. David W. Park, Nicholas W. Jankowski, and Steve Jones (New York: Lang [Digital Formations 76], 2011), 163-175; Branden Hookway, *Interfaces* (Cambridge, MA: MIT Press, 2014), 59.

5 Hookway, *Interfaces*, 59.

6 Hartmut Winkler, *Prozessieren. Die dritte, vernachlässigte Medienfunktion* (Munich: Wilhelm Fink, 2015), 294.

7 N. Katherine Hayles, "Cybernetics," in *Critical Terms for Media Studies*, ed. W.J.T. Mitchell, Mark B.N. Hansen (Chicago: University of Chicago Press, 2010), 148.

8 Michael Andreas, Dawid Kasprowicz, and Stefan Rieger, "Technik | Intimität. Einleitung in den Schwerpunkt," *Zeitschrift für Medienwissenschaft* 15, no. 2 (2016): 12.

9 Mark B.N. Hansen, "Ubiquitous Sensation: Towards an Atmospheric, Impersonal and Microtemporal Media," in *Throughout. Art and Culture Emerging With Ubiquitous Computing*, ed. Ulrik Ekman (Cambridge, MA: MIT Press, 2013), 73.

“internet of things” (and the related measuring of everything and everybody) – is, in fact, a dissemination of interfaces. Secondly, (and on this basis), our encounter with computers, computerized media, and computerized things through various forms of programmed and designed user interfaces is not superseded but rather accompanied by “pervasive” and “seamless computing”.<sup>10</sup> Mark B.N. Hansen’s description of the “experiential shift” by “twenty-first-century media” depicts the diversity of interconnected interface politics:

Thus, well before we even begin to use our smart phones in active and passive ways, the physical devices we carry with us interface in complex ways with cell towers and satellite networks; and preparatory to our using our digital devices or our laptops to communicate or to acquire information, the latter engage in complex connections with wireless routers and network hosts.<sup>11</sup>

While these devices are constantly (and “calmly”<sup>12</sup>) interfacing with networks and servers, we do also use our smart phones in active ways, which is why we pay for and update them. Even today, graphical user interfaces are so obviously omnipresent that this manifestation of software is still “often mistaken in media studies for ›interface‹ as a whole”<sup>13</sup>. Despite this, media studies analyses of common user interfaces are still not common.<sup>14</sup> This must change if we want to better understand our interrelationship with (previous, current, and upcoming) forms of computing.

In the second half of the twentieth century, film studies and film analysis became institutionalized at European universities. Given the increasing relevance of (personal) computing and graphical user interfaces over the last thirty-five years, it is high time to establish the discipline of interface studies and analyses in the humanities. This is necessary, because interfaces define today’s reality in manifold ways. Understood as the complex of various processes of connectivity and conduction, interfaces

10 See Thomas Steinmaurer, *Permanent vernetzt: Zur Theorie und Geschichte der Mediatisierung* (Wiesbaden: Springer VS, 2016), 305.

11 Mark B.N. Hansen, *Feed Forward. On the Future of Twenty-First-Century-Media* (Chicago: University of Chicago Press, 2015), 62.

12 See Florian Sprenger, “Die Vergangenheit der Zukunft,” in *Internet der Dinge. Über smarte Objekte, intelligente Umgebungen und die technische Durchdringung der Welt*, ed. Florian Sprenger, and Christoph Engemann (Bielefeld: Transcript, 2015): 143-168.

13 Cramer, Fuller, “Interface,” 149.

14 For exceptions see Fuller, Matthew: “It looks like you’re writing a letter: Microsoft Word”, in: Matthew Fuller, ed., *Behind the Blip. Essays on the Culture of Software* (New York: Autonomedia, 2003),

11-37; Christian Ulrik Andersen, and Søren Pold, eds., *Interface Criticism. Aesthetics Beyond Buttons* (Aarhus: Aarhus University Press, 2011); Margarete Pratschke, “Interacting with Images. Toward a History of the Digital Image: The Case of Graphical User Interfaces,” in *The Technical Image. A History of Styles in Scientific Imagery*, eds. Horst Bredekamp, Vera Dünkel, and Birgit Schneider (Chicago: University of Chicago Press, 2015), 48-57; Teresa Martínez Figuerola and Jorge Luis Marzo, eds., *Interface Politics* (Barcelona: Credits, 2016); Florian Hadler and Joachim Haupt, eds., *Interface Critique* (Berlin: Kadmos, 2016); Jan Distelmeyer, “Machtfragen. Home Entertainment und die Ästhetik der Verfügung,” in *Film im Zeitalter Neuer Medien, Teil II: Digitalität und Kino*, ed. Harro Segeberg (Munich: Fink Verlag 2012), 225-251.

*carry* – in every sense of the word – the global computerization of living conditions. Interface processes transmit, channel, bear, support, sustain, head, conduct, promote, and lead. A vital role in this context is still played by graphical user interfaces which amount to something like the blockbusters of today’s visual politics.

Graphical user interfaces inform us (to some extent) of the real and the imaginary, the well-prepared and consequential relations between humans and computers as applied in computers. Studying their complicated interface politics and ordinary manifestations like graphical user interfaces in particular, allows for the computer to be realized as a particular “power machine”<sup>15</sup>, which enables us to examine a key component of computers and computerized things /beings/environments: programmability.

## OPERATIVE IMAGES AND DEPRESENTATION

The interdependence of aesthetics and dispositifs demands that attention be paid to the special status of these images and signs that – to quote a *Windows 10*-commercial

from 2015 – “help you do your thing”<sup>16</sup>. Of course, these so-called “computer icons” could likewise be symbolic, depending on the specific interface design. Regardless of the potentially iconic or symbolic character of these images and signs, all clickable or touchable appearances correspond to Peirce’s idea of indices.<sup>17</sup> These images and signs must somehow have a physical relation to the presented processes of computing, to the interior telegraphy of the computer; they “show something about things, on account of their being physically connected with them”<sup>18</sup>. They otherwise simply would not work. To specify this indexicality, it is helpful to consider the difference between what Peirce called a genuine index and a degenerated index, because graphical user interfaces combine both forms of Peirce’s indexicality.

Graphical user interfaces visualize what the computer offers to do in a particular way without, of course, showing what is actually happening ›inside‹ the machine. “Software, or perhaps more precisely OS,” as Wendy Chun has stated, “offer us an imaginary relationship to our hardware: they do not represent the motherboard or other electronic devices but rather desktops, files, and recycling bins.”<sup>19</sup> This is obviously true, but at the same time this relationship – de-presented by symbolic or iconic

15 See Jan Distelmeyer, *Machtzeichen. Anordnungen des Computers* (Berlin: Bertz + Fischer, 2017), 82-92.

16 <https://www.youtube.com/watch?v=j3ZLphVaxkg>, accessed August 30, 2017.

17 See Marianne van den Boomen, *Transcoding the Digital. How Metaphors Matter in New Media* (Amsterdam: Institute of Network Cultures, 2014), 37-41.

18 Charles S. Peirce, “What is a sign,” in *The Essential Peirce: Selected Philosophical Writings, Volume 2* (1893-1913), ed. The Peirce Edition Project (Bloomington: Indiana University Press, 1998), 5.

19 Wendy Hui Kyong Chun, *Control and Freedom. Power and Paranoia in the Age of Fiber Optics* (Cambridge, MA: MIT Press, 2006), 20.

signs – offers more than just an *imaginary relationship* to the working hardware of the computer, for instance, in the form of the motherboard. These clickable or touchable signs are simultaneously linked electronically to the inner processes of the machine, to its interior telegraphy, whose flow of electronic signals connects, among others, the motherboard to the indexical signs of the graphical user interface. This enables us to click/touch them, to start the promised and hidden algorithmic processes, which is why Frieder Nake calls them “algorithmic images”<sup>20</sup>. The contradictory character of these images and signs has led Marianne van den Boomen to coin the very fruitful term *depresentation*. They show what we can do without showing the “procedural complexity” and the multitude of requirements and consequences attached:

[T]he icons on our desktops do their work by representing an ontologized entity, while de-  
representing the processual and material complexity involved. This is the way icons manage computer complexity, this is the task we as users (in tacit

conjunction with designers) have delegated to them.<sup>21</sup>

To address the special quality of these “symbolic handles”<sup>22</sup>, I have discussed them as “operative images”,<sup>23</sup> adopting a term coined by Harun Farocki to describe the production of imagery by machines for machines.<sup>24</sup> These images are, as Volker Pantenburg has put it, “completely absorbed into the process of the respective operation. They aren’t intended to be released separately, and strictly speaking don’t need to appear as images at all but emerge as the intermediate product of a wider technical process.”<sup>25</sup>

The adjective “operative” indicates that these images are included as efficient components of electronic technical operations.<sup>26</sup> With this in mind, Farocki underlines that these images are made for operative purposes and neither for “edification nor instruction” [“Erbauung oder Belehrung”<sup>27</sup>]:

In my first work on this subject, *Eye/Machine* (2001), I called such pictures, made neither to entertain nor to inform, ›operative images.‹ These are images that do not represent an

20 Frieder Nake, “The Semiotics Engine. Notes on the History of Algorithmic Images in Europe,” *Art Journal* 68, no. 1 (2009): 76-89.

21 van den Boomen, *Transcoding the Digital*, 36.

22 Cramer and Fuller, “Interface,” 149.

23 Translating of the term “operative Bilder” Farocki uses “operative images” as well as “operational pictures” and “operational images” – I will use here “operative” to stress the efficacy of these images and signs (see: Harun Farocki, “Phantom Images,” *Public. Art, Culture, Ideas* 29 (2004): 12-22 and <http://www.harunfarocki.de/installations/2000s/2003/eye-machine-iii.html>, accessed August 30, 2017.

24 See Distelmeyer, *Machtzeichen*, 92-98.

25 Volker Pantenburg, *Farocki/Godard. Film as Theory* (Amsterdam: Amsterdam University Press, 2015), 210.

26 This distinguishes Farocki’s operative image from Sybille Krämer’s concept of operational imagery and operational scripts (see Sybille Krämer, “Operative Bildlichkeit. Von der Grammatologie zu einer ›Diagrammatologie: Reflexionen über erkennen-des Sehen,“ in *Logik des Bildlichen. Zur Kritik der ikonischen Vernunft*, ed. Martina Heßler, and Dieter Mersch [Bielefeld: Transcript, 2009], 94-123.)

27 Harun Farocki, “Quereinfluss / Weiche Montage,” in *Zeitsprünge. Wie Filme Geschichte(n) erzählen*, ed. Christine Ruffert, Irmbert Schenk, Karl-Heinz Schmidt, and Alfreds Tews (Berlin: Bertz, 2004): 61.

object, but rather are part of an operation.<sup>28</sup>

This last point is crucial, and marks a productive difference between Farocki's concept and my application of it.<sup>29</sup> Whereas the operative images of the interface *mise-en-scène* may not be made for "edification nor instruction" in the classical sense, they do (and must), of course, instruct us as "users"<sup>30</sup> what is capable of being done. What they instruct, and are part of through derepresentation, is a kind of knowledge about computers, about their usage, and about us – an "implicit memory"<sup>31</sup>.

Operative images as derepresentations of computer performance are parts and thresholds of (at least) four types of mutually connected operations forming today's widespread computerization – that is, interface operations within the meaning of the multilayered interface facets:

1. Interface operations between various types of hardware and

software inside computers forming their interior telegraphy.

2. Interface operations between computers, leading to further co-action of hardware and software by protocol-driven networks.
3. Interface operations between computers and non-computer forms of interconnected materiality – such as bodies or technical artifacts in smart cities and their idea of programmatic control.
4. Interface operations that allow humans to use computers more or less consciously – hence, operations understood as technical, physical, artistic, and epistemological processes, including questions of the relationship between software and ideology raised by Wendy Chun<sup>32</sup>, Alexander Galloway<sup>33</sup>, and Cynthia and Richard Selfe.<sup>34</sup>

28 Farocki, "Phantom Images," 17.

29 For other uses of the term, see: Werner Kogge, "Lev Manovich – Society of the Screen," in *Medientheorien. Eine philosophische Einführung*, ed. Alice Lagaay and David Lauer (Frankfurt a.M.: Campus Verlag, 2004), 297-315; Ingrid Hoelzl, "The Operative Image – an Approximation," <http://mediacommons.futureofthebook.org/tne/pieces/operative-image-approximation>, accessed August 30, 2017.

30 Using the term "users" I would like to stress the point that the common distinction between "users" and "programmers" is highly problematic – especially when it comes to interfaces. As Wendy Chun has pointed out, "programmers are users" since "they create programs using editors, which are themselves software programs": "The distinction between programmers and users is gradually eroding, not only because users are becoming programmers (in a real sense programmers no longer program a computer; they code), but also

because, with high-level languages, programmers are becoming more like simple users. The difference between users and programmers is an effect of software." (Wendy Hui Kyong Chun, "On Software, or the Persistence of Visual Knowledge," *Grey Room* 18 (2004): 38.

31 See Jan Distelmeyer, "An/Leiten. Implikationen und Zwecke der Computerisierung," *Medien, Interfaces und implizites Wissen, Navigationen – Zeitschrift für Medien und Kulturwissenschaften* 17, no. 2 (2017).

32 See Wendy Hui Kyong Chun, *Programmed Visions. Software and Memory* (Cambridge, MA: MIT Press, 2011).

33 See Alexander Galloway, *The Interface Effect* (Cambridge, MA: MIT Press, 2012).

34 See Cynthia L. Selfe, and Richard J. Selfe, "The Politics of the Interface: Power and Its Exercise in Electronic Contact Zones," *National Council of Teachers of English* 45, no. 4 (1994): 480-504.

## (AESTHETICS AND LOGIC OF) REGULATION

As a final point, I would like to highlight just one aspect of the fourth type related to the special indexicality of these operative images, which brings me back to the question of how analyzing graphical user interfaces could help address the dicey character of computerization. Addressing this indexicality inevitably confronts us with the consequences of programmability, which I understand as perhaps the most thought-provoking characteristic of computers and computerized media /things/beings. Graphical user interfaces always propose ideas and representations of more than just the computer; instead, “[i]nterfaces and operating systems produce ›users‹ – one and all.”<sup>35</sup> And since all of our computer use has to be envisaged and enabled by programming, computer interfaces always empower users to regulate while at the same time forcing them to be regulated. Hence, the representing interface *mise-en-scène* shapes the aesthetic appearance of the computer as an *aesthetics of regulation* [Ästhetik der Verfügung].<sup>36</sup>

This aesthetics of regulation is marked by a particular power structure – a logic of regulation: Actively regulating users are being regulated

in a system, in which they have to play under the default rules with the provided tools and prerequisites. But this is no one-way street: Precisely because every computer operation relies on programs, all programmed functions, regulations, barriers, and presets are principally alterable and expandable by users or hackers. This processuality identifies dealing with computers as a power struggle with which its political issues may begin. Dealing with an interface *mise-en-scène* built on changeable and representing operative images confronts us with programmability by involving us in it. That is why an interface analysis of the various processes of connectivity and conduction leads to an investigation of programmability, as the basis for both defining processes and allowing for protest and redefinition. Hence, if we live in a world headed for “complete computerization”, what does it mean for every purpose of these general purpose machines we increasingly rely on, to necessarily depend on programming?

If, for instance, an “ambient intelligence” and “smart environment” require “the programming of autonomous agents of various kinds”<sup>37</sup>, what kind of autonomy is this with which “the question of the in- or ahuman, the question of our inexistence”<sup>38</sup> is associated? What kind of programs are at work, and who or what has set it up for what purposes?

35 Chun, *Programmed Visions*, 67-68.

36 See: Distelmeyer, *Machtzeichen*, 65-126.

37 Ulrik Ekman, “Complexity and Reduction – Interview with Davis Rokeby,” in *Ubiquitous Computing, Complexity, and Culture*, eds. Ulrik Ekman, Jay David Bolter, Lily Diaz, Maria Engberg,

and Morten Søndergaard (New York: Taylor & Francis Ltd., 2015), 199.

38 Ulrik Ekman, “Introduction,” in *Throughout. Art and Culture Emerging With Ubiquitous Computing*, edited by Ulrik Ekman (Cambridge, MA: MIT Press, 2013), 21.

And if programming these “autonomous” software agents makes it “impossible for the programmer and operator to capture all situations in advance and to connect them with specific instructions”<sup>39</sup>, what responsibility rests with the abstract rules provided by the programs? Simply put, whose purpose will reign?

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39 Kai Hofmann, and Gerrit Hornung, “Rechtliche Herausforderungen des Internets der Dinge,” in *Internet der Dinge. Über smarte Objekte, intelligente*

*Umgebungen und die technische Durchdringung der Welt*, ed. Florian Sprenger, Christoph Engemann (Bielefeld: Transcript, 2015), 355.

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