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# TAKING PART. TWO STEPS TOWARDS NETWORKED COMPUTERIZATION

By Jan Distelmeyer

*“That is why the term interface is so fruitful today: It helps addressing a variety of efficacious operations – from the material basis of all sorts of computers and networks up to the educational and epistemological or ideological guidance by user interfaces showing and instructing me what to do.”*

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# Step one: interfaces perform conduction

It is getting increasingly difficult to say what one is dealing with when dealing with computers and their aspired ubiquity. Especially because of their networked condition, the spread and diverse forms of computers – in all their stationary, mobile, embedded, sensor-supported, and increasingly quasi-autonomous (that is: programmatically evolving) modes – create a nearly overwhelming complexity. A simultaneity of highly effective modes of exhibited and unobservable power: As the obvious presence and handling of computers and their operative images (particularly visible through the spread of mobile computers such as smartphones) increases, so does the implementation of comparatively hidden processes of sensing, calculation, and conduction (emphasised e.g. in relation to smart cities, big data analyses, and machine learning) that is considered as “seemingly autonomous agents”<sup>1</sup> or the “becoming environmental of computation”<sup>2</sup>. The present computerization is characterized by the simultaneity of a special form of inaccessibility and functionality.<sup>3</sup>

1 Jennifer Gabrys, *Program Earth: Environmental Sensing Technology and the Making of a Computational Planet* (Minneapolis 2016), p. 65.

2 *Ibid.*, p. 4.

3 The suggestions and questions in this article are based on the

It is precisely to address this widespread complexity that the concept of interface proves to be extremely helpful. Its own challenging complexity helps to approach that of the advancing computerisation and cybernetisation. Interfaces involve various apparatus and processes. They create and enable modes of connectivity and transfer in different and mutually related forms: between hardware and hardware, software and hardware, software and software, and between those interconnected hardware-software relationships and everything (bodies, things, environments) that is not a computer. This last form includes people who actively and consciously relate to computers – ranging from using or programming computers and developing machine learning systems to questions of design<sup>4</sup> and the relationship between software and ideology. With such operations we humans decide and learn from experience what this could be: a computer, its user, a network, or “the digital”.

These different interface layers and processes are not only intertwined, but also share an indispensable basis: the conduction of electricity which enables signals to be transferred. This is why the conceptual history of the term interface

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presentation “Anteil nehmen. Interface-Prozesse des Netzwerks” at the annual conference of the German Society for Media Studies (GfM) 2018 in Siegen and on a more detailed paper entitled “From Object to Process. Interface Politics of Networked Computerization” in the proceedings of the conference „Interface Politics: After Post-Truth”, in: *Artnodes Journal* 24 (2019).

4 On the concept of the interface in design theory around 1970, see Roland Meyer’s essay in this issue. On interfaces as “diegetic prototypes” and imaging interfaces in future warfare, see Christoph Ernst’s essay in this issue.

and its roots around 1870 – introduced by the physicists James and William Thomson (later Lord Kelvin) to describe the conduction of energy – is so enlightening.<sup>5</sup> William Thomson's research on electricity and "interfaces between media of different conductivity"<sup>6</sup> led among other things to his famous work with the transatlantic telegraph.

Today the term interface allows us to describe the computer's "interior telegraphy"<sup>7</sup> (its inner processuality and conduction of signals) as well as its connections and distributed networks, its embeddedness, and its multifarious relations to us in the form of dealing with user interfaces, for example. Thus, in contrast to terms and concepts aiming at mathematical rules (like "algorithmic"<sup>8</sup>) or a deliberately general description of global effects (like "technosphere"<sup>9</sup>, "implication"<sup>10</sup>, or "the stack"<sup>11</sup>), the con-

cept of interface, with its specific intricacy and history (in the physics of the 19<sup>th</sup> century and since the late 1950s in computer technology and computer science<sup>12</sup>), places certain requirements on an analysis and thus grants it special possibilities: It demands and enables to remain alert to the different interface levels and their relationship to each other. Interfaces constitute the technical basis for any implication of computers in support of the proclaimed technosphere. And interfaces constitute the material (and industrial), aesthetical, as well as ideological basis for an understanding, what I can actually do with a computer.<sup>13</sup>

Hence, investigating the interface complexity means combining concrete and material questions of technology and (infra)structures with cultural, political, and epistemological ones. The question of interfaces leads to certain, isolable conditions and processes of conduction as well as to the complexity of the cooperation formed by them. This is its heuristic advantage and the challenge of *interface analysis*. The interface concept opens both an investigative horizon and a mode of analysis, which always asks for further interface levels and processes involved in the phenomenon I am currently investigating. What other interfaces are in play? What else is involved?

5 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, Steve Jones (New York 2011), pp. 163–175; Branden Hookway, *Interfaces* (Cambridge, MA 2014), pp. 59–119.

6 Crosbie Smith and M. Norton Wise, *Energy and Empire: A Biographical Study of Lord Kelvin* (Cambridge, MA 1989), p. 212.

7 See Hartmut Winkler, *Prozessieren. Die dritte, vernachlässigte Medienfunktion* (Munich 2015), p. 294.

8 Antoinette Rouvroy and Bernard Stiegler, *The Digital Regime of Truth. From the Algorithmic Governmentality to a New Rule of Law*. La Deleuziana. *Online Journal of Philosophy* 3 (2016), pp. 6–27.

9 Erich Hörl, Introduction to general ecology: The ecologization of thinking, in: *General Ecology: The New Ecological Paradigm*, ed. Erich Hörl (London 2017), pp. 10–13.

10 Mark B.N. Hansen, *Feed Forward. On the Future of Twenty-First-Century-Media* (Chicago 2015), pp. 580–629.

11 Benjamin H. Bratton, *The Stack: On Software and Sovereignty* (Cambridge, MA 2016).

12 See Hans Dieter Hellige, *Krisen- und Innovationsphasen in der Mensch-Computer-Interaktion*, in: *Mensch-Computer-Interface. Zur Geschichte und Zukunft der Computerbedienung*, ed. Hans Dieter Hellige (Bielefeld 2008), pp. 13–15.

13 See Jan Distelmeyer, *Drawing Connections. How Interfaces Matter*. *Interface Critique* 1 (2018), pp. 27–28.

Where computers are at work, interfaces are at work – and even more so where they are networked. Against this background Christian Ulrik Andersen and Søren Pold speak of a metainterface: “Although the interface may seem to evade perception, and become global (everywhere) and generalized (in everything), it still holds a textuality: there still is a metainterface to the displaced interface.”<sup>14</sup> In order to emphasize the enduring materiality, processuality, and the different (observable and unobservable) levels of interfaces, which also act when (user) interfaces disappear or become ubiquitous, it is advantageous, then, to further strengthen the concept of interface. Especially since the origin of this concept and its historical proximity to conduction literally request different modes of conduction to be taken into consideration.

My conceptual consequence is: *interfaces perform conduction*. The semantic field of conduction includes the physical meaning of transmission referred to in “the theory of electric conduction”<sup>15</sup> (or in the basic function of semiconductors), as well as the social, educational, religious and political meaning of leadership and guidance, to which such terms as political conduction or “algorithmic conduction”<sup>16</sup> refer. That is why the term interface is so

fruitful today: It helps to address a variety of efficacious operations – from the material basis of all sorts of computers and networks up to the educational and epistemological or ideological guidance by user interfaces showing and instructing me what to do.

## Step two: from file to programming flow

This first step – a brief reminder of the advantages of the multi-faceted and thought-provoking interface concept, which are particularly evident in the proximity of *interface* and *conduction*<sup>17</sup> – allows reflections on the interface politics of post-industrial values.<sup>18</sup> They arise in

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17 In a comparable way James Ash speaks of „transduction“. Ash combines the technical (“transduction refers to a process of ‘convert[ing] one kind of energy into another kind of energy’”) with the philosophical meaning (“[f]or Simondon, transduction is a process ‘in which activity gradually sets itself in motion, propagating within a given domain, by basing this propagation on structuration carried out in different zones of the domain [whereby] each region of the constituted structure serves as a constituting principle for the following one’”). Thus, Ash understands “transduction” as “a process by which objects in interfaces are organized by designers to produce particular qualities for other objects in that interface and for the people using that interface” (James Ash, *The Interface Envelope. Gaming, Technology, Power* [New York 2015], p. 28). In contrast to this emphasis on user interfaces, the approach proposed here and its connection to ‘conduction’ emphasizes the multi-layered quality of the interface complex, which also includes Ash’s understanding of interfaces as (infra-)structures and environments, in which objects are arranged and processes of transduction, transmission and mutual impact, take place.

18 On the design of user interfaces as a technique of motivation and habituation for post-industrial subjects, see Timo Kaerleins’s essay in this issue.

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14 Christian Ulrik Andersen and Søren Pold, *The Metainterface. The Art of Platforms, Cities and Clouds* (Cambridge, MA 2018), p. 10.

15 Vannevar Bush, *Memex Revisited*, in: *New Media, Old Media. A History and Theory Reader*, ed. Wendy Hui Kyong Chun and Thomas Keenan (New York 2006), p. 90.

16 Bratton, *The Stack*, p. 52.

the programmatic correlation between demonstration and seclusion: of interface operations difficult or impossible to observe (networked modes of computing and *autonomous agency*) on the one hand and the dissemination of operative images and derepresentations (understood as an ongoing oscillation between displaying computer agency and at the same time concealing “the processual and material complexity involved”<sup>19</sup>) on the screens of the spreading smartphones on the other hand. I would like to make a few fragmentary proposals on how this correlation can be addressed and questioned. My approach is to start with the most popular, the most obvious, and the most tangible – with the front-end and its interface politics of derepresentations, performed as an “interface *mise-en-scène*”<sup>20</sup>.

A historical and persistently effective example to discuss post-industrial value creation processes is the shift from object-oriented to process-oriented interaction in interface *mise-en-scènes* since 2007. This shift is of great but hardly noticed importance for the status and functionality of the computers with which the value creation of platform or capture capitalism runs.<sup>21</sup>

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19 Marianne van den Boomen, *Transcoding the Digital. How Metaphors Matter in New Media* (Amsterdam 2014), p. 36.

20 See Jan Distelmeyer, *Machtzeichen. Anordnungen des Computers* (Berlin 2017), pp. 81–92.

21 See Till A. Heilmann, Datenarbeit im “Capture“-Kapitalismus. Zur Ausweitung der Verwertungszone im Zeitalter informatischer Überwachung. *ZfM – Zeitschrift für Medienwissenschaft* 13 (2015), pp. 35–47; Dal Yong Jin, *Digital Platforms, Imperialism and Political Culture* (New York 2015); Nick Srnicek, *Platform Capitalism* (Cambridge 2017).

The introduction of the iPhone and its first operating system marked a historic turning point in more than one respect. The interface correlation of screen, operative images, mouse, and keyboard, presented in 1983 by the Apple Lisa (enabled, of course, by the work of Xerox PARC), was replaced in 2007 by a touch-sensitive screen, operative images, and my body – promoted by Apple as “letting you control everything with just your fingers”<sup>22</sup>. Controlling means interfacing by modes of conduction: At certain parts of the capacitive touch screen marked by operative images, my physical contact leads to altered electrical voltage conditions or capacities. A touching act of conduction is the very start of the commands and program sequences attributed to these operative (conducting) images.

This enables a new performance of an interface *mise-en-scène* that is presented in a grid pattern on the so-called “home screen”. This shows which apps are available to me *with just my finger* and furthermore how I handle this computer is primarily how I handle apps. The operative images of this interface *mise en-scène* do not derepresent files or folders, but rather programs. And this, in my opinion, is at least as important as establishing the touchscreen: the change from object-oriented interaction to process-oriented interaction.

Now interaction no longer starts with objects such as folders or files that wait

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22 See Ripley M. Louise, Trickster Fiddles with Informatics: The Social Impact of Technological Marketing Schemes. *Journal of Systemics, Cybernetics, and Informatics* 6/1 (2008), p. 91.

for me on my desktop and may assure my status as owner or central reference figure of a *personal computer* and “N(YOU) Media”<sup>23</sup>. On the home screen everything begins with a program that I always have to select and start first to find my “digital objects”<sup>24</sup> in it – to get to my music, my photos, or my notes in the flow and regime of the installed program.<sup>25</sup> Not until 2017 the new operating system iOS 11 for iPhones and iPads provided a kind of comeback of the object with the new app named “Files”, which in 2010 was preceded by the app “My Files” on Android systems. Object orientation returns here not as default (as with the desktop), instead as a program like and next to many others.

This interface *mise-en-scène* of smartphones and tablets of various brands, inspired and urged by the iPhone, has initiated and conducted a new way of dealing with computers. A new gesture and order of availability: not to proceed from objects (like a file) but from processes and programmatic structures represented by operative images of apps. Of course, even in object orientation nothing works without the primacy of programs, be-

cause every file management system of a desktop environment like the “Finder” is nothing but a running program. But the gesture is different now. Process/program first: In the beginning, the mass/power of the programs dominates, from which I can choose, but which I do not own, move and create, as I did with my files and folders. My digital objects only appear under the condition of the program responsible for them. Instead of owning these programs, the goods of the software industry, I can acquire the right to their lawful use.

In addition, processes are also gaining in importance here, as many apps (already in 2007) depend on a running Internet connection. The advertised promise of the iPhone, “it ushers in an era of software power”<sup>26</sup>, echoed by this new performance of process orientation, is closely related to another paradigm shift: to the always-on of widespread (and not only mobile) forms of permanently networked computers and their uninterrupted energy flow as well as their uninterrupted energy consumption. Although “the voracious energy consumption of digital systems and its current and potential interactions with climate policies raise many questions”, as a study published in 2019 stresses, “the material footprint of digital technology is largely underestimated by its users, given the miniaturization of equipment and the ‘invisibility’ of the infrastructures used. This phenomenon is reinforced by the widespread availability of services on the ‘Cloud’, which makes

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23 Wendy Hui Kyong Chun, *Updating to Remain the Same. Habitual New Media* (Cambridge, MA 2016).

24 With reference to Yuk Hui I understand digital objects in this context as materialized forms of a large amount of “data and metadata, which embody the objects with which we are interacting, and with which machines are simultaneously operating” (Yuk Hui, *On the Existence of Digital Objects* [Minneapolis 2016], p. 48).

25 The personal pronoun ‘my’ is a little misleading here, not only for copyright reasons, but also because of the special nature of digital objects. Nevertheless, I remain with it, because it helps to describe the gesture of the interface *mise-en-scène* in its transformation.

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26 See Ripley, *Trickster Fiddles with Informatics*, p. 91.

the physical reality of uses all the more imperceptible and leads to underestimating the direct environmental impacts of digital technology.”<sup>27</sup>

To be is to produce traffic. And its commodification is one of the most promising business models of post-industrial production processes. The iPhone is not only a paragon for the triumph of those mobile, sensory, and quasi-autonomous active computers called smartphones. It is also a role model for the contemporary computer, that is, or should be, always connected to the Internet – and thus to further interface processes of hardware and software, to cables, server parks, and last but not least the “protocol interface”<sup>28</sup>.

As computer efficiency can therefore increasingly be outsourced via online services and “cloud” computing, the priority of incessant networking also allows the ongoing change in the status and location of the prioritized processes: programs, software. Software can now appear even less as a product to buy and own, as good and property, but as a processing and subscribable (outsourced) service, as Irina Kaldrack and Martina Leeker have argued.<sup>29</sup>

My very brief suggestion now is that

these programmatic, structural, and ecological changes of networked computers have also been supported by the interface *mise-en-scène* since 2007. Since access to my data is only possible through an obvious entry into a running program (and software as a service), this shift from object- to process-orientation supports to habituate to new conditions of conduction – to new man-machine(-world) relationships in the *era of software power*.

From object to process, from file to programmatic flow: The development that dealing with a computer should become more and more synonymous with dealing with a network can thereby appear both productive and natural. Just as my digital objects are now only and ostentatiously present in the flow of various and responsible programs, my data is increasingly no longer stored on my computer, but in the distributed and conducted computer network and its formations of platforms, services, and the like. This network – interface processes, programmatic systems, and circuits all of which tend to remain hidden and perhaps perceived as comparatively immaterial<sup>30</sup> – seems to be more than and at the same time increasingly identical with my computer. In this I am to take part.

With regard to a post-industrial economy based on many traditional forms of industry, a whole series of questions arise from this interface politics, three

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27 The Shift Project, *Lean ICT: Towards Digital Sobriety*, 2019, [https://theshiftproject.org/wp-content/uploads/2019/03/Lean-ICT-Report\\_The-Shift-Project\\_2019.pdf](https://theshiftproject.org/wp-content/uploads/2019/03/Lean-ICT-Report_The-Shift-Project_2019.pdf), p. 10.

28 Alexander R. Galloway, *Black Box, Black Bloc*, in: *Communization and Its Discontents: Contestation, Critique, and Contemporary Struggles*, ed. Benjamin Noys (New York 2012), p. 243.

29 Irina Kaldrack and Martina Leeker, *There is no Software, there are just Services: Introduction*, in: *There is no Software, there are just Services*, ed. Irina Kaldrack and Martina Leeker (Lüneburg 2015), pp. 9-10.

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30 See Sebastian Gießmann, *Die Verbundenheit der Dinge: Eine Kulturgeschichte der Netze und Netzwerke* (Berlin 2014), p. 427.

of which I would like to conclude here: If I own neither the network nor the programs containing my data, how can I claim ownership of my data? To what extent is ownership on and through platforms tied to and established by interfaces (their industry, performances, and matter)? Which deeply material and energy-consuming infrastructures enable immaterial work in capture capitalism?

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