SPECIAL SECTION:

MATERIALITIES OF THE INTERFACE

Usually, the relationship between user interfaces and materiality is addressed via a problematisation of differences. Whereas user interfaces are often considered 'surfaces' which hide the 'materiality' of the 'deep' technological structures in order to establish a more 'intuitive' or 'fluid' user experience, critical perspectives on user interface analyses such processes as a form of 'concealment' of the material side of these technologies. Breaking with common perceptions, user interfaces are considered to be technologies which implement an artificial 'naturalness' of their use and consequently their use as a consumer product. Yet, to criticise the, much quoted, 'invisibility' or 'transparency' of interface-materialities is in turn committed to dualistic assumptions such as 'frontend/backend' or 'human/machine.' By now, it is generally accepted that user interfaces cannot be primarily regarded as technologies of controlling a computer, but as networked configurations which enable complex human-machine interactions. In consequence, challenges to this kind of 'critical' thinking have emerged. Critical interface theory has to take into account the fact that the materiality of interfaces has changed considerably (and is constantly changing). With the rise of the internet of things, the rapid development of machine learning and the subsequent proliferation of 'smart devices' and their respective 'medialities,' it is no longer enough for a critical approach to uncover a materiality 'behind' the interface. For example, in the era of so-called 'Natural User Interfaces' it is necessary to transform old distinctions like those between 'semiotic' and 'material' structures. The user interfaces of today are technologies in which semiotic, cognitive and material aspects of digital media technologies converge in habitualised practices ('interactions'), e. g. now ubiquitous gestures like 'pinch-to-zoom'. Hence, to engage in a critical interface-theoretical discussion leads almost necessarily to a discussion on the status of materiality in media theory in general. A critical perspective on interfaces must discuss theoretical notions of materiality with regard to everyday practices as well as with regard to highly specific forms of interface use. This includes a consideration of the materiality of practices and media that are usually not part of the core area of the paradigm of the traditional GUI (Graphical User Interface). Interesting theoretical notions can be found e. g. in specific media theories such as film theory or general media theory and media philosophy.

The following essays address this issue by giving insights into the contemporary discussion about the materiality of interfaces. In the first article Christoph Ernst discusses the concept of "material metaphors" as it is proposed by Marianne van den Boomen. For Ernst, van den Boomens concept of material metaphor ignores the boundary between non-discursive and discursive aspects of the production of meaning in interfaces. Although the idea of material metaphors is problematic, insofar the 'materiality' of interface metaphors is positioned against a more traditional view of the semantics of interfaces, van den Boomens idea is on the right track giving interface theory a powerful concept to rethink the materiality of interfaces. In the second essay, Konstantin Haensch uses the example of smart speak-

ers to show how these technologies fit into everyday life as "strategic media objects." Based on the fact that the transformation of everyday objects represents a "new" way of interfacing with material culture, the essay shows to what extent new interface regimes are implemented. The essay calls for a critical analysis of these objects as visible "things" (and not invisible "objects"), drawing on ideas derived from media philosophy and discourse analysis. In the third and final text, Elisa Linseisen discusses the epistemic practice of zooming with regard to its interface-theoretical aspects. In contrast to the old distinction between "surface" and "depth" high-resolution interfaces represent a new media culture in which practices of interaction, change and creation of objects are in the foreground. Using a case study covering a period from 1958–2020, Linseisen argues that zooming can be used to grasp a media culture in which differences arise from the materiality of high-resolution digital images.

The three essays of this special section are based on a panel of the German Society for Media Studies (GfM) working group on Interfaces that took place during the annual conference of the GfM at the University of Köln in September 2019. The authors are grateful to the other panelists, Till Heilmann (Bonn) and Sabine Wirth (Marburg), for their contributions to the panel and its conception, and Karoline Kozlowski, for her great help during the finalization of the manuscript.

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GIRLS AND THEIR CATS: ZOOMS – HIGH RESOLUTION – MAKING A DIFFERENCE

By Elisa Linseisen

"High resolution image surfaces are overfull with data – pixels – and zooming in them is a process of inquiry that leads to meaningful and sensual exclusions, distortions or intensifications."

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Making a Difference

1957, 1998, 2020 – based on these seemingly randomly chosen dates I will tell a media-philosophical story, maybe a *science fiction* in the sense of Donna Haraway, about various zooms in visual worlds, questioning a specific media materiality: the high resolution of digital interfaces. This narrative is neither teleologically nor media-ontologically defined, but rather uses book pages, data environments and windowpanes to span a conceptual field in order to illustrate how high-resolution interfaces of smartphones, tablets, laptops, smart TVs and advertising surfaces line our reality. Screens do not disguise reality in a delusive, simulated or hyperreal way. This requires a theoretical view to abandon the idea (dedicated to Platonic philosophy) that a deeper (or more) meaning is hidden behind or beneath the surface of an image. I argue that HD zoomable user interfaces show that movement in the high-resolution image initiates the potential for interaction, change and creation – rather than an abstraction or complete control – of reality. High resolution image surfaces are overfull with data – pixels – and zooming in them is a process of inquiry that leads to meaningful and sensual exclusions, distortions or intensifications. I will correlate zooming and high resolution in order to refer to processes of differentiation in these data-dense images, which must not be recognised as a misrepresentation of reality, but rather as its exploration and the entanglement in it, and which, as my chosen examples will show, begin with girls and often also with (their) cats.

1957

"The first picture, from which we start, is as we said already one of a child sitting in front of a school, with a cat on her lap."[1] The girl and her cat are appearing on the first page of the children's book *Cosmic View: The Universe in 40 Jumps* by the reform pedagogue and activist Kees Boeke, only to vanish again from the book on the third page: "It is surprising that already in this forth illustration the child, who filled the greater part of the first picture, has completely disappeared."[2] Soon after, all that remains is imagination – "there is the little girl: we know she must be there, but we cannot see her!"[3] The girl and the cat have dissolved from a concrete representation into an abstract memory of their visibility, smaller than or equal to one pixel of the depicted, which comprises – staggered in size, the girl and the cat, top views of cars, a blue whale, houses and fields, the cartography of the Netherlands, the free-standing earth globe and the solar system and – in the opposite direction – a mosquito in the fur, then the skin and cell structure of

1 Kees Boeke, Compton, Arthur H, *Cosmic View: The Universe in 40 Jumps* (New York 1957), p. 9.

2 Ibid., p. 12.

3 Ibid., p. 14.

the cat. By turning the pages of the book, different scales of the world viewed are related to each other. The girl's dissolution into the information density of the representation of a world surrounding her is, according to Zach Horton, a media-theoretical problem of high resolution. A ratio between representation and medium has been introduced in COSMIC VIEW between the resolution, i. e. the quality of representation of the ink-printed paper and the resolution, i. e. the detail of the reality depicted: "Resolution […] is highlighted as a material property or relationship between two scales: the scale of the book in the reader's hands and the scale of the surface [of reality] that each page depicts."[4] The illusory trick, namely that the girl is present with her cat, even though she is no longer visible on the page of the book, reveals the selective negotiation of every representational relationship, i. e. the medium itself. COSMIC VIEW explores this process of mediation in 40 different views, each providing different details of reality in alignment or absence with the granularity of the illustration. According to Horton, the book would remind us that we cannot change scales without gaining as much information about reality as we lose about it. These contingencies call for a constellation of reception that negotiates the differences of the variables in the process (of turning the pages and weighing thoughts) and that does not passively and contemplatively surrender to a self-contained world view: "The reader must work within the material limitations of resolution and the discontinuity between scales, yet generate virtual connections between these scalar slices of the universe."[5]

1998

In 1998, a girl draws similar virtual relationships between different parts of a universe when she attends the exhibition 'Digital Earth' in a local museum. Using a head-mounted display and a data glove, the girl is able to explore reality, which first reveals the solar system and, within it, the earth globe against a black background. Due to the ever-increasing resolution, the girl changes her field of vision and moves from continents, countries, cities, houses to a scale that corresponds to the world she lives in. Inquisitive, during her virtual exploration of the world, the young exhibition visitor does not look for the well-known house cat but prefers to research bison and bighorn sheep. She constantly requests new information in order to further discover reality, and with her curiosity she shapes the image surrounding her, the virtual reality of a digital earth, which Al Gore in turn spelled out for his audience at a lecture at the California Science Center in Los Angeles with a similar pedagogical approach as Boekes.[6] Once again it is

4 Zach Horton, Composing a Cosmic View: Three Alternatives for Thinking Scale in the Anthropocene, in: *Scale in Literature and Culture*, ed. Michael Tavel Clarke and David Wittenberg (Berlin and Heidelberg 2017), pp. 35–60.

5 Ibid., p. 53–54.

6 Al Gore, The Digital Earth: Understanding our Planet in the 21st

about the relationship between different resolutions, namely human perception, which Gore concedes a "very high resolution" when the information density of the reality, which has a much higher resolution, has been correctly formatted or compressed. This requires, according to Gore, a "multi-resolution, three-dimensional representation of the planet, into which we can embed vast quantities of geo-referenced data."[7] The girl as epistemological proxy, placed in the middle of the narrative as well as in the middle of the digital earth, demonstrates that this form of representation must be designed to interact with data, to bring data sets into relation to each other, in order to make the "complex interaction between humanity and our environment" comprehensible and its various proportions negotiable.[8]

2020

The tactile and tangible nature associated with the change in the level of detail of her environment seems to be a given mode of world exploration for a seven-year-old girl who, some twenty years after Gore's vision, is standing at the window on the third floor of her parents' apartment and looking into the backyard of the house. The girl's gaze wanders from the rustling leaves of the chestnut tree to the neighbour's daughter's bicycle, until her attention is focused on a prowling, black-grey cat. The girl is interested in the animal, she wants to take a closer look at it and therefore places her thumb and index finger on the glass pane "as if it were a touchscreen:" "*The girl spreads her two fingers, moving them back and forth in what is called the 'pinch-to-zoom' gesture.*"[9] Curator and theorist Doreen Mende recognizes in her description of the child's behaviour how the internalised, techno-physiological automatism – the pinch-to-zoom gesture – becomes a mental apparatus for exploring the world, even if there is no interactive display at all, but rather the analogue window-pane that establishes the relationship to reality: "The code of touch programs the brain into a screen of producing a world."[10] The screen, mentally stretched open by the movement of the two fingers, once again aligns the graininess of reality with the dissolving capacity of perception and, based on this relationship, establishes reality anew by 'framing', i. e. medializing, a certain section of it. Following Mende, with a brief reference to Virilio, the pinch-to-zoom gesture is connoted as imperial imagination, rendering the distance accessible, without any restriction: the framing of the emerging reality and the effortless navigation within it does not reach its

Century. *Digital Earth* (1998) www.digitalearth .gov/VP19980131.html, access: May 31, 2020.

7 Ibid., p. 1.

8 Ibid., p. 2.

9 Doreen Mende, The Code of Touch: Navigating Beyond Control, or, Towards Scalability and Sociability. *e-flux* (2020); https://www.e-flux.com/journal/109/331193/the-code-of-touch-navigating-beyond-control-or-towards-scalability-and-sociability/, access: May 31, 2020; emphasis in original.

10 Ibid.

limits, nor does the supposed knowledge about it; the screen is no longer an "*interface that serves as a portal of connectivity to the world outside*," but an "*intraface*" and connects a physical (gaze/touch) situatedness within reality to the promise of its control.[11]

Zoom Pedagogics, Zoom Politics

Mende is not the only one to raise a political, representation-critical issue in the exploration of reality through the media's weighing up of degrees of resolution. It seems to be a well-established commonplace in current theories concerning the relationship between humans, non-humans and the environment: namely that zooms are not suitable for addressing reality's complexity via media-ecological or network-like, lateral connections, even if, or precisely because, 'the large' and 'the small' can be easily related to each other. Before I elaborate further on this point, I would like to briefly summarise what unites the three stories described in my argument, and why I place them in the context of a representational-critical unease with zooms. One characteristic that brings the examples from 1957, 1998 and 2020 together is that none of them are zooms that negotiate scalability through the relationship between media resolution and the level of detail of reality. Indeed, Horton even chooses the well-known zoom from Charles and Ray Eames' animation 'Powers of Ten' (1977), which moves from humans to the galaxy and then on a cellular level, as a counter example to *Cosmic View*.[12] More on that in a moment.

First of all, my three examples deal with relations of reality, e. g. between the Netherlands and the solar system, a museum and the planet and of course between the girl and a cat. Further, the discussion of these different realities in all of the stories is carried out through a haptic practice: turning pages, the data glove in surrounding visual environments and the pinch-to-zoom gesture on the glass pane. What all three examples have in common, moreover, is that a girl was chosen as the protagonist in order to specify the location 'in the midst of a visual reality', an "intraface" (Mende), which seems to be oriented less towards representation and more towards interaction, albeit mental or virtual. Finally, a pedagogical claim can be identified which aims at conveying complexity and which opposes an imperial position of overview or the appropriation of a density of details of reality – its high resolution – in the scale of universe/earth/human/cell.

Following the pedagogy of the described examples is the mentioned cultural and media science zoom criticism, which has its most prominent advocate in Bruno Latour. Latour nurtures

11 Ibid.

12 Horton, Composing a Cosmic View, p. 55.

an immense epistemological suspicion against zooms, which he describes as "disastrous metaphor"[13], which "poisons thinking sustainably."[14] Zooms would reduce the complex relationships of reality, the different scales of the universe, to a hierarchical gradation and, by means of continuous movement from small to large, would suggest their anthropocentric controllability.[15] 'Powers of Ten" or the Google Earth zooms, which are undoubtedly anticipated in Gore's fictitious visit to the "Digital Earth" exhibition, would smooth out scalar differences in reality and create an even, undisturbed surface, which would immediately give rise to platonic criticism of an hallucination that conceals the diversity of reality: For Latour, the zoom is completely implausible, a figment of the imagination, an uncritical effect, "an assemblage as artificial as a fake perspective in a stage set."[16]

As already mentioned, Boecke's children's book *Cosmic Views* is considered a positive counterpart to the populistic zoom, calling on its pedagogical impetus to use the mental and media sidesteps to reveal the gaps that arise when one tries to grasp the complexity of reality. Mende, too, argues against the continuity of the zoom, which she supplements by a frameless representation. As a counterexample, she refers to the cinematic theory of montage and to the political potential of making the joints between images visible. Montage, however, does not only unfold the power of a (moving) image during projection (in the cinema), but, according to Mende, at the editing table, where the image can be perceived as "a working instrument that creates a space-time of thought"[17], similar to, for example, turning pages in COSMIC VIEW or structuring data in 'Digital Earth': "It turns the image viewer into an image-thinker-cum-worker."[18] (ibid.) According to Mende, simply pressing a touch screen is „the least of all possible labor-exhaustive activities – *kinderleicht*."[19] This assessment that zooms are to be used "as uncannily easy as the most powerful tools of control"[20], brings me back to the beginning of my argument, namely to the most qualified recipients of such zooms: the girls and their cats.

Little Girls …

If one had nothing to add to the zoom criticism just outlined, then the girls with their cats could, as a naive type of recipient, complement it, if they were

13 Bruno Latour, Anti-Zoom, in: *Scale in Literature and Culture*, ed. Michael Tavel Clarke and David Wittenberg (Berlin and Heidelberg 2017a), pp. 93–101, here 98.

14 Bruno Latour, *Kampf um Gaia: Acht Vorträge über das neue Klimaregime* (Berlin 2017b), p. 235; my translation.

15 Bruno Latour, Zoom auf Paris. Die sichtbare Stadt, die totalisierte Stadt, die unsichtbare Stadt. *Lettre International* 92 (2011), pp. 52–53; Bruno Latour, *Eine neue Soziologie für eine neue Gesellschaft: Einführung in die Akteur-Netzwerk-Theorie* (Berlin 2014); Latour, Anti-Zoom; Latour, *Kampf um Gaia*.

16 Latour, Anti-Zoom, p. 98.

17 Mende, The Code of Touch.

18 Ibid.

19 Ibid.

20 Ibid.

perceived, for example, in the sense of Siegfried Kracauer's 1928 described "little shop girls".[21] Narcotised by the concealing social ideology of the Weimar Republic's cinema, Kracauer argues that any political potential of the projected images is suffocated by the female innocence. The essay "The little shop girls go to the cinema" has, as Kracauer explains, similar pedagogical intentions as the given examples and "is conceived as a small collection of samples whose textbook cases are subjected to moral casuistry."[22] However, the moral lessons taught by Boeke, Gore and Mende, which we have encountered above, seem to be convinced, quite the opposite of Kracauer, of the curiosity, the critical engagement and above all the involvement of the girls in the knowledge production process of the images. The girls act as a participatory counterpart to the imperial construction of reality, for example because they are not only depicted in *Cosmic View*, but were also involved in the production of the book, a result of Boekes' communitarian and anarchist educational doctrine;[23] or because the girl includes her own data in the composition of "Digital Earth," the virtual reality described by Gore.[24]

The three scaling aspects that I presented are inseparably linked to world exploration and the girl in particular, which does not follow a patriarchal order, but rather *queers* it, is therefore, also for Mende, in a position "to make sure that we do not leave navigational tools [like the pinch-to-zoom gesture] to the world-destroyer."[25] The girl creates reality – "not only one universal world that the imperial navigator has claimed, but rather many worlds" and is capable of doing so, if one follows Mende further, not because she obeys pedagogical guidelines so well, but because she appropriates and rededicates the existing, supposedly ideologically intended modes of world exploration via a subversive strategy of "unlearning" and opens them up for a changed world view. The girl is not the professional engineer or scientist who authorizes the representation of a reality, but rather takes an accepting but yet acting role of receiving and applying, which, according to the established assertion, also produces reality through a certain disposition to modify given media forms.

Potentials of High Resolution

This possibility of rededicating existing visual worlds allows me to return to zooms, or more specifically: to internal movements within the image, which, through similar finger pointing as the pinch-to-zoom gesture, currently and ubiquitously determine the reception of zoomable user interfaces. In conclusion,

21 Siegfried Kracauer, The little Shopgirls go to the Movies, in: *The Mass Ornament: Weimar essays*, ed. Thomas Y. Levin (Cambridge, MA 1995 [1928]), pp. 293–304.

22 Ibid., p. 294.

23 Horton, Composing a Cosmic View, p. 52.

24 Gore, The Digital Earth, p. 2.

25 Mende, The Code of Touch.

I would like to argue that precisely such simple forms allow effortless navigation within the supposedly frameless cadre of digital screens that make the potential for interaction, change and the creation of reality, which was called for at the outset, feasible. The properties of the executed non-zooms between book pages, in data environments and on glass panes can then, in the sense of 'unlearning', be understood as digital zooms – i. e. continuous, calculated movements as a negotiation of different scales. In order to escape the accusation of illusion, zooms into digital screens must be understood less as *forms* of representation of and more as *formats* of interaction with reality – digital formats that produce knowledge in the process of reformatting and constant rescaling; elsewhere I am using the term "epistemological zooming".[26] Through epistemological zooming it becomes evident that reality is embedded in the data layers, in the density of information, in the processable scope for re- and post-processing, in the incompatibilities and consequently in an operative understanding of visuality, which seems to be stimulated by digital materiality – by high resolution. Knowledge must then be gained practically and materially, through exploring and questioning the digital images: Knowledge process is image processing. Mende also argues in this direction when she refutes her assertion that digital images appear frameless on displays and when she recognizes the plurality of frames in the high-resolution of the images, in the separation of each individual pixel from the other. The potentials that seem to be hidden between the pixels and not behind or below the surface of the image, but within it, require zooming, in order to unfold their reality-exploring and critical potential: "One can see these tiny frames by zooming into the digitized or computer-generated image, as if looking behind the scene from the front; the extreme close-up disrupts the image's representational function by imposing its own condition of producing."[27] Following the aforementioned montage theory according to Esfir (Esther) Schub, Mende emphasises a social dimension of scalability, in terms of collective work, if one correlates, as I also suggest, zooming with the materiality of high resolution – "the excess of thousands of pixel frames per centimeter (pixel density) introduces a mass scale of practices of mediated communication."[28] Revealing the condition of fabrication would reveal "the enmeshment of technology with politics, violence, images, and labor."[29]

26 Elisa Linseisen, *High Definition. Medienphilosophisches Image Processing* (Lüneburg 2020); Elisa Linseisen, Epistemological Zoomings into Post-Digital Reality, or How To Deal With Digital Images? Mimesis as a Methodological Approach, in: *Re-/Dissolving Mimesis*, ed. Sebastian Althoff, Elisa Linseisen, Maja-Lisa Müller and Franziska Winter (Paderborn 2020b), pp. 158–85.

27 Mende, The Code of Touch.

28 Ibid.

29 Ibid.

… and Their Cats

In conclusion, the consequence of such an operative characteristic of digital images is that both reality and its perception can be understood as enmeshment with the world. Subsequently, the easy gesture of zooming into smooth, seamless surfaces follows the participatory structure that I have called up with the three non-zoom examples: Zoomable user interfaces also constitute surrounding pictorial worlds that are to be engaged with and that establish lateral relationships between the environment, humans and non-humans, e. g. the girl at the windowpane and the cat in the garden. For this purpose, prescribed gestures, especially for the users of a Western culture, must not be understood as control or abstraction, but as modes of 'new' or 'different ways of learning', as the girls demonstrate. Especially the situation when standing at a windowpane and supposedly failing to zoom closer to the cat would be a productive conclusion of image processing, namely that the negotiation of the proportions of reality via images always means an entanglement of the negotiator with this reality, a "situatedness"[30] in it. That is, the media-technical ensemble in which the girl is positioned at the glass pane is not attributable to her supposed naivety, or to the imperial control of the gaze that zoomable user interfaces have taught the young user. Trying to easily access the world via pinch-to-zooms takes the girl to a certain limit, which causes an epistemological vertigo effect that reveals commonplaces and predetermined standards: "*for a second, the girl loses her sense of orientation.*"[31] The loss of orientation in the standard format of reality is a precondition for the entanglement in it and its negotiation of scale, which can be brought back to the cat at the very end of this text.

In the words of Donna Haraway, one could say that zoomable user interface brings a world view of the cat into play – not Wiener's cat as a cybernetic circuit[32] and also not Schrödinger's quantum-mechanical cat – but the cat as a "practice of turning tropes into worlds,"[33] "[q]ueering specific normalized categories […] for the hope for livable worlds,"[34] a practice of "*materialized refiguration*,"[35] that Haraway calls "cat's cradle". Cat's cradle is a game for children, which, like the turning of the pages, the data glove and the pinch-to-zoom gesture, is a manual one – a string-figure that allows to establish links and relationships between different (human and non-human) actors and that, above all, underlines the involvement of the players in the game.

30 Donna J. Haraway, Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective. *Feminist Studies* 14/3 (1988), pp. 575–99; Donna J. Haraway, A Game of Cat's Cradle: Science Studies, Feminist Theory, Cultural Studies. *Configurations* 2/1 (1994), pp. 59–71.

31 Mende, The Code of Touch.

32 Norbert Wiener, *Cybernetics, or Control and communication in the animal and the machine* (Cambridge, MA 2019).

33 Haraway, A Game of Cat's Cradle, p. 60.

34 Ibid., p. 59.

35 Ibid., p. 61, emphasis in original.

With cat's cradle Haraway introduces a "knotted analytical practice" of the "anti-racist multicultural feminist studies of technoscience"[36], with the intention "that readers will pick up the patterns, remember what others have learned how to do, invent promising knots, and suggest other figures that will make us swerve from the established disorder of finished, deadly worlds."[37] Drawing on Haraway's theoretical/science fiction, one might say that the girl at the window, the cat in the garden, the techno-physiological automatism of zoomable user interfaces and the epistemological zooming all together play cat's cradle. Thus, differences are produced in a reality that has the materiality of high-resolution digital images. In doing so, the girl abandons an imperial model of technology and, with an operative understanding of the image, generates new insights into reality as image processing. The final pedagogical call in this text therefore is to go out and play cat's cradle with girls and (their) cats.

36 Ibid., p. 68.

37 Ibid., p. 65.

References

Boeke, Kees, and Arthur H. Compton, *Cosmic View: The Universe in 40 Jumps* (New York: The John Day Company, 1957).

Gore, Al., The Digital Earth: Understanding our Planet in the 21st Century. Digital Earth (1998); www.digitalearth.gov/VP19980131.html, access: May 31, 2020.

Haraway, Donna J., Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective. *Feminist Studies* 14/3 (1988), pp. 575–99.

Haraway, D. J., A Game of Cat's Cradle: Science Studies, Feminist Theory, Cultural Studies. *Configurations* 2/1 (1994), pp. 59–71.

Horton, Zach, Composing a Cosmic View: Three Alternatives for Thinking Scale in the Anthropocene, in: *Scale in Literature and Culture*, ed. Michael Tavel Clarke und David Wittenberg (Berlin and Heidelberg: Springer, 2017), pp. 35–60.

Kracauer, Siegfried, The little Shopgirls go to the Movies, in: *The Mass Ornament: Weimar essays*, ed. Thomas Y. Levin (Cambridge, MA: Harvard University Press, 1995 [1928]), pp. 293–304.

Latour, Bruno, Zoom auf Paris. Die sichtbare Stadt, die totalisierte Stadt, die unsichtbare Stadt. *Lettre International* 92 (2011), pp. 52–53.

Latour, B., *Eine neue Soziologie für eine neue Gesellschaft: Einführung in die Akteur-Netzwerk-Theorie* (Berlin: Suhrkamp, 2014).

Latour, B., Anti-Zoom, in: *Scale in Literature and Culture*, ed. Michael Tavel Clarke and David Wittenberg (Berlin and Heidelberg:

Springer, 2017), pp. 93–101.

Latour, B., *Kampf um Gaia: Acht Vorträge über das neue Klimaregime*, trans. Achim Russer and Bernd Schwibs (Berlin: Suhrkamp, 2017).

Linseisen, Elisa, *High Definition. Medienphilosophisches Image Processing* (Lüneburg: Meson Press, 2020).

Linseisen, E., Epistemological Zoomings into Post-Digital Reality, or How to Deal With Digital Images? Mimesis as a Methodological Approach, in: *Re-/Dissolving Mimesis*, ed. Sebastian Althoff, Elisa Linseisen, Maja-Lisa Müller and Franziska Winter (Paderborn: Fink, 2020), pp. 158–85.

Mende, Doreen, The Code of Touch: Navigating Beyond Control, or Towards Scalability and Sociability. *e-flux* (2020); https://www.e-flux.com/journal/109/331193/the-code-of-touch-navigating-beyond-control-or-towards-scalability-and-sociability/, access: May 31, 2020.

Wiener, Norbert, *Cybernetics, or Control and communication in the animal and the machine* (Cambridge: MIT Press, 2019).