Interfaces (for) Diffracting Technobodies: A Science-Humanities-Design Perspective for an Algorithmic Somatechnics

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Abstract:
In response to some current examples of experimental interface design in times of the COVID-19 pandemic – corona data dashboards, a contact tracking app, and an art intervention of distance design in public space – this article brings perspectives and insights from multiple disciplinary fields, several concepts, and a set of arguments together for a 'more comprehensive understanding' (Repko and Szostak 2021) of how these cases of design build (on) an algorithmic somatechnics. We argue that this type of understanding perhaps deserves its own naming for which we propose the bracket of the 'creative humanities' (Bleeker, Verhoeff, and Werning 2020) – a field that borrows productively from science, humanities, and design. Specifically, we aim to develop such an interdisciplinary perspective to respond to and specify the popular understanding, often reproduced in scholarship, of how technobodies are simultaneously created by and co-creating algorithmic media. We do this by bringing the perspective of diffractive reading to these media with the help of interface theory in order to diagnose that this understanding of the coming-into-being and functioning of technobodies is founded on an interpretation that positions agency on the side of either the social or on the side of the technical, or in their inter-relation. To this interpretation

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we respond with a *diffractive interface approach* to traverse this socio-technical constellation and think with the specificity of computation. We focus on the interface as an apparatus within and beyond which the technobody as datum is a locus of an *ontological dynamicity* that can have *un-easy agential effects*. Conceptualising the body as a somatechnical datum that may have un-easy effects is particularly relevant in our (post-)pandemic era that requires designs for distance that can afford maximum space for agency, mobility, and presence, yet confronts us with unattainable clarity and security.

Keywords: agency; diffraction; distance design; interface; technobodies.

During the first months of 2020, the COVID-19 pandemic started to unsettle life on a world-wide scale. While writing this article in the Summer and Fall of 2020 and located in Northern Europe (The Netherlands), the pandemic is still ongoing with many global regions entering a second wave. Just like many colleagues, both of us contributed a short reflection on the pandemic with one of us focusing on spatiotemporal figurations (Verhoeff and Merx 2020) and the other on the experience of time (Van der Tuin 2020). Both our texts come down to something that perhaps resembles Margrit Shildrick's conceptualisation, published in *Somatechnics* in December 2019, of the 'body shocks' that she encountered in broad interdisciplinary (even deep transdisciplinary) and creative research. Researching the phenomenon of heart transplant surgery by working with both patients and clinicians, as laid out in her contribution to the special issue *Data Matters: (Un)doing Data and Gender in the Life Sciences* (Fiedel, Malich, and Varino 2019), Shildrick conceptualises body shock as what happens to both populations. The clinicians appear as shocked when they hear about their patients' body shock:

> Even recipients [of heart transplant surgery] who overtly hold on to a rigid machine model of the body and reject any thought of a personal connection [between themselves and the heart donor], are highly likely to show distress, anxiety, and disturbance in their bodily comportment. In other words, beyond the *surface* expression, we are able to show that the vast majority of recipients do, in fact, experience a significant degree of ontological unease. (Shildrick 2019: 217; emphasis in original)

'Distress, anxiety, and disturbance in bodily comportment' are, thus, processes of an 'ontological unease'. This unease, or as we prefer to call it here: *un-ease*, we have implicitly or explicitly also articulated in our short reflexive essays that in various ways deal with the paradoxical relationship between presence and absence, spatially as well as temporally in the current (post-)pandemic moment.

With Sigrid Merx, Nanna Verhoeff wrote about figurations of current design for distance in urban public spaces that work with affordances for bodies to be present, to act and communicate in a time of 'inter-mediacy'. Examples are the use of chalk, tape, paint, and light on the city's surfaces to structure situations of presence and passages for mobility in public space. From a scenographic perspective, the temporary design of these 'urban interfaces' (Verhoeff et al. 2019) provides contours for agency as an emergent quality (an *agentiality*). Iris van der Tuin wrote about the thick and causally non-linear experience of time during the coronavirus pandemic on population, individual, and pre-conscious levels. On all of these levels, COVID-19-related data points and data visualisations appear to be real-time representations but they actually refer to a past (e.g. when some-body may have picked up the virus while running errands and subsequently played a part in its spread within their community) while also indicating an unforeseeable future both socially, physically, and emotionally or affectively. The very point of this latter reflection was also to put into words how an event in the future (the production and presentation of a positive test result) adds something to the past by deneutralising a seemingly innocent trip to the supermarket, for instance, while leaving the body in the present in a state of *ontological dynamicity* as the result of the oscillation between times and between presence and absence. Far from an impairing effect of shock, halting the body into a paralysed state, in the current moment we perhaps see a different effect of this shock – a state of oscillation, of agential un-ease. Clarity and security have become sheer unattainable for navigating our (post-)pandemic time.

Significant of our current reflection on experimental interface design is also an alignment with Shildrick's method of conceptualising body shock:

> In embracing both philosophical and sociological enquiry, together with bio-medical investigation and visual explorations, we were able to embrace a non-reductive style reliant on different perspectives that rather than being oppositional or simply adopted in parallel, offered a conjoined approach. Going beyond the 'and…and…and' model of mixed methods, each perspective lost its singularity and became interwoven – and certainly impure – on an ad hoc basis. Undoubtedly there were instances of discordances, discomfort, and doubt, but this is what a research assemblage looks like. (Shildrick 2019: 215)

In this co-authored article, we explore such a conjoined approach. We develop an interdisciplinary perspective in an attempt to respond to and specify the popular understanding, often reproduced in

scholarship, of how technobodies are simultaneously created by and co-creating algorithmic media. The algorithmic media that we study are all in development, still, as they are examples of experimental interface design in times of the COVID-19 pandemic. In our examination of how we can recognise an 'algorithmic somatechnics' in design we aim to develop a science-humanities-design perspective on *interfacing* as productive of the technobody as datum, the oscillatory locus, indeed, of an ontological dynamicity with *un-easy agential effects*. We develop this perspective in response to three current examples of experimental interface design that each in their own way are intended to provide information to act upon: corona data dashboards, a corona contact tracking app, and an art intervention of distance design in public space.[1]

Setting Up (For) A Diffractive Interface Perspective

Our time is not only a pandemic time. We also live in the so-called 'algorithmic condition' (Colman et al. 2018). Algorithms pervade our world and impact the coordinates of our living, moving, and acting. These algorithms function on four distinct layers (see Table 1). The first layer pertains to the interaction between the world and the algorithm: algorithms mirror and co-shape the world of which they are part. This is often formulated in terms of human, machine, and milieu/environment relations – or, as we can say, somatechnical ecologies.[2] Given that algorithms function in the world of which they are part, the second layer indicates: the intra-action of the world and the algorithm (for intra-action, see Barad 2007, Draude 2020, and below). Thirdly, algorithms function autonomously. After all, machines are said to be 'autonomously proceeding' with data and therefore contingent computation must be reckoned with. Fourth is the layer of lived experience of the technobody: here the merger of algorithmic technologies and the embodied subject that functions in populations on individual and pre-conscious levels.

What robust theorization can do justice to these dynamic layers of inter- and intra-action, autonomy, and entanglement at once?

'Algorithms', Johanna Drucker claims, 'are instructions for processes, for performances, whose outcomes may usually be predictable, but of course, are as open to error and random uncertainties in their execution as they are to uncertain outcomes in their use at the higher level of their operation and use' (Drucker 2013: ¶11). It is her suggestion to 'touch on each layer of digital media – in an analysis of the co-dependencies and contingencies of the material substrate, in a description of the production of display from code through processing as a performative act, in the engagement of users with the generative

Table 1: Algorithmic Functioning

1. interaction between the world and the algorithm
2. intra-action of the world and the algorithm
3. contingent computation
4. lived experience of the technobody

experience of viewing, and in the mutability and reinscribability of files in the mutable substrate of digital technology' (Ibid.: ¶13). Albeit that Drucker (2011: 14) makes an explicit humanities intervention in interface theory, as per the title of her article, she here deploys a mathematical language ('probabilistic, not mechanistic' [Ibid.: 18]) for computation, a language sensitive enough to capture the dynamic multiplicity encountered in interfaced and *interfacing* environments or structures. We propose in this article to further sensitize Drucker's language and make her proposal more precise by reading her work diffractively through Karen Barad's.

Barad's term *diffraction* refers to the quantum-physical phenomenon of patterns emerging from entanglements in the natural world. The phenomenon has also been recognised in ecologies that are usually deemed 'technologically mediated' such as the milieu or environment predicated on the entanglement of object and agency-of-observation whereby the latter is an entanglement of subject and measuring device. Moreover, diffraction is also recognised in thought (diffractive reading). For us, diffraction has the potential of making Drucker's proposal specific. Drucker suggests that such a making precise is needed, when she says that '[t]he image of a forking path may have worked for simple hypertext, but in the realm of multiple modularities, no common ground for organizing experience exists' (2011: 15). This common ground, we argue, is diffraction. Importantly, diffraction is *never* a y-crossing but implies integration as the very definition of 'pattern'.

For Drucker, '[c]odependence and contingency, the performative experience of knowing produced in a relationship between environment and subject, are the defining terms of interpretative interface' (2011: 18). What needs further precision here are Drucker's uses of co-dependence and relationship. Co-dependence suggests two entities being dependent on one another. Such a relationship suggests entities entering into exchange. Barad tackles the problem of the entity-logic underlying both terms in the following fragment:

> [R]elations are not secondarily derived from independently existing relata; rather, the mutual ontological dependence of relata – the relation—is the ontological primitive. […] relata only exist *within*

> phenomena as a result of specific intra-actions (i.e., there are no independent relata, only relata-within-relations). The term 'intra-action' signifies *the mutual constitution of relata within phenomena* (in contrast to 'interaction', which assumes the prior existence of distinct entities). In particular, the different agencies remain entangled. (2007: 429, n. 14)

When speaking about an interface 'in use', or about interfac*ing*, then, we must assume a performative experience that, according to Drucker, starts off in the middle: producing a subject, selected content, and reflection thereon. This idea of interfacing is in line with Barad (2003, 2007) who also introduces the term 'relation of an "exteriority within"' thus conceptualizing boundaries of, and within, phenomena as agential and as bound up with the phenomenon of interfacing.

In order to figure out what to make of Drucker's use of contingency, we must look a little further. Drucker wants her theory of '[p]erformative materiality and interpretative interface [to] embody emergent qualities. Their form would be codependent with use, rather than structured to constrain or model specific behaviors or tasks. They should have the potential to be inflected – by subject positions, point of view, and acts of interpretation' (2013: ¶37). Emergent qualities are not so much *co-dependent* with use but, rather, the qualities come about *intra-actively* in situations of use and, in addition to that, forms *remain* dynamic and are not stabilized once and for all. Drucker's normative reference to 'inflection' makes an allusion to such dynamicity: agencies relate with other agencies (i.e., subject positions, researched materials, points of view, acts of interpretation).

Testing Design

Corona data dashboards of governments, academic and research institutions, as well as newspapers, magazines, or online news platforms are cases of experimental interface design that provide factual as well as speculative or 'projective' information on the spread of the coronavirus in a certain area or around the globe for a general public. We take as our starting example the *Coronavirus Dashboard* commissioned by the government of The Netherlands. As stated on the website, the intention is to display data to inform actions: 'The coronavirus dashboard gives up-to-date information about COVID-19 in the Netherlands. Picking up signs that the rate of infection is increasing allows us to act to stop the virus from spreading.' Currently (that is: in October 2020) published on the website is also the disclaimer that the dashboard is under construction: 'The dashboard will remain under development as long as

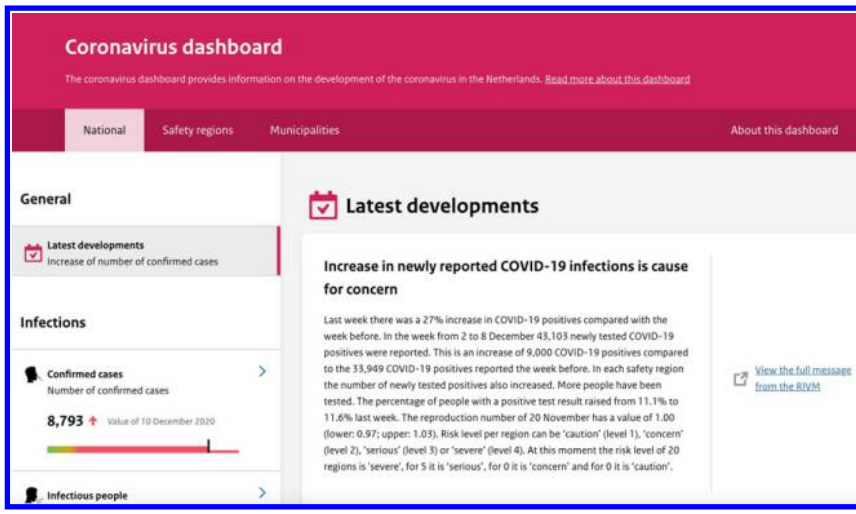

Figure 1. Screenshot of the *Coronavirus Dashboard* of 11 December 2020 (Source: https://coronadashboard.government.nl).

coronavirus is still with us, because we are always looking to see if we can add better data. Moreover, it takes time to set up the dashboard properly. So we're expanding it step by step.'[3]

In order to track-and-trace the spread of the virus, the *Coronavirus Dashboard* makes use of several numerical indicators, mainly a combination of the number of deaths reported as directly caused by COVID-19, the number of IC-beds in use for corona patients, the number of positive coronatests, an estimate of the percentage of infected people, the reproduction rate of the virus, and the measure of its continuous or discontinuous dispersion (see Figure 1).

With 'tracking-and-tracing', data dashboards in general aim to provide real-time and historical information for governments, (N)GOs, and individuals to base their (rational) decisions on.[4] This intrinsically historical information provides insight in development of the coronavirus: we see climbing, stable, and falling graphs, percentages, and rates. What is tricky about the dashboards, however, is their suggestion to represent a current state of affairs based on a real-timeness of the represented data. There is always a delay between datum and representation, but emphatically so in data based on deaths, hospitalisations, or test results and their reporting for a dashboard to represent. For that reason, the dashboards may also draw on alternative sources of information such as the Google behavior of a population (do we see an increase in searching for symptoms such as dry coughing or fever

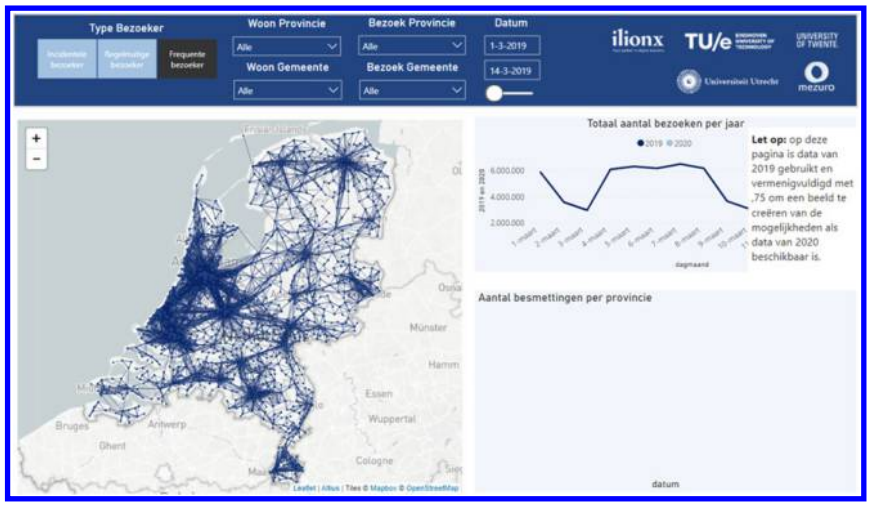

Figure 2. Screenshot of the *Covid Radar* of 11 December 2020 (Source: https://innovationorigins.com/a-smart-dashboard-predicts-regional-outbreaks-of-covid-19).

in a region?) or data drawn from sewage water tests (these tests signal COVID-19 infections in a community one week before symptoms are noticed by individuals). Such supporting information may somewhat close the temporal interval between the progression of illness in a measured body, the result of a corona test performed on that body, and the making public of the measurement – an interval analogue to the one between feeling OK and moving around freely, showing symptoms, testing positively, and what the test result may have in store for a person or community. It is the unsettling effect of the latter interval that Van der Tuin wrote about in her short reflection on experiencing time and temporality during the first months of the global coronavirus pandemic.

Meanwhile, a group of scientists from three universities and collaborating with two tech companies, has developed what they call a *Covid Radar* that is meant to exceed this tracking and tracing by also making predictions on the basis of people's mobility data gathered by an app, combined with crowdsourced data with the help of questionnaires about physical health (see Figure 2).[5]

While predictive data suggest an ambivalent reliability – based on facts, that is, data with algorithmic exactitude, yet fundamentally speculative qualities – this type of dashboards (coincidentally here called a 'radar' after weather apps that predict the progression of precipitation) also fails to represent the *now*. Indeed, here we must tentatively conclude that corona data dashboards, with their factual

representation and realist feel, struggle to close the gap and to offer direction, or soothe any unsettled feelings as they necessarily represent either outdated or speculative data.

Corona contact tracking apps for mobile devices respond differently to the coronavirus-related temporal intervals that so many of us, both personally and professionally, want to close or respond to.[6] These mobile interfaces are designed and used differently, and for a slightly different purpose than corona data dashboards. Whereas dashboards are intended to provide a source of factual information for institutions and individuals to base their decisions and behaviors on, contact tracking apps actively track already unfolding behaviors as a source for such information. The contact tracking apps are to be installed on smartphones that, as personal somatechnical devices, are carried around by and on individual bodies/users. The apps track and store random (anonymised) codes based on the spatial proximity of two bodies/users as calculated based on the exchange of Bluetooth signals (or, alternatively, GPS data, which is less precise and more prone to breaches of privacy). These codes of contact can subsequently be activated once the body of an app user has been tested positive for COVID-19. When someone reports a positive test result in the app, the codes (or: digital traces) of contact can then subsequently be sourced for information to be provided to selected bodies/users (see Figure 3). These app users are provided the information that they have been close to a carrier of the virus while the latter was in the interval between getting infected and showing symptoms.

During the moment of contact, body/user 1 was unknowingly and unwillingly in the state of potentially infecting others. After the corona app has informed body/user 2 about their risky proximity, body/user 2 is in the same situation as body/user 1 was before. As such the principles of tagging, tracking, and (retrospective) tracing infuse the dynamic network of bodies with a complex and dynamic temporality and positionality that populates the standard 'corona interval' we know from the data dashboard with personalised information with the effect of settling some of the anxiety caused by the virus, yet it unsettles a clear distinction between then/now, there/here, and self/other thus perpetuating ontological instability.

Our third example is an urban interface–a prototype of 'distance design' for public spaces.[7] The *Smart Distancing System* developed by Dutch artists Jólan van der Wiel and Nick Verstand makes use of a combination of position tracing, motion tracking, and distance measurement as a way to capture, not corona-related data, but the body in the interval of not-knowing.[8] Van der Wiel and Verstand make use of motion

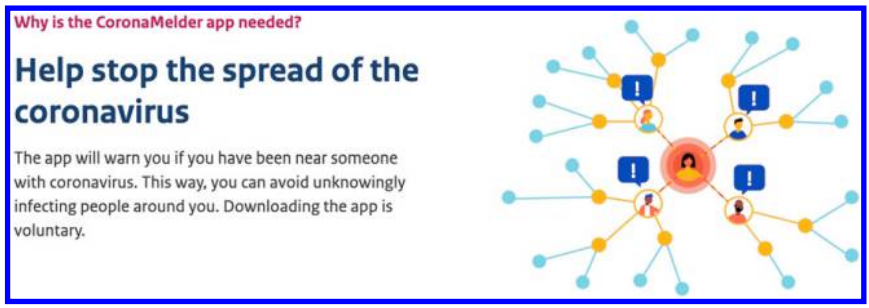

Figure 3. Screenshot of the Dutch *CoronaMelder* app (Source: https://coronamelder.nl/en/; accessed 11 December 2020).

Figure 4. Smart Distancing Systems (Source: https://smartdistancingsystems.com; accessed 11 December 2020).

sensors and lasers that either position individual bodies in flexible circles with a 150 centimeter (5 feet) diameter or beam contracting and expanding lines of a specific length (again 150 centimeter or 5 feet) on the floor, so that passing bodies know when and how to keep a safe distance so as to not be at risk of infecting, or getting infected by, other bodies (see Figure 4).[9] The art intervention takes the oscillatory state of not-knowing as its very basis and responds primarily and explicitly to the ontological instability caused by the coronavirus pandemic. While the designers themselves call it an art project, they also point at the possible adoption for practical use in train stations, shopping malls, airports, or other crowded public spaces. In an online article, for

example, the makers are quoted with the statement that they developed speculative design with the question of how, with a creative use of technology, art can contribute to a shaping of the 'one-and-a-half-meter society' (as the [post-]pandemic situation is called in Dutch). As they put it, with their design they aim to make physical distancing more fun, more beautiful, and better functioning.[10]

We take these examples of dashboards, apps, and urban interfaces as 'test cases' for and of the contemporary cultural moment. Not only do they experiment with and test the possibilities for a design of and for technobodies that is steeped into, and engages with, various forms of ontological dynamicity, but they also test our own assumptions, concepts, and methods when analyzing their design principles in relation to the current historical situation. As such, they ask for a response from us as researchers of and in this moment. When taking them seriously as our test cases, *here* and *now*, we find that the first thing they ask from us is a critical positioning of their status as 'case' in our thinking about experimental design of and for technobodies.

Lauren Berlant in her article 'On the Case' summarizes the messy process in which cases come-into-being:

> Case almost closed: the marked subject is a walking exemplar, a person trailing an already-known story. Not always, though—[…] the case can incite an opening, an altered way of feeling things out, of falling out of line. (2007: 666)

This quote identifies most (psychoanalytical) case studies with (disciplinary) norms and truths, whilst leaving room for non-representationalism in some possible others. In Berlant's terms:

> It is as though, when executed conventionally, the case study is a claim about realism. The reworkings of the case study […] instead seek to make an opening within realism, suggesting where it might travel. (2007: 669)

Here, two moves are made in one go. First, cases that are approached with non-representationalism make realism permeable. Secondly, this permeability lets the case material float ('suggesting where [the material] may travel'). Central to this discussion is a claim about the Kuhnian *exemplar* or *already-known stories*. Berlant suggests that whilst what she calls 'cases' or 'case studies' seem to be exemplary of some-thing or some-body and therefore to have wider applicabilities, they do nothing but un/successfully projecting certain static norms and truths back onto what is actually a more dynamic, i.e, *event-based* reality. She provides arguments for both intentional rewritings and reframings of case studies on the part of the researcher, and for unexpected

'speaking' or movement on the part of persons, bodies, and other things that seem to be case material. Her key argument is that approaching cases with epistemic assumptions of exemplary fixity import unnecessary problems into scholarship, problems that get partly solved owing to what we would call the unruly nature of ontological dynamicity. This dynamicity, for instance, refers to an ongoing agentiality in the world that is at once bounded, so to speak, by the norms and truths that realist epistemologies institute as if 'from above', that get re-instituted by disciplined and disciplining scholars following 'disciplinary matrixes' (Kuhn [1962/1969] 1996), and that are nevertheless sometimes shaken up by case materials. New-materialist scholar Maggie MacLure has formulated the latter as a potentiality that she captures alternatively with the words 'glow' or 'wonder':

> This potentiality can be felt on occasions where something—perhaps a comment in an interview, a fragment of a field note, an anecdote, an object, or a strange facial expression—seems to reach out from the inert corpus (corpse) of the data, to grasp us. These moments confound the industrious, mechanical search for meanings, patterns, codes, or themes; but at the same time, they exert a kind of fascination, and have a capacity to animate further thought. (2013: 228)

MacLure seems to introduce the 'anecdote' as something that precedes the 'case'. Anecdote, then, etymologically meaning 'things unpublished', refers to a zone or state of provisionality that raises questions and invites experimental thinking – something that we see at the heart of creativity. The invitation to 'think in the act' (to paraphrase Erin Manning and Brian Massumi [2014]) is how anecdotes are ontologically dynamic and precisely thereby more accurate and precise. As such anecdotes offer valuable starting points for theoretical inquiry, while also providing a methodological challenge. For this very reason, we have set up our engagement with examples of COVID-19-related experimental interface design anecdotally, or: as test cases.

Events Producing Entities

A second challenge our test cases put forth is for us to both address and complexify an entity logic that is prevalent and so stubborn that we find it in most of the disciplinary fields that we engage with here, as well as in society at large. This entity logic becomes evident in two ways. Firstly, it is at the heart of the framing of even our own perspective as an 'interdisciplinary' one, bringing together seemingly pre-existing disciplinary knowledge and insights in a move that suggests a certain

academic stability. The paradox here is that, whereas disciplinary knowledge and insights may seem to be already 'out there' for us to pick up and use, disciplines are *alive* – hence: always also transforming – and do not have fixed boundaries. Moreover, as we have learned from new-materialist epistemological reflections, research 'objects' are active agents that affect disciplinary boundaries, as well as the knowledge about and insights in them, and in their 'relatings' (Haraway 2003: 6). Secondly, in line with Berlant, we would argue that a method of 'case studies' would be as paradoxical as an inter-disciplinary perspective, and that a false entity logic is at the very start of this paradox. We would argue that our cases cannot be distinguished from the perspectives from which they have been set up and from the concepts with which they are understood. While we (have to) embrace the fact that cultural inquiry cannot commence without some sort of entity logic (if only by having 'culture' as its focus), what we aim to argue and demonstrate is that this logic needs its proper place.

Indeed, some form of 'entity logic' constitutes the 'when', the 'where', and the 'how' of any kind research, and may be unavoidable in that sense. All research is obviously based on decisions but it matters which decisions are allowed to drive the research, by which decisions the researcher is driven, and to what extent the researched object is a muted or 'speaking' agent. This import of decisions and their assumptions does not only apply to methods of knowing (epistemology) and to notions of being (ontology), but also to the shaping of social values (ethics). In order to not efface but reflect on how decisions affect research, we intend to stage how such assumption importation informs our research and, hence, its outcomes and therefore the very substance of the argument of our article.

Let us do some of the staging in a table-format (see Tables 2 and 3).

What Table 2 shows is not a binary thinking but rather a proposal for process thinking that activates an 'event logic' and positions the entity logic that we perhaps cannot escape but should complexify. What we see here are not two mutually exclusive columns but rather two columns that are intricately related as *events produce entities*. So, let's switch the columns and their alignment to make this logic visible (see Table 3).

Epistemologically, the event logic is a corrective pertaining to our preferred starting point of research. Ontologically, it is a matter of 'priority' (as Brian Massumi would have it [in De Boever et al. 2009: 40–1]). Donna Haraway would simply say: 'Beings do not pre exist their relatings.' (2003: 6) Ethically, it is an intervention, as it is 'valuable' to consider how researched 'objects' are agential material in the research apparatus.

Table 2: Entity Versus Event

entity	***event***
inter-disciplinarity	*creative humanities*
case study	*anecdote*
agency	*agentiality*
interface	*interfacing*

Table 3: Events Produce Entities

event	***entity***
creative humanities	inter-disciplinarity
anecdote	case study
agentiality	agency
interfacing	interface

The Event-Level in Interface Design

Thinking processually about designing interfaces for/of an algorithmic somatechnics by activating event logic has further implications. Taking our anecdotal test cases of experimental design of and for technobodies seriously also asks from us to become more specific about what would be the event-level of an interface design for the ontological dynamicity that this entails. Here, the intersections of science, humanities, and design become explicit.

Diffraction as a concept coming from quantum physics and having been introduced to the humanities by Karen Barad (2007) allows us to become precise about Johanna Drucker's proposal for interface theory, in her call for a:

> […] shift from an entity-based to an event-based conception of media [intended to] demonstrate the radically constitutive, co-dependent relations of complexity we overlook when we take a web of contingencies for a static, fixed, object of intellectual thought. (2013: ¶30)

Indeed, it is the contingencies that we will be focusing on if we understand interface design as productive of intra-active agentialities (Barad 2007) that need further specification. After all, such contingencies may include outliers in the creation and understanding of often oppositionally constructed categories (in times of COVID-19: 'healthy' versus 'ill') that must be theorized as quanta with binary-shattering quantum effects. It is possible for outliers to transverse the socio-cultural binaries reproduced in scholarship and it is possible for spatio-temporal

complexities to make the use of binaries wholly imprecise. Following those that theorize the process of computation as itself contingent (e.g. Fazi 2018) helps us zoom in on agency in the algorithmic condition (Uricchio 2011, Colman et al. 2018) from a diffractive perspective for a more specific understanding of the body as somatechnical datum.

Social categories of meaning-making and power difference such as gender, race, age, or health are in fact apparatuses 'measuring' technobodies, thereby constructing and producing somatechnical data. Together with the researcher and, in our discussion, the corona data dashboards, corona contact tracking apps, and art interventions in public space, they are agencies-of-observation, entangled and de-cohering with/in algorithmic machines (for entanglement, see Barad 2007; for de-coherence, see Moran 2019). Measurements may include chance-events. What we intend to signal here is that chance itself alludes to, and often escapes, statistical quantification, i.e., bringing in computation as not only at work in processes of generation and perpetuation of technobodies but also in the scholarship of technobodies with the use of data. Chance is both a valid social-science indication of a data set being representative or not, and indicating computation as a dynamic, complex, and elusive process. In the words of Beatrice Fazi:

> Computation might encompass, or be modelled upon, the empirical mutability of the real world, and through interactive and embedded operations it might become more powerful and adaptable. Algorithms might also be enmeshed with the empirical plane by means of application, implementation and performance. However, a crucial assertion […] is that computation is already contingent, before any implication with the empirical dimension of sensible reception, because of the maximal indeterminacy of its axiomatic character. (2018: 6)

We find allusions to chance and affirmations of 'contingent computation' exciting, because now we can exceed stifling oppositional binaries on the level of individuals and populations, and must carve out space for chance and elusiveness (Chun 2011), friction (Rose 2016), obfuscation (Galloway 2012),[11] glitch-events (Marenko 2015), or simply built-in *serendipity* on the level of populations, bodies, and machinic functioning. Unexpected functioning of measurement apparatuses can happen on the following levels: 'internal (algorithmic sequences) or external (input data), human (programmers, users) or machine (hardware)' (Marenko 2015: 112). Perhaps we can understand these entity-levels as a layered notion of the digital interface and add the event-level of interfacing itself. What would be a productive perspective for all this?

We propose that what is needed is a flexible science-humanities-design perspective for the algorithmic condition, a perspective situated at the intersection of interface theory (Ash 2015; Dieter and Gauthier 2019; Drucker 2011, 2013; Galloway 2012; Hookway 2014; Rose 2016; Verhoeff 2012; Verhoeff et al. 2019) and diffractive reading (Minh-ha [1988] 1997, 1996; Haraway 1997; Barad 2003, 2007; Van der Tuin 2018, 2019). With this perspective we intend to follow up Drucker's call for 'an event-based conception of media' solid enough to accommodate complexity, dynamicity, and contingencies. We therefore propose moves from static entity logic to dynamic event logic, and from individualist or population-based concepts of technobodies to an event-based concept of 'positionality' that is based in/on encounters that traverse binary socio-technicality and contingent computation.

In feminist philosophy, it has been argued that difference exceeds what we can imagine as the opposite of sameness. Rosi Braidotti ([1994] 2011: 150–60) has famously argued that (sexual) difference encompasses a multi-layered concept encompassing the differences between men and women, or *Difference*; the differences amongst women/men, or *diversity*; and the differences within the sexed, gendered, and sexual subject, or *differing*. The third layer is most relevant here as it expresses the possibility to vary over time and in space in the way in which one positions oneself and, even more so, the possibility to be surprised by one's own positioning, consciously, unconsciously, affectively, or non-consciously engendered. The non-exhaustivity of the sameness-difference binary has implications for how we experience our technobodies and how we design (for) somatechnical data, especially after the algorithmic turn. This is where dashboards, apps, and distance designs ask for thinking through the intersecting logics of computing, diffractive reading, and interface theory.

Science-Humanities-Design

As a next step in our thinking about experiencing, responding to, and acting on ontological dynamicity, specifically as it is prompted by corona data dashboards, corona contact tracking apps, and art interventions in public space in (post-)pandemic societies, we propose to further develop the implications of this diffractive reading of interfaces and interfacing for the relationship between science, humanities, and design. As we argued above, interfacial reading is a diffractive reading, indicating that there is dynamic movement through media and life itself, i.e., an ongoing process of data being produced, patterns emerging, and

chance events. Patterns and chance events emerge in a human-machine-environment entanglement of lived experience that operates between world and algorithm, within world-algorithm relating, and algorithmically (computationally) per se. Interfacing may generate surprise or un-ease in (and about) technobodies, surprise or un-ease about what is encountered and engaged with, and about subject positioning. Such subject positioning may involve social subjectivity, but also research subjectivity, and for scholars preferably both. The very point about this subjectivity, here and now and for a future, is that we have to deal with a spatiotemporal presence-absence dynamic and their unforeseen consequences.

It is with moderation and curation of content, and with technical specificity that design is hinted at in the discussion of diffractive reading and interface theory. The algorithmic condition connects science, humanities, and design. Working with Drucker's concepts and theories, we have seen that *mathematical* language about probabilities was invoked to actualize a non-mechanistic *humanities* approach to interfaces and interface theory.[12] Moreover, a diffractive perspective on interfacing necessarily invokes an entanglement of interface, software, as well as hardware *design*. Quick-scanning the ways in which design functions in today's theory of cultural inquiry, we find an unreal opposition: either design is a 'third culture' and, hence, specific or it is 'everywhere and nowhere equally and fully'.[13] The latter take on design can be found in ontological design circles in which it is affirmed, often in *sloganesque* fashion, that 'we are all designers and we are all designed' and that 'design designs' (see for instance Willis 2006). Designing here spans across a wide variety of domains connecting buildings and things, management and ICT systems, and bodies and thought. The third-culture interpretation can best be illustrated by a table with which philosopher Ian Bogost summarizes the work of computer scientist Mark J. Nelson who, in turn, summarizes the work of design scholar Nigel Cross (see Table 4[14]).

Instead of arguing that design is a bounded third culture or an unbounded cultural foundation, we want to suggest that whilst the *contents* of the categories listed in Table 4 bleed into one another,[15] bringing to mind the all-pervasiveness of ontological design, what we need for research projects to be 'valuable' is a being-specific about a 'when', a 'where', and a 'how'.

Entity logic provides *too much* of a specificity by reducing possible answers to research questions; event logic is nothing but a call for 'situated knowledges' (Haraway 1988). The gauntlet of such a research specificity has been taken up by new-materialist scholars studying a wide

Table 4: Bogost-Nelson-Cross on Design as Third Culture

The phenomenon of study in each culture is • in the sciences: the natural world • in the humanities: human experience • in design: the artificial world
The appropriate methods in each culture are • in the sciences: controlled experiment, classification, analysis • in the humanities: analogy, metaphor, evaluation • in design: modelling, pattern-formation, synthesis
The values of each culture are • in the sciences: objectivity, rationality, neutrality, and a concern for 'truth' • in the humanities: subjectivity, imagination, commitment, and a concern for 'justice' • in design: practicality, ingenuity, empathy, and a concern for 'appropriateness'

variety of apparatuses of production of 'subjects', 'objects', and 'positions' in dynamic entanglements.[16] Media scholars studying media-specificity have *de facto* done the same in their dispositif analyses or cartographical works that map out the triadic relationship between materiality and technology, 'text', and subject in communicative media situations (see Kessler et al. 2015 and Verhoeff 2012). What we wish to note is that these new-materialist (and) media scholars, often humanists, are already interested in questioning the realities of natural and artificial worlds, in classifications and alternative patternings, in truth and in praxis. In other words: they are already interested in science and in design. Moreover, their research questions are often processually brought about by anecdotes in certain zones or states of provisionality, testing the not isolatory, but creative, domains of science, humanities, and design.

Thinking and Making (for) Diffracting Technobodies[17]

In a move to some provisional concluding reflections following our engagement with interfaces (for) diffracting technobodies, we want to clarify what the 'dashes' in the subtitle do for us and how we see that this 'science [dash] humanities [dash] design' perspective is characteristic of what we call a 'creative humanities' approach (see also Bleeker, Verhoeff, and Werning 2020). The dash is an ambivalent sign as it combines the em dash that is used to mark a break in a sentence or to put a clause between parentheses and the en dash (sometimes stylistically a hyphen) that 'indicates spans or differentiation', instead.[18]

The joining of breaking and parenthesising, one the one hand, and, on the other, spanning and differentiating resonates with the co-existence of the entity and event logics which we discussed earlier. This transversing of the double logic of norms and truths (entities as they have come about) and the potentialities that Berlant called 'openings, altered ways of feeling, fallings out of line' has been somatechnically theorised by Susan Stryker and her colleagues as a 'transing': as 'categorical crossings, leakages, and slips of all sorts, around and through the concept "trans-"' (Stryker, Currah, and Moore 2008: 11). This is what they argue:

> It's common, for example, to think of the 'trans-' in 'transgender' as moving horizontally between two established gendered spaces, 'man' and 'woman', or as a spectrum, or archipeligo, that occupies the space between the two. […] But what if we think instead of 'trans-' along a vertical axis, one that moves between the concrete biomateriality of individual living bodies and the biopolitical realm of aggregate populations that serve as resource for sovereign power? What if we conceptualize gender not as an established territory but rather as a set of practices through which a potential biopower is cultivated, harnessed, and transformed, or by means of which a certain kind of labor or utility [is] extracted? 'Trans-' thus becomes the capillary space of connection and circulation between the macro- and micro-political registers through which the lives of bodies become enmeshed in the lives of nations, states, and capital-formations, while '-gender' becomes one of several set of variable techniques or temporal practices (such as race or class) through which bodies are made to live. (Ibid.: 13–4)

The affirmed horizontal and vertical movement, the focus on sets of (material) somatechnical practices, on spaces of connection and circulation between the micro and the macro registers with/in which we live our lives 'is an improvisational, creative, and essentially poetic practice through which radically new possibilities for being in the world can start to emerge', the authors argue (Ibid.: 14). And we agree with them in an analysis of dashboards, apps, and art interventions that is inclusive of, and reaches beyond, the brackets of gender, race, or age, and that borrows productively from science, humanities, and design for test cases dealing with health. This analysis is currently situated in the coronavirus pandemic, namely its Summer and Fall 2020 incarnations.

The new-materialist humanists and media scholars that we are most inspired by when thinking about such a disciplinary borrowing, recognise the (literally) productive connection between thinking and making practices: thinking as/through making and making as/through thinking. Such a productive practice is fundamentally methodological. The *methodologicity* involved is emphatically experimental and

comfortable with knowledge production in uncertainty (or un-ease), dynamicity, and friction. Creative humanities projects are creative in designing and developing their own methods and approaches, as they seek to navigate and explore the productive connections and reciprocal relationships between the creative practices they engage with, and to develop conceptual approaches for what these practices work with, through, or beyond. Through their engagement with contemporary artistic, cultural, and societal issues, and as themselves fully immersed in 21st-century media (Hansen 2015; Dieter and Gauthier 2019) and the algorithmic condition, both experimental scholarly and design projects, each in their own way, develop conceptual and/or critical foci in a fundamentally and programmatically creative practice. '[E]xperimenting and theorising are dynamic practices that play a constitutive role in the production of objects and subjects[,] and matter and meaning', says Barad (2007: 56; emphasis removed).

To return to our design test cases, we have accepted their challenge to think with them and to explore the conceptual work of their design, as they experiment and test how technobodies are diffracted by their interfaces, and as such themselves diffract the experience of positionality and agentiality in the world. Taking part in the current pandemic situation and making proposals for (post-)pandemic somatechnical ecologies, the three designs each raise fundamental questions about the socio-technical interface as an apparatus within and beyond which the technobody as datum is a locus of an *ontological dynamicity* that can have *un-easy agential effects*. We have found that the third project, the art intervention in public space, perhaps most explicitly takes up this un-ease as a productive design challenge, speculatively making as/through thinking with its potential for both individual bodies, the communal body, and the 'body politic'. This demonstrates, at the same time, the potential of the creative humanities for turbulent times.

Notes

1. We have presented parts of this article, with different case material, at the conference *Media in Transition 10: A Reprise – Democracy and Digital Media* (May 17–18, 2019) at MIT, Cambridge, MA and at the annual conference of the Gesellschaft für Medienwissenschaft (GfM) on the topic *Media and Materialities* (September 25–28, 2019) at the Institute for Media Culture and Theatre, University of Cologne, Cologne, Germany.
2. 'The machine is not simply hosting a code that carries and executes instructions. It is also now autonomously proceeding by modulating sequences of data extracted from the environment alongside its own generative processes' (Marenko 2015: 115) and 'humans make machines as machines make humans, and they both participate in the becoming of their milieu' (Ibid.: 116).

3. All quotes are taken from https://coronadashboard.government.nl (accessed 19 October 2020).
4. For a rich, critical discussion of data dashboards, specifically for the governance of smart cities, see Mattern 2015.
5. See https://www.universiteitleiden.nl/en/news/2020/04/covid-radar-app-lumc-en (accessed 19 October 2020).
6. The 'corona app' we have taken as our example is the Dutch CoronaMelder app (https://coronamelder.nl [accessed 11 December 2020]).
7. Additional examples of distance design, ranging from innovative objects to scenographic proposals, can be found here: https://www.dezeen.com/tag/social-distancing (accessed 19 October 2020). An example of the use of screens for distance in public space is https://algoritmeregister.amsterdam.nl/anderhalve-meter-monitor (accessed 19 October 2020).
8. For more about their design project, see https://ddw.nl/en/programme/5426/smart-distancing-system (accessed 11 December 2020).
9. The circular shapes of this interface, here, foster presence, agency, and mobility within the current regime of physical distancing in public space. Visually encapsulating the moving body, paradoxically, this alludes to conceptual metaphors proposed in critical interface theory such as the 'interface envelope' (Ash 2015) or 'traps', captivation, and capture (Dieter and Gauthier 2019) that emphasize how the technobody is constrained and disciplined as much as it is empowered.
10. For more about their ambitions, see https://www.dearchitect.nl/architectuur/nieuws/2020/05/functional-social-distancing-art-door-jolan-van-der-wiel-en-nick-verstand-101243168?_ga=2.209919888.461114417.1596445959-1413616360.1596445959 (accessed 19 October 2020).
11. As Galloway argues, an interface is 'an autonomous zone of interaction […] concerned as much with unworkability and obfuscation as with connectivity and transparency' (2012: 120).
12. In the instance of reading humanities through mathematics thus generating this non-mechanistic approach we recognize the method of 'diffractive reading' as explained and referenced under the heading 'The Event-Level in Interface Design'.
13. Here we borrow words from Haraway (1988: 584).
14. http://bogost.com/writing/blog/the_sciences_the_humanities_an/ (accessed 11 December 2019). In the comments section of the blog post, design theorist Carl DiSalvo underscores the usefulness of Cross's work for understanding the third-culture interpretation. He also brings Richard Buchanan and Herbert Simon to the attention of readers.
15. This has also been argued about C.P. Snow's 'two cultures'. See Van der Tuin 2014.
16. 'Apparatus of literary production' is Katie King's concept from 1991. Haraway (1988) coined the term 'apparatus of bodily production'.
17. This part previews our book *Critical Concepts for the Creative Humanities*, forthcoming with Rowman and Littlefield International.
18. Wikipedia article 'Dash' (accessed 23 September 2019).

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