Postdigital Science and Education

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We are increasingly no longer in a world where digital technology and media is separate, virtual, 'other' to a 'natural' human and social life. This has inspired the emergence of a new concept – 'the postdigital' – which is slowly but surely gaining traction in a wide range of disciplines including but not limited to the arts (Monoskop, 2018; Bishop, Gansing, Parikka, and Wilk, 2017), music (Cascone, 2000), architecture (Spiller, 2009), humanities (Hall, 2013; Tabbi, forthcoming, 2018), (social) sciences (Taffel, 2016), and in many inter-, trans-, and post-disciplines between them (Berry and Dieter, 2015). Through this research, the term postdigital is slowly entering academic discourse. The University of Edinburgh's *Centre for Research in Digital Education* is seriously considering rebranding towards the postdigital (Bayne and Jandrić, 2017: 204; see also Jandrić, 2017: 201); Coventry University recently established the *Centre for Postdigital Cultures* (Coventry University, 2018); authors of this editorial are editors for the forthcoming journal *Postdigital Science and Education*[1].

Published in the influential *Wired* magazine, a major source of inspiration for the growing body of postdigital research is Nicholas Negroponte's article 'Beyond Digital' which boldly claims: "Face it – the digital revolution is over" (Negroponte, 1998). This does not mean that the digital is not important. However, continues Negroponte, "its literal form, the technology, is already beginning to be taken for granted, and its connotation will become tomorrow's commercial and cultural compost for new ideas. Like air and drinking water, being digital will be noticed only by its absence, not its presence." (ibid) Similarly, Florian Cramer writes: "the 'post-digital' describes an approach to digital media that no longer seeks technical innovation or improvement, but considers digitization as something that has already happened and thus might be further reconfigured" (Cramer, 2013; see also Cramer, 2015). In 2013, a larger group of researchers at transmediale Berlin has undergone an extensive peer review process which has resulted in a common working definition:

> Post-digital, once understood as a critical reflection of "digital" aesthetic immaterialism, now describes the messy and paradoxical condition of art and media after digital technology revolutions. "Post-digital" neither recognizes the distinction between "old" and "new" media, nor ideological affirmation of the one or the other. It merges "old" and "new", often applying network cultural experimentation to analog technologies which it re-investigates and re-uses. It tends to focus on the experiential rather than the conceptual. It looks for DIY agency outside totalitarian innovation ideology, and for networking off big data capitalism. At the same time, it already has become commercialized. (Andersen, Cox, and Papadopoulos, 2014).

One of the first books which explicitly deals with the postdigital, Robert Pepperell and Michael Punt's *The Postdigital Membrane: Imagination, Technology and Desire* (2000), introduces another useful definition. For Pepperell and Punt, "the term Postdigital is intended to acknowledge the current state of technology whilst rejecting the conceptual shift implied in

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[1] *Postdigital Science and Education* is contracted with Springer, and its first issue is expected in early 2019.

the 'digital revolution' – a shift apparently as abrupt as the 'on/off' 'zero/one' logic of the machines now pervading our daily lives" (2000: 2). This definition focuses on the difference between the continuous nature of biological existence, and the discrete ('on/off') nature of digital technology. In this way, it is strongly connected to the posthumanism of Donna Haraway's cyberfeminism (1991/1985), "the deconstruction of the liberal humanist subject" of Katherine Hayles (Pötzsch and Hayles, 2014: 95) and their cyberpunk roots such as William Gibson's *Neuromancer* (Gibson, 1984). This approach to the postdigital challenge is particularly visible in fields like online education (Knox, 2016) and networked learning (Jones, Ryberg, and de Laat, 2015), and in questions such as (bodily) identity (Besley, 2010; Davidsen and Ryberg, 2017, Hayes, 2017), (human and organizational) creativity (Besley and Peters, 2013) and the relationships between (digital) technology and human agency (Hayes, 2015).

Pepperell and Punt's definition of the postdigital captures some aspects of our historical moment where the century-old primacy of physics, which has peaked in the digital, now gives way to biology. According to Dyson,

> It has become part of the accepted wisdom to say that the twentieth century was the century of physics and the twenty-first century will be the century of biology. Two facts about the coming century are agreed on by almost everyone. Biology is now bigger than physics, as measured by the size of budgets, by the size of the workforce, or by the output of major discoveries; and biology is likely to remain the biggest part of science through the twenty-first century. Biology is also more important than physics, as measured by its economic consequences, by its ethical implications, or by its effects on human welfare. (Dyson, 2007)

While this may sound plausible, the biotechnologist Craig Venter shows that the question is not about the struggle between physics / the digital and biology / the analogue. According to Venter,

> We're actually starting at a new point: we've been digitizing biology, and now we're trying to go from that digital code into a new phase of biology, with designing and synthesizing life. So, we've always been trying to ask big questions. 'What is life?' is something that I think many biologists have been trying to understand at various levels. We've tried various approaches, paring it down to minimal components. We've been digitizing it now for almost 20 years. When we sequenced the human genome, it was going from the analog world of biology into the digital world of the computer. Now we're trying to ask: can we regenerate life, or can we create new life, out of this digital universe? (Venter, 2008)

The challenge of digitizing biology is technical and scientific. With emerging ethical questions such as whether we should allow the copyrighting of a genome, and with emerging changes in the structure of scientific research including, but not limited to, the incursions of big data and algorithms, the postdigital challenge is also deeply economic and political. Therefore, Michael Peters develops the notion of bio-informational capitalism as "the emergent form of fourth or fifth generational capitalism based on investments and returns in these new bio-industries: after mercantile, industrial, and knowledge capitalisms", which is "based on a self-organizing and self-replicating code that harnesses both the results of the information and new biology revolutions and brings them together in a powerful alliance that enhances and strengthens or reinforces each other" (Peters, 2012: 105). Bio-informational capitalism is

simultaneously physical (digital), and biological (non-digital) (see also Pierce, 2013). Producing deep epistemic and ethical problems such as digital immortality (see Savin-Baden, Burden, and Taylor, 2017), therefore, it is postdigital.

Even from our incomplete literature overview, it seems intuitive that the concept of the postdigital appears to adequately capture contemporary human existence (see Taffel, 2016, for a detailed overview of various perspectives on the postdigital). These days, however, we are somewhat weary of various post-concepts – and with good reason. In post-industrial societies characterized with abundance of consumer goods, "we have not in any way left the smokestack era of factory production" (McLaren and Jandrić, 2014: 807; see also Jandrić, 2017: 161). Immediately after its publication, Francis Fukuyama's famous "the end of history" (1992) has been identified as an ideological construction aimed at endless perpetuation of capitalism (Cox, 2014). Postmodernism, for all its early promises, has failed to deliver the promise of surpassing modernism (Peters, 2011). A similar line of critique can easily be applied to the postdigital (see Cox, 2014). Why invent a new term, when it does not make a clear rupture from our existing theories? Responding to Cox's critique, however, Cramer asserts that the post- within the postdigital should be understood differently. According to Cramer,

> 'post-digital' can be defined more pragmatically and meaningfully within popular cultural and colloquial frames of reference. This applies to the prefix 'post' as well as the notion of 'digital'. The prefix 'post' should not be understood here in the same sense as postmodernism and post-histoire, but rather in the sense of post-punk (a continuation of punk culture in ways which are somehow still punk, yet also beyond punk); post-communism (as the ongoing social-political reality in former Eastern Bloc countries); post-feminism (as a critically revised continuation of feminism, with blurry boundaries with 'traditional', unprefixed feminism); postcolonialism ...; and, to a lesser extent, post-apocalyptic (a world in which the apocalypse is not over, but has progressed from a discrete breaking point to an ongoing condition – in Heideggerian terms, from *Ereignis* to *Being* – and with a contemporary popular iconography pioneered by the *Mad Max* films in the 1980s). (Cramer, 2015: 14)

In the oft-quoted chapter 'What is 'Post-digital'?', therefore, Cramer popularly describes the postdigital as "a term that sucks but is useful" (Cramer, 2015: 13).

We might also return to the theories of 'posthumanism' discussed previously to understand the critical dimensions of the 'post-' prefix. Also cautious of the 'posts', Neil Badmington describes 'posthumanism' as "a convenient shorthand for a general crisis in something 'we' must just as helplessly call 'humanism'" (2000: 2). Just as humanism might have been considered as something of a calamity, we might also see the 'digital' as currently undergoing a similar predicament. The utopic visions of free, open, and consensual communities that characterized the early days of the web appear rather distant in the contemporary climate of powerful, tax-avoiding internet corporations, political meddling on social media, algorithmic tinkering of 'personal' media streams, and the environmental effects of data storage and processing. In the era of 'post-truth' (yet another 'post'!) (see Peters, Rider, Hyvönen, Besley, 2018), the sheen of efficiency, productivity, and objectivity that once seemed to characterize everyday understandings of the digital has been tarnished with revelations of bias, discrimination and inequality.

The broad social problems for which Silicon Valley offered slick, user-friendly, solutions, were perhaps too simplistic to begin with (see Morozov 2013), while the 'revolutions'

promised by big data and algorithms often tended to reproduce their own predetermined prejudices (see, for example, O'Neil, 2016). There is growing concern over the actual, concrete, social, and material influence of the digital, which stands in contrast to the tendency to view it as 'virtual', ethereal, and without 'real' consequences, perhaps captured effectually by this year's 'Fairness, Accountability, and Transparency' conference[2], focused on understanding the ethical and moral dimensions of socio-technical systems. There is, therefore, an additional and valuable meaning we might attached the to the 'post' of the postdigital here: a 'holding-to-account' of the digital that seeks to look beyond the promises of instrumental efficiencies, not to call for their end, but rather to establish a critical understanding of the very real influence of these technologies as they increasingly pervade social life.

The postdigital is hard to define; messy; unpredictable; digital and analog; technological and non-technological; biological and informational. The postdigital is both a rupture in our existing theories and their continuation. However, such messiness seems to be inherent to the contemporary human condition. For instance, the current crisis of (academic) publishing results from messy relationships between pre-digital understanding of intellectual property and digital ways of creating and disseminating content (Peters et al, 2016). The well-documented challenge of commodification of education is not caused by digital technologies, but its main aspects (including, but not limited to, automatic assessment) cannot be thought of without digital technologies (Peters, Besley, and Araya, 2013; Hayes and Bartholomew, 2015; Peters and Jandrić, 2018). The postdigital challenge posts significant epistemic questions (Suoranta and Vadén, 2010); these are particularly visible in the field of big data and algorithm studies, and the associated perspective of networked learning, which have only begun to assess the individual and social consequences of the mashup of human and non-human activity and the ability to clearly distinguish between the two (Jones, Ryberg, and de Laat, 2015; Knox, 2015; Ryberg, Sinclair, Bayne, and de Laat, 2016; Jandrić, Knox, Macleod, Sinclair, 2017; Knox 2018).

Traditionally, the field of networked learning has been characterized by a particular interest in the 'digital' and 'virtual' aspects brought about by networked technologies, often with a focus on 'online courses' with individuals sitting in their homes, connected through desktop computers to other learners in 'virtual conference rooms'. However, it is clear that contemporary networked learning is becoming increasingly more diverse.

> The pervasiveness of internet access (in some parts of the world) and the dramatic increase in ownership of mobile technologies (laptops, tablets and smartphones) are changing the places of where and how networked learning is happening. From virtual learning environments being mainly used by 'distance education' to becoming a standard component for all higher education students. From ICT and learning being an esoteric activity in labs to becoming a pervasive part of campus and lecture hall activities (whether consciously or not on behalf of the teacher). From working primarily from home to people being on the move and engaging in online activities while being on the train or in cafes, and students alternating between distributed work and meeting on campus. (Ryberg and Sinclair, 2016: 13)

This is reflected in an increased interest in sociomateriality, socio-material practices, and notions of place-based spaces for networked learning (Carvalho, Goodyear and de Laat, 2016);

and, for example, in exploring students' group work. Ryberg, Davidsen and Hodgson (2018) warn of an overly strong focus on 'digital technologies' which might make us overlook that contemporary student practices with technology are complex entanglements between physical and digital technologies, spaces, activities and time. Rendering the very term 'digital' problematic, networked learning researchers explore the forefront of the postdigital challenge.

The advent of intensive data-processing increasingly entangles the digital in the assumed 'humanity' of education, challenging the commonplace view of technology as an external 'enhancement' (Bayne 2014), and questioning often-held assumptions about the learning process itself (Knox 2018). The postdigital challenge also applies to studies of labor, where social acceleration (see Sinclair, 2017) and the promise (or threat) of widespread technological unemployment may significantly disturb the ancient notion that human beings constitute themselves through work (Peters, Jandrić, and Hayes, 2018; Means, 2017 and 2018). Thus it brings potential to disrupt decades of linguistic assumptions that marginalize human academic labor in educational technology policy (Hayes, 2015, Hayes and Bartholomew, 2015). This includes the myth that technology alone has innate power to effect positive, market driven changes to the ways that people learn. Routes are before us to resist such de-humanizing elements of consumer-focused education and re-conceptualize a curriculum intertwined, not apart from the human body (Hayes, 2017).

Indeed it closely relates to complex relationships between physics and biology, and Peters' notion of bio-informational capitalism (2012). The postdigital challenge reaches beyond technological determinism, probes alternative futures such as radical educational equality (Vadén and Suoranta, 2012) and cybercommunism (Vadén and Suoranta, 2009), and seeks new opportunities for critical pedagogy (Monzo and McLaren, 2017). It is as if postdigital over-determinates the sociopolitical landscape; without anyone's 'permission' it entered the classrooms in both student's and teacher's pockets (via their mobile devices), immersed into the pedagogical process, and broke the boundaries of formal and informal teaching and learning: unreflexive certainties turned into reflexive uncertainties. (Vadén and Suoranta, 2007; Jandrić and Boras, 2015; Peters and Besley, 2015.) Thus, concludes Cox, "the ruptures produced [by the postdigital] are neither absolute nor synchronous, but instead operate as asynchronous processes, occurring at different speeds and over different periods and are culturally diverse in each affected context" (Cox, 2014).

The postdigital challenge is all around us. In public discourse, it unfortunately ended up with a name which carries some bitter baggage of earlier post- concepts. Consequently, the term postdigital may provoke some nitpicking critique; at the bright side, it may provide historical continuity, help us learn from earlier theories, and perhaps even avoid an odd conceptual trap. Looking beyond terminology, however, the contemporary use of the term 'postdigital' does describe human relationships to technologies that we experience, individually and collectively, in the moment here and now. It shows our raising awareness of blurred and messy relationships between physics and biology, old and new media, humanism and posthumanism, knowledge capitalism and bio-informational capitalism. While we would perhaps prefer to go forward with a fresh name, we do realize that the postdigital condition is one of today's grand challenges in science, education, arts, and various other areas of human interest. With all imperfections, therefore, we embrace the concept of the postdigital – and we look forward to developing it in the future.

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