

Postdigital artistic positionality and its potentials for cultural education

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Abstract

In 2002, in *Culture in Bits*, Gary Hall described challenges to the ‘identity’ of cultural studies, pointing to the debate between political economy and cultural studies. Rapid technological change has distracted us since, but these challenges remain. Furthermore, recent developments surrounding the Covid-19 pandemic have also revealed complex interconnections across viral biology and information science, with the global lockdown giving rise to related postdigital artistic activities. In *Algorithmic Culture* Ted Striphas discussed a delegation of the work of culture to computational processes, which significantly alters the practice, experience, and understanding of culture. This article examines to what extent postdigital art practices offer a form of resistance to political economic ‘illusions’ of democratic forms of public culture found across the Internet, and at which price. If humans and technology are acknowledged as part of a collaborative artistic process, can this address issues pertaining to power, exploitation, and emancipation, in our postdigital age? We conclude that when artists engage with their personal postdigital positionality, this brings such possibilities a little closer in these uncertain times.

Keywords: postdigital, art practice, positionality public culture, cultural studies, digital humanities, bioinformation, resistance, mediation

Introduction

In the 21st century political economic illusions are all around us, making it difficult to verify authenticity, including democratic forms of public culture, both online and offline (Mackenzie and Bhatt, 2020; Khan, 2020). It is all too easy to raise concerns based on what appears to have altered in a so-called digital era, however it can be enlightening to look further back, as well as ahead, when considering what a postdigital perspective on art practices might offer (Jandrić, et.al, 2018, Jandrić and Hayes, 2018, Sinclair and Hayes, 2019, Hayes, forthcoming, 2020). Whilst the disciplines of art and computer science each bring creative potentials, they also bring historical connections and tensions from how they have been understood and enacted in society. As digital media of all varieties have been developed and analysed, the work of both science and interpretation can be noticed. Perhaps art and science are an unlikely couple to bring together, and had they met in a bar, they may even have politely excused themselves before taking their relationship further.

Such an amusing prospect does though have serious implications that sit at the roots of many of our contemporary issues surrounding visual media and practices. A proliferation of what has been labelled ‘fake news’ in a so-called era of ‘post-truth’ and ‘bullshit’, has given us recent stress, as well as new categories in which to park our concerns, but the more fundamental structures beneath these activities are rather more difficult to expose. As pointed out recently by Mackenzie and Bhatt (2020): ‘There have been increasing concerns that fake news in online platforms is undermining the legitimacy of the press, the democratic process, and the authority of sources such as science, the social sciences and qualified experts.’ (Mackenzie and Bhatt, 2020). These observations could not be more relevant, when at the time of writing, citizens worldwide are anxiously awaiting accurate media updates on the global effort against Covid-19. Artistic practices and the digital humanities do not sit outside of this situation. Lacković points to an ‘unprecedented profusion of visual information across digital

media that contributes to the contemporary post-truth era, marked by fake news and uncritical consumption of the media' (Lacković, 2020). She suggests in response that critically engaging with postdigital semiotics, is much needed 'in an age of global ecological and social crises, uncertainty and fast consumption of digital content' (Lacković, 2020).

These arguments also have implications for postdigital art practices, which may be created through the digital (at least in part) and interpreted in the context of cultural education. There is a need to consider firstly, what this could mean for the identity of cultural studies (taking into account historical tensions with political economy), as well as to question whether we may have a new opportunity in postdigital art, to move beyond an uncritical utilisation of digital platforms, devices and media (Ackermann, Egger & Scharlach, 2020). In our discussions we go further, to argue that postdigital art practices, based on authentic human experience, can offer us a form of resistance to many political economic 'illusions' of democratic forms of public culture, that can now be found across the Internet, and are thus now also participants in human lives. However, at the centre of postdigital art practices are human choices, based on personal, 'postdigital positionality' (Hayes, forthcoming, 2020).

We therefore conclude that, digital technologies are not the real starting point for aesthetically renegotiating the issues that arise from them. Beginning with any digital technology is simply a false position from which to disrupt the political economy that surrounds it. A true aesthetic renegotiation requires artists to acknowledge and work with their own personally postdigital positionality as they form artistic interpretations. This concerns developing a deep, critical awareness of the social and political context surrounding their artistic identity and also how this positionality and related values influences their understanding of the digital media they work with. Positionality calls into question the 'objectivity' or 'neutrality' of any postdigital actor (whether human or not), effectively making the argument that usually someone's interests are at stake (Hayes, forthcoming, 2020). If artists critically engage with their own postdigital positionality, even as they occupy the interfaces between art and commercial technologies, then this offers a powerful and authentic route towards renegotiating the potential of postdigital art practices for cultural education.

Challenges to the identity of cultural studies

When considering postdigital art practices against a background of cultural education, it is worth firstly expanding on the approaches and tensions between political economy and cultural studies. Political economy is discussed by Yao (2017: 285), as: 'the scholarly discourse studying social relations, particularly the power relations, which affect the production, distribution and consumption of wealth, income and resources, including information and communication resources'. Yao argues though that political economy also concerns the study of control and survival in social life, because political economists in media research examine the material foundations of what has become labelled as 'the public sphere'. If this concerns an 'understanding of our news and entertainment industries as capitalist enterprises, and the analyses of the frontiers of "new media" development' (Yao, 2017) then digitally informed art and the digital humanities are also an integral part of this public sphere.

On the other hand, a cultural studies approach looks at the above context from a different angle which is defined by Babe as: 'the multidisciplinary study of culture across various social strata, where culture refers to arts, knowledge, beliefs, customs, practices and norms of social interaction' (Babe, 2009: 4). A critical approach would therefore consider the power relations at work across media artefacts, which are often analysed in terms of their social meaning as cultural texts and related social relations involved in their production and use (Yao, 2017). As cultural studies consider people as able to build their own identities from the various

media artefacts at their disposal, and political economists in media research seek to understand a broader information society, including the social and economic changes in the marketplace, and the role of state and government intervention, this has given rise to an ongoing debate and conflict between ‘politics of identity’ and ‘politics of class’ since the 1980’s (Jandrić, 2017: 160). These different routes into aspects of the humanities and digital humanities provide important historical background to this topic of postdigital art practices and cultural presence.

Postdigital artists propose new forms of critical examination of digital, networked media (Ackermann, Egger & Scharlach, 2020), even as they use these technologies, or indeed acknowledge politics of identity, or class. This means that ‘postdigital artworks are generated via digital methods, or at least informed by digital technology, even if they do not necessarily have to create a digital output’ (Ackermann et al. 2019: 183). The work of these artists could therefore be cutting across the longstanding debate between political economy and cultural studies and providing new perspectives on these arguments. In engaging with their own personal postdigital positionality, their work has potential to span the existing disciplinary and political barriers.

We have written elsewhere about the tensions between ‘scientific authority over more traditional artistic expertise and autonomy’ (Jandrić and Hayes, 2018: 238). We have discussed the conditions that produce authentic artworks, as opposed to the combined factors in the political economy surrounding artists that may yield more instrumental consumer products, that become discussed as art. Our arguments were based on ‘the powerful expressions of human experience that emerge through the artistic process’ and we proposed that: ‘intensely personal research methods and pedagogies emerge from the hybrid spaces linking, for example, human artistic creativity, digital technologies and visual culture, physical activities, discourse, learning and research’ (Jandrić and Hayes, 2018: 238). We made the point that neither art nor science are new disciplines and that digital boundaries are continually constructed and reconstructed. What makes these dynamic, is the work of artists and scientists and the processes they engage with, in connection with their human experience, rather than the more static products that have been produced. As Shaun McNiff argues, there is really no such thing as art, only artists (McNiff, 1993). If this is true, then perhaps by analogy, academic disciplines are never ‘complete’ if their practitioners continue to develop them through process and experience. We therefore concur with Crane that in order to verify authenticity, including democratic forms of public culture (whether on, or offline), it is necessary to look at the active routes through which (artistic) practices take place. Well over half a century ago, Crane questioned:

What, then, are the humanities? It will not do merely to say that they are human achievements in language, art, philosophy, and science, though they are these. We must also take into account the methods and arts by which such achievements may be constituted as humanistic subject matters distinct from the subject matters of scientific enquiry (Crane, 1967:167)

Perhaps such distinctions were once clearer cut, in pre-digital times. Now, in a postdigital context, we would want to expand Crane’s comments to suggest we take into account the methods, arts and *actors* (not all of which are human, but now might be considered to be hybrid in various ways, due to the introduction of artificial intelligence (AI), algorithmic capabilities and bioinformation). The interplay across humanistic subject matters and the subject matters of scientific enquiry are no longer distinct. This is particularly apparent through the current Covid-19 pandemic, where a ‘bioinformationalist’ response represents historically unprecedented level of sharing information (Peters, Jandrić and McLaren, 2020).

It should also be acknowledged that even a decade earlier than Crane's question, in the 1950's, both artists and designers were working with forms of mechanical devices and analogue computers, in ways that could be considered 'a precursor to the work of the early digital pioneers who followed' (V & A, 2020). Crane proceeded to point out that in their separate endeavours both the humanities and scientific subjects can include the same objects. However, he makes further points that we consider relevant to this discussion:

One major distinction will be clear if we consider what is left over after language or literature has been analysed and explained by the factual methods of science. What is left over is precisely the question of the nature and value of the language or literature as a human achievement, and as an object, therefore, not merely of curiosity concerning its circumstances or genesis or natural laws, but of understanding and appreciation for what it is. (Crane, 1967:168)

Considering this proposition now, in what might be referred to as 'postdigital' times (Jandrić, et.al., 2018), helps to maintain a continuity of thought and critical debate on what the humanities (and by association, humans) actually bring to the analysis of culture. This is important in understanding the wider cultural educational context surrounding digitally informed art and in examining what postdigital art practices might contribute.

In his writings on posthumanism, Neil Badmington acknowledges his caution in using the term 'post'. He is careful to point out that he does not take the 'post' of posthumanism 'to mark a clean and clear break' to suggest that posthumanism simply follows humanism chronologically (Badmington, 2006). We agree. We would apply the same caveat when using the term postdigital (Sinclair & Hayes, 2019). A small illustration of the complexities of postdigital understandings and the need to avoid looking at artistic practices chronologically comes in the work of typewriter artist James Cook who uses typography to design pictures (BBC News, 2020), rather than the digital software that some may see as more 'native' to his age group and era of artistic practice. For James the typewriter is a tool to create art, like any other chosen process, for cultural education this is a rich example of the breadth of choices and combinations of tools open to artists, for postdigital art practices.

Disrupting the political economic assumptions behind digital distractions and illusions

With so many visually engaging and distracting digital devices and applications at our fingertips in the 21st century, it is hardly surprising that what lies beneath computer interfaces may not be a first consideration, when creating digitally informed art. As some theorists would argue, in a postdigital context, the digital itself has melded into the background, only to be noticed when it is not present, rather than when it is co-directing our endeavours (Fawns 2019). Yet, whilst many (but not all of us) now experience a smooth efficiency of operation across the digital computer platforms we engage with, whether we know it or not, we are also simultaneously experiencing a loss of vision. Users of digital technology no longer have sight of any real reminder of the computational processes that lie beneath the multiple applications they use, or that use them... By this we mean that any belief that we each use only what we wish to, in terms of digital platforms, is a political economic illusion. We are now routinely exposed to countless forms of public culture, through bricks and mortar and across the Internet, but levels of democracy and fairness are much more difficult to determine, due to hidden forms of programming and politics beyond personal control.

As authors, we cannot say that we particularly miss the squeal of a dial-up modem, the failure of floppy discs, the anxiety of intermittent access to the Internet, or indeed repetitive

patterns of background computer code when rebooting a machine. Yet with the passing of such features we also risk a gradual loss of memory of a different kind, as we take for granted massive storage space, fast Internet connections and rich and colourful interfaces. For example, we doubt that these days, each time any of us switches on a device, we also routinely consider how the processing techniques, methodologies and representations that are drawn from computer science (Hall, 2013: 781) are playing their part in jointly shaping political economic interpretations of public culture and artistic practice. Individual artists may not necessarily look deeply beyond the creative process they seek to further either. They may not explicitly ask themselves if there are deeper implications for cultural education surrounding their choice of digital tools. Yet in creating digitally formed art they are fostering relations between the disciplines of art and computer science. Just as new relationships between human beings can bring exciting possibilities, these take time to flourish or fail, as the cultural background of each person comes to influence shared activities. Arguments arise from the diverse perspectives that each person holds, but perhaps these may also come to alter those in the relationship, to bring a new shared identity as a couple, despite retaining singular traits stemming from a different upbringing. The potentials of marrying humans and binary technology, as part of a collaborative artistic process, shares similarities with this scenario.

Whilst computing devices themselves alter in shape and physical design with breathtaking speed, the 'identity' of computers 'remains part of the disciplinary protocol of the field' (Poster, 1990: 147, Hall, 2013: 781). Therefore, as argued by Striphas, a delegation of the work of culture to computational processes, significantly alters how culture is 'practiced, experienced and understood' (Striphas, 2015: 395). By association, this then structures and philosophically frames from the outset, our creative, artistic endeavours performed through any digital means. Murray, drawing on Heidegger's invitation to question technology through *poiesis* (thus revealing what is brought into existence that did not exist before), recommends 'pushing the mixture of art, technology and philosophy in order to focus on profound epistemological realignments within the philosophical sphere where art meets technology' (Murray, 2014: 12). When society appears to be increasingly constructed by digital media, how the logic of computer science articulates with political economic assumptions, to shape artistic practice and public culture, seems to be a key challenge. Therefore, considering the logic that sits beneath the devices and software we use, at the same time as critically examining the layers of representation on top, as part of cultural education, are important forms of resistance to political economic 'illusions' of democratic forms of public culture found across the Internet.

Digital humanities have an extended disciplinary family who don't all talk to each other

It is not our intention to diverge too far away from the potentials of digitally informed art for cultural education, but this is not a topic that can be contained under the banner of digital humanities alone. Also beautifully obscured by the immediacy of the enticing windows of computer applications before us, are the many disciplinary trails that lead to, and emerge from, the field of computer science, as it develops a relationship with artistic practices. Rather like a new couple getting to know each other then, surrounded by their large and diverse extended families, the disciplines of art and computer science each bring creative potentials, and also baggage, from their historical connections. Neither has a monopoly on either conformity or activism, but there are intersecting power relations that need to be navigated, if the digital is to inform art, and art to inform the digital.

The disciplinary relatives that may get involved include media and communications studies, science and technology studies, software and informatics, data and performance studies, bioinformationalism, to name but a few. It is here that postdigital theory surrounding

both computing and art, amongst other fields, can step in as counsellor and mediator perhaps, to open new pathways for postdigital art practices. Postdigital theory presents an opportunity to resist relationships between computing and art that lack authenticity and to avoid ‘illusions’ of democratic forms of public culture that now dominate the Internet. The postdigital is a route back to meeting with the members of an extended disciplinary family who may not currently talk with each other, but who could develop new and exciting bonds. According to Jandrić, some of the new bonds will focus to epistemology while others will reach all the way to politics:

Disciplinarity, multidisciplinary, and interdisciplinarity are imbued within the existing social and technoscientific orders. In spite of significant epistemological and practical achievements, therefore, these methodological approaches are structurally unable to provide radical social change. Transdisciplinarity and antidisciplinarity are better suited for critical networked learning, as their position outside of dominant disciplinary power relationships provides genuine potentials for emancipation and social transformation. In this way, the seemingly innocent field of research methodologies has become a battlefield between values, worldviews, and ideologies. (Jandrić, 2016: 178)

The postdigital route implies a full-on attack on illusions of democratic forms of public culture; therefore, it predominantly consists of transdisciplinarity and antidisciplinarity.

Postdigital art practices as resistance and mediation

In the early 2000s, the concept of the postdigital was first developed in the context of experimental ‘glitch’ art (Cascone, 2000). Its usage has soon expanded towards more traditional forms of art and architecture and following a brief tour through (formal and vernacular) media studies, it finally landed in the fields of science and education (Jandrić et al. 2018). Across these diverse contexts, the concept of postdigital has undergone various transformations, yet some of its key components stubbornly remain unchanged. The postdigital describes this curious, uncanny space between the digital and the analogue. ‘When the prefix post(-) triggers us to recognise that there is something to talk about in the term that follows, with the word ‘digital’ it signals that we have not done with the digital and there are some material aspects of the digital that cannot be physically composted.’ (Sinclair and Hayes, 2019: 130) The postdigital does not take sides in the debate between ‘politics of identity’ and ‘politics of class’ – instead, it recognizes (and builds upon) dialectical relationships between the two types of politics, as they play out through the personal positionality and lived experience of the artist. Similarly, the postdigital does not give primacy either to scientific authority or to artistic expertise and autonomy. However, the postdigital does – and very strongly – reject the political economic assumptions hidden beyond various forms of digital technology. To do so, the postdigital embraces the more radical forms of collaboration between traditional disciplines, which have the potentials to reach towards emancipation and social transformation.

Postdigital art practices refuse to remain cloistered within the traditional realm of ‘pure’ art. Borne from constant conversations with members of their extended family from digital humanities to sciences, postdigital art practices mediate and re-mediate multiple planes of human reality. Postdigital resistance against false authority and ideology embedded in technology is a direct outgrowth from postdigital understanding of ‘blurred and messy relationships between physics and biology, old and new media, humanism and posthumanism, knowledge capitalism and bioinformational capitalism’ (Jandrić et al. 2018: 896). Postdigital

art practices are ‘a rupture in our existing theories and their continuation’ (Jandrić et al. 2018: 895): ‘As a contradictory political and educational landscape, the postdigital age introduces new problems and possibilities for horizontal and vertical pedagogical praxis’ (Jandrić et al. 2019: 174). We cannot help but notice that the very notion of ‘postdigital art practices’ is somewhat misleading – all postdigital practices are related to art, and all postdigital art practices reach towards members of an extended disciplinary family, situated way beyond arts, who don’t all talk to each other. Resistance and mediation are part and parcel of postdigital practices (as they connect with each individual’s personal positionality). These definitely include, but are far from limited to, postdigital art.

Conclusions

Issues pertaining to power, exploitation, and emancipation are embedded in the very nature of postdigital art practices. Epistemically and politically, postdigital art practices can offer genuine resistance to political and economic ‘illusions’ of democratic forms of public culture found across the Internet. However, such theoretical and practical positioning arrives at a high cost. Firstly, this is situated in a fluid, uncanny space between competing technologies, disciplines, and social arrangements, where postdigital art practices may become less ‘artistic’, less ‘practical’, and sometimes even less ‘postdigital’, than we would normally expect. Therefore, together with exploring political and social transformations caused by postdigital art practices, we also need to examine postdigital transformations of art practices, as we know them. Such activities require a deep and critical honesty about where our starting points really are. If postdigital art practices only begin from a particular digital technology, then these will always be flawed by a starting point born from the logic of the political economy in which that technology was designed and implemented.

In order to further potential for cultural education, a true aesthetic renegotiation requires artists to acknowledge and work with their own personal postdigital positionality. Once artists engage with a deep, critical awareness of the social and political context surrounding their postdigital artistic identity they can look afresh at the role of the digital media they choose to work with. They can call into question any assumed ‘objectivity’ or ‘neutrality’ surrounding any postdigital actor (whether human or not). As such they use their positionality to cut across the longstanding debate between political economy and cultural studies and provide exciting new perspectives. In engaging with their postdigital positionality, their work has potential to span the existing disciplinary and political barriers and those ahead of us in the future.

References

- Ackermann, J., Egger, B. & Scharlach, R. (2020). Programming the Postdigital: Curation of Appropriation Processes in (Collaborative) Creative Coding Spaces. *Postdigit Science and Education*. 2, 416–441 <https://doi.org/10.1007/s42438-019-00088-1>
- Ackermann, J., Doerk, M., & Seitz, H. (2019). Postdigitale Kunstpraktiken: Ästhetische Begegnungen zwischen Aneignung, Produktion und Vermittlung [Postdigital Art Practices: Aesthetical Encounters between Appropriation, Production and Education]. In B. Jörissen, S. Kröner, & L. Unterberg (Eds.), *Forschung zur Digitalisierung in der Kulturellen Bildung [Research on Digitalisation in Cultural Education]* (pp. 183–194). München: Kopaed.
- Babe, R. (2009). *Cultural studies and political economy: Toward a new integration*. Lanham: Lexington Books.

- Badmington, N. (2006). Cultural studies and the posthumanities. *New cultural studies: Adventures in theory*, 260-72.
- BBC News (2020). Typewriter artist James Cook says 'it's a weird way of having fun'. BBC, 14 January. <https://www.bbc.co.uk/news/av/uk-england-essex-51094889/typewriter-artist-james-cook-says-it-s-a-weird-way-of-having-fun>. Accessed 25 February 2020.
- Berry, D. M. (2014). Post-digital humanities: Computation and cultural critique in the arts and humanities. *Educause*, 49(3), 22-26.
- Cascone, K. (2000). The aesthetics of failure: 'post-digital' tendencies in contemporary computer music. *Computer Music Journal*, 24(4), 12–18.
- Crane, R. S. (1967). *The Idea of the Humanities and Other Essays Critical and Historical*. Chicago and London: University of Chicago Press.
- Fawns, T. (2019). Postdigital education in design and practice. *Postdigital Science and Education*, 1(1), 132–145. <https://doi.org/10.1007/s42438-018-0021-8>.
- Hall, G. (2002). *Culture in bits: The monstrous future of theory*. London: The Athlone Press.
- Hall, G. (2013). Toward a postdigital humanities: Cultural analytics and the computational turn to data-driven scholarship. *American Literature*, 85(4), 781-809. <https://doi.org/10.1215/00029831-2367337>.
- Hayes, S. (forthcoming, 2020). *Postdigital Positionality: developing powerful narratives for learning, teaching, research and policy in Higher Education*. Leiden: Brill
- Jandrić, P. (2016). The methodological challenge of networked learning: (post)disciplinarity and critical emancipation. In T. Ryberg, C. Sinclair, S. Bayne & de Laat, M. (Eds.). *Research, Boundaries, and Policy in Networked Learning* (pp-165-181). New York: Springer. https://doi.org/10.1007/978-3-319-31130-2_10.
- Jandrić, P. (2017). *Learning in the Age of Digital Reason*. Rotterdam: Sense.
- Jandrić, P., & Hayes, S. (2018). Future Approaches in Using Art-Based Research from Human Experience. In R.W. Prior (Ed.), *Using Art as Research in Learning & Teaching: Multidisciplinary approaches across the arts*. Bristol, UK: Intellectbooks.
- Jandrić, P., Knox, J., Besley, T., Ryberg, T., Suoranta, J., & Hayes, S. (2018). Postdigital Science and Education. *Educational Philosophy and Theory*, 50(10), 893-899. <https://doi.org/10.1080/00131857.2018.1454000>.
- Jandrić, P.; Ryberg, T.; Knox, J.; Lacković, N.; Hayes, S.; Suoranta, J.; Smith, M.; Steketee, A.; Peters, M. A.; McLaren, P.; Ford, D. R.; Asher, G.; McGregor, C.; Stewart, G.; Williamson, B. & Gibbons, A. (2018). Postdigital Dialogue. *Postdigital Science and Education*, 1(1), 163-189. <https://doi.org/10.1007/s42438-018-0011-x>.
- Jordan, S. (2019). *Postdigital Storytelling: Poetics, Praxis, Research*. Routledge.
- Khan, C. (2020). Negotiating (dis)Trust to Advance Democracy through Media and Information Literacy. *Postdigital Science and Education*, 2(1), 170-183. <https://doi.org/10.1007/s42438-019-00072-9>.
- Lacković, N. (2020). Thinking with digital images in the post-truth era: innovation in critical media literacy and higher education. *Postdigital Science and Education*. <https://doi.org/10.1007/s42438-019-00099-y>.
- MacKenzie, A., & Bhatt, I. (2020). Lies, bullshit and fake news. *Postdigital Science and Education*, 2(1), 1-8. <https://doi.org/10.1007/s42438-019-00085-4>.
- McNiff, S. (1993). The authority of experience. *The Arts in Psychotherapy*, 20(1), 3-9.
- Murray, T. (2014). Philosophical Prepositions: Ecotechnics Là OÙ Digital Exhibition. *Diacritics*, 42(2), 10-34.
- Peters, M. A., Jandrić, P and McLaren, P. (2020). Viral modernity? Epidemics, and the bioinformational paradigm. *Educational Philosophy and Theory*. 1-23.
- Poster, M. (1990). *The Mode of Information: Poststructuralism and Social Context*. Cambridge, UK: Polity.

- Sinclair, C., & Hayes, S. (2019). Between the post and the com-post: examining the postdigital 'work' of a prefix. *Postdigital Science and Education*, 1(1), 119-131. <https://doi.org/10.1007/s42438-018-0017-4>.
- Striphas, T. (2015). Algorithmic culture. *European Journal of Cultural Studies*, 18(4-5), 395-412. <https://doi.org/10.1177%2F1367549415577392>.
- V & A. (2020). A History of Computer Art. <http://www.vam.ac.uk/content/articles/a/computer-art-history/>. Accessed 25 February 2020.
- Yao, J. (2017). Beyond the political economy versus cultural studies debate? Toward a new integration. *Fudan Journal of the Humanities and Social Sciences*, 10(3), 281-295. <https://doi.org/10.1007/s40647-017-0167-x>.