Performed Subjectivities in Ranking and Recommendation Systems

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There is a delicate balance between
appropriating new technologies
and being appropriated by them.
(Pasquale 2015, 43)

Digital Labour in Creative and Cultural Industries

Digital creativity has long been viewed as a space which offers unprecedented possibilities for socio-economic development. This is well exemplified by the early dotcom era and subsequently by the support given to industries that fall under the umbrella term of Creative and Cultural Industries (CCI), which was first coined by the United Kingdom's Department for Culture, Media and Sport (DCMS) in the late 1990s. It is often used in relation to urban development policies linked to the rhetoric on creative classes (Florida 2002). Until now, digital creativity and its professions seemed to almost exclusively inhabit sectors clearly defined by Information and Communication Technologies (ICT); however, it also inhabits those which are more difficult to define (but which are of no less importance) to the Creative and Cultural Industries, which can be considered 'factories without walls' of informational capitalism.

Now, the digitisation of processes also plays a pivotal role in the production chains of physical goods. As a result, the digital sphere is becoming more and more important; this is clear if we look at the push towards the systemic and structural digitisation of production and consumption processes. Within this framework, the digital sphere offers directions and transversal affordances which, to a certain extent, are shared by the different sectors which produce 'ideas' (the CCIs) and 'things'. A shared language, a regulating system which is as abstract (think of the binary code) as it is concrete (think of the ability of the digital sphere to influence behaviours, content, subjects and objects).

Let us now focus our attention on sectors where digital creative work has historically developed, in the CCIs; in other words, the beating heart of the creative economy. What sets these industries apart is a greater centralisation of creative-cognitive functions in the production cycle, but also greater circularity and interaction between the production and consumption phases. John Hartley (2005) defines digital creative work as the convergence between creative arts (connected to individual talent) and mass cultural industries, in the context of new digital media technologies. As a result, digital creative work is closely linked to the media world (communication environments) and to the discourse between individual creativity – which aims to personalise processes and products – and creativity in mass cultural production, which aims to serialise and scale processes and products, as often occurs in the movie industry, large broadcasting agencies and, today, in digital media factories.

The map of digitally-related creative professions is the result of hybridisations within the new media ecology, which has been heavily redefined by new actors of the internet economy. Fondazione Rosselli's 14th Report on Communications in Italy (Barca and Zambardino 2012) includes a study on the new structures deriving from the co-dependencies of traditional media and internet actors, and highlights that these co-dependencies exist and change as a result of the different stages of internet development:

1. 'The Age of Discovery'. This era was characterised by substantial deregulation of social and economic flows.
2. 'The Age of Experimentation' (up to the dotcom bubble of the 1990s). In this era, users continue to enjoy the use of free content, while traditional content producers remain wary of transferring their content online for fear of not finding profitable business models.
3. 'The Age of Consolidation'. Our current era, which is characterised by a more articulated value chain. The market and its users are more mature and have a greater propensity to experiment with services behind a paywall.

The Age of Consolidation coincides with the switch to Web 2.0 and the popularity amongst users of sharing and co-creating. In this trend towards the hybridisation of genres, services and business models, we are seeing a shift on behalf of network players from distributors to producers of creative content

(a prime example of this is Netflix). This transformation also represents the shift to platform capitalism (Vecchi 2017; Srnicek 2016), which transcends the CCI sectors and leads to the creation of new business set-ups and work opportunities, such as the 'platformization' of capital-work relationships.

Within this context of technological innovation, traditional media professions are 'hybridised' with ICT professions. Work profiles that require hybrid skills, which encompass technology, communication and marketing, are emerging; these include titles such as web designers, webmasters, user experience analysts and social media managers. 'Cloud' managers and Big Data and mobile content specialists are among today's most sought-after professional figures. If we were to map these professions, we would see that the required skills are an ICT specialisation combined with textual, visual and audiovisual communications expertise.

In terms of what work looks like in this hybrid industry, we are seeing the combination of 'individualisation' and 'recircularization' of work. Within the media sector, we have observed a growth of content produced by individuals or small-scale productions, but also collaborative and almost always project-based (short-range, intermittent) productions, which often straddle the commercial and non-commercial spheres, and which may be paid or free (Terranova 2000). This tendency is occurring concurrently with the crisis of both cultural institutions and traditional media (Banks, Gill and Taylor 2013). Digital creativity professionals are in strong demand, particularly in strictly ICT professions (Aica et al. 2017) and over time they have quite simply become paradigmatic professions of contemporary work.

Indeed, as highlighted by several studies carried out on digital creative work (for Italy, see Mazali 2016), these professions, and the people behind them, are subjected to certain dynamics we find in the broader employment sector today: employment precarity (Gill and Pratt 2008); work stress and anxiety, which are linked to increased rates of subjective and objective precarity (Gill and Pratt 2008); the tendency to establish forms of self-exploitation (Ross 2009) dictated by the need to build and maintain a high digital reputation; the high affective content of the work (Hardt 1999), which exacts a significant emotional toll in order to carry out one's job, but also the growing demand placed on the worker to fully embrace and commit to the business project; the push towards personal capitalism (Bonomi and Rullani 2005); and finally, the tendency – and need – to adapt to platform capitalism's rules of exchange (to give an example in the creative field, think of the growing importance of freelance marketplaces such as Fiverr or Dribble).

These features, which place attention on individuals, fit into new collective configurations which characterise contemporary digital culture: participatory culture (Jenkins 2006) and the active role of the public in 'media making' (Boccia Artieri 2012) constitute a significant part of today's media productions; the short-circuit between production and consumption leads to the creation of hybrid content makers who are both professional and non-professional, and are also referred to as 'proams' – professional amateurs (Flichy 2010). This

leads to an unprecedented tension between different kinds of 'service providers' (for example, the presence of proams leads to the lowering of the cost/value of creative products, which has a detrimental effect on actual professionals); the implementation of crowd modalities to self-finance creative projects or to conduct job searches are new practices for professional growth, which very quickly lead to possible perverse effects, as in the case of the gig economy (Graham and Shaw 2017).

In this complex digital work landscape, creative professions were among the first to be subject to the logic of the algorithms which feature in online reputational mechanisms, rating processes, evaluations and measurements. Within transformations of labour practices, creative workers were also among the first to showcase the critical aspects of the so-called 'algorithmic self' (Pasquale 2015) or 'data self' (Horning 2012) or 'quantified self' (Moore 2018), which emerge from the process of sharing, being shared, having automated recommendations, and being processed by algorithms. This is because it is vital for digital creativity professionals to use the affordance of social networks and platforms to showcase their creative work.

To maintain a competitive advantage or simply to remain visible on the network stage, it is therefore necessary to adopt an algorithmic self, at the service of self-promotional strategies. The algorithmic self of digital creatives is based on two socio-technical systems: building a digital reputation and establishing recommendation mechanisms. The former involves a person's individual sphere and enables the creation of a digital subject that will compete in the network's arenas; it entails the construction of affordances of the techno-subject. Using a gaming metaphor, we could say that reputation mechanisms correspond to the features that a player assumes when playing a character. The latter corresponds to the superstructure of social networking relational logics; in the videogame metaphor, the recommendation mechanisms are the playing field and its rules.

Both systems are socio-technical: they are the 'machinic regulation' (Deleuze and Guattari 1980) *and* the subjects' space of action. From the workers' perspective, one's reputation can be a field of empowerment (it can be somewhat guided), and recommendations can be a field of 'alienation', that is a place of complete depersonalisation, a playing field where only automatic machines play. Between these two extremes there are many nuances, and professionals are afforded the possibility to at least partially guide the outcomes of these socio-technical systems.

To understand how creatives can orient reputation and recommendations in their favour, let's now analyse one of the most important platforms in terms of global penetration and self-promoting strategies: Facebook. In particular, we will look at how Facebook operates reputation and recommendations systems within its algorithm.

Facebook's Algorithm

In 2017, Evan Williams, co-founder of Twitter and platforms such as Blogger and Medium, when interviewed by the *New York Times* (2017) on the topic of social networks, said:

> I think the internet is broken. I thought that, once everybody could speak freely and exchange information and ideas, the world is automatically going to be a better place, but I was wrong about that.

The problem is that the internet rewards extremes. Or rather, Facebook's algorithm interprets our digital behaviours as precious indicators of what it believes may be more interesting, relevant and engaging for us. Its end goal is to dissuade us from leaving the platform's walled garden and its entire ecosystem (Facebook owns Messenger, WhatsApp, and Instagram). This same principle governs the algorithms of platforms such as LinkedIn (owned by Microsoft) or YouTube (owned by Google).

Also in 2017, John Evans, TechCrunch's opinion columnist, stated that: 'At Facebook's scale, behavioural targeting doesn't just reflect our behaviour, it actually influences it. The way Facebook's News Feed works is that the more you 'engage' with posts from a particular user, the more often their posts are shown to you. The more you engage with a particular kind of post, the more you will see its ilk. It's just showing you what you've demonstrated you're interested in. The problem applies to all social networks with 'smart' algorithmic feeds that optimise for engagement. Facebook is just the largest and most influential by far' (TechCrunch 2017).

According to Lovink (2016), the crux of the matter is the invisibility of the internet rather than its omnipresence: digital is the new, comforting, unquestioned general rule, and social media are not monstrous machines, but rather (soft) tools of influence: private companies offering the public communication and information management services which, judging by their reach, have an undeniable impact on opinions and behaviour.

While the debate about the very nature of these tools is still ongoing, with some placing social media in old categories – are they containers of content or creators of content?, are they public or private spaces? – the sheer volume of information and data we produce and consume is continuing to grow exponentially (Internet Live Stats). The algorithms on the different platforms are purposefully designed to decide what we can or want to see of this infinite mass of data, adopting different and sometimes extremely complex criteria to make those decisions. Over the years, Facebook has repeatedly issued statements about how its News Feed algorithm (de facto, its recommendation system) actually works.

In 2016, Adam Mosseri, then VP of Product Management for News Feed, emphasised that the goal of the News Section was to connect every person with what is most 'important' to them and only them (Mosseri 2016). Basically, each News Feed is built completely around the actions of the individual user, which can be more or less public (from the comment on a post to the amount of time spent on it). No two News Feeds are the same, even if two platform users like the same things and have the same friends. Concretely, when a user or a Page publishes a post, the system generates a real auction among the various posts published by the friends and pages followed by a given person when that person connects to Facebook. The algorithm then attributes a relevance score to each individual post and arranges the various possible posts on this basis (sometimes deciding not to show them at all). The factors that regulate the News Feed algorithm (over 100,000) are constantly updated, but among the main ones used in 2016, we find those which constituted the Edge Rank from the very beginning (TechCrunch 2010), which are: affinity, weight and time decay. These are influenced by:

- The Content Poster: how often we interact with the Page/user who posted it;
- The Content Type: how often we interact with that type of content (images, videos, links, text, etc.);
- Post Interactions: comments, likes, shares; and
- Post Publishing Time: how recent the update was.

However, in 2018, Mark Zuckerberg's priority was 'putting people at the centre' (Zuckerberg 2018), thereby modifying the algorithm to prioritise posts that generate conversations and create meaningful interactions among platform users such that:

- The format is less important than the content;
- Friends and family posts are prioritised over public content (Pages); and
- Greater importance is given to the territorial and local aspects of posts and responses (geolocalisation).

As Adam Mosseri, VP News Feed at Facebook, indicated in 2017 (SocialMedia-aExaminer 2017), Facebook's algorithm uses four steps to help it decide how to rank your content in the news feed:

1. *Inventory*: When you first open your news feed, Facebook's algorithm takes an inventory by looking at all of the stories posted by your friends and the pages you follow.
2. *Signals*: Facebook then considers all available data and tries to make an informed decision about how interested you may be in a certain story. Both 'context signals' (such as time and place of access, type of connection, access device) and 'content signals' (which specifically relate to individual posts) are taken into consideration.

3. *Predictions*: Facebook then uses these signals to help make predictions and calculate the probability of certain outcomes; for example, how likely you are to comment on a story, share a story, spend time reading a story, and so on.
4. *Score*: Facebook consolidates the information to calculate a 'relevance score,' a number that represents how interested Facebook thinks you may be in a certain story. Facebook does not really know how interested you are in a certain story; it's an educated guess at best. There are, however, content signals that are weightier than others: particular attention is given to the so-called 'meaningful interactions', such as, for example, if the link to the post has been shared on Messenger; if the post has generated multiple comments (responses) from the same people (thus activating a conversation); if we interacted with a post of a page shared by a friend, and so on.

The algorithm has undergone further changes over the years (Wallaroo 2020); however, it has actually seen an organic drop in the visibility (reach) of the content published in the Pages, spaces specifically designated for the communication of companies, institutions and freelancers. From January 2016 to mid-July 2016, publishers' Facebook Pages experienced a 52% decline in organic reach (Martech 2016) – and it has continued to decline over time.

Today, the average reach of an organic Page post hovers around 5.2% (Wearesocial 2020). That means roughly one in every nineteen fans sees the Page's non-promoted content. The easiest way to boost distribution and direct sales is to boost the advertising budget: it's no secret that most social platforms operate on a pay-to-play model for brands. The more you pay, the more you are seen, and the more your brand sells. Since 'carriers have become personal brands that need to be managed in a virtual age' (Gioia et al. 2014), building a good personal branding strategy today on Facebook (as with other social platforms) means being able to create a digital identity that draws the attention of a specific audience, provides compelling and distinct content (becoming a credible voice in a specific field relevant to the interests of a specific audience), reaches (gathering a community of followers) and generates meaningful engagement (Khamis, Ang and Welling 2017). In concrete terms, this means:

- Investing time and specific skills in content creation and curation activities.
- Investing time, skills and budget in digital advertising.
- Fostering interactions with the reference community (better comments, like, and shares).
- Using a tone that makes the posts 'conversational'.

Individuals stand out from the crowd by articulating their unique value proposition and adopting a professional approach in a consistent manner. It takes time to build trust, earn credibility and forge a relationship, yet this is increasingly important for those who want to develop their own personal brand. To achieve this, it is essential for digital creative professionals to understand the

'languages' of the different platforms and the functioning of their algorithms. These are the current 'golden rules', which are also subject to sudden changes that platforms make to their algorithms, to ensure that digital reputation mechanisms are also tools of effective empowerment for creative workers.

However, we must not forget that these same mechanisms can lead to 'alienation', i.e. maximum depersonalisation, as shown by the example of the evolution of the Netflix algorithm discussed below; unless individuals communicate in an obviously human manner, with the algorithms being prepared to analyse, rank and propose human behaviours, rather than the content itself.

Humanising Algorithms?

The digital reputation and personal branding dynamics of digital creative professionals are part of the broader dynamics of media platform recommendation systems. The Netflix algorithm is emblematic in this respect. Ed Finn (2018), when analysing the evolution of Netflix's recommendation systems, noted that the first version of their algorithm, called Cinematch, fully represented the logic of algorithmic culture 1.0, that is an algorithm based on 'a straightforward statistical linear models with a lot of data conditioning. In other words, the algorithm relied on users rating movies on a single five-star scale. Cinematch didn't care about lead actors, directors or genres. 'It was a mathematical approach to recommendations, one that ignored the complex position of Hollywood entertainment and movie rentals as culture machines' (Finn 2018, 88). The problem inherent in the 'algorithm 1.0' approach – based on a stochastic logic of abstraction and probability – is that 'while everyone could see that it was doing a better job, nobody could quite explain why' (Finn 2018, 90).

In 2012, Netflix claimed to have changed the Cinematch algorithm by inserting logics that went beyond the five-star model, making it much more complex and more interrelated with other platforms, including Facebook. In addition, Netflix introduced a video content tagging system that was not carried out by a machine, but by real people. The word 'tagger', originally referred to as automatic content markup programs, is now a Netflix 'job title'. Todd Yellin, Vice President of Product Innovation, the man who conceived the system, called the platform's new 2.0 algorithmic logic the 'Netflix Quantum Theory' platform, from the word 'quanta', which indicates the dozens of microtags that taggers are asked to identify within the videos. Netflix's anonymous taggers are a clear example of human work at the service of the machine culture that underpins today's computational efficiency. This example also reminds us that in the field of creativity, whether produced or consumed, algorithms have shown that they need people, because creativity cannot only be 'efficient', it must also be 'fulfilling'. Unfortunately, as Netflix's emblematic example suggests, the human role is currently limited to 'serving' the machine and instead of the machine being humanised, the person is 'machinised'.

In this scenario, it seems increasingly urgent, on the one hand, to empower computer designers and, on the other, to overcome single-disciplinary specialism

(which has led the technological development of intelligent machines in a predominant way) and shift towards a fully socio-technical approach. In light of the growing debate on artificial intelligence – also visible in the media coverage of the ethical considerations of algorithms (Ouchchy, Coin and Dubljević 2020) – actions and reflections on ways of making algorithms less 'unfair' have started to appear. By way of example, some IT development directions for the implementation of 'socially responsible' algorithms are working to design more socially responsible artificial intelligence agents to mitigate biases that are inadvertently incorporated into algorithms (Vetrò et al. 2019); both 'independent' and 'institutional' organisations are monitoring the impact of algorithms in order to spread awareness and suggest guidelines for their governance (Algorithm Watch 2020; Agid 2018). On the one hand, the aim of new branches of study on algorithm development is to pay further attention to the ways in which artificial intelligence technologies can trigger positive effects in terms of reducing the existing social, economic and cultural differences through the adoption of equity criteria and methods that embed interdisciplinary concepts into algorithmic systems. On the other hand, we have to know that one cannot talk about 'better algorithms' without first clarifying the distinction between algorithmic equity and social justice. Otherwise, the emphasis will be placed on whether or not to find a technological 'fix' to a problem that is, in fact, sociopolitical by nature. Techno-mathematical solutions are certainly important, but the question is not only limited to the algorithmic aspect.

Lastly, it should be said that it is not just a matter of 'opening the black box', or in other words, making the functioning of the algorithms transparent, because the problem inherent in some machine learning techniques is that they generate algorithms that are not predetermined, and that are paradoxically and constitutionally incomprehensible; such machine learning training techniques produce algorithms based exclusively on numerical weights in a neural network.

There is a research agenda needed that once again calls into the question the accountability of developers and researchers in creating 'explicable' machine learning techniques, algorithms designed so it is possible to explain why they produce a certain set of results. However, underlying these efforts, an inescapable question remains: if this technology is itself non-transparent, due to the fact it is the result of a process that is ultimately unknown in its deepest ganglia, is it right to develop it at all? And, moreover, to use it?

Final Remarks

Analysing the characteristics of digital work to understand its specificities within the Creative and Cultural Industries means confronting the affordances of the digital medium. It is not a simple tool, but a common 'language': a regulation system, both abstract (binary code) and material (the ability of the digital medium to mould behaviours, contents, objects and subjects). Among the digital affordances that condition the subjects/workers of the digital

creativity value chains, an important one is represented by the algorithms of the reputation and recommendation systems, necessary tools for creatives to maintain their 'market position'.

From the workers' point of view, digital reputation can be an area of empowerment (it can be somewhat guided); however, recommendations can be 'alienating' and create a space of maximum depersonalisation, a playing field where automatic machines play. Between these two extremes there are many possibilities, and the chance for professionals to influence, at least in part, the outcome of these socio-technical systems.

To understand if and how creatives can orient reputation and recommendations in their favour, the rules and grammars of the Facebook platform in terms of influencing self-promoting strategies were analysed in detail, focusing on its algorithm and how it has evolved over time. The lesson we learn is that it costs digital creative professionals a lot to maintain their own digital visibility in terms of time and money, since controlling or 'bending' the Facebook algorithm for one's own ends requires investing time and specific skills in content creation and curation; investing time, skills and budget in digital advertising; fostering interactions with the target community (better comments and shares, instead of likes); and using a tone that makes the posts 'conversational'.

While these are currently the rules to ensure that digital reputation mechanisms are tools of empowerment for creative workers, we must not forget that these same mechanisms can be 'alienating', or depersonalising, as highlighted by the Netflix recommendation algorithms, one of the most powerful and pervasive media platforms for creative audiovisual content.

While the analysis of the Facebook algorithm has allowed us to understand how to 'humanise' its use, looking more closely at the Netflix algorithm tells us that algorithms must evolve considering the complexity of the processes they want to automate. For the time being, this evolution seems to be based on a balance between automation and human intervention to the complete detriment of the human. On platforms such as Netflix, the role of humans is designed to 'serve' the machine. More than humanising the machine, the individual is 'machinised'. To address this criticality, IT designers ought to be made responsible and foster an ethical and conscious approach to the development of algorithms as soon as possible. Some initiatives are moving in this direction, tracing the way to make algorithms intelligible, reducing the bias inherent in algorithmic design, and controlling the social impacts of algorithms.

References

Agid – Agenzia per l'Italia Digitale. 2018. *Libro Bianco sull'Intelligenza Artificiale al servizio del cittadino*. https://ia.italia.it/assets/librobianco.pdf.

Aica, Assinform, Assintel and Assinter. 2017. *Osservatorio delle Competenze Digitali: Scenari, gap, nuovi profili professionali e precorsi formativi*. Available at: https://www.assinteritalia.it/ProxyVFS.axd/null/r15297/Report

-integrale-Osservatorio-Competenze-Digitali-2017-pdf?ext=.pdf&v=8401 (last accessed 15 December 2020).

Algorithm Watch. 2020. *Automating Society Report 2020.* Available at: https://automatingsociety.algorithmwatch.org (last accessed 15 December 2020).

Banks, M., Gill, R., and Taylor, S. (Eds.), 2013. *Theorising Cultural Work. Labour, Continuity and Change in the Cultural and Creative Industries.* Routledge.

Barca, F. and Zambardino, B. 2012. *XIV Rapporto Iem. L'Industria della comunicazione in Italia. I nuovi attori 'sopra la rete' e la sostenibilitá della filiera di Internet.* Fondazione Rosselli. Available at: https://www.unipa.it/persone/docenti/d/paolo.dibetta/.content/documenti/2012_XIV_rapporto_IEM.pdf.

Boccia Artieri, G. 2012. *Stati di connessione. Pubblici, cittadini e consumatori nella (Social) Network Society.* FrancoAngeli.

Bonomi, A. and Rullani, E. 2005. *Il capitalismo personale. Vite al lavoro.* Torino: Einaudi.

Deleuze, G. and Guattari, F. 1980. *Mille piani.* Castelvecchi.

Finn, E. 2018. *What Algorithms Want: Imagination in the Age of Computing.* MIT Press.

Flichy, P. 2010. *Le sacre de l'amateur: Sociologie des passions ordinaires à l'ère numérique.* Editions du Seuil.

Florida, R. 2002. *The Rise of the Creative Class.* Basic Books.

Gioia, D. A., Hamilton, A. L., and Patvardhan, S. D. 2014. Image is Everything. *Research in Organizational Behavior*, 34, 129–154.

Gill, R. and Pratt, A. 2008. Precarity and Cultural Work In the Social Factory? Immaterial Labour, Precariousness and Cultural Work. *Theory, Culture & Society*, 25(7–8), 1–30.

Graham, M. and Shaw, J. (Eds.), 2017. *Towards a Fairer Gig Economy.* Meatspace Press.

Hardt, M. 1999. Affective Labor. *Boundary 2*, 26(2), 89–100.

Hartley, J. (Ed.), 2005. *Creative Industries.* Wiley-Blackwell.

Horning, R. 2012. Notes on the 'Data Self'. *The New Inquiry*, 2. February. Available at: https://thenewinquiry.com/blog/dumb-bullshit (last accessed 11 December 2020).

Internet Live Stats. http://www.internetlivestats.com. 7 December 2020 (last accessed 11 April 2022).

Jenkins, H. 2006. *Convergence Culture: Where Old and New Media Collide.* New York University Press.

Khamis, S., Ang, L., and Welling, R. 2017. Self-Branding, 'Micro-Celebrity' and the Rise of Social Media Influencers. *Celebrity Studies*, 8(2), 191–208.

Lovink, G. 2016. *Social Media Abyss: Critical Internet Culture and the Force of Negation.* Polity Press.

Martech. 2016. Facebook organic reach is down 52% for publishers' Pages this year, 6 July. Available at: https://martech.org/facebook-organic-reach-drop-steepens-52-publishers-pages (last accessed 11 April 2022).

Mazali, T. 2016. *Digital Workers. I professionisti delle industrie creative.* Aracne.

Moore, P. V. 2018. *The Quantified Self in Precarity: Work, Technology and What Counts*. Routledge.

Mosseri, A. 2016. Facebook for Developers, News Feed: Getting Your Content to the Right People, 12 April. Available at: https://developers.facebook.com/videos/f8-2016/news-feed-getting-your-content-to-the-right-people (last accessed 15 December 2020,).

New York Times, The. 2017. The Internet Is Broken': @ev Is Trying to Salvage It, 20 May. Available at: https://www.nytimes.com/2017/05/20/technology/evan-williams-medium-twitter-internet.html (last accessed 15 December 2020).

Ouchchy, L., Coin, A., and Dubljević, V. 2020. AI in the Headlines: The Portrayal of the Ethical Issues of Artificial Intelligence in the Media. *AI & Society*, 35, 927–936.

Pasquale, F. 2015. The Algorithmic Self. *The Hedgehog Review*, 17(1), 30–45.

Ross, A. 2009. *Nice Work if you Can Get it: Life and Labor in Precarious Times*. New York University Press.

SocialMediaExaminer. 2017. The Facebook Algorithm Demystified: How to Optimize for News Feed Exposure, 31 May. Available at: https://www.socialmediaexaminer.com/facebook-algorithm-demystified-how-to-optimize-for-news-feed-exposure (last accessed 15 December 2020).

Srnicek, N. 2016. *Platform Capitalism*. Polity Press.

TechCrunch. 2010. EdgeRank: The Secret Sauce That Makes Facebook's News Feed Tick, 23 April. Available at: https://techcrunch.com/2010/04/22/facebook-edgerank (last accessed 15 December 2020).

TechCrunch. 2017. Facebook is Broken, 4 June. Available at: https://techcrunch.com/2017/06/04/when-you-look-into-the-news-feed-the-news-feed-looks-into-you (last accessed 15 December 2020).

Terranova, T. 2000. Free Labor: Producing Culture for the Digital Economy. *Social Text*, 18(2(63)), 33–58.

Vecchi, B. 2017. *Il capitalismo delle piattaforme*. ManifestoLibri.

Vetrò, A., Santangelo, A., Beretta, E., and De Martin, J-C. 2019. AI: From Rational Agents to Socially Responsible Agents. *Digital Policy, Regulation and Governance*, 21(3), 291–304.

Wallaroo. 2020. Facebook Newsfeed Algorithm History. Last Updated: December 9, 2020. https://wallaroomedia.com/facebook-newsfeed-algorithm-history (last accessed 15 December 2020).

Wearesocial, Hootsuite. 2020. Digital 2020 April Global Statshot Report, 23 April. Available at: https://datareportal.com/reports/digital-2020-april-global-statshot (last accessed 15 December 2020).

Zuckerberg, M. 2018. Facebook post, 19 January. Available at: https://www.facebook.com/zuck/posts/10104445245963251 (last accessed 15 December 2020).