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The Digital Production Gap in the Algorithmic Era

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Fake news takes work just like journalism but without the integrity and the reporting. Still, even with disinformation, people have to think of a story idea; write it up to make it accessible to a targeted audience; design the layout in an appealing way; attach a photo, graphic, or at least a clever headline that will drive traffic using search engine optimization; figure out where and when to place it amid an array of other articles and ads; and disseminate it through provocative social media posts. Much more behind-the-scenes labor must happen for fake news to go viral, not the least of which is building up an audience that is shocked enough to want to share it.

This digital production of disinformation stands in stark contrast to the more idealistic possibilities put forth at the dawn of the social media era. We have come a long way since the wide-eyed first decade of the 2000s, when the idea of citizen journalism was a bright light at the end of a narrowing dark tunnel of brutal cuts to newsroom staff by fewer and fewer locally owned media outlets in favor of mega news corporations that had gone public (Benkler 2006; Jenkins 2006). The idea was that networked individuals (Rainie and Wellman 2012) could break free from the chains of bureaucratic news and media institutions and produce their own content online, creating a more diverse marketplace of ideas.

At the same time, though, a small group of activists, policymakers, and scholars was sounding the alarm on a digital divide around who could access this treasure trove of information (Dimaggio et al. 2004; Hargittai 2003). But what was missing from much of this initial digital divide analysis was who was on the producer end of this content firehose. With the concept of a digital production gap, Schradie (2011) theorized this distinction between production and consumption in analyzing digital inequalities, building on scholars who had suggested that online participation was not as egalitarian as the internet optimists would have had us believe (boyd 2009; Correa 2010; Hindman 2009).

A key mechanism of the digital production gap that Schradie (2011) articulated was controlling the digital means of production. This was a reference to a concept developed by Karl Marx, whose analysis refers to the transformation of the economy from an agrarian to an industrial society, in which those controlling the means of production were those who controlled land, labor, raw materials, factories, machines, and other capital materials. In turn, as scholars want to understand content producers whether a New York Times columnist or a WeChat poster, it is essential to analyze all the factors that go into controlling that means of digital production to understand any constraints on doing so, including power relations. Nonetheless, in the early 2010s, most of the methodological focus was on the individual as a unit of analysis, identifying who was more likely to produce online content according to certain demographics (Schradie 2011; Hargittai and Walejko 2008; Correa 2010). So, an individual having use of digital devices at work and at home and being able implicitly to “control” them meant having an educational level commensurate with the necessary information and communications technology skills and an income level to afford a connected computer, for example.

Social class, often defined with these variables of income or education, remains one of the most reliable predictors of digital content production. While production gaps based on social class, as well as gender, race, ethnicity, and disability, are and remain critical factors on their own, not simply in relation to class, this chapter focuses on social class as an analytical lens while also highlighting intersections. Nonetheless, this social stratification approach—which categorizes people by various socioeconomic factors—is not sufficient to explain the production gap. Yes, it is important to own a gadget or master a skill, but it is also a question of who ultimately pulls the digital strings. Indeed, the most prolific producers online are not individuals or citizen groups but corporations and states which have an ever increasing monopoly over the means of production (Schradie 2015b).

Since the early days of the web, technology has exponentially transformed what it means to be a digital producer in terms of inequalities, from algorithms and artificial intelligence (AI) to platform labor and surveillance, with the seat of power largely centered around Silicon Valley, though corporate rivals in China and elsewhere have emerged as forces to be reckoned with. Nonetheless, comparable and

comparative research on content production using GAFAM (Google, Apple, Facebook, Amazon, and Microsoft) and BATX (Baidu, Alibaba, Tencent, and Xiaomi) across different countries has not kept up with the growing digital production inequalities across these corporate platforms, nor has it kept up with the exponential growth of data worldwide. We argue that it is essential to understand digital production inequalities in the context of these platform-driven technologies making who does and who does not control these digital means of production even more critical. It, Key to understanding the digital production gap is this question of power, and power relations, not simply demographic variables. Even someone with an advanced degree and an array of digital devices is no match for the power of GAFAM or BATX, as well as governments and elites which all coalesce around the hegemony of digital production. While viral online photos, videos, and other posts by everyday people certainly are common with online content production, from Black Lives Matter tweets to K-Pop fans on TikTok, in the long term, they are drowned out by people with more power.

Thus, research and analysis need to incorporate questions of who controls the digital means of production for more robust theories, models, and studies of digital inequality in general, and of digital production in particular. While the concept of controlling the digital means of production in relation to the online production gap was a key theoretical advancement, technological advancements and, more importantly, a tightening of the corporate control over them throughout the 2010s have shown that this concept is even more critical today. We are no closer to controlling the means of production than when the concept of the digital production gap was introduced. In fact, this gap has only gotten wider and deeper.

The Changing Ecosystem of Digital Content Production

To understand this transformation of digital production, it is useful to take a step back and first examine the trajectory of online content production and its resulting inequalities. Then, we will trace how the content lens is a necessary though insufficient way of theorizing the digital production gap.

Early Digital Content Production

Producing content is not new to the digital era. From the early printing press to mimeograph machines, as well as the telegraph and fax machines, people with the means to do so have been able to communicate their personal and political stories and news. And like today, corporations and states dominated these modes of communication. While the digital era certainly changed communication production, it especially transformed the distribution end of that content to enable a much broader, more efficient, and targeted reach (Rainie and Wellman 2012). In fact, this transformation is a key element of the myths around the democratization of online content.

Outside of the foundational military and university uses, early internet content generally fell into two areas—one was text content, in the form of online newsgroups, email, and even some gaming. Initially, throughout the 1980s, these text-based-only tools were often used through known social, community, or workplace networks (Turner 2006). This communication was often written by individuals to other individuals (one-to-one). Newsgroups, such as Usenet based in the U.S. or chat services on the Minitel in France, had the early social media characteristic of “one-to-many,” with groups formed around common interests ranging from politics to gardening. An early scholar of social differences with regard to this content was Marc A. Smith, who found that just a small fraction of people was more likely to dominate the Usenet space. Although he did not analyze the socioeconomic background of posters, from available diffusion curves of internet access at the time, people with higher incomes and education levels were most likely to be using these services at that point (Smith 1999; Van Dijk and Hacker 2003). However, it was only a small pool of early adopters, mostly university-educated, who were even participating in these groups to begin with.

The other area of content was the growth of websites, which started to accelerate rapidly in the early 1990s. Dot-coms—startups centered in Silicon Valley—began to dominate the internet by registering website names hand over fist. But individuals could still register a domain name, whether as a .com or

a .org, and develop their own website with basic graphics and lots of text. While courses on coding using html technology—the coding needed to put up a website and related content—proliferated, these producers were often limited to a small group of elite adopters. Eventually, software tools from companies like Adobe became available, but the learning curve and time it took to learn were still high. At the same time, though, the web was open, in the sense that users could create content on a website, and, as part of the semantic web, that content would match with what was being searched through early search engines. But as a proportion of the total population, content producers remained a niche group (Schradie 2015b). Barbrook and Cameron (1995) famously described a “virtual class” of entrepreneurs, software developers, engineers, communication specialists, and others, who they went on to describe as “Rich white Californians.”

Nonetheless, in the late 1990s, advancements in software and interest in being able to distribute one’s ideas and thoughts to the broader digital public inspired a new form of content creation: blogs. While blogs may now seem retro, “blogging” was a new word at the time that was a mashup of “web” and “log.” With software like Live Journal, Blogger, and Word Press, blogging was in theory easily available, though, as Hindman (2009) pointed out and Schradie (2012) later confirmed for the United States, it tilted toward those with university education—people who had the skills, resources, and time to blog, not to mention the influence to build a following.

It was not until the early 2000s, when social media platforms emerged, that an increasing number of everyday people with a computer, an internet connection, and some know-how could share information online in text and graphic form without having to host their own website. Newsgroups of just text were and are still an important part of the social media landscape, but images and text in shorter bursts became the norm on newer integrated platforms, from Friendster and Myspace to Twitter and Facebook. These new platforms built on previous ones as Twitter was initially described as a “micro-blogging platform” and Facebook was pitched as one’s own website—both of which became available to the general public in 2006 when Time magazine named “You” the person of the year for creating online content. While research on content production inequality was still rare, danah boyd (2007, 2009) compared American teenagers’ perceptions of social media usage based on the social class and race of their users, with Myspace perceived to be associated with lower socioeconomic as well as Latinx and Black users in the United States, whereas Facebook was perceived as a platform for wealthier, predominantly white users.

By this time, however, another piece of technology was transforming how people could use the internet to express themselves both visually and verbally—with video. The compression rates for video sharing had improved dramatically, making it practical to both upload and download video—if one had the right tools and internet speed. YouTube quickly spread worldwide—with early do it yourself (DIY) sensations like the lip-syncing and dancing of the Back Street Boys from China, which went viral on the platform in 2006 (ewo 2005).

The digital public sphere, and the utopianism that surrounded it, seemed to be in full swing across a range of content production activities, whether for entertainment or politics. But the question remained: Who was contributing to this new online town square, and who was not? This interactive web was not just an assemblage of static websites; it was dubbed “Web 2.0” for its participatory potential. Rather than a one-to-many form of content distribution, it was many-to-many. Digital creation was seen as something that was now accessible to more people and possible for wider participation (Jenkins 2006; Benkler 2006).

Nonetheless, very little research existed by this point on how representative this online space was. Some scholars had paved the way by examining individual platforms or uses (boyd 2009; Correa 2010; Hindman 2009). But if the internet was supposed to be more egalitarian and participatory than offline communication methods, who was that “You,” the person of the year for creating online content? Whose

voices were and were not online in these spaces? Schradie (2011, 2012, 2013, 2015a) set out to answer this question more broadly. With American survey data across 9 years between 2000 and 2008, she examined how much people reported creating content across 10 online production activities, from websites and blogs to videos and photos, as well as older newsgroups and newer social media sites. Digital consumption—or basic access to online information—divides still prevailed then, as they do now. But even among people online, social class differences persisted across all 10 production activities. People with a university education were much more likely to create online content than those with a high school degree. As the article title explained, “The Digital Production Gap: The Digital Divide and Web 2.0 Collide” (Schradie 2011).

But social class never operates on its own and has important intersections with race, ethnicity, and gender vis-à-vis digital production (which also do not depend on class to be significant both empirically and normatively). For instance, racial and ethnic gaps that persist in consumption and access seem to be reversed in production, at least in the United States (Correa and Jeong 2011; Schradie 2012). In terms of social media content creation, after controlling for social class, in the United States, Black, Asian, and Latinx university students report a higher share of content creation than white students, even when controlling for other factors (Correa and Jeong 2011). A greater share of Black Americans are active on Twitter, relative to their proportion among educated young adults in the United States (Hargittai 2015). There is also a gendered digital production gap, based on parsimonious though binary distinctions. While people who identify as women were more likely than men to consume online content, men were more likely to produce it in the public sphere. Interestingly, this inequality gap was greater for women from higher education levels compared to similar-status men than it was for women with lower education levels (Schradie 2015a). Sobieraj (2018) later unpacked some of the mechanisms behind this gender gap, such as the harassment that women face when posting in public spaces.

Technology has changed in fast-paced internet time since first theorizing the digital production gap in 2011, with 72% of Americans using at least one social media platform (Pew Research Center 2019). Longitudinal studies have noted increases in social media postings across all age groups (Bechmann 2019), with a large and consistent gap in participation over time favoring those with the highest education over the lowest education (Koiranen et al. 2019). Yet class differences persist, especially if one thinks back to Smith’s (1999) early Usenet research. The question that remains is not only who is posting the most but also whose voice is most likely to be heard.

This representation remains a key area of concern in the context of digital production inequality, given that journalists, policymakers, and politicians are increasingly turning to online content to measure what matters in society, from Medium and Wikipedia posts to protest tweets and Weibo videos (Treem et al. 2016; Hindman 2009). While all content is worthy of analysis and is part of the digital public sphere, it is political information online that is often vital to the digital democracy that was supposed to be a hallmark of the internet era (Benkler 2006; Jenkins 2006; Castells 2009; Dahlberg 2007). And scholars have repeatedly found inequalities in political production activities online more generally (Oser and Boulianne 2020), as well as with digital activism (Schradie 2019). An increasingly common way to measure online content production is through hashtags, particularly through Twitter. Nonetheless, with poor and working-class people not only less likely to be online but also less likely to be creating this type of online content, using hashtags is an extremely difficult way to assess the digital production gap.

Regardless, questions of social class and digital production have centered on a linear mathematical equation of how representative the digital public sphere pie has been. Have poor and working-class people been less likely to be online? Have they been less likely to create content for this online treasure trove? This became even more important with talk around big data, which has been critiqued by scholars for its lack of representativeness when looking at social media and digital production (Hargittai 2015; Schradie 2017), or what was later coined “big dick data” (D’Ignazio and Klein 2020), making it even more of a race in which the marginalized could never keep up. The stepped-up use of algorithms,

particularly in digital distribution, has changed this formula. It is no longer a matter of linear addition but of exponential equations.

Digital Content Production Inequalities in the Algorithmic Era

While this question of the digital content production gap still matters as digital practices evolve, the period since 2010 has brought a greater understanding of why controlling the digital means of production has become even more critical. The broader utopianism of digital production began to wane as the rise of darker views of the internet began to permeate the public's consciousness—from sexist content around gamergate to emerging cries of bots and hacks into electoral political information (Woolley and Howard 2018; Massanari 2017). Underneath this dystopianism view is a growing ecosystem of digital consumption and production such that inequality is no longer just a series of points on diffusion S-curves (Rogers 2010) measuring over time if and how more people were posting online and often showing the poor and working-class far behind. Instead, with both technological advancements as well as a greater understanding of how the internet works measuring the volume of production in relation to class inequality metrics has been a necessary though insufficient way of understanding the digital production gap. While pure stratification analysis is important in terms of who is producing (and consuming) online content, it is not enough to explain production inequalities. And the stakes have never been higher. It is also not enough just to be concerned that marginalized voices have been increasingly drowned out in ever-growing data troves dominated by elites. The game changed with an increasing concentration of power and the impact of algorithms.

One of the major differences now is that an increasing amount of this production is being centralized on digital platforms, including big tech social media and content platforms like YouTube, and subject to the algorithms of Google and other search engines. The increase of mobile technologies has made the creation of software based on open-source code increasingly difficult, given that access to the internet is now almost entirely facilitated by applications. These apps and closed-off systems have been likened to “walled gardens” (Lutz 2019; Paterson 2012) and “black boxes” (Pasquale 2015), offering users very little control over their means of production and coming with more and more surveillance. While one can upload videos and photos on the fly, consistent and sophisticated digital production requires more than convenience. Smartphone technologies have amplified this loss of control since the affordances for digital production using smartphone technologies are different from those of personal computer-based internet access. While smartphones are more convenient and financially accessible, laptops and desktops are more optimal for many forms of production, thanks in part to a keyboard and larger display, as well as access to files. While sociodemographic differences have a greater influence when explaining differences in digital production activities than access to various devices, having use of a computer does increase the likelihood of undertaking certain “capital-enhancing activities” (Pearce and Rice 2013).

Of course, algorithms are not new. In simple terms, an algorithm is a mathematical equation—equations that were used for the early web, as well. And even when Google launched in 1998, questions were swirling around its “black box” that determined what showed up in searches. Even in the late 1990s, it was Google's secretive algorithm that controlled if and how your html-coded website about a DIY bat house fighting mosquitoes showed up in the first 10 hits of a Google search. It is simplistic, though true, to say that Google controls that algorithm. Yet the capitalist business model of who pays to promote this search system is also critical. The person who had the coding capacity then to even develop that bat house website has even less power now in getting it higher up on a page rank. What dominates search is a combination of advertisements and search engine optimization that is less and less about the topic and more and more about who can pay to promote the post, much like what leads to a larger audience on other platforms like Twitter or TikTok. The black box that is a search engine's page and feed rank algorithm means that all forms of digital content are dependent on the platform in order for them to be

seen—which depends on the author’s understanding of how that search engine works, as well as the resources and power they have to intervene. Thus, both the creation and publishing of content, as well as its search and display, are increasingly closed (i.e., less open), with the means of production concentrated in the hands of a small number of companies, leaving users in the dark.

What do these algorithms do for the average producer? Some scholars, like Noble (2018), have argued that these algorithms actually reinforce structural inequalities, rather than disrupt them. One of the ways by which algorithms do this is through a lack of transparency for most platforms’ users. The sorting mechanisms that algorithms drive, building on big data, are likely to be understood only by those who build them. Nonetheless, even the coders in a company may work on one small section of the platform, leaving the overall algorithm in corporate control, with many users unaware of algorithms at all. A recent study carried out in the United Kingdom by the Oxford Internet Institute (2020) found that while 47% of Brits believe they have a good understanding of AI, many underestimate its importance in their daily lives, with only 26% believing that they use AI tools and services daily. Another study, of Norway’s population, found that only 13% of those surveyed indicated having high or very high awareness of algorithms, with age, education, and gender all identified as key factors in this gap (Gran, Booth, and Bucher forthcoming). The researchers even suggest that algorithm awareness could constitute a new digital divide. While it is critical to document divides like these, it is even more important to situate them within the broader concept of the digital means of content production—affecting not only what one produces but in turn what one views.

On Facebook, this can mean using the right words, several pictures (instead of just one), and posting at the right time of day to achieve “maximum reach” (Bucher 2017) or even paying to promote your post so that it gets seen by more people. On YouTube, the most common videos are “vlogs, followed by gaming videos, sketches, and tutorials” (Ferchaud et al. 2018), which has evolved significantly since the platform’s inception in 2006 and the days of amateur cat videos. YouTube and TikTok have even given rise to a whole new generation of digital content producers: YouTubers and TikTokers. These influencers share everything about their lives, building bonds with their users through so-called authenticity and realism (Ferchaud et al. 2018); and their increasingly performative videos are tied to their ever-increasing funding from the platform as a reward for their viral content. Driven to the top of the YouTube watch list, for example, by the platform’s algorithms, which they themselves work to game through provocative (and even click-bait) language in their titles, these high-production value videos rake in increasing numbers of clicks and subscriptions; and the cycle continues. And this mechanical decision-making is far from neutral. The algorithm creates a hierarchy of visibility driven by the demands of advertisers that overwhelmingly discriminates in favor of creators overwhelmingly hailing from the middle and upper middle classes (Bishop 2018), who have the know-how, the ability, and the means to game the system. The algorithm works to the benefit of these advertisers, which means that content producers—far from fully in control of their means of production—are beholden to this algorithm which determines their visibility.

But it is essential to clarify that the users who are most adept at manipulating these algorithms are not individuals who have more or fewer attributes but are institutions, corporations, and states. For instance, some social movement groups, on both the left and the right, have dedicated staff members to monitor and track what types of messaging works for their membership and target audience (Karpf 2016; Schradie 2019). Certainly, corporations are well known for using not only algorithms but also data gleaned from the public’s digital traces to target advertising. Even news outlets doing solid investigative journalism, not just so-called fake news sites, use search engine optimization for headlines and other keywords in their stories to get the greatest reach. And, of course, governments harness the power of algorithms to flood social media feeds with information, such as the well-known Russian use of bots (Woolley and Howard 2018). The goal for all these outlets is to get their story heard by a broader group of people, be it in the name of journalism, advertising, or propaganda.

So poor and working-class people now face a double exclusion with digital content production. They are less likely to produce online content than their middle- to upper-class counterparts, but they, like all individuals, also face an increasingly uphill battle to be heard even when they do create online content. Not only did a fair representation of voices not become a reality, but algorithmic capitalism has also amplified corporate voices.

Nonetheless, algorithms drive not just search and social media feeds. They are also the engine of AI that not only makes marginalized voices less visible online but also misrepresents them, like the designation of content produced for YouTube by creators with regional accents as unrecognizable by closed caption text matching (Bishop 2018). So, content by and about them is often distorted. Like big data and algorithms, AI is a Silicon Valley term that has taken on a life of its own—pun intended. AI uses information from an algorithm that it repeats exponentially for automatic decision-making behavior—from driverless cars and robots to what you see on your Instagram feed. This area of technological automation targets the poor and working class. Just because the term may denote a sterile space that seems to be devoid of bias, like algorithms, it is intentionally designed—but not by or for the poor.

Despite flippant arguments that algorithms are not inherently biased because they are mathematical equations, the writers of these algorithms certainly are. They are not representative of the general population, especially the working class and people of color. This perpetuated myth of “technologically mediated neutrality,” as well as that of meritocracy, has operated in sync with a consolidation of technology and power which codifies class, racial, and gender markers of white male supremacy (Noble and Roberts 2019). The example that Noble (2018) explains in her book is how Google searches for “Black girls” tend to show pornographic and racist images. While the intent of the production of these algorithms is not necessarily classist or racist, their effect is ultimately the reproduction and perpetuation of systemic racism (Benjamin 2020). Findings such as these, however, are not new to the digital era. Other forms of media have done the same type of racialized and class profiling historically. For instance, Kendall (2005) documented similar findings about poor people in predigital media, often characterizing them as either victims without agency or cheaters. Yet the digital era ramps up these distortions, arguably widening the content gap rather than coming close to eliminating it.

And while we often focus on what the algorithms powering AI make visible, algorithms can also make certain types of content produced by marginalized and racialized people invisible, according to Benjamin (2020), who gives many examples of how the design of AI technologies themselves, such as web cameras, can literally make it more difficult for Black people to be recognized. Class intersects with race here, with people of color disproportionately excluded from the algorithmic training and coding process. This exclusion can lead to the coding of racialized stereotypes and the stigmatizing of people of color in terms of where they live, what they do, and who they interact with. The outcomes of this “neutral” process are significant: When people of color do become visible, they are subjected to surveillance (Benjamin 2020).

At the same time, we cannot assume that widespread visibility of digital production is a goal of all content creators, like it may be with YouTubers, TikTokers, tweeters, bloggers, and many others. Some want limited visibility, yet finding and ensuring privacy in these online spaces take time and savvy. LGBTQ youth, for example, may produce content in certain spaces where they can safely ask questions and post content without fear of being “outed” (Hawkins and Watson 2017). Others may be fine with public visibility in theory, though the ultimate goal is rather to stay within one’s chosen silo. For example, some use Black Twitter to build and strengthen community through digital production, acting and reacting “with one another rather than with an imagined audience” (Clark 2015). White nationalist movement online communities are a different form of quasi-public discussion and content production that seeks to limit visibility; members look for “safe spaces” because they are concerned about monitoring by investigators or regulators (Caren, Jowers, and Gaby 2012). Some American conservatives, for example, left Facebook for Parler or other social platforms where they believe they are

more free to post as they please (Bond 2020). In theory, groups can regulate their privacy settings online, but the algorithmic power of these platforms continues to steer people into such online groups in the first place to better monetize these preferences.

A Theoretical Framework for Controlling the Means of Digital Content Production

Rather than just assessing digital production inequalities or evaluating the more complex algorithmic and corporate systems that shape it, however, we also need to put them in a broader theoretical perspective to understand the mechanisms behind them.

Some scholars have theorized production very openly, by calling it “participation” in a utopian sense (Jenkins 2006) or by arguing that pure production is impossible because of the blurriness between consumption and production in the online world and that, furthermore, online and offline distinctions are difficult to make at all (Ritzer and Jurgenson 2010). This may be easy to say for people who have regular and consistent access to digital technologies, whatever their personal production environments—someone may like a tweet and a nanosecond later compose a lengthy post on Medium while simultaneously checking email, eating lunch, and rocking a baby. But because most people do not fully control the production or the distribution of their content, even in this scenario where one may not have child care or may have other constraints, a vast array of factors must be taken into account to theorize production itself.

When Schradie (2011) conceptualized digital production as distinct from consumption of content, she found that a key mechanism of class-based production gaps was controlling the digital means of production. At that time, a key element was continuous and unlimited internet access at home and at work with computers. It was more than just answering the question, Do you have access to a computer or an internet connection? With the advent and the increasing use of “smart” mobile devices, this is no less important since controlling the means of production is not limited to having a usable device that has the functionalities necessary for a vast array of content production. While a mobile smart phone with a camera may be great for Instagram posting, imagine having to do all your work on it or having a laptop but one which must be shared with others. Or perhaps you cannot afford an unlimited data plan so rely on locations with Wi-Fi, to which you may or may not have stable access at home. Countless other factors feed into being able to control the means of digital content production—and feed into the broader conception of digital production in the algorithmic era. Nonetheless, even someone with an arsenal of tech tools still pales in comparison to corporate and other institutions that dominate digital production. But to situate these mechanisms, it is useful to unpack several theories that can inform the digital means of production.

One digital inequality theoretical framework that scholars use is the three levels of the digital divide. The first level is broadly concerned with inequalities of access to digital devices and infrastructure; the second with inequalities of skills, uses, and an assortment of digital practices; the third with inequalities in outcomes based on digital technology use (van Deursen and Helsper 2015). The first level targets what constituted the bulk of the early digital divide literature starting in the late 1990s—the binary question of whether people had basic access to a computer or the internet. This favored research into consumption of content on the internet, especially for Web 1.0. The proportion of households without access in countries of the Organisation for Economic Co-operation and Development has shrunk to about 10% on average, with G7 countries ranging from about 20% of households in the United States to just 4% in the United Kingdom in 2019 (Organisation for Economic Co-operation and Development 2020). This slice of the population is not only overwhelmingly poor but is also even larger when the measurement of these rates is scrutinized. The 90% access rate does not distinguish between types of access and generally includes everything from high-speed access through a MacBook to occasional, low-speed, old gadget use. As a result, it is vital not to minimize the importance of access. The COVID-19 pandemic has thrust this basic digital divide question (back) into the public discourse. With remote and online work forced upon the

education system and labor market, digital inequalities at the most basic level have been laid bare. But pandemics notwithstanding, having high-quality and consistent access is still critical to any type of digital production and a necessary step that is oft forgotten or overlooked. The first-level divide is what the digital production gap had counterposed as the ability to consume, rather than produce, online content. So, in many ways, it was production's necessary twin.

But the nature of the second-level digital divide is murkier, with researchers often throwing anything into this box that does not fit into the first level of access or what we will see as the third level of outcomes. Rather than different uses or production activities, it is often categorized as analyzing users more in-depth, looking at the factors that lead to usage, for instance (Scheerder, van Deursen, and van Dijk 2017). The scholarship on the second digital divide is focused primarily on use more generally and the skills to make that use effective. Predating this theory is the work that drove its conceptualization. Scholars such as DiMaggio and Hargittai (Dimaggio et al. 2004) argued that inequalities were not limited to a binary question of computers or not or internet or not but rather that there were a range of inequalities not only across different users' sociodemographic traits but also in their skills, confidence levels, and other key factors. And indeed, all these digital inequalities feed into digital production inequalities.

Nonetheless, the second-level digital divide is not the only theoretical framework that sheds light on digital production. Shaw and Hargittai (2018) conceptualized a pipeline of online participation, which acknowledges that the process of producing is not independent from other forms of digital engagement but requires several steps before production can take place. The authors suggest that their model can be applied in different contexts for online production activities including contributing to Wikipedia (their case study), discussion forums for news media sites, and posting on social media. Shaw and Hargittai (2018) argue that studies too often focus uniquely on the output of the productive process, which ignores the relatively large pool of potential contributors or producers and how that pool slowly shrinks with all of the steps involved in needing to produce online content. Internet users can only make contributions to a site once they have heard of the site, then visited the site, and then know that it is possible to contribute to it. The results of Shaw and Hargittai's study also highlight the importance of internet experiences and skills, as well as socioeconomic and demographic factors when trying to study digital production. In effect, then, the pipeline framework is more useful in conceptualizing digital content production gaps because it broadens the lens from the overly general second-level divide, for which the main limitation is that it undertheorizes digital production.

But what of the third level of the digital divide? Scheerder, van Deursen, and van Dijk (2017) suggest that digital inequality research has mostly identified socioeconomic and sociodemographic determinants of internet use which are disconnected from outcomes. Van Deursen and Helsper (2015) argue for the existence of a third-level divide: Individuals with higher socioeconomic status can generate a greater offline return from their digital engagement than their counterparts with lower socioeconomic status. While some scholars had already been looking at the outcomes of inequalities in digital use, whether for economic or political outcomes (Dimaggio et al. 2004), this third level is still a useful concept.

Even still, focusing uniquely on identifying socioeconomic and sociodemographic factors assumes and is built on the premise that internet platforms and search engines are neutral. As internet activity is increasingly concentrated in corporate-controlled platforms, as opposed to the browser-centered public web (Paterson 2012), the technologies themselves also contribute to the disparity of outcomes that are identified in the third-level divide. The influence of the platform is even more important when considering the outcomes of digital production, which is left out from, or at least not specified in, the digital divide framework.

On the one hand, none of the theories that address Silicon Valley control look at digital production inequality in particular, especially when seeking to understand the exact mechanism behind the

differences in outcomes once digital production inequality has been documented. On the other hand, by consistently treating socioeconomic and sociodemographic factors as the primary determinants of digital engagement, some scholars make the fundamental assumption that the influence of these factors is the main path toward a more democratic public sphere. However, a few theories can give insight into this theoretical weakness. One approach is the argument around data colonialism (Couldry and Mejias 2019), which compares the control of one's data to theories of body and land ownership. Another theoretical thrust is one that has tackled a Marxist approach to the means of production, highlighting the role of social media giants like Facebook in fully developing and maintaining the platform that constitutes the means of production (Fuchs and Sevignani 2013). Unlike approaches based only on a stratification analysis, both of these frameworks situate production inequality within broader power structures that significantly reduce individual users' control of and agency over the means of production. Another argument pays more attention to context around digital inequalities more broadly (Helsper 2017), building on relative deprivation theory, which assigns a greater role to the social and temporal context of the user or creator when considering digital inequalities and does not assume that factors like social class have a consistent effect on digital production. Finally, a theory of class power (Schradie 2020) outlines how a combination of individual, organizational, and contextual constraints works to limit online content production among the working class.

But it is imperative that any theory around the digital means of production be grounded in empirical data, ideally marrying the stratification and power relations approach (Schradie 2020). While individual sociodemographic measures are essential for isolating and establishing a baseline for who is producing content, they remain insufficient for explaining some of the contextual means of production factors for an individual's online production activity that may be as important for explaining the production gap. These factors include not only the corporate-controlled platforms and algorithm-driven production contexts in which production is taking place but also social class relations, which are broader than demographic variables.

Among the scholarship that uses empirical data, digital divide research remains an important foundation for looking at different types of inequalities around digital production. Yet, what we need is a more direct theoretical framework that addresses power—which is the essential ingredient for who controls the digital means of production: those with more power in society. While this includes individuals with more resources, corporations with more resources, and states with more resources, it is ultimately about more than resources. It is also about being able to wield hegemonic power. This control over the means of production is crucial for understanding the disparity in outcomes that digital divide scholars have sought to address, which means research cannot focus purely on stratification analysis with a narrow focus on socioeconomic status. When digital inequality analyses are only individualized and not relational, they may overlook these important power imbalances, which are mechanisms of digital inequalities and require class to be viewed as an analytic category, not just a descriptive one (Schradie 2020). And the question of power plays an even greater role in producing online content than just accessing it.

Conclusion

Since new media pundits trumpeted the arrival of a utopian era of online participation and creation, the digital means of production have become more apparent as online content creation is increasingly concentrated on a limited number of powerful, closed platforms. GAFAM and BATX have done more than simply create forums for digital engagement; they increasingly control all aspects of the means of production from content creation tools to algorithms that determine what is seen and how. And none of this will disappear by giving someone a laptop or encouraging people to “just post more.” As these platforms became increasingly susceptible to bots and fake news, our view of digital production has taken a turn for the dystopian as users increasingly find themselves losing control over the means of production. This trend has magnified existing socioeconomic and racial inequalities on a massive scale,

and the outcomes of the digital production gap are now more serious than ever with these technologies in society. Who and what controls the algorithmic means of production has become a central inequality question around digital production. At the same time, the early web was never an egalitarian space, so reforming tech companies is not a simple fix to address the digital production gap.

Increasingly, as we have seen, this “who” is not “you” but rather ruling digital elites, governments, and corporations that have amassed control over these means of production while bringing about the resulting inequalities. The myth of meritocracy plays an important role in the tech industry’s justification of the inequitable wealth distribution within the tech realm (Noble and Roberts 2019; Benjamin 2020). This myth is part of a broader discourse of Silicon Valley ideology (Schradie 2015b), built around the neoliberal principles of free markets, freedom from the state, and free labor. As we have discussed, these principles are themselves built into the social media tools and platforms that have ingrained themselves in the digital production practices of the everyday population.

To meet these threats, digital production inequality scholarship must evolve with the changing and increasingly algorithm-driven contexts and environments of production which have serious implications for socioeconomic outcomes. We need dynamic models to understand digital production—not linear ones. Stratification analysis (for the operationalization of social class) is no longer sufficient to explain the digital production gap in this new environment. Current theoretical frameworks have been useful for analyzing the increasing complexity of digital inequalities, but they do not quite capture the growing power of algorithms and closed-source platforms or the broader control by a digital ruling class of elites, corporations, and states. This new framework or model should focus on the primacy of controlling the digital means of production. This framing can connect scholarship on digital production with a rich, emerging scholarship on digital and platform labor, as well as surveillance and AI.

Another crucial limitation of much of the research on digital production inequalities is a lack of comparable data across different countries. Much of the English-language scholarship, using national samples from the United Kingdom or the United States, for example, has not been in conversation with research from other countries. Certainly, scholarship exists on online participation in non-English-speaking countries, such as Denmark (Bechmann 2019) and Finland (Ertiö, Kukkonen, and Räsänen 2020; Koironen et al. 2019). However, more studies are needed comparatively in, on, and with the Global South as well as the Chinese digital ecosystems to better understand how political, platform, and cultural contexts can shape digital production inequalities. This is especially important when considering variations in digital production versus consumption across and even within countries and when seeking to understand the mechanisms of the production gap, from basic access metrics to contextual power differences. Along with a greater exploration of inter- and intranational differences, more qualitative and mixed-methods research is necessary to unpack these mechanisms and their influence on people’s digital production practices. Finally, research on the type and quality of the content is essential to understand the impact of these differences.

So why does it matter? Certainly, more people are posting online content than produced television or radio programs of the past, but with the firehose of online information, the question remains as to whose voices dominate. Digital technology was supposed to overcome the media dominance of the elite with a broader array of voices. But most marginalized communities never got a fair shot. While scholars have been focused on inequalities of access or skills, the wider means of production have been increasingly concentrating in the hands of a small group of the digital ruling class. As a result, analyses of the digital divide in general, and online content production in particular, must incorporate both measures and processes of what the means of production actually are beyond simply production tools or the sociodemographics of the people who use them. The corporations and states designing the algorithms certainly are.

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