THE HIDDEN BLUEPRINT: A DISSECTION OF THE TECHNOLOGICAL FOOTPRINT ON LIVING SYSTEMS

Michele Ferris-Dobles
The University of Illinois at Chicago

Chad Van De Wiele
The University of Illinois at Chicago

Kristina Green
The University of Illinois at Chicago

Melina Garcia
The University of Illinois at Chicago

Carrie O'Connell
The University of Illinois at Chicago

Introduction

The proliferation of technological systems which permeate, and often dominate, human sociological systems is ripe for critical exploration. The purpose of this panel is to investigate the myriad ways in which technology has encroached upon—and, arguably, engineered—human behaviors, once considered the domain of psychological and biological outcomes. Additionally, this panel will offer critical insight into how disproportionate and otherwise ethically skewed technological influence may be mitigated at the point of creation in order to restore balance between tech consumer and tech creator. Topics in this panel span human migration, algorithmic encoding, human-machine communication, datafication of the human subject, glitch technology, and AI-based prediction. This panel will investigate ways in which technology has converged with human systems, often unquestioned, and offer analysis into the

potential consequences of this convergence, as well as potential solutions for alleviating the omnipresence of technical sovereignty on living systems.

Specific panel presentations discuss:
- The inorganic digital footprint that mitigates the tangible human footprint of human migration.
- The pitfalls of cybernetic prediction and the corrosive nature of AI-based prediction.
- The nature of human-machine communication, as documented by interactions with Amazon Go.
- Normalization of gender, as evidenced by algorithmic determination in Spotify suggestions.
- The emancipatory power of "breaking" the black box of participatory technology.

Each panel topic identifies technology as the basis for living systems at the socio-cultural level. For example, multiple papers investigate how algorithms seek to manage, mitigate, and encourage human behavior, while others look at the physical technological infrastructure which guides the flow of human migration. The overarching goal of each paper encourages the end-user to take a deeper look at the symbiotic relationship between digital infrastructure and living systems in order to critically examine the consequences of convergence without critical oversight. Each paper in this panel also identifies a humanistic concept that interrogates the blurring between natural and artificial, human and machine, agency, and autonomy. Post-humanism requires scholars to reconsider what it means to be human and forces a critical inquiry about why, how, and under what circumstances machines can or should replace or augment human actors, and the extent to which machines can be made to act responsibly. For example, as displaced populations are forced from their nation-states, the ethical implications that those migrants of diaspora may tailor their migratory routes to current technological infrastructure must be considered.

As we evolve towards engineering more scalable communication networks capable of harnessing the allegiance of a wide swath of the population based on geographic proximity, we mustn't neglect to consider that these networks are driving human behavior as much, if not more, than they are supporting it. Similarly, when considering the hidden philosophical blueprint that prescribes predictive artificial intelligence, we mustn't neglect to consider the assumptions which belie this philosophy, and the subsequent impact the systems derived from that philosophy which seek to predict the patterns of our human behavior.

These research topics identify the importance and relevance of scholarship in the area of human-machine communication and advocate for their inclusion in the conceptualization, prototyping, and creation of ethical robotic and AI technologies. Increasingly, humans find themselves socializing with intelligent agents and robots at home, in schools, and at work. Further, humans often do recognize the extent to which technological systems drove human behavior. This panel offers a glimpse into the

necessary, provocative, and timely discussion about HMC and the role of critical scholarship in shaping technologies of the future.

As technology progresses, we find ourselves on the precipice of social and cultural evolution in which the illusory real disguised as "user-friendliness" becomes more and more ubiquitous in design theory. In many respects, the trajectory of the modern-day Internet suggests that rather than heading towards emancipation (what user-friendliness promises)--we are headed closer to invisibility. Each of these panels reveals a mechanism by which we may peek into the constructs of our techno-social reality, as so that we may mitigate the dangers of such invisibility.

COMMUNICATION TECHNOLOGIES AND HUMAN MIGRATION: MOVING BEYOND THE NARRATIVE OF THE 'CONNECTED MIGRANT'

Michele Ferris-Dobles
The University of Illinois at Chicago

Communications technologies have become ubiquitous tools in our lives. They have been designed in ways that they blend with our bodies and surroundings, and weave into our social fabrics. Social relations are no longer confined to face-to-face interactions and we cannot separate our offline and online worlds. They have become ordinary (Scannell, 1995), habitual (Moores, 2005), domesticated (Haddon, 2006), pervasive (Farman, 2011), and an infrastructure of our 'every day' (Plantin et al., 2018). They are part our day-to-day routines (Schegloff, 1986) and rituals (Carey, 1989); and in many ways we feel we can't live without them (Plantin et al., 2018).

This reality has also permeated the processes of human migration. It can be argued that communication technologies have radically changed the ways migrants experience identity, belonging, affection, information sharing, decision-making, and social networking (Brinkerhoff, 2009). The ubiquity of the smartphone during the processes of human migration has made it part of the 'digital infrastructure of movement' (Gillespie et al., 2018; Latonero & Kift, 2018) were "social media, mobile apps, online maps, instant messaging, translation websites, wire money transfers, cell phone charging stations, and WiFi hotspots have created a new infrastructure for movement as critical as roads or railways" (Latonero, 2015 as cited in Gillespie et al., 2018; p.2). In this regard, we cannot conceive contemporary migration without communication technologies, as "media do not just add a new dimension to the phenomenon of migration—they transform it altogether" (Madianou 2014; p. 323).

Traditionally, in the context of human migration, communication technologies have been broadly understood as resources (Awad & Tossell, 2019). In this manner, the smartphone has been referred to as a 'lifeline' (Gillespie et al., 2018) and as a life-saving device (Barros, 2017) for the migrants. This 'utilitarian' approach, particularly in the cases when people are fleeing extreme situations of violence and poverty, has identified the smartphone as a device which is directly linked to life/death situations—in multiple forms. For instance, communication technologies in the context of migration are

associated with safety and survival, as they afford migrants information, navigation tools, and regular communication contact across geographical distances with their family and acquaintances; which have implications on their migratory routes and decisions (Witteborn, 2015; Gillespie et al., 2018). From an intimate approach, the mobile phone allows affective family and social networks to take place across geographical distances, which are vital for the wellbeing of both the migrants and their loved ones who remain at their countries of origin; this influences the peoples' decision to migrate and where to migrate (Madianou & Miller; 2012) On the other hand, the smartphone also stores personal data and information that can put the migrants at risk, as they create new ways of surveillance, exploitation, and violence (Gillespie et al., 2018). In this matter, in the context of migration, the utilitarian affordances associated with the smartphone range from safety, protection, and survival; to risk, danger, and death.

This paper argues that the 'utilitarian' approach which focuses mostly on the positive and negative consequences of the use of the mobile phone, oversimplifies the complex interconnections between human mobility and communication technologies. Ignoring the imaginaries, symbolic meanings, and infrastructures behind the—materiality, functionality, and utility—of the mobile phone, does not allow us to comprehend the complexities that have made the smartphone a ubiquitous device in the context of human migration.

This paper applies the "imagined affordances" (Nagy & Neff, 2005) and an infrastructural (Peters, 2009) theoretical approaches to explore: What have allowed the smartphone to become a pervasive device which shapes the processes of human mobility? How does the context of migration structure the 'imagined affordances' of technology? Which are the structures, systems, and arrangements (political, financial, legal, military, sociotechnical) that allows the smartphone to permeate almost all the processes of migration in the world?

By exploring the contemporary case of Central American migration to the United States, this paper argues that by examining the "imagined affordances" beyond the materiality and utility of the mobile phone, we can gain new insights about the uses and meanings that go beyond those designed by the developers of the technology; and that instead are created by the needs, expectations, and perceptions of the migrants. And that by researching the mobile phone as an infrastructure, we can acquire understandings of how bigger actors and systems are linked to the processes of mediated migration.

What is lost/gained when in the context of migration, human and machine become reducibly object, yet irreducibly other? This is a question that can only be tackled if we move beyond the 'utilitarian' approach, which has dominated academia, media representations, humanitarian discourses, and political narratives. Migration is part of the history of humanity. For centuries people have been developing and using different means and strategies to be able to move across borders, to unite with their loved ones, and to flee situations of danger to survive. The narrative of the 'connected migrant' that through the use of the smartphone makes its migratory journey a 'smart migrant journey'' (Awad & Tossell, 2019); ignores the resilient capacity that humans have, especially those in vulnerable situations, to be creative, to resist, and overcome multiple

boundaries. In this sense, reducing mediated migration to a 'utilitarian' approach reinforces a colonial narrative where one can "see traces of the colonial discourse of the European savior" in the "celebratory discourse on the affordances of technology for refugees" (Witteborn 2018; p.22). In other words, the 'utilitarian' approach has political consequences.

By looking at the infrastructure and the 'imagined affordances', one can understand why some people who are migrating can gain freedom from disconnecting (Witteborn 2018) and why sometimes connectivity feels as an imposition rather than a choice (Awad & Tossell, 2019).

For many years' academics, journalists, and activists have been questioning if communication technologies are either good or bad for the migrants and their families. This paper claims that there is no definitive answer to this question; and that instead there is need for a more complex conceptualization of the role of communication technologies in the context of migration. One that aims to understand the migrants and their families not only in relation to their precarity and needs. One that acknowledges the resilience and creativity of this group of people, who will migrate—with or without—connectivity.

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PRIMED PREDICTION: A CRITICAL EXAMINATION OF THE CONSEQUENCES OF EXCLUSION OF THE ONTOLOGICAL NOW IN AI PROTOCOL

Chad Van De Wiele
The University of Illinois at Chicago

The primary purpose of this paper is to explore the shortcomings of modern-day applications of Norbert Wiener's cybernetic prediction—the theoretical foundation of AI—particularly in terms of capture technologies that remain ubiquitous as a method of data collection for feeding such systems. I argue that such data are not impartial or

necessarily explanatory, but rather evidence of third-order simulacra, *simulation*, as conceptualized by Jean Baudrillard (1994). Taking a comparative historical approach, this paper examines what cybernetic prediction, as outlined by Wiener, excludes; namely, an attendance to the complex ontological now. Secondly, this paper explores the potential social consequences associated with predictive technologies predicated on a cybernetic theorem that fundamentally excludes myriad contingencies in favor of more easily quantifiable categories of data.

Cybernetics, at its core, is the acute science of subjective choice reduction as a means of avoiding entropy, which makes such categorization attractive. As Faucher argues, 'Cybernetics does not drive toward the ultimate truth or solution, but is geared toward narrowing the field of approximations for better technical results by minimizing on entropy' (2013, 206). Yet, as modern applications of algorithmic and AI-based risk assessment systems illustrate, the (counter-cybernetic) push towards determining a predicted 'truth' or 'solution' has achieved the opposite, partly due to the reliance upon categories of data— rather than a variety—as the heuristic which guides machine learning.

Critically, this process and the technical systems that facilitate prediction closely align with what Philip Agre (1994) describes as *capture*. According to Agre (1994), capture serves as both a linguistic metaphor (opposite the visual metaphors of surveillance, as articulated by Orwell and Foucault) and material process of tracking used to characterize the institutional, technical logic whereby human activities are captured and represented, or tracked, within sociotechnical systems. The point of simulation, in the sense that it serves as a blueprint for prediction, is to model possibilities of human behavior relating to the social/cultural. However, at what point does simulation become just a more consumable way of saying, 'shaping behavior through technology'? As Malik (2010) argues, 'control in the cybernetic sense does not mean absolute control of every detail. It is more like steering, directing and guiding' (33). To aid in this guidance requires a broad brush applied to cull information into categories. Unfortunately, the data upon which these systems operate are often biased, woefully incomplete, or simply unqualified. For example, in the sentencing of convicted criminals, factors beyond the individual's crime—such as broader recidivism rates based on socioeconomic and demographic data—are used to predict the likelihood an individual may be a repeat offender, thereby influencing sentencing (Hillman 2019). Accordingly, it is fair to question whether such potential 'predicted' behavior is primed via the algorithmic encoding of emotional triggers Weiner believed encouraged behavioral repetition.

Complicating the relationship between information input and predictive outcomes is the problem of data categorization that is foundational to capture technologies. For example, as applied to risk assessments for criminal offenders, a qualitative understanding of the perpetrator, as well as those individually particular antecedents which may have factored into the commission of a particular crime, are secondary (if considered at all) to the broad categories within which a perpetrator may fall. Data such as age, race, and socioeconomic status are far more valuable to the cybernetic game because they may be reduced to easily quantifiable statistics. The propensity for AI-based, cybernetic systems to *prime* (i.e., 'prune') human behavior has been explored by several scholars, albeit in different ways: From reproducing essentialist social

categories and magnifying their attendant (institutional, economic, etc.) disparities, to transposing notions of risk and the institutional handlings thereof. In *Coming to Terms with Chance,* for instance, Oscar Gandy Jr. (2009) describes cross-sector technologies of 'rational discrimination' that 'facilitate the identification, classification and comparative assessment of analytically generated groups in terms of their expected value or risk' (55). Such techniques, leveraging actuarial risk models and statistical evidence for purposes of prediction, serve to emphasize and reify race as an essential category (via proxy measures; see also Harcourt, 2015).

As the science of control or prediction of future events and actions, cyberneticians are practitioners of gestalt psychology, attempting to make sense of a seeming chaotic world around them (Halpern, 2014). The ideas of communication and control, when applied to human behavior, thus theorize and re-envision systems, both sociological and biological. As this paper argues, however, such prediction is a narrow, self-referential system of feedback that ultimately becomes a self-fulfilling prophecy girded by the psycho-social effects of the very chaos it seeks to rationalize. Because cybernetic prediction focuses on what has been and what will become, rather than what is, the very foundation of cybernetic prediction is incomplete. As Halpern (2014) notes, even Wiener understood that not all forms of information (such as metaphorical representations, connotative meaning, denotative descriptions, etc.) could be recorded into cybernetic systems, thereby making the foundation of prediction wholly incomplete if we are to understand that humans are cultural creations as much as they are agents of neurotransmission.

Today, we find ourselves within such a technological future—defined by the increasing entropy of systems—that Wiener warned against. Among the myriad public and private domains within which AI-based systems *prime* human behavior, perhaps the most consequential and ethically questionable is the criminal-legal system: In the U.S., algorithmic decision-making programs, predictive policing applications, and targeted/anticipatory surveillance technologies have become standard fare. Wiener recognized the potential for human actors—governments, militaries, and other cultural hegemons—to leverage the power of the *learning machine* against its citizenry, and cautioned as much. To mitigate such domination—both of the machine and the human actors who seek to leverage its power, Wiener (1989) heeds that 'we must know as scientists what man's nature is and what his built-in purposes are, even when we must wield this knowledge as soldiers and as statesmen; and we must know why we wish to control him' (182). It is not just the scientist, he notes, that should be responsible for our new technological future, but also the anthropologist and philosopher, if we are to prevent such an entropic reality.

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SUPER-BIG MARKET-DATA: A WALKTHROUGH APPROACH TO AMAZON GO

Kristina Green
The University of Illinois at Chicago

In their Aware Home prototype design, Kidd and colleagues (1999) conceptualize a In their *Aware Home* prototype design, Kidd and colleagues (1999) conceptualize a 'smart' home environment where human occupants and automated, wireless technologies collaborate with one another to "produce an environment that is capable of knowing information about itself and the whereabouts and activities of its inhabitants" (p. 1). In many ways, this 'living laboratory,' relocated the networked infrastructures, digital communication tools and informational organizing principles from the workplace to the home.

More than two decades removed from the *Aware Home* imaginary, the scale of 'smart' environments has moved beyond the confines of the home into cities the world over. For example, an hour's drive from Seoul, Songdo represents a sustainable, high tech city and "modernist paradigm in urban design" (Halpern, 2015). According to Halpern (2015), Songdo city planners at Cisco "envision the world as interface, an entire sensory environment where human actions and reactions, from eye movement to body movement, can be traced, tracked, and responded to in the name of consumer satisfaction and work efficiency…" (p. 3). This research project conceives of the world as interface and interrogates digital extractive points that knowingly and unknowingly exist all around us. Using *Imagined Affordances* (Nagy & Neff, 2015) as a theoretical

framework, this project investigates how sensor-fusion technologies are understood within commercial smart environment that, according to Marx (2016), can be classified as "high technologies" of surveillance.

Marketed as "the future of shopping" for time-impoverished urban residents, Amazon Go is a new Amazon endeavor of cashierless convenience stores. A total of 25 Amazon Go stores have opened in cities across the United States–including Chicago, Seattle, New York, and San Francisco–since December 2016 (Burgess, 2018; Coldewey, 2018; Fleishman, 2018; He, 2017; Keeling, 2019; Liedtke & Pisano, 2019; Tillman, 2019; Zumbach, 2018). Here's how the stores work: Customers download the Amazon Go mobile app and scan their unique QR code upon entering one of the Amazon Go stores. Like scanning a commuter pass at a subway station, the mobile app opens a turn-stop and shoppers can choose from a selection of food, beverages, meal kits, and convenience store items. Amazon Go's own branded items includes everything from ready-to-cook meals for two to premade sandwiches, yogurts, chocolate bars, and even Amazon Go souvenir water bottles and coffee mugs. The stores can be described as boutique convenience stores with the added bonus of tens-of-thousands of dollars' worth of floor-to-ceiling 'high' technologies (Marx, 2016) hidden among grocery coolers and display cases.

An Internet search of Amazon Go yields dozens of reports by journalists and bloggers who recycle the phrase "just walk out" technology directly from Amazon's press releases and promotional material. In reality, however, the just-walk-out shopping experience is powered by advances in human action recognition (HAR, Chen, Jafari, & Kehtarnavaz, 2017; Gravina, Alinia, Ghasemzadeh, & Fortino, 2017). Thus, from Songdo to Chicago, a "special class of spatial products…designed to provide ubiquitous physical computing infrastructure" (Halpern, 2015, p. 3) has arrived.

Amazon Go represents an ideal case study for investigating human-machine communication (HMC) in the wild (see Guzman, 2019). An important prerequisite for case studies are that the topic of interest must offer a contemporary snapshot of something both old and new, historical and contemporary. In other words, case studies are said to be the preferred method when the case under investigation represents a "a fluid rendition of the recent past and the present, not just to present" (Yin, 2017, p. 43). Case studies necessitate a mixed-method approach. Therefore, this panel presentation details findings from 30 semi-structured interviews conducted with 15 people who have visited and shopped at Amazon Go stores in-person, as well as 15 others who have only read or heard about Amazon Go from the news media or others.

The first key finding from these interviews suggests that the direct experience of shopping at Amazon Go in-person did not predict a better technical understanding about how a cashierless store works. Shoppers and non-shoppers alike were equally knowledgeable, only having a vague understanding of the technology at play. For those who visited in-person, many emphasized its time-saving affordances but largely overlooked how. With that said, most shoppers and non-shoppers were able to accurately infer that cashierless-ness necessitated information about store merchandise, the whereabouts of consumers, and the virtual exchange of money through their mobile device. Second, Amazon Go remediates familiar conventions from

urban design–namely public transit conventions like turn-stops or sliding doors. Why is this significant? It means people necessarily have to be able to pay-to-play. Even in instances when visitors had no intention of making a purchase and just wanted to explore for "the novelty of Amazon," their entrance was predicated on their method of payment from the start. Interestingly, visitors who made no purchases, received a receipt in the amount of $0, and for those who did make purchases, many reported losing track of their spending, only to find out once they had already left the store. Third, Amazon Go also remediates our sense of surveillance, safety, and sociality. Shoppers described feeling "exposed," "on display," and "creeped out" by the high-tech convenience store setting. Many also noted that without stopping to pay with a cashier or self-checkout machine, they felt as though they were stealing. Shoppers and non-shoppers also described feeling conflicted in terms of sociality: on the one hand, "sometimes it's nice to not interact with others." However, many worried that this makes for an increasingly lonely and isolated world. Finally, only 2:30 participants interviewed were aware of the Ghost Work that makes Amazon Go appear to seamlessly function. That's right, sensor fusion in Amazon Go is not entirely automated and relies on assisted machine learning and a team of people who validate the accuracy of these algorithms on the back end. Most participants defined automation as a technical process that does not require human intervention and concluded that Amazon Go represents an automated shopping experience. However, they were largely unaware of the workers that make this illusion possible.

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"THANK YOU, NEXT": AN EXPLORATION OF ORGANIC VS. AUTOMATED NETWORKS - A CALL FOR INTENTIONAL DESIGN

Melina Garcia
The University of Illinois at Chicago

To date, digital media studies have focused on the effects of technology mediating our lives. From the Arab spring to the #MeToo Movement we have witnessed Web 2.0 applications mediating interactions amongst disenfranchised communities that have

resulted in overthrowing governments and exposing toxic patriarchal industries. However, these platforms have also hosted the rise of alt-right and neo-Nazi publics, thus giving a renewed life to a culture of hate, violence, and sadism. Until now these investigations have focused on the impact of technology mediating interactions amongst human actors, but what happens when technology is the main actor forging connections amongst us? What happens to life when the human is removed, and technology automates our interactions? This is the central theme that this project wishes to address.

In 2018 Vox journalist, Kaitlyn Tiffany, reported that for three of the past four years, Spotify's most streamed music artists of the year were all men (December 2018). This is particularly strange given the current success of so many women music artists. For example, in 2019 Ariana Grande simultaneously held Billboard's top three top 40 hits -- a feat not achieved since the Beatles in 1964. Kasey Musgraves won the 2018 Grammy album of the year and in 2017 Cardi B released the first female rap single to reach number one since 1998. So why are Spotify's most streamed music and content predominantly produced by male artists? Well, Spotify claims this is "how 191 million people around the world stream music and content". However, recent algorithm bias studies suggest that Web 2.0 systems, like Spotify translate "old forms of social segregation" by "recognizing patterns in input data" (Apprich, Chun, Cramer, and Steyerl, 2019, p.128). The following paper presents a comparative network analysis between an organic and automated network to further understand the impact of designing sociotechnical systems that promote patterns of similarity versus difference.

Spotify is a Swedish audio streaming platform that services 207 million users in 19 countries (Fleischer & Snickars, 2017). As of 2017, it supports over two million artists, which suggests that the application offers a longtail range of options (Anderson, 2004). Recent findings, however, reveal a steep power law in which most artists report low popularity scores. Artist popularity scores are algorithmic measurements that compare artists by dividing their total number of streams by the number of streams of the most listened to artist (South, 2018). Observing power laws is not a new phenomenon in network science. Most studies report that the top 10 to 20 % of actors command the network's attention and visibility (Drezner & Farrell, 2008; Barabasi & Albert, 1999; Perline, 2005; Newman, 2003; Barabási, 2002). On Spotify, 66.5% of the artists have a popularity score below 5 (South, 2018). The presence of these power laws and Spotify's reputation for producing maledominated charts indicate that more is at play than just the way users interact with the platform. Ultimately it begs the question: to what extent does the platform contribute to producing male-dominated charts?

Homophily--a social network science axiom that suggests that segregating into groups in which our neighbors look and think like us is natural-- informs the current design of Web 2.0 platforms, like Spotify (McPherson, Smith-Lovin, & Cook, 2001) . As a result, sociotechnical systems propagate current hegemonic structures such as historically male dominated markets like the music industry. To understand the extent to which the current design of sociotechnical systems promotes existing power structures this investigation performed a comparative network analysis between the organic 2018 Hip-Hop collaboration network and Spotify's automated related artist network. Whereas the actors forge the connections themselves in organic network, tie formation is informed by

algorithmic calculations in automated networks. Both organic and automated networks are known to promote homophilous connections, however, past studies suggest that offline hegemonic norms become magnified online (Boyd & Ellison, 2008) Therefore offline networks that promote connections among male actors offline will promote even more homophilous male connections online.

This study produced several interesting findings including. First, it found that the prominent actors in each network differed significantly in terms of popularity score. These popularity score differences suggest that the process of forming connections between actors in an organic network differ from those in an automated one. Secondly, homophilous and heterophilous connections were positively correlated with artists' gender. Lastly, statistically significant homophilous male connections were observed in Spotify's related Hip Hop artist network but not in the organic network. These empirical results suggest that networks automated by non-human actors promote more male homophilous connections than typically found in a network where connections are forged by humans. These findings align with previous algorithm bias studies which suggest that we need to reevaluate the passive nature that we project onto these sociotechnical systems. Ultimately, this paper calls for an era of intentional design in which sociotechnical systems are intentionally designed to promote diversity and treated as active participants in the digital ecology.

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BREAKING THE "BLACK BOX": EXPLORING THE PHILOSOPHICAL PARALLELS BETWEEN EPIC THEATRE AND MODERN DIGITAL INTERFACE

Carrie O'Connell
The University of Illinois at Chicago

In recent years, the increasing invisibility of the machinations of digital interfaces through the process of "black-boxing" has obscured the functionality of systems infrastructure for the sake of user-friendliness. In this paper, I argue that this process of obfuscation is similar to the 19th century theatrical concept the *fourth wall*, which encourages audience connection through deception. When the fourth wall is present, the illusory "real" is showcased at the expense of ontological reality through a suspension of disbelief on the part of the consuming audience. Similarly, the interfaces through which we engage the digital world today obscure system functionality for the sake of ease of use, but at what cost? As *epic theatre* emerged in the 20th century to disrupt the illusion of the fourth wall, so too have modern scholars of media history encouraged a dismantling of the illusory distance between human interlocutor and digital tool as a means of techno-social emancipation from the technical infrastructures which shape the modern human condition.

In this paper, I argue that a qualitative approach to science and technology studies that mirrors the tenets of epic theatre is methodologically justified. As Masson (2017) notes, humanistic researchers today are often too "in awe" of the digital tools at their fingertips, and often "succumb to scientism" in their research by biasing towards the allure of tech, or "big data," rather than fully investigating their merits. Through the artistic technique of ostranenie, or defamiliarization, we can recalibrate scholarly objectivity to see these tools not just for their power, but full influence in shaping social systems. Scholars in various fields have argued that one of the great merits of digital tools is their capacity for ostranenie, for 'making strange' our objects of study – and by the same token, for calling into question our most profound assumptions about them (Manovich 2017).

Breaking the wall between illusion and reality is integral, not just for understanding theatre productions, but understanding our current place in a highly techno-social society. As Kochhar-Lindgren (2005) assesses: "This is where we today exist: on the

(in)calculable line between the two domains, the organic and its other, as the ontological lines that demarcate values shift, forever shattering," (p. 123). Perhaps it is time for a reset back to an era in which artificial conduits of representation and the ontological reality they reflect are once again distinguishable, if emancipation is to be encouraged.

To appeal to audiences and make the experience more meaningful (not just entertaining), the 19th century stage became what theatre historian Bryant-Bertail (2000) calls a "sociological laboratory" that dissected the human condition in the same manner Modernist contemporaries like Freud had dissected the human mind, or Darwin dissected myriad species. Similarly, our modern digital tools--particularly those which connect us to the Internet--have also become a sociological laboratory or sorts. As Nick Couldry and Andreas Hepp argue in their 2017 book *The Mediated Construction of Reality*, our modern human condition has been datafied--meaning every morsel of human behavior that takes place in the digital realm can be extracted, categorized, dissected for meaning, then exploited for capitalist purposes. For Emerson (2014) and Durham Peters (2014), any emancipatory power users may have from this exploitation lies in our ability to understand the systems which collect this information. In other words, if we want to understand how we are being datafied, and therefore commodified, then we must break the fourth wall of the black box and tinker with the systems innards once again.

Originators of the epic theatre tradition, which challenged the reign of naturalism, Brecht and Piscator sought to, similarly, upend the traditional form of deceptive storytelling by "breaking" the fourth wall and engaging the audience, once again, in a tangible way. To accomplish this, showcasing the inner-workings of stage technology in a visible was necessary. Both Piscator and Brecht echo Walter Benjamin's (1936) postulation that the mechanization of art counteracted the passivity of perception. By showcasing the functionality behind the scenes, in other words, we might be once again engaged in the process. Through what Brecht called the "estrangement effect," audiences could be distanced from the artform by a disruption of presentation--a reflexive "glitch," as Emerson (2014) might call it--rather than be drawn in by the seduction of verisimilitude. The philosophical undercurrent of this method is that if we know we are watching art unfold, we are more likely to cognitively process that art, rather than simply be passively entertained. To the champions of epic theatre, this process of estrangement and defamiliarization allowed the audience fuller understanding of the connotative meaning of a subject through a bastardization of its tangible signifier.

Today, the digital tools we use are a kind of "sociological laboratory" in their own respect. To correct course and return our relationship with digital tools back to one of a more equal power balance, Emerson (2014) argues that we reimagine interface-as-threshold; in other words, what serves as "interface" between user and tool should no longer be seen as simply entry points of connection. Rather, by exploring the physical artefacts at our fingertips, we may gain a better understanding of how systems operate in order to make sense of their function and the creative relationship between user and tool. One way explore interface-as-threshold is to expose the power of tools by highlighting their disfunction, or "glitch." Philosophically in line with the Modernist concept of reflexivity, by showcasing the flaws created by the medium / tool (i.e. a double exposure of a single photographed image presented as the final artwork) the

audience is reminded of the point of production, thus making complete defamiliarization from the process of production implausible. When the information intake is disrupted by the "glitch," the audience is unable to simply digest the encoded dominant hegemonic narrative of a representation. Since they are reminded of the tools via their presence in the final artefact, a participatory cognitive process for decoding intended meaning is necessary. In this respect, Emerson takes a page from Brecht and Piscatero in that she calls for exposing the mechanizations behind the process in order to understand their function. By exploring the functional aspects of a system, we are reminded of the medium, as well as our relationship to it.

The imbalance fueled by the connective deception of "user-friendliness" is nothing new, but--rather--a re-imagining of the theatrical concept of the *fourth wall*. This concept, which woos the audience into a suspension of disbelief, presupposes what happens onstage is reality masked by an invisible interface between audience and action--the removed "fourth wall" in an imagined room represented by the tangible barrier created by the proscenium arch over the stage. As naturalistic as the form (acting style or set design) may be, what happens onstage is never objective reality any more than the data that is birthed from our contemporary interactions with digital tools is objective. What we call user-friendliness today--in large part a design bias towards form over function--is similar to the tactics used on the 19th century naturalistic stage.

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