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Humanistic infrastructure studies: hyper-functionality and the experience of the absurd

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ABSTRACT

Bridging third wave HCI with infrastructure studies, this paper examines the relationship between infrastructural visibility, breakdown, and experience through an existentialist lens. We present and theorize a state of infrastructural functionality – which we term 'hyper-functionality' – that renders infrastructure visible because of its experiential effects on end-users, not necessarily because of malfunction. We introduce this term through the presentation of a story from the life of one of the authors in which an infrastructural assemblage behaved unexpectedly, giving rise to the experience of the absurd – a feeling of alienation from oneself and the technological assemblages that constitute one's daily world. We explore the applicability of hyper-functionality for the interpretation and theorization of larger-scale scenarios by using it to interpret reactions to the role that social media – Facebook in particular – played in the troubled United States presidential election in 2016. We contend that the existentialist-tinted lens of hyper-functionality constitutes a novel and meaningful way of analyzing the human experience of the mundane in relation to infrastructures, thus forming the basis for a humanistic infrastructure studies.

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> A world that can be explained even with bad reasons is a familiar world. But, on the other hand, in a universe suddenly divested of illusions and lights, man feels an alien, a stranger. His exile is without remedy since he is deprived of the memory of a lost home or the hope of a promised land. This divorce between man and his life, the actor and his setting, is properly the feeling of absurdity. (Camus, 1955, p. 6)

1. Introduction

Broadly, infrastructure studies can be divided into two traditions or modes (Plantin, Lagoze, Edwards, & Sandvig, 2018). The first deals with the historicity of infrastructures: their development and antecedents. The second approaches infrastructure in terms of its sociological implications. Rarely are these two modes mutually exclusive

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(e.g., Bowker & Star, 2000; Cronon, 2009; Hughes, 1993; Star & Griesemer, 1989; Star & Ruhleder, 1996). In their overlap, neither mode adequately addresses subjective experience of infrastructures.

Both historical and sociological approaches create technical lenses through which human users are interpreted through the ontology of objects. Our analysis is in consonance with both traditions, but draws attention to a humanistic dimension which they lack. As Larkin (2013, p. 329) puts it, 'Infrastructures are matter that enable the movement of other matter.' Where he defines infrastructures as 'built networks that facilitate the flow of goods, people, or ideas and allow for their exchange over space,' (p. 328) the objectification of the human becomes apparent: the human becomes matter.

We posit that a latent objectifying ontology subtends infrastructure studies: one which flattens the ontology of actants involved in infrastructural functionality such that human subjectivity is overtaken by the objectified human, or the human as defined through the lens of their objects. This is perhaps unsurprising given that humans are dependent on things (Hodder, 2011). Because this dependence occurs in an increasingly hyper-mediated *umwelt* (Von Uexküll, 2009) – a phenomenological register of the world as it is experienced by a given actant – it is easy to lose sight of the human view of objects for an objectival view of humans.[1] Leveraging the phenomenological turn in third wave human–computer interaction (HCI) (Harrison, Tatar, & Sengers, 2007) and the concretization of humanistic HCI (Bardzell & Bardzell, 2015), we present in this paper a framework for understanding infrastructure from the view of the person: an infrastructural inversion (Bowker, 1994) of the subjects and objects that gather to produce the phenomenon of infrastructure: of infrastructure-as-thing (Heidegger, 1971; Latour, 1993).

1.1. Objectification through infrastructure

The historical mode of infrastructure studies deals with infrastructure as large systems under development; the sociological tradition deals largely with social and political arrangements that subtend infrastructure. Both approaches are relevant to the present tense in which subjective experience occurs: everything echoes through the temporality of its analysis; all history is a history of the present tense (Croce, 1921). But the present tense constructed by the study of infrastructure is frequently one seen through the lens of objects rather than through the lens of subjective (users') experience.

As Star and Ruhleder (1996, p. 113) wrote:

> The normally invisible quality of working infrastructure becomes visible when it breaks; the server is down, the bridge washes out, there is a power blackout. Even when there are back-up mechanisms or procedures, their existence further highlights the now-visible infrastructure.

The human subject is viewed through the lens of the objects they can no longer use: they are seen as implicitly configured *users* (Woolgar, 1990). Where the user is an objectified operationalization of the human subject (Lamb & Kling, 2003), the human seen through the lens of infrastructure is a reduction. This effect is similar to that which was described by Heidegger relative to the scientific treatment of 'things:' sciences – even those that are socially oriented – are not well equipped to deal with things, but rather reduce things to objects (Heidegger, 1971). Through the lens of phenomenologically informed science and

technology studies (STS) (*cf* Latour's Heideggerian definition of things [1993]), this is problematic. It is not only problematic in ontological terms, but also in terms of the construction of a humanistic infrastructure studies agenda focused on issues of ontological transformation, agency, experience, and values.

The thing is a gathering (Binder et al., 2011; Ehn, 2016), always already at least a dyadic gathering of subjective and objective actants. As with the carpenter's tools (Ingold, 2006), the gathering of the thing recedes into invisibility when it is functioning. In its invisibility, the dyadic composition of the 'thing' (e.g., the subject and the object) is replaced by an apparently subjective construction. Paradoxically, this subjective construction turns out to be an objectival framing of subjective experience: subjectivity is analyzed through the possible actions that a subject might take, where those actions are dictated by the objects available. Infrastructures and their object components are compulsive enablers/controllers (Latour, 1998); just as Lacan and Fink (2006) famously argued that language speaks us, infrastructures *live* us. To describe the status of the user through the visibility of breakdown is to frame the user in an objectival mode. A humanistic infrastructure studies assumes the position that we live our infrastructures: it takes a shift in the locus of agency as central, from object back to subject.

The study of breakdown follows a standard epistemic trajectory: breakdown spawns capta (Drucker, 2014). Drucker introduces the terms capta as follows: 'no "data" preexist their parameterization. Data are capta, taken not given, constructed as an interpretation of the phenomenal world, not inherent in it' (2014, p. 128). The ontological accessibility of breakdown – of *breaking* down – breaks down itself through the data-driven interpolation of the phenomenal world.[2] In the form of capta, breakdown and its effects become objects belonging *to then and there* rather than *here and now*. In the objectification of breakdown through its creation and representation as capta, the human experience of breakdown is smothered like a concept in 'that repugnant kitchen' of the laboratory (Latour, 1993, p. 21). When infrastructure becomes visible through breakdown, its visibility, whether described through the eyes of its frustrated users or not, is always already an objectival visibility. The condition of visibility emerges as a result of a condition of the object: its brokenness. Thus, to speak of infrastructural breakdown's impact on subjective users is necessarily to frame the experience of infrastructure in an objectival lens: one sees the user framed by their objects; one does not see objects framed by their users.

In this paper, we construct a theoretical lens through which to view infrastructural objects from the vantage of the user: we do so by identifying certain instances in which infrastructures become visible through qualities of their functionality, but in becoming visible, bring about the experience of absurd alienation on the part of their users: where the world of the user appears off-kilter and the human subject stands as separate and separable from the infrastructures that subtend their daily lives, caught between the agency of the object and their own embodied agency.

1.2. Defining infrastructure and identifying our approach

We define infrastructure by its ablative qualities (Peters, 2015): a category of durable object constellations *through* and *by means of which* actions are taken. As durable object-constellations, infrastructures allow for and support actions taken through and by means of them. As such, our definition of infrastructure necessarily extends beyond its conservative

connotations of pipes and roads and wires to the very media that constitute the end-points of communicative processes: screens, tablets, smartphones.[3] But to study the effects of breakdown on the experience of being human in relation to infrastructure is to overlook the thrownness (Heidegger, 1962) of the human state: it is to take infrastructure as a known variable, already accounted for in the daily experience of the human subject. This is a particularly academic approach, incapable of approaching the social imaginary (Taylor, 2004) precisely because 'infrastructure' as a concept is not, by its very nature, often present in the minds of its users.

That the human lives through and by means of infrastructures means that infrastructures affect (and in part effect) the experience of being human.[4] The human user is not merely a technical operationalization that serves as the foundation for functional requirements documents: they are the *human* user, complete with emotionality, irrationality, idiosyncratic mental maps of how things work; personal narratives; families; ambitions; and problems. That infrastructures most readily become the object of analysis and scholarship at the point of their breakdown primes us against studying the same infrastructures from the vantage of the human that experiences their breakdown.

Individuals embedded alongside a given and concretized infrastructural set tend not to pay attention to the experience of infrastructure; similarly, we as researchers, tend not to see the experience of infrastructure as an accessible unit of analysis: the subject is always framed by the object. Infrastructure recedes in the form of the mundane *because it is* mundane; the experience of infrastructure – the act of living through and by means of it – recedes into the background as noise to a signal. And yet, the mundane is precisely where life unfolds, where the social becomes itself.[5] For the humanist-technologist, this presents as quite a problem. To study infrastructure – visible or invisible – must also be to study the *experience* of infrastructure: not the study of how a given user experiences a given infrastructure, but rather how the human writ large experiences herself in relation to infrastructures. Absent a focus on the human and social facets of infrastructure, we are only seeing part of the picture – and a technological determinist one at that. To begin to limn the bigger picture – which amounts to the question of the future of the human discourse in terms of emergent infrastructures – novel or interdisciplinary frameworks are required.

To this end, this paper introduces the concept of hyper-functionality – a quality of infrastructure that emerges through user interaction *with* infrastructure – in order to see and study it through a distinctly human lens. This lens is subjectival rather than objectival, because hyper-functionality emerges in the context of an infrastructure that is functional, but whose functionality forces the user to reconsider aspects of their worldview. Hyper-functionality induces an infrastructural inversion. Whereas breakdown allows for the study of the user through the lens of the infrastructural object, hyper-functionality allows for the theorization of infrastructure from the vantage of the user.

To introduce hyper-functionality, we present the story of a trip to get a cup of coffee.

2. Nineteen minutes to anytime fitness (via Ocean Blvd)

John took the keys out of the ignition. The music stopped. He opened the door, exiting into the parking lot behind the coffee shop. It had taken him about twenty minutes to get across town.

This trip was a near-weekly occurrence, reserved for particularly stressful days or small celebrations. He used it to clear his head and took it as an opportunity to chat with the coffeeshop staff. In those days, he was working from home and almost entirely on his dissertation. Human contact was at a premium.

That day, that trip, was no different. John had been smoothing out a particularly gnarly section of a chapter. He needed a break – fortifications and a clear head for the remaining edits. An iced americano sounded good, so he put his laptop aside, slipped his loafers on, and walked down the hall to the elevator. He pressed the call button and waited for the telltale, discomforting click-and-grind noise that signaled the elevator's arrival on the sixth floor.

He descended to the parking garage two floors below the street, just across Third from one of the several gyms that had popped up in his neighborhood since it began to gentrify: Anytime Fitness. He cued up some music on his old iPod Touch, which had been rigged to interface with the equally obsolete touchscreen of his hatchback's built-in (early) navigation system. After winding through the garage, he pulled out onto the street and headed south towards Ocean Boulevard to the tune of Lee Morgan's 'Search for the New Land.'

He liked that drive. If you timed it right it took you past a park, beyond a row of stately houses that line the shore, where hundreds of people practice yoga in the late morning. Usually there was a good breeze off the ocean, too. In Southern California – for better or worse – you spend a lot of time in your car. It becomes like a second home: another place to be comfortable when and if possible.

After he ordered his drink and chatted with the staff a bit, he walked around the block back to his car – another chance to rack of some steps for the ol' FitBit. He felt good. The first sip of the drink was bitter and sweet and cold. The sun was shining as it does in Jackson Browne songs.

He approached the car door and his phone vibrated. He reached into his pocket expecting an email or a text, and saw a message on the screen from Apple Maps: '19 min to Anytime Fitness (via Ocean Boulevard).'

His phone had never done that before. It had occasionally reminded him not to take the San Diego Freeway (the infamous I-405) on his way to or from campus, but it had never recommended that he go to the gym. His heart sank. He'd finally quit smoking a couple months prior and had gained some weight. It made him uncomfortable – fitness, or the physical appearance thereof, is a complex social phenomenon in Southern California. It is enough to make a Midwesterner feel out of place. Had his phone just called him fat? It sure felt like it.

He forgot his good mood and drove home, past the houses, past the yoga practitioners, past Anytime Fitness, and down into the subterranean garage.

2.1. Why a story?

We choose to present this story because of the way in which a human becomes uniquely visible through their relationship with otherwise invisible infrastructure. It would be inaccurate to say that the infrastructural constellation co-comprising John's *habitèle* (Boullier, 2014) – the physical-technological instantiation of cultural capital in the form of such things as smart phones, activity trackers, tablets, automobiles – was broken or rendered itself visible because of outright failure: the GPS system worked. Moreover, the functional

invisibility of this infrastructure was so complete that it didn't enter into John's consciousness until it presented the results of its functionality. It emerged into visibility precisely *because* it was too functional, thus effecting a state change in John's relationship to his world. John became newly visible to himself because of his infrastructure's functionality. His phone's map of the world simply didn't include his apartment building. Given the incompleteness of its map of the world, John's phone therefore suggested that it would take 19 min to get to Anytime Fitness, where the gym served as a proxy for his apartment. In one fell swoop, John was recreated in terms of his infrastructure: 'Quoth the raven: heavy evermore.'

Indeed, John's *habitèle* of accreted objects and the infrastructures that subtended them were all functioning according to their design: the elevator didn't crash during descent, the road was intact; water supplied the espresso machine; he was able to pay via credit card; the car started and ran; the GPS technology in the phone was connected and working and suggested a route that would take him to within one hundred feet of his intended destination – to the nearest cached location; even the workaround that compensates for broken touchscreen in his car's dashboard GUI functioned.[6]

But the joy of that particular trip, the long exhale between obligations – the very reason for the trip itself – was nullified because the infrastructures that subtended his devices gave rise to an unexpected outcome. John's everyday infrastructure – his more or less durable constellation of objects through and by means of which he performs his life – became discretely visible because of its functionality: a functionality that rendered him newly visible to himself. Or, rather, John became newly visible *because* of his reaction to the type of functionality his *habitèle* demonstrated. It was too functional, otherly functional. It was so invisible as to render itself visible through its unexpected functionality: it was *hyper-functional.*

3. Hyper-functionality and the absurd

We introduce the hyper-functional as a means of addressing infrastructure through the lens of the human users living through and by means of infrastructure. We contend that hyper-functionality can be identified through affective reactions of the human user, including anxiety, sadness, or even humor. As a result of this, we frame our discussion of hyper-functionality largely within the literature of alienation and absurdism: the existentialism of Albert Camus.

If individuals construct their notions of 'self' through actions in the world, and actions in the world are rendered possible through infrastructures, then any change in our perception of how these infrastructures function potentially results in a change in notions of 'self.' Thus, in forcing a difficult recognition and cognitively dissonant reappraisal of the infrastructures into which the user is enrolled, hyper-functionality necessarily provides ideal conditions for the experience of alienation. When infrastructures function within the parameters of their design, but do so in an unexpected or undesirable way, they give rise to symptoms of alienation: the user's understanding of their *habitèle* is breached or broken; the world is somehow different than expected. Through the experience of alienation, the human can become the primary lens through which object-infrastructures are viewed.

We locate the state of hyper-functionality as between and, to borrow a phrase from Levi-Strauss (Levi-Strauss, 1983) '*en deca de*,' (beside; an adjacent present [Kauffman,

2003]) the states of past-tense breakdown and future-oriented idealized functionality. *We define hyper-functional infrastructure as infrastructure that functions within the defined or assumed parameters of its design – not the least of which is the enrollment required of a user to engage with and through a given infrastructure – but does so in such a way as to yield unexpected experiential outcomes for the user*. We contend that the experience of the absurd is a primary symptom of hyper-functional infrastructure.

We have chosen 'hyper' to describe the category of functionality tentatively evidenced in the coffee scenario because the emergent phenomena occur as a result of functionality that goes beyond or over the realm of designed, foreseen possibilities.[7] If the user maintains a tacit or implicit understanding of what can be done through an object, and therefore how they might come to be/act *by means of* that object, then instances where functioning infrastructures yield outcomes or behaviors that are beyond the scope of this understanding constitute something other than true functionality. The infrastructural object is 'hyper-functional.'

Hyper-functional outcomes bestow upon an infrastructural constellation the visibility more commonly associated infrastructural breakdown precisely because of the type of functionality demonstrated. The user – the human enmeshed in an *habitèle* – becomes aware of their subtending infrastructures because of the affective changes they bring about. It is this subjective awareness that frames the study of hyper-functionality. In bearing witness to hyper-functionality, not only is infrastructure rendered visible, but the *user* becomes newly visible to themselves *through* the infrastructure: the infrastructural visibility of hyper-functionality brings to light an altered state of the user, a state of alienation.

When John went to the coffee shop, the object constellation – the end-user-facing set of infrastructures – that he carries with him by virtue of having enrolled into the technological ecology of 2019 in Southern California, functioned in such a way as to yield an unexpected and dissonant result: a feeling, a shame of his body dysmorphic. In the next section, we investigate the applicability of the construct of hyper-functionality for describing and constructing an analytical framework for broader situations. As an example, we consider the unexpected role of social media platforms in the 2016 election of the 45th President of the United States. In both examples, the experiencing subject is alienated from themselves through hyper-functionality: John was interpolated as someone who could stand to go to the gym; and in the Facebook example, users were re-interpolated as digital constructs, largely divorced from their subjective experience of the world.

4. Hyper-functionality in larger scale scenarios

The United States presidential election in 2016 has been the subject of much media coverage and analysis. Much of this coverage had to do with the role that foreign agents played in manipulating users' perceptions of candidates through the social media platform Facebook. In a nutshell, parties unaffiliated with the United States government, such as Cambridge Analytica, were able to manipulate the Facebook newsfeed content of large groups of US citizens.[8] Newsfeeds were manipulated in order to sway political opinions for or against certain candidates; and to increase the general sense of division that has recently characterized much of United States society along the lines of race, Second Amendment rights, LGBTQ concerns, and religion.

That certain parties were able to use the Facebook platform as a means to effect electioneering does not mean that Facebook was in any way functionally broken. In fact, Facebook functioned as it was designed to: messages were still sent, ads purchased and disseminated, pages created and maintained. Gifs of cats flooded newsfeeds. But despite this smooth functionality, Facebook was rendered unusually visible. It became visible because it worked perfectly, but in an unexpected way: ad buyers were able to leverage advertising-related demographic categories generated by Facebook to place politically motivated ads and sow the seeds of cultural and social division. In hindsight, this functionality is well within the extreme boundaries of Facebook's mission:

> Facebook's mission is to give people the power to build community and bring the world closer together. People use Facebook to stay connected with friends and family, to discover what's going on in the world, and to share and express what matters to them. (https://investor.fb.com/resources/default.aspx)

It is certainly possible to include electioneering and espionage in the broad category of 'what matters' to certain users, but it would be unreasonable to think that such a functionality is what comes to mind when most users log in. Yet here we are, and there we were: deeply enrolled (197.7 million US users in 2016) in a communications and advertising platform that, by virtue of its designed functionality, was participant (and arguably complicit) in what might have been called societal-level 'dirty tricks' in the Nixon era – it facilitated intentionally divisive acts, some grounded in hate speech, through the advertising infrastructure it comprises.

For those of us who enjoy sharing pictures of our cats, messages with Mom and friends Noopur, Jamie, or Kostas, or just posting pictures of some over-priced avocado toast – the authors *are* writing from California, after all – the picture painted by this social media mutation of advertising – what McLuhan (1964, p. 232) called the 'richest and most faithful reflections that any society ever made of its entire range of activities' – is not rosy. Although we may be made uncomfortable by the hyper-functional effects of Facebook manipulation on the American political sphere, we become complicit in the effects of hyper-functionality through our use of the platform. In realizing our unknowing complicity, we become alienated from ourselves. We realize a state of absurdity; Facebook-as-infrastructure becomes visible from the vantage of the subject, rather than the (objectified) subject becoming visible through the lens of Facebook.

In this state of absurdity, the general user of Facebook is divorced from its otherwise pleasant aspects by contributing to the viability and success of a platform too reckless to understand its own potential for what can only be described as politically motivated divisiveness. In funneling interested ad buyers towards groups of users digitally constructed as *x*, *y*, or *z*, Facebook can be described as hyper-functional because it functioned in a way which lay beside that which is generally expected of it. The reappraisal of Facebook as a powerful political actant constitutes an instance of absurd alienation because in being itself, it was not what its users thought it was and they were not who they thought they were.

As users of Facebook not otherwise involved in muckraking, espionage, or 'dirty tricks,' we come to see ourselves as something we were not previously; we come to see ourselves in a new light precisely because a platform we use to communicate and express and cultivate our identities has also been used against us precisely because it allows us to do those things.

On 23 September 2017, Zeynep Tufekci published an op-ed in *The New York Times* entitled, 'Facebook Ad Scandal Isn't a "Fail," It's a Feature' (2017). She writes:

> Some of Facebook's users may find it even harder to accept what happened. How could the site that we use to keep in touch with friends and family, share baby pictures, and keep up with politics and volunteer work be made so easily to cater to the interests of Nazis?

In answer to this rhetorical question, she continues:

> But anyone who understands how Facebook works shouldn't have been surprised. That's because the same digital platform that offers us social interaction, news, entertainment and shopping all in one place makes its money by making it cheap and easy to send us commercial or political messages, often guided by algorithms. The recent scandal is just a reminder.

Our worlds, including the narrative tools we use to make sense of them across time, cease to be familiar – and become, therefore, alienating – when our understandings of them, the means by which we accomplish many of the tasks that make us who we are, no longer match their visible machinations. In revealing itself as hyper-functional, Facebook created a state of alienation for a large portion of its users. Whereas the experience of the absurd has previously been discussed in terms of embodied experience, digital technologies extend the experience of the absurd into the realm of the data doppelganger and the bifurcated archive (Seberger, 2019): the digital other. Facebook became a vehicle for the transmission of the absurd.

Facebook was designed to serve as a platform through which individuals can exchange information. This was not necessarily monetizable information – at least not at its conception. Over time, however, monetizable information became Facebook's *raison d'être*. As part of achieving fiscal sustainability, Facebook sells highly specific aggregate data about users to organizations who might then sell products to those users. This is exactly what occurred prior to the US Presidential election in 2016. It just so happens that Facebook's hyper-functionality fostered unsightly actions on behalf of some malevolent political actors: through enrollment into the infrastructure of Facebook, and in concert with hidden actors, the agency of the user was suborned. Their agency was distributed in a dehumanizing way that rendered them the *acted upon* rather than *actors*. But hyper-functionality in emerging technologies is not relegated to Facebook alone: Google autofill can be 'accurately' racist (Noble, 2013); Microsoft's AI chatbot can be efficiently taught to be prejudiced (Price, 2016); and AI writ-large suffers from a 'white guy' problem (Crawford, 2016). The hyper-functional resides as a cultural *éminence grise* in our technological infrastructures.

In each of these instances, hopeful or successful infrastructures come with potential 'wicked problems' (Buchanan, 1992) of alienation. The *potential* for alienation crosses over into the *reality* of alienation when the user continues to live their lives through and by means of infrastructures that demonstrate hyper-functionality. Infrastructures act in the absurd by going beyond their initial promise of responding to users' needs. When infrastructures respond to what they think users' needs *should* be, infrastructures force users either into a set of compensatory actions to readjust their expectations or into accepting infrastructures' judgment of themselves. In either way, to one extent or another, the world of the user becomes 'divested of illusions and lights' (Camus, 1955, p. 6).

5. Making sense of hyper-functionality: absurdism and alienation

In light of these scenarios pointing to a potential category of infrastructural experience – and therefore highlighting the need to develop tools to study the experience of infrastructure in the present tense – we need to get analytically beyond the objectifying frameworks of functionality and breakdown in order to explore the experience of infrastructure. We need to focus on what *is*, on the meeting point between individual rhythm and infrastructural rhythm (Jackson, Ribes, Buyuktur, & Bowker, 2011). The concept of the absurd will facilitate.

For Camus – the premier philosopher of the absurd – the experience of alienation and the condition of absurdity in which human life unfolds are intrinsically linked. To illustrate, we revisit the epigram that began this paper:

> A world that can be explained even with bad reasons is a familiar world. But, on the other hand, in a universe suddenly divested of illusions and lights, man feels an alien, a stranger. His exile is without remedy since he is deprived of the memory of a lost home or the hope of a promised land. This divorce between man and his life, the actor and his setting, is properly the feeling of absurdity. (Camus, 1955, p. 6)

Abstracting away the gendered language common to Camus's era, there is something particularly useful here for approaching the quotidian experience of infrastructure: a person's naturalized familiarity with their world. Our experience in the world, navigating roads, search engines, advertisements, and elections, generates an imaginary: a shared understanding of 'how things work' and what can be expected in the course of daily life relative to a given cultural-historical *a priori* (Taylor, 2004).

When infrastructures are hyper-functional, we feel abruptly alienated: we are made aware of ourselves as if from the outside, aware of the weight of the infrastructural boulder that we, like Sisyphus, carry with us up the mountains of our lives (Camus, 1955). In this self-awareness, shared imaginaries cease to adequately map to events in the world or legitimize courses of action: the world 'divested of illusions and lights' is not as it once seemed. The human subject takes primacy in the conceptual framing of infrastructure. This experience of the shift between 'as it was thought to be' and 'as it is seen to be' evidences a need to treat the mundane experience of infrastructure as a central object of study precisely because of the impact it has on the experience of being human.

If a user expects Outcome-A when interacting with a given set of infrastructures, but is met with Outcome-A_1, then the user is, to a certain extent, alienated from the expectations and legitimizing assumptions they use to make sense of the world. Such alienation, although not necessarily strong enough to constitute catastrophic or categorical breakdown of a given infrastructure, constitutes the absurd: the point at which the individual is forced to either recuperate or distantiate from their previous tacit or explicit understanding of themselves and their world.

One definition of 'alienation' provided by the Oxford English Dictionary provides additional nuance to the treatment provided by Camus: 'the taking of something from a person, esp[ecially] without authorization; appropriation; an instance of this.' In this definition we find a sense of agency behind alienation. That is, an actant is implied in the creation of the feeling of alienation that/who exists outside of the mind of the alienated. It is in this definition that we tentatively read the role of infrastructure as such an

actant – not one with conscious intent (Callon, 1986) but one which acts in such a way as to change one's world.

In the alienation of the absurd we have thus far focused on the users' reactions to hyper-functionality rather than the liminal space between the recognition of the absurd and the reaction to it: the misery or stoic heroism of the futile or the dark tint of gallows humor. But to get at the absurdity of infrastructure – the possibility for the experience of the absurd in lives lived through ablative configurations of objects, and therefore the possible identification of a set of modes by which infrastructure is experienced in a present tense – we must resist the desire to deflect the essence of alienation by focusing on reactions to it.

Camus, it seems, was aware of this, too. In describing his search for 'an absurd reasoning,' he engages in an explication of Karl Jaspers' work:

> When Karl Jaspers, revealing the impossibility of constituting the world as a unity, exclaims: "This limitation leads me to myself, where I can no longer withdraw behind an objective point of view that I am merely representing, where neither I myself nor the existence of others can any longer become an object for me," he is evoking after many others those waterless deserts where thought reaches its confines. (Camus, 1955, p. 9)

In seeking to validate the absurd as a means of understanding the quotidian experience of infrastructure, we must bear in mind the core of the absurd, not only reactions to it or symptoms of it. Such diligence takes the form of inhabiting those 'waterless deserts': 'the real effort is to stay there, rather, in so far as that is possible, and to examine closely the odd vegetation of those distant regions' (Camus, 1955, p. 10). Still at the preliminary diagnosis of hyper-functionality – its recognition – we must necessarily address its symptoms and extrapolate from them. To proceed in the opposite direction would be to once again generate knowledge of experience through the capta-based description of breakdown.

Through the experience of the infrastructural absurd as it presents in the form of hyper-functionality, we come to understand our relationship to infrastructure in new ways. As the prompt tells us to get fit, or what movie to watch, or where to drive, we are uncomfortably aware of the 'neutral' infrastructures which are entraining us: we are aware of the pressures defining the boundaries of 'the world out there' and our own subjectivity. It is not just funny that a predilection for serial killer movies leads to a Netflix recommendation that we watch a children's movie: in Leonard Cohen's words, it is a 'crack in the world' through which the light can shine in (Cohen, 1992). The punctual recognition of the absurd is the point at which we can start to produce a satisfactory understanding of an otherwise completely alienating world which seems to sculpt all aspects of our existences.

6. Conclusion: the lens of the infrastructural absurd

The study of infrastructure is always already a study *of* temporality and *in* subtlety: *of* temporality because of conflicting rhythms at play in any infrastructural assemblage that meets with the human and the shifting relationality of systems and their components that subtend cultural-historical milieus and bound the potential motions of the world-as-knot (Haraway, 2016); *in* subtlety, because when they are working smoothly, infrastructures do not make themselves apparent. Humanistic infrastructure studies must be all the more subtle and sensitive because of the objectival framing infrastructure effects.

When entrenched in the category of the accreted present tense – when the latest and greatest devices, or those we simply covet or require in order to live in accordance with the social imaginaries in which we find ourselves, have found their way into the construction of our individual *habitèles* – it is often difficult to even identify infrastructure as an actant (Latour, 1987): we ask, 'What is infrastructure?' even as the road unfurls beneath our wheels and myriad signals emanate from the smartphones in our bags and pockets and navigation directions light up our dashboard. That is, infrastructure is difficult to identify until something about the road or the phone or the touchscreen reveals itself as out of place, as something other than was tacitly expected, be it through outright breakdown or more subtle emergent outcomes. In answer to this question of, 'What is infrastructure?' we respond that the answer must include, 'Something subtended by subjective experience.'

Infrastructure is where the rubber hits the road between one discursive modality or constellation and another. Finding oneself in a world of which sense must be made, often contrary to the sense made of the world as it functioned under previous infrastructural constellations, is as fine an example of alienation as we can think of. Take an old joke as an example:

Q: Why did the chicken cross the road?

A: To get to the other side.

Having crossed the road, the first chicken to do it must have understood. The only reason to cross the road is because the road is there. In its absence, the chicken would just be walking along, end of story. Once the road is realized as a road, as an infrastructure standardizing the trip from Point A to Point B, but also bisecting Areas C and D in the process, the chicken's world around the road must be described in terms of it. To get to the other side is as funny and sad a punch line as there ever was because getting to the other side isn't just an issue of location: it is also an issue of the way it was versus the way it is. That first chicken that crossed the road, perhaps named Pollo Wright, was a pioneer in alienation.

Roads as infrastructures define new ecological communities (mountain lions in southern California traversing I-405; hedgehogs in England making their way across the M1) through their severing of communities. They become natural barriers. The brave chicken crossing the road is attempting to live an old infrastructure; their act is as much one of suicide as valor – eventually all chickens crossing roads will die; and evolutionary theory suggests that a set of non-road-crossing chickens will become the new 'natural' norm, who will then develop their own absurd relations with transport infrastructure.[9] And yet like Sisyphus for Camus, we must imagine the chicken happy.

In each instance where the user (either human or non-human) encounters a new road, or a road with new qualities, a conceptual reconciliation is required: disruption begets recomposition. This process of re-composition, of re-associating one's previous understanding of the self/environment dyad with the new 'natural' norm deserves careful scrutiny – particularly when 'disruption' is the goal of infrastructural design. To move from an established set of infrastructures to an emergent one by way of disruption is to enforce an exile: telling users – from humans to mountain lions to chickens – through action that 'you can't go home again' (Wolfe, 2011).

There are many ways in which we, the authors as individuals, feel interpellated by our assorted infrastructures. On our computers, our ever-yawning chasms of email disfunction creates anxiety and guilt; our Amazon accounts create persons who love military space opera (where Geof just had a fleeting interest in it once); our Netflix accounts know that despite whatever self-image we may hold, we will generally click through to mindless schlock rather than watch *Black Narcissus* or *My Dinner with Andre*.

This is where the present of infrastructure in the form of the hyper-functional comes in. It is only when there is a clear and present dissonance between ourselves and our infrastructure (John is not a fitness fanatic despite his infrastructure's interpellation of him; nor is Geof going to drive on roads that are on fire despite what Waze might direct him to do[10]) that we get the deep, absurd pleasure of being actors in the world rather than the cultural dupes we thought we were becoming. The appearance of hyper-functionality communicates a two-fold message: first, one receives dissonance – the dissonance of unexpected outcomes enabled by a functional system; second, it communicates an opportunity. This opportunity is as a window that provides a new and necessary view into the experience of infrastructure in our everyday lives. Not a window that is constructed through the objectification of experience, but a window that emerges through experience itself. It therefore also provides an opportunity to begin designing better relationships between people and their ablative infrastructures; to begin constructing an agenda for a more humanistic infrastructure studies derived not through the lens of the object, but towards the object through the lens of experience.

Notes

1. We use 'objectival' in its grammatical sense: of, relating to, or constituting an object esp. in grammar.
2. The essays in Gitelman's edited volume, *Raw Data is an Oxymoron* (2013) provide additional coverage of this onto-epistemological problem.
3. We take a cue from the media theorist John Durham Peters (2015), who argued for the inclusion of geological, hydrological, and climatological elements in the definition of 'media.'
4. Each of us resides within differently constructed *habitèles*; differently motivating and rationalizing social imaginaries. The authors write from one in particular: that of the relatively affluent and techno-centric social imaginary of Southern California. We acknowledge that ours is not a specifically generalizable position. However, we also believe the constructs and frameworks described in this paper to be generalizable in the broadest sense: while we (the authors) refer to ourselves and tell stories through and by means of the pronoun 'we,' it is not our intention to homogenize, patronize, or colonize. Humans depend on things (Hodder, 2011). Humans create infrastructures or durable material grammars. The specifics of these infrastructures – individual *habitèles* – vary from individual to individual, culture to culture, society to society. But the human relationship to things pervades.
5. In the words of John Lennon, 'life is what happens while you're busy making other plans' (Lennon, 1980).
6. At first glance, it is possible to argue that the GPS portion of this particular object constellation was, in fact, broken. However, when viewed from the perspective of the user, the infrastructure was not broken, simply confounding. It functioned just as it was designed to given the GPS data to which it had access. Regardless of the backend issues – blackboxed from the perspective of the user – the message appeared on the user's smart phone. In so appearing, the infrastructural assemblage effected the type of communication it was designed to effect: the communication just so happened to demonstrate an emergent functionality of the infrastructural system, one symptom of which, was the construction of a negative emotional state.

7. The prefix 'hyper- 'is rooted in the Greek '*ὑπέρ*' (*hupér*) meaning 'over, beyond, over much, above measure.'
8. Similar effects were seen in the United Kingdom: https://www.politico.eu/article/cambridge-analytica-chris-wylie-brexit-trump-britain-data-protection-privacy-facebook/.
9. Birds follow the speed limit, too: https://www.nationalgeographic.com/news/2013/8/130821-birds-road-speed-limit-traffic-evolution-animals/.
10. https://thehill.com/policy/technology/363852-waze-is-sending-california-drivers-towards-fires.

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