

The Sociology of Speed

Digital, Organizational, and Social
Temporalities

Edited by

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Speed, Time, Infrastructure

Temporalities of Breakdown, Maintenance, and Repair

Steven J. Jackson

Life is in the transitions as much as in the terms connected.

William James, "A World of Pure Experience," 1904

This chapter concerns the importance of *breakdown, maintenance and repair* to human and material stability and change—and whether new ways of thinking about such phenomena might also help us to rethink relationships between technology and time. While Part II of this volume has examined other dimensions of the material shaping of technology, I want to call particular attention to processes of failure and restoration as core and widely neglected dimensions of infrastructure, even—perhaps especially—within the core transport, communication, and computing infrastructures commonly held responsible for contemporary experiences of speed and acceleration. As I'll argue, such processes are complex, omnipresent, deeply skilled, and rooted in our relationships to and with material things—and for all of these reasons widely neglected in our theorizing. They are also sites from which a different temporal sensibility in and around technology might begin to emerge.

The chapter that follows opens by questioning a classic line on the relationship between emerging technologies and the social experience of time. It then turns to alternatives to this line, and argues that reimagining modern infrastructures from the standpoint of breakdown, maintenance, and repair (rather than design, invention, or adoption) may lead us toward different outcomes in our thinking around time and technology. It takes up a small but growing body of work in infrastructure and repair studies that has begun to rebalance the story of technology by restoring attention to the myriad acts and moments, large and small, mundane and creative, conservative and

transformational—by which systems and infrastructures are fixed, maintained, and extended. And it concludes with speculation on the temporal and ethical possibilities that emerge when breakdown, maintenance, and repair—the “slow underbelly” of modernist stories of speed and technology—are taken more centrally into account.

Speed, Time, and Infrastructure: The Classic Line

Earlier contributors to this volume have explored the deep and intimate relationship between technology and time that has occupied and challenged work in the social sciences since their inception. From “the annihilation of space and time” (Marx 1973) and the accelerated forms of “exposure” reworking urban life (Simmel 1950), to contemporary experiences of “chronopolitics” (Virilio 1986) and “time-space compression” (Harvey 1989), technologies of transport, communication, and computing have long been central to arguments for the growing speed and acceleration of contemporary life. Such theoretical contributions find their counterpart in the less nuanced stories around time and technology offered in popular writing around technology, media reports, and the self-accounts of the technology industries themselves. In their simplest *Wired* magazine form, these stories posit a simple causal arrow: technology accelerates, and life adjusts.

But as attested to by a growing body of theoretical and empirical work (including many of the contributions to this volume), the relationship between technology and time is more varied, complex, and uncertain than all that. My own entrée into these questions is through the varied forms of time and timeliness organized and structured through *infrastructure*: and conversely, the myriad forms of maintenance and repair required to sustain it. Growing from work in the history of technology and pragmatist, interactionist, and feminist traditions in sociology, science studies, and information science, recent work in infrastructure and repair studies offers numerous resources for reimagining the story of technology and speed. Against global pretensions of acceleration, for example, historian of technology David Edgerton (2011) has argued for the long, slow, and highly partial integration of what we usually celebrate as “cutting edge” technologies into social life, in contrast to the slow and enduring impact of older and frequently mundane technologies as these are taken up and creatively repurposed through ordinary use around the world; or as Paul Edwards (2004) has observed, “the most salient characteristic of technology in the modern (industrial and post-industrial) world is the degree to which most technology is *not* salient for most people, most of the time” (2004: 185). This work has emphasized the role of infrastructure in shaping human experiences of time

(including our notions of temporal scale and “modernity” itself) but also the role of time and temporal passage (e.g. through moments of growth, stabilization failure, or decline) in shaping the physical forms and dynamics inherent to infrastructure. This situates infrastructure firmly *in* and *of* time, rather than as an agent or force impinging on it from the outside.

A second resource for reimagining relationships between time and technology may be found in an influential notion of infrastructure first advanced by Star and Ruhleder (1996). In their account, infrastructure provides the framework or scaffolding for social and technical activities of all sorts, and exemplifies a number of key features or properties: its embedding in other structures; its frequent transparency (or invisibility) in use; its reach or scope beyond single sites of practice; its connections to norms and conventions grounded in wider communities of practice; its embodiment in standards; its dependence on an installed base of practices and material objects; and its tendency to “reappear” (or return to conscious reflection) under conditions of failure or breakdown. If this definition calls out the relational quality of infrastructure—exemplified elsewhere in the dictum, “one person’s infrastructure is another person’s barrier” (Star 1999)—it also underscores its timeliness: its positioning, sometimes delicate, within wider flows and relations through which its meaning and viability *qua* infrastructure (as opposed to disparate and unmoored grouping of objects) is assigned. This exposes infrastructure to the vagaries of time and change in the world, and makes questions of “*when* is an infrastructure?” (Star 1999) no less central than questions of what, where, or for whom.

From this starting point, other propositions around the relationship between time, speed, and infrastructure become possible: for example, that our stories of time and infrastructure are always stories of *multiple* times, and the challenging and power-laden processes by which these are brought into workable and temporary alignment; that the cast of actors involved in these stories may be larger and more varied than technology-centered accounts may suggest; and that infrastructure itself is subject to all the same processes and pressures: a *creature*, and not just agent, of time. Such insights underscore the need to set the story of speed against other temporalities which must also be accounted for in any balanced discussion of technology, time, and social life: temporalities of breakdown, ruin, and decay for example; and of maintenance and repair. The sections that follow explore each of these in turn.

Temporalities of Breakdown, Ruin, and Decay

A small but growing body of recent work across the social sciences has (re)turned to problems of breakdown, ruin, and decay, both as ever-present

realities in the social life of things and people, and as sites of generativity from which the new is being perpetually (re)produced. DeSilvey (2006) for example has explored the residual material culture of a derelict homestead in Montana to argue for the live and fertile processes unleashed through ruination, showing how the “disarticulation” of objects—for example, a book box slowly giving way to mice and rot—may complicate both assumptions around the “timeless” nature of objects and a series of ontological distinctions (e.g. artifact vs. environment, nature vs. culture) that have long framed and limited the imagination of social scientists. Edensor (2011) has shown the complex and multiple temporalities that shape and sustain heritage buildings (here, St. Ann’s Church in central Manchester) as dynamic and ongoing *assemblages*, subject to processes of transformation over time through their interactions with weather, pollution, salts, living agents ranging from bats, birds, and rodents to moss, bacteria, and people. Scholars of architecture, urban planning, and information science have begun to question their fields’ predominant emphases on design, reimagining buildings, devices, and other material artifacts instead as unruly *events* unfolding across time and space, and upheld by ongoing acts of ordering and stabilization, in the absence of which “buildings must die” (Cairns and Jacobs 2014). In some instances, renewed attention to breakdown has become a tool for unsettling received academic and political categories: for example, the turn to notions of “ruin” and “debris” in recent postcolonial scholarship (Stoler 2008); or growing attention to processes of “abjection” and other forms of infrastructural violence in anthropology (Anand 2012; Ferguson 2012). In others, attending to waste and ruination has given rise to whole new genres and subfields of work: for example, the emerging fields of waste or discard studies (Lepawsky 2014; Liboiron 2014) and the associated project of “garbology” (Humes 2013).

But if these principles hold for building and empires, they are no less true of other kinds of infrastructures, including those commonly credited with producing the experiences of speed and compression at the heart of accelerationist narratives. In many parts of the world, railways are in physical decline, as lines fall into disuse, rail beds erode, and plant life (previously held at bay through aggressive programs of spraying and weed control) creeps in. Decay shows up in the cracks that mark and degrade American highways, in a collective state of physical decline since their heyday of national expansion in the 1950s. Normally shy of publicity, infrastructure is most likely to make the news in the West these days in the form of spectacular bridge collapses, as chronically underfunded infrastructure—the victim of tax resentments and funding cuts that follow in turn from a kind of political decay—breaks and fails. Histories of telecommunications development around the world are replete with ruin, as undersea cables break, computing stock (for example, as introduced by

international donor investments ranging from rural telecenters to One Laptop Per Child) fails and degrades, and wires are stripped and resold for copper (Rosner and Ames 2014; Chan 2014). The presumed weightlessness of “the digital” itself may be subject to complex processes of decay, as storage erodes, firmware fails, files corrupt, and the voltages marking binaries of 1 and 0 grow fuzzy and indistinct (Cantwell-Smith 1998; Blanchette 2011).

What can broken objects and the processes that produce them give to the sociology of speed? To begin, such instances remind us that key instrumentalities of speed—the core and “cutting edge” infrastructures from which contemporary experiences of speed and acceleration are held to flow—are for all that no less subject to the processes of reversal, ruin, and decline that characterize other forms of social and material existence in the world. For all their vaunted power and reach, transport, communication, and other infrastructures central to the acceleration of temporal experience from Marx’s time to our own remain in many ways light and fragile creatures, prone to the constant threat of failure and decay. Attending to breakdown points us toward the active and ontologically productive nature of ruin, and the irreducible presence of embedded materialities with rhythms and propensities all their own, which can only ever be sometimes, and for a while, slowed, arrested, and aligned. These possibilities are contained and made invisible by any number of categorical distinctions (artifact vs. waste, order vs. dirt (Douglas 1978), etc.) and too often by presumptions of agency and value in the stories we tell about the material world around us. But when allowed to “speak,” breakdown and ruin can complicate these settled categories, calling to light new forms of order and ordering and (re)directing attention to the innumerable transformations always already underway in the object worlds around us. Through such mechanisms,

processes of decay and the obscure agencies of intrusive humans and non-humans transform the familiar material world, changing the form and texture of objects, eroding their assigned functions and meanings, and blurring the boundaries between things. (Edensor 2005: 318)

If such processes give rise to new things, they also give rise to new lines and principles of order: contrary to frequent assumption, sites of ruin and decay may be marked less by the absence of form than by its multiplication and diversification: a profusion, rather than attenuation, of order.

In sum, temporalities of breakdown upend linear and teleological histories by reminding us that time flows at many different paces and in many different directions at once, not all of them fast or—as conventionally understood—

forward. They remind us of the enduring materiality of time, and of the fact that things remain live and active, even (perhaps especially!) after their moments of design, general use, and cultural glory have passed. They challenge easy stories of origin and end point, showing instead the endless processes of emergence and transformation from and ultimately to which objects arise and eventually go. Such processes themselves may be generative and productive, giving rise to processes of learning, invention, and discovery that are graced under other circumstances with the name “innovation.” This may help us to extend and broaden the forms and scales against which human-centered understandings of time operate, from the quantum (Barad 2007) to the geological (Parikka 2015). The much-celebrated instrumentalities of speed are no less subject to these forces, showing all the same variances, multiplicities, and fragilities. The evidence for decline and decay is all around us. In the words of the great Nigerian novelist Chinua Achebe (1958), “things fall apart.”

Temporalities of Maintenance and Repair

Except that, much of the time, they *don't*. If the world is replete with instances of breakdown, ruin, and decay and certain groups encounter breakdown more frequently and forcefully than others, the more common experience is that the systems and infrastructures around us *mostly* work, for *most* people, *most* of the time. Because of this, we have tended to regard enduring function as a natural and more or less permanent feature of systems, rather than as the ongoing, frequently artful, and often fraught accomplishment that it is. Indeed, if we are to think to the longevity of systems at all (which we generally don't) we are most likely to attribute it backwards to moments of origin and the virtues of good design.

Such perceptions neglect, however, the centrality of maintenance and repair to working infrastructures of all kinds—and the complex and sometimes ambivalent temporalities built and expressed through such action. Support for this position can be found once again through recent work in architecture. Following from their argument for the necessary mortality of buildings, Cairns and Jacobs (2014) attach enormous importance to the role of maintenance and building staff as ongoing shapers and transformers of buildings' living identities. As this work attests, notions of static form and imaginations of timeless design that have long preoccupied the field are both inaccurate and a disservice to the real-world processes and labors by which buildings are sustained and made to evolve or “learn” (Brand 1995) through time. Strebel's (2011) study of concierge workers in a Glasgow housing estate

documents the routine inspections, maintenance activities, and minor repairs by which the “momentum” of the building—its unique temporal trajectory and unfolding into the future—is sustained. Neither purely backward-looking nor restorative in nature, and lost under the field’s normal fixation on architectural form and intention, such activities shape and reshape buildings as dynamic entities through time, ensuring their status as live and timely objects.

More recent work by Graham and Thrift (2007) has extended this line to consider the various forms of maintenance and repair through which such futures are forestalled. Drawing on the classic Heideggerian distinction between things “ready-to-hand” vs. “present-at-hand,” along with recent work in infrastructure and urban studies, they trace the myriad forms of maintenance and repair by which modern cities are constituted and sustained (as opposed to the broken, chaotic, and impossible places they would quickly become if maintenance and repair work were withdrawn). Cities are in many ways no more (and no less!) than a complex assemblage of infrastructural systems, held in partial states of function and connection through large (and largely neglected) collections of maintenance and repair work. Under ordinary circumstances, such work remains “invisible,” subsumed within the flow and function of urban life; it is only when massive and catastrophic failure threatens that maintenance and repair is restored to widespread attention (giving our public discourses around infrastructure a flair for the dramatic). This fact, and the general failure to extend urban theory by accounting for conditions in cities of the “global South” (where experiences and responses of failure and repair may be simply too prominent to ignore), helps to:

sustain widespread assumptions that urban “infrastructure” is somehow a material and utterly fixed assemblage of hard technologies embedded stably in place, which is characterized by perfect order, completeness, immanence and internal homogeneity rather than leaky, partial and heterogeneous entities. (Graham and Thrift 2007: 10)

The error of this assumption is made clear in any even-handed consideration of electricity, computing, and automobility: key infrastructures in shaping and defining life in contemporary cities. As Graham and Thrift enumerate, such infrastructures are both prone to widespread vulnerability and breakdown (ranging from or brown-outs and security glitches, to potholes, vehicle failure, and congestion) and sustained only at the cost of enormous private and public investments in maintenance and repair—investments increasingly undermined by neoliberal policies that further marginalize repair work and workers and heighten the vulnerability of core urban infrastructures. (for more on this point, see also Graham 2001).

The centrality of maintenance and repair work to urban infrastructure and experience has been further elaborated in a striking series of studies by Denis and Pontille (2014, 2015) around maintenance and repair work among sign crews in the Paris subway. As the authors show, such work is central to the “material ordering” by which the subway’s wayfaring systems and urban flow more generally are sustained. They trace first the stabilization of representation through an ambitious program of standardization launched in the 1990s that sought to unify and prescribe (to a remarkable level of detail) all activities pertaining to the design, production, and placement of signs across all components of the greater Paris transport network. But this work, they argue, provides an as-yet insufficient account of the objects in question, for it fails to track the numerous threats and vulnerabilities that threaten the continued existence and intelligibility of the signage system. From mold to graffiti, discoloration to vandalism and theft, the crews charged with maintaining the integrity of the system work to uphold vulnerable and fragile objects against a heterogeneous and sometimes hostile environment. In contrast to the initial design work, maintenance is necessarily vigilant, reactive, and improvisational, attentive to emerging conditions that threaten the ongoing viability of signs across time and context. These two projects—standardization and design and maintenance and repair work as separate but aligned responses that together uphold the effective and timely performance of signs as objects.

My own work with colleagues and students has explored the work of computing and mobile phone repair across a range of sites, from mobile phone repair operations in Namibia and Bangladesh to amateur fixing movements in the global North. Such projects have underscored both the constant (if neglected) processes of breakdown and decay that characterize the real-world existence of computational infrastructures, and the varying regimes of maintenance and repair that nevertheless sustain them as working (under most circumstances, for most people, most of the time). This has included work on the widespread neglect of maintenance and repair in formal development programs (for example, computing for education programs in rural Namibia, see Jackson et al. 2011, 2012), and the role that this neglect plays in undermining various “information and communication technology for development” (ICTD) initiatives. It has also begun to explore the varied “repair worlds” by which Southern computational infrastructures are sustained, arguing for these as sites of difference, innovation, and power which, if properly considered, can begin to correct the extreme geographic tilt in global understandings of innovation (whereby computational skill and innovation is held to be the property of a narrow caste of designers and engineers in rarefied locales like Silicon Valley, rather than the diverse,

widely distributed, and heterogeneous phenomenon that it in fact is (Jackson et al. 2011, 2012)).

This work has documented how repair work is organized and sustained in such settings, including at the nexus of local social and professional networks and global flows of objects and knowledge, including vast and complex material circulations in everything from parts and tools to the detritus ("waste") flowing in and out of repair shops (Jackson et al. 2011; Ahmed et al. 2015; see also Houston 2014). It has also documented the particular forms of skill, learning, and innovation embedded in repair work, as expressed across a range of common and not-so-common operations (e.g. "flashing," "servicing," "jumpering," "reballing") and shared through extended and complex networks of apprenticeship and collaboration (Ahmed et al. 2015) (see Figure 11.1). Our more recent work has explored the nature and problem of "values in repair," arguing for the importance of maintenance and repair as sites for the extension and reworking of values and valuation in and around technology, and a necessary counterpart to the better-studied problem of "values in design" (Houston et al. 2016).

Taken collectively, these and other examples from the emerging field of repair studies help to cast light on both the ubiquity and diversity of repair work, and its role within wider systems of material and social order. Here two additional observations may be in order. First, while often routine and mundane in character, maintenance and repair work may also embed crucial elements of skill, innovation, and creativity. A beautiful instance of this can be found in Klemp et al.'s (2008) analysis of the repair of a single wrong note struck during a solo by jazz pianist Thelonious Monk during a 1953 performance of jazz standard "In Walked Bud." Working with recordings and session notes from this and two other performances, the authors show how Monk's initial error is "saved" through the complex reworking of subsequent phrases that weave the erroneous note into a new musical fabric distinct from the original. The repair is performed in real time, and worked out in collaboration with the other members of Monk's group, who hear Monk's "error" and join him in constructing a path through which the initial dissonance of the mistake is gathered, extended, and recouped giving the performance its own novel identity and coherence. This underscores the emergent and relational quality of repair, and its location within ongoing streams of action that are themselves temporally and situationally organized. As Klemp et al. (2008) note:

when we listen to music, we hear neither plans, nor mistakes, but *takes* in which expectations and difficulties get worked on in the medium of notes, tones and rhythms. Notes live in connection with each other. They make demands on each other, and, if one note sticks out, the logic of their connections demands that they be reset and realigned.



Figure 11.1. Repair worker in Gulistan underground market, Dhaka, Bangladesh; photo courtesy of Syed Ishtiaque Ahmed

While not all instances of repair will achieve this lofty level of achievement (nor is every repair worker Thelonious Monk!), improvisation remains central to the work of maintenance and repair writ large. This point is made clear in groundbreaking early work by Orr (1996) and Henke (2000), whose photocopier repair technicians and building mechanics work with available tools, resources, knowledges, and collectively held experience (stored in the form of “war stories”) to restore function and order in the wake of local and contextually framed breakdowns. Variety in the nature of these breakdowns however—in complex sociotechnical systems, no two failures are alike—demands the adaptive and creative rather than rote application of repair skill and knowledge. This makes repair work resistant to the codifying tendencies that structure work under more controlled and settled environments, including sites of industrial design and production. This situated and improvisational quality has led scholars to language and metaphors that will at first blush seem at odds with the often mundane and ordinary nature of maintenance and repair work: Graham and Thrift (2007) have talked about it as a form of ingenuity, for example; Denis and Pontille (2015) have described it as a kind of dance.

Second, while in some instances the temporal identity of repair as restorative or transformative will be clear, in others the line will be fuzzy at best. Take the example of “looping” or “jumpering,” widely practiced by mobile phone

repair technicians in the informal markets of Dhaka and Kampala (and discussed in greater detail in Houston 2014; and Ahmed et al. 2015). Under this technique, faulty subcomponents (sound cards, accelerometers, etc.) are neither fixed nor replaced but bypassed, as repair technicians solder new pathways on to faulty motherboards, rerouting connections so that compromised components are removed from the general flow, thus preserving and restoring overall device integrity. This work is deeply knowledgeable and skillful, demanding both practical understanding of motherboard geographies (which vary significantly by model and manufacturer), and fine-grained motor skills capable of laying thin lines of solder that establish the desired connections but not others. But while this work restores global function, it does not reproduce an original *per se*: the phone that emerges at the end is demonstrably *not* the same device, nor is it a copy or return to an earlier form. At the level of function, the phone now works differently, containing some but not all of its earlier possibilities. Internally and externally, it bears the marks of its labor as well as the breakdown that occasioned it (broken circuits, scratched casings, etc.). The phone has become in effect a different object: new but not radically new, separated from and connected to its past by the forms of breakdown, maintenance, and repair through which it has passed.

Understood as mechanisms of ordering and modes of temporal practice, maintenance and repair offer distinct and valuable contributions to ongoing debates in the sociology of speed. At the broadest level, such instances suggest a different kind of temporal sensibility, one grounded not in linear or teleological faith, but in honest recognition of the fragility of things, and a respect (even wonder!) for the ongoing work by which stability and order (such as they are) are sustained: what I've elsewhere described as a form of "broken world thinking" (Jackson 2014). Temporalities of maintenance and repair, as deployed in the expansive sense here, gather and blend the unruly timelines of things. In their absence, objects are left to go their own ways, becoming in turn homes for *other* things: rust, mice, and plants for example; or in the case of a growing number of subways and train stations around the world, overflow housing for poor and marginalized groups displaced, in part, by speed. Such instances point to sites, moments, and experiences too often obscured by global stories of speed and acceleration. They also suggest other forms and kinds of timeliness—some of them mundane and slow—by which the effect of speed and acceleration is produced and sustained.

Our frequent blindness to such facts has any number of intellectual and practical consequences. In the venture capital and scientific funding worlds, it is much easier to attract support for new and "transformative" programs of work than the maintenance and continuation of old ones (even where the

worth of such programs has been established beyond dispute). In worlds of technology, the neglect of maintenance and repair (and the primacy of design it produces) helps to maintain a narrow and provincial geography of innovation in which the people and processes that matter are constrained to a few square miles of northern California (and a small handful of analogue sites around the world). A similar provincialism may characterize the geography of speed, which may turn out on closer inspection to apply most dramatically to what turns out to be a rather narrow and rarefied class of places, actors, and moments. Taking maintenance and repair seriously invites us to broaden these stories, and to rethink our timelines. To neglect such moments is to collude in the forms of invisibility that such stories help to produce: both around the nature and status of repair work and workers themselves, and the vast range of efforts which in fact characterize and produce temporal experience today.

Discussion: Repair, Time, and Ethics

Taken collectively, these varied observations around breakdown, maintenance, and repair offer a different possible starting point for our discussions around technology and social life, including the questions of speed explored in this volume. I have argued elsewhere for the contributions such thinking might make to other areas of concern. Some of these tie to immediate and highly practical issues: for example, the design of devices and infrastructures that might better enable and support (rather than frustrate and lock out) possibilities of repair; or the construction of more repair-friendly policies (for example, the reform of intellectual property and liability law to embed rights to repair as concomitant rights of ownership and use). Others are more speculative, and speak to alternative ways of knowing and engaging the social and material worlds that take seriously the notion of breakdown, maintenance, and repair as facts, rather than exceptions, to ordinary life.

As a contribution to the sociology of speed, three additional observations may be in order. The first concerns the distributional consequences of breakdown and repair—both as experience unevenly distributed in the world, and as form of necessary work that nevertheless goes routinely overlooked and undercompensated: a type of blindness that costless or teleological accounts of technology and speed help to exacerbate. Like other global accounts, undifferentiated discussions of speed and acceleration risk missing the vast differences that mark and separate the temporal experiences of variously placed social actors. If “fast” is an affordance of our new technically mediated orders, it is not one available to all. If some revel and reel in the heady experience of speed, others see their lives slowed down (or engage in slow

and patient work to produce it). Where some are made to move faster, others are forced to wait. While such distributional consequences have periodically attracted the attention of scholars of speed (see Chapters 9 and 10 in this volume) the core of the point remains perhaps best expressed in classic work by Doreen Massey written in response to an earlier round of debates around the nature of global acceleration and "time-space compression." As Massey insists:

different social groups and different individuals are placed in very distinct ways in relation to these flows and interconnections. This point concerns not merely the issue of who moves and who doesn't, although that is an important element of it; it is also about power in relation to the flows and the movement. Different social groups have different relationships to this anyway-differentiated mobility: some are more in charge of it than others; some initiate flows and movement, others don't; some are more on the receiving end of it than others; some are effectively imprisoned by it. (1994: 61)

Attending to breakdown, maintenance, and repair may help deepen and extend the distributional analysis of speed, suggesting once again categories of temporal experience neglected under prevailing accounts of acceleration, as well as key forms of labor (themselves neither mobile nor speedy) by which *others'* experiences of speed are supported and maintained. It may also help counter the myths of unity and self-efficacy that emerge when systems and infrastructures are presented with their fragilities and labors stripped away.

The second point concerns the rich and suggestive relations between breakdown, maintenance, and repair, and the ethical and political possibilities suggested under a growing body of work around fragility, precariousness, and care. This work has emphasized shared experiences of fragility as both description of the contemporary moment and starting point for a common ethics and politics in the wake of the various "posts" and "neos" we inhabit: "-colonialism," "-modernism," "-liberalism," etc. Andrew Sayer (2011), for example, has argued for shared vulnerability to suffering as grounds for a more robust consideration of ethics within the social sciences, restoring questions of value and values to the center of the field. William Connolly (2013) has pointed to the "fragility" of our geological, biological, and climate systems, along with growing instabilities in economic unmoored by neoliberal reform, as necessary starting points for new and pluralistic democratic projects. In the absence of these, the consequences of fragility are passed "down" to those least equipped to bear them, following a circuit first described by Simmel:

Every new pressure and imposition moves along the line of least resistance which, though not in its first stage, usually and eventually runs in a descending direction. This is the tragedy of whomever is lowest . . . He not only has to suffer from the deprivations, efforts, and discriminations, which, taken together, characterize his

position; in addition every new pressure on any point whatever in the superordinate layers is, if technically possible at all, transmitted downward and stops only at him. (Simmel 1950: 236–7, cited in Connolly 2013: 23)

Writing in the wake of 9/11 and the devastations of the Iraq War, Judith Butler pursues the consequences of what she terms “a primary vulnerability to others” (2006: xiv), a recognition “that there are others out there on whom my life depends, people I do not know and may never know” (2006: xii). The shared nature of such vulnerabilities are exposed through violence, but also marked and honored through mourning: an act that affirms and upholds relations of mutual vulnerability, a way of staying with others through grief that acknowledges our shared exposure to the vicissitudes of pain, loss, and destruction.

The most direct and suggestive link of all, however, may be to a growing body of work in feminist ethics and technoscience underscoring the presence and centrality of *care*: as affective state, as ethical relation, and as mundane form of practical work. As developed by scholars from Tronto (1993) and Star (1991) to Mol (2008) and de la Bellacasa (2012), care provides an alternate entry point to many contemporary concerns, including but not limited to the problems of time, speed, and repair foregrounded here. In an influential definition offered by Tronto, care includes:

everything that we do to maintain, continue and repair “our world” so that we can live in it as well as possible. That world includes our bodies, our selves, and our environment, all of which we seek to interweave in a complex, life sustaining web. (1993: 103)

Care builds from and expresses a commitment to interdependence and (mutual) vulnerability, a recognition that human endurance and flourishing in the world are never autonomous and self-sustaining accomplishments, but rather arise at the intersection of innumerable relationships, webs of dependencies in which life and experience is suspended and sustained. This entails (deep!) ethical commitments and attachments: those with whom we find ourselves immediately entangled, but also more distant others whose existence is subject to the same vulnerabilities and dependencies as our own. But if care speaks to the ethical and the affective, it also speaks to and is expressed in *action*: “vital ethico-affective everyday doings that engage with the inescapable troubles of interdependent existences” (de la Bellacasa 2012: 199).

Such work has made many and important contributions in extending and reshaping work in science and technology studies and the broader social sciences. Here I wish to emphasize the *material* implications of care, and the deep and suggestive connections between care and the processes of breakdown, maintenance, and repair described earlier—a connection that

scholars have only begun to unfold (see, inter alia, Jackson 2014; Denis and Pontille 2015; de la Bellacasa 2015; Houston and Jackson 2016). As core feminist scholarship asserts, care in its inter-human dimension extends beyond affective disposition or “structure of feeling” to encompass the rich and ongoing forms of work, labor, and interaction by which the status and well-being of others is acknowledged and upheld. This can include work both physical and bodily in nature: for example the sense of care intended when we speak of caring for a sick child, a hospital patient, or an aging parent. But the same kind of attending to physical need and frailty may characterize our interactions with the non-human worlds around us, perhaps especially when such actions begin to express and take on affective and normative weight. Like forms of care directed toward humans, maintenance and repair work starts from a basic recognition of vulnerability and decline, a feel for “the fleshiness and fragility of life” (Mol 2008: 11). Like human-directed care, it involves forms of work and labor designed to forestall such outcomes, upholding and sustaining objects in viable or working order. Like human care, maintenance and repair builds on and extends commitments to connection and interdependency, sustaining individual entities within wider networks of value and relationality. And like human care, maintenance and repair involve acts of perceptual and affective attention, a “listening forth” organized around a fundamental openness to the state and status of others. If this implies a normative relation, it also specifies a *temporal* one: from soil, to subway signs, to mobile phones, the care of things may involve a *staying with* in time and place, a subjecting and reorienting of one’s own time to other temporal flows and processes, including the temporalities of breakdown and decay (long and slow, sudden and protracted) that must be accommodated and adjusted to in the ongoing doing of repair work. To engage in repair-as-care is therefore to open and tie oneself to the rhythms, flows, and timeliness of another. Such rhythms of care (what de la Bellacasa 2015 calls “care time”) may stand at odds with efforts at mastery and control. Uncertainties in the irruption of breakdown are one reason, for example, why maintenance and repair work, even more than production, is difficult to anticipate and account for under modern regimes of planning and management. For all these reasons, care—for people as for things—remains an inescapably timely, and relational act.

Taken together, temporalities of breakdown on one hand, and repair and care on the other, can help to correct holes and imbalances in current understandings of the relationship between technology, time, and social life. Temporalities of breakdown help to remind us that “speed,” where it is to be found, is a hard-won and by no means automatic accomplishment. They point us toward sites and moments that challenge and contest the

orientations toward the simple linear narratives that characterize and mar many accounts of speed, both academic and popular. They point to the deep and multiple presences of *other* temporalities, including those grounded in the materiality of objects and things, which may support, undermine, or remain indifferent to more human-centered understandings and experiences of time (what is fast to a rock?). And they remind us that time, as a property of interactions, may flow in every which way at once, only sometimes summing to a unified pace and direction.

Temporalities of repair and care complete this picture, suggesting the real work by which order is held in place, and things made to persist in the conditions we have found them in (or *given* them, through processes of construction and design). They point to the real-world actions and relations, both effective and affective, by which we operate on time and the timeliness of human and non-human others, coaxing and inviting certain processes of change while forestalling or working against others. They underscore the deeply material character of this work, and the practical processes by which time, as a property of situated interactions, is made to take on shape and weight in the world.

Collectively, such perspectives help us to relocate understandings of time itself: from external backdrop or yardstick, to something emerging at the center of human and material experience in the world, reminding us that time happens in interactions, and not the other way around. This sense is central to a long line of pragmatist work, and is perhaps best expressed in the James quote that led this chapter, given here in its full context:

Life is in the transitions as much as in the terms connected; often, indeed, it seems to be there more emphatically, as if our spurts and sallies forward were the real firing-line of the battle, were like the thin line of flame advancing across the dry autumnal field which the farmer proceeds to burn. It is "of" the past, inasmuch as it comes expressly as the past's continuation; is if "of" the future in so far as the future, when it comes, will have continued it. (1904: 212-13)

Appropriately pursued, this mode of thought moves time and transition to the very center of human and material trajectories through the world:

a metaphysics of transiency, in which human life is seen as a wandering, a traveling, a bemusement which rocks side to side, comedy and tragedy, breakthrough and setback—yet, in all, a purposive, even progressive, trip. (McDermott 2007: 157, cited in Klemp et al. 2008: 5)

Conclusion

Breakdown, maintenance, and repair are central to the accomplishment of "speedy" infrastructures (as indeed all things with standing and duration in

the world). The material worlds around us embed rich and varied temporalities of their own, many of which run counter to general and undifferentiated stories of speed. The actual rhythms that shape and define human experience in the world are multiple and diverse, and while under the right circumstances they may “sum” to speed, they are never wholly constituted or defined as such. An important subset of these rhythms is grounded in the ongoing work of maintenance and repair by which the durability of such systems, together with their distinct processes of change and unfolding into the future, are produced, sustained, and transformed.

How might the sociology of speed change by taking such features into account? It would become more diverse and less confident, opening itself to a greater range of temporal experience, including slownesses, departures, and reversals obscured or neglected under more linear and teleological accounts. It would be more resolutely sociomaterial, cognizant of rhythms and tempos emerging from spheres of existence beyond the human—the temporality of objects, the timeliness of things. At the same time, it would pay wider heed to human work and labor, including the myriad forms of maintenance and repair through which experiences of speed are produced, sustained, and accommodated under the circumstances of individual and collective lives, making each of us in small and varied ways agents, and not just “dopes,” of speed. And it would be more attentive to speed’s distributional character and consequence, including for actors whose work and experiences are rendered invisible under present accounts. Abstract and undifferentiated stories of time, speed, and technology may be inclined to write such experiences off as marginal, limited, or residual—echoes or sidelines, perhaps regrettable ones, in the global story of speed. I believe they are constitutive, and will determine how true such stories turn out to be.

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