

# Circumscribed time and porous time: Logics as a way of studying temporality

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## ABSTRACT

In this paper, we introduce the notion of a *temporal logic* to characterize sets of organizing principles that perpetuate particular orientations to the lived experience of time. We identify a dominant temporal logic, *circumscribed time*, which has legitimated time as *chunkable*, *single-purpose*, *linear*, and *ownable*. We juxtapose this logic with the temporal experiences of participants in three ethnographic datasets to identify a set of alternative understandings of time – that it is also *spectral*, *mosaic*, *rhythmic*, and *obligated*. We call this understanding *porous time*. We posit porous time as an expansion of circumscribed time in order to provoke reflection on how temporal logics underpin the ways that people orient to each other, research and design technologies, and normalize visions of success in contemporary life.

## Author Keywords

Temporality; Rhythm; Social Norms; Logics; Ethnography; Close Reading

## ACM Classification Keywords

H.5.m. Information Interfaces and Presentation (e.g. HCI):  
Miscellaneous

## INTRODUCTION

Rodger, a 43 year-old director of sales describes his plan for the following day: “Up at 2:50[am], 10 min to stumble around, in the pool by 3:15[am] ... [and so on, until] ... crashing at 9:30pm.” Albeit somewhat extreme, Rodger’s approach to scheduling is not unusual. Like many Americans, he feels compelled to quantify the temporal resources of his day. In attempting to do it all, he looks to precision scheduling to measure, circumscribe, and conquer the demands in his life: “*It has to work like clockwork or I’m screwed.*”

Time animates the ways that technologies are used in professional and social situations, and has been a longstanding topic of interest within CSCW [13, 14, 18, 20, 24, 38]. Cooperation and collaboration, both core activities

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within this domain, require attention to temporal patterns almost by definition, whether it be in the sequential ordering of interdependent tasks or the particular rhythms of subgroups. Despite this core focus, Steinhardt and Jackson [53] suggest that time continues to be a fertile topic to explore within the field of CSCW. A richer understanding of the ways that time animates the multiple overlapping domains of contemporary professional and social—and now highly mobile—lives is needed. We respond to this call by returning to our field’s legacy of interrogating the design, use and resistance to temporal technologies such as calendars and scheduling software to showcase how certain logics of time pervade everyday sociotechnical practices, both inside the office and out.

In this paper we articulate the concept of a *temporal logic* – a particular orientation to time that manifests in time-related social norms, moral judgments, daily practices, and technologies for scheduling and coordination. We use this frame first to delineate a dominant temporal logic that we refer to herein as ‘*circumscribed time*.’ This logic, which is embedded in many popular tools, current scholarship, and especially in the discourse of time management, is characterized by assumptions that time is *chunk-able* (i.e. unitized and measurable), oriented to a *single purpose*, experienced *linearly*, and *owned* by individuals. We then draw on ethnographic data and prior research to juxtapose the core tenets of a circumscribed temporal logic against lived temporal experiences. We find and name an emergent set of temporal elements – *spectral*, *mosaic*, *rhythmic* and *obligated* time – which implicitly challenge the assumptions of the dominant logic. We call this collective set ‘*porous time*.’

The temporal logic of circumscribed time falls short of describing, let alone organizing, the complex temporalities that govern American lives today. As an expansion of the dominant logic, porous time aims to provide a more nuanced account of how temporality shapes interactions among people, technologies, and the self. In articulating a conception of porous time, we aim to emphasize the ways that individuals can and do understand and adapt to the fluidities of time even when the organizations and institutions that they live and work within – be they technical, social, or political – do not. When pressured for time, we find individuals like Rodger struggling to get in ‘control’ of their time by adhering ever more strenuously to

society's dominant logic of circumscribed time. Success appears immanent by breaking a day into single-purpose temporal chunks of time, which can be optimally gridded. Embedded in social and institutional norms, as well as promoted by task management techniques and calendaring tools, this logic perpetuates a promise that an autonomous individual can control the spontaneity and unpredictability of a life that inevitably involves other people and plans [18].

In this paper, we challenge ourselves, and the CSCW community more broadly, to be more reflexive about the temporal constructs we assume as givens when we conduct our work. In addition, we seek to engender a conversation about the multi-faceted nature of temporality. Thus, our goal is less to specify the particularities of a preferred typology or conceptualization, but to provide a vocabulary to galvanize continuing research and design in this area.

### RELATED WORK

CSCW has been investigating the relationship of time and work practically from its inception as a scholarly field [12, 13, 20, 39]. Not surprisingly, calendars, particularly Groupware Calendaring Systems (GCS) and their use within organizational contexts, have been well studied in this area (e.g., [20, 24, 38]). Grudin and Palen, for example, showed that usage patterns related to calendar access and visibility differed markedly among organizations [20]. Palen [38, 39] further contributed a set of core constructs regarding 'calendar work', showing how calendars are used variably for temporal orientation, scheduling, tracking, reminding, recording and archiving, and retrieval and recall [38: 19]. Later work by CSCW researchers has documented the wide spectrum of roles that calendars play for individuals [58, 59], the role of calendaring within family contexts [34, 35], and the potential of predicting attendance at events from calendrical patterns [33]. This focus on calendars and "calendar work" instantiates and reinforces the understanding that time can be positively managed, whether for personal, professional or familial ends.

Building on organizational scholarship about the formation and routinization of temporal regularities in organizations [25, 41, 42, 63], CSCW scholars have also introduced the concept of *rhythms* to describe various temporal experiences. Much of this work has pointed to the multiplicity of rhythms in workplace environments and the significant effort required to bring them into alignment [4, 22, 36, 45, 52]. Drawing from Zerubavel [67, 68], Reddy and Dourish detail large-scale and fine-grained *temporal rhythms* within a hospital that reflect repeated tasks or procedures within the organization [45]. In parallel, they present the idea of a *temporal trajectory*, or temporal path a patient takes during his/her stay in the hospital.

Egger and Wagner [11], a decade prior, also underscored the organizational nature of time in their research on "the problems of temporal ordering" [11:250], outlining the notions of *temporal ambiguity* and *temporal dependences* to

describe situations that arise when tasks are loosely coupled but temporal synchronization is necessary. Bardram [1] articulated the notion of *temporal coordination*—"the temporal aspect of coordinating cooperative work" [1:158]—to form the basis for his 'Patient Scheduler' system design, a tool for synchronizing distributed work within a hospital. Bardram, like Palen, linked successful temporal coordination to artifacts, noting "...a temporal artefact, such as the clock or the calendar, can be turned into a temporal coordination artefact, mediating the temporal coordination, when shared within a collaborating community of practice" [1:164]. Notably, the ability for an artifact to manifest as a coordination tool requires a shared sense of temporality, or rhythm, among a group of workers.

Rhythms have also been noted at the individual level such as "bored Mondays" or "focused afternoons" [28], and the presence of multiple event horizons – those of plans-in-the-making versus plans-in-action – are rhythmic patterns that have been shown to implicate coordination and collaboration [53]. Relatedly, Ubicomp researchers have developed tools to aid individuals in aligning their lives to one temporal rhythm at the expense of others [3, 58, 59].

The proliferation of mobile and networked communication technologies over the last decade has also inspired scholars to focus on multi-tasking and interruptions (e.g., [14, 15, 36, 47]). While some of this research has been aimed at building technologies to better support multi-tasking, other research has been critical, pointing out the negative consequences of distraction and task-switching [29]. A parallel line of thinking, called 'presence bleed' [16], articulates the way that multi-tasking and extended temporal boundaries blur individuals' professional and personal identities as work bleeds into and throughout multiple spheres of life. This research emphasizes that temporal experience is rarely singular, rather more often layered in complex ways.

Finally, scholars from a variety of disciplines have drawn attention to the moralities and politics of time management. Leshed and Sengers [26] argue that American professionals struggle to construct identities around a positive moral value of 'busyness' while also experiencing the tensions of multiple and conflicting commitments. Sengers continues to develop this line of work in an emerging project on the moral orders of time [49]. Gregg draws attention to the relationship between technology and broader societal patterns arguing that, "apparently individual choices add up to a structural shift in work practices that is exacerbated by online technology's extensive reach" [17:123-24]. Sharma [51] raises the political and ethical question of how certain people's temporal rhythms are implicated in or subject to the times of others. For her, temporality is not just an individual experience; time is a site of impingement and the negotiation of social and institutional power relations rather than a site of personal agency. Mazmanian and Erickson [32] echo this refrain with the suggestion that time has

become de-commoditized within the global capitalist superstructure that promotes ‘24/7’ competition and within which, marketing the total availability of employees is a competitive advantage.

Taken together, ideas such as temporal ordering, patterns, rhythms and politics confirm the situated, cultural and socially constructed nature of time. As Palen writes,

*“...clocks and calendrical systems make time tangible and meaningful by imposing both natural and artificial boundaries on it – minutes, hours, days, weeks, months, years. In this sense, calendrical systems (like the Gregorian calendar) are themselves artifacts. Paper and electronic calendars contain these time system representations, which allow for the manipulation of time, exchanging one meeting hour for another, allotting time for a task, splicing events in between others. It is time-as-artifact that, in part, makes calendars useful.” [38:20].*

It is precisely this organization and experience of time-as-artifact, and the ways that it is then enacted in observable cultural patterns, that prompts our reflections herein.

### **THEORETICAL FRAMING**

The notion of time-as-artifact [38] reflects and embodies a common understanding of time that is shared among the members of a society. We call a common understanding a *temporal logic*. We adapt this concept from institutional theory and its theorization of ‘institutional logics’ [6, 43, 60]. As defined by [48], an institutional logic comprises “the belief systems and related practices that predominate in an organizational field.” These logics “provide the ‘organizing principles’ that furnish guidelines to field participants as to how they are to carry out the work” [5].

In particular, by *temporal logic* we mean the socially legitimated, shared assumptions about time that are embedded in institutional and societal norms, discourses, material and technological processes, and shared ideologies. A temporal logic defines what is rational, normal and expected, and imbues a society with a definition of *what time is* that directs individuals in *how they should operate in and through time*. It provides an understanding of time that becomes so embedded that it seems to define reality.

In previous temporalities research, scholars have drawn productively on Zerubavel’s similar concept of a *sociotemporal order* – an orientation to time that is shared amongst a social group and thusly produces coordinated rhythms and temporal alignments [15, 53]. While many have built on this concept in a way that suggests multiple orders or the practices of ordering, Zerubavel himself defines the term as analogous to “the ‘physiotemporal order’ which regulates the motions of celestial bodies and to the ‘biotemporal order’ which regulates the lives of organisms” [68]. His perspective attends to the ways that a particular orientation to time manifests in the routines of day-to-day activities and technologies of planning, scheduling and coordination. However, it also implies that a

single sociotemporal order regulates activities or technologies in a stable and unified way.

By contrast, we find that a temporal logic approach centers less on universal rules and more on the social construction of norms and practices related to time [5]. In Western society, the dominant temporal logic reflects a tradition of professionalized time commodification with correlate linear and quantifiable qualities. According to Egger and Wagner, this orientation, which we refer to as circumscribed time, holds that “time is homogeneous, objective, measurable, and infinitely divisible” [11:249]. It is this conceptualization of time—and its implications—that we analyze, critique, and try to reframe in this paper.

### **METHODOLOGY**

Our analytical approach adopts the infrastructure studies concept of an ‘infrastructural inversion’ [8]. We conduct a ‘temporal inversion’ here – moving time from its usual position in the background up into the foreground of this research. This temporal inversion unfolds in two parts.

First, we provide a close reading of a recent commercial for Microsoft Outlook. Research in the CHI and CSCW community has been enriched by recent engagements with humanistic and critical methodologies [2]. Though close reading is less common in HCI (see [21] for exception), it comes from a disciplinary tradition similar to that of discourse analysis, used to analyze constant connectivity [21], e-government systems [60], and video game play [55]. We take particular guidance from the HCI-adjacent field of video game studies, which has used close reading to simultaneously “[lay] bare the faults and inconsistencies of a media artifact” while also “[celebrating] the many ways in which a text can create meaning” [7: 1]. Our reading of the advertisement provides an analytical artifact that we use as an exemplar of the enactment of the dominant temporal logic, circumscribed time. Our production of this artifact is merely functional; we ascribe no valuation to the example of technology in use presented.

Second, we compare this analytical artifact to a subset of qualitative data culled from fieldwork on knowledge professionals in Boston, families of professionals in southern California, and long distance hikers on the Pacific Crest Trail (PCT). These collective data detail how a variety of people negotiate work and everyday activities, outline personal and professional relationships, and struggle to define a sense of self in alignment with prevalent norms around time, connectivity, work, and productivity. All data were collected by the first and third author cumulatively over the last ten years using traditional qualitative interview and observation techniques (see [31, 32] for more details). While the data that inform this work are not derivative of a single study, collectively they provide a broad picture of normative understandings of time within different social and occupational communities.

The comparison between our close reading and our field data followed the spirit, if not the exact letter, of grounded theory [10, 54], including iterative rounds of verbal coding and theorizing. This analytical work was carried out collectively among the three authors, both in person and via a series of video conferences in the spring of 2014.

### **OUTLINING A DOMINANT TEMPORAL LOGIC**

A temporal logic operates at multiple levels. It is perpetuated in social and cultural discourse; is embedded in institutional expectations and policies; drives the design and implementation of technologies; establishes resilient social norms; and provides a cache of normative, rational examples to draw on when individuals need to make sense of their everyday engagements with time. When a tool like Microsoft Outlook is designed, presented, and justified in a marketing campaign it is both reflecting and perpetuating a temporal logic.

In 2010, Microsoft ran a commercial for its Outlook email and calendar program called “Yoga Quest.” According to the company’s promotional copy, the advertisement shows, “...how one busy woman uses Outlook to manage what matters – from play dates, to work meetings, to emails, to a much needed, but seemingly unattainable, yoga session. See how Microsoft Outlook 2010 can help you balance all aspects of your work *and* personal life by integrating multiple calendars and email accounts into one, easy-to-manage place.” [66]. This commercial provides rich, detailed examples of this technology as it might be used and an idealized picture of how one should act on and through time via the help of a calendaring system. This promotion is thus marketing not only a product but also a normative way of living. It is precisely for its popular cultural resonance that we chose to analyze this advertisement.

#### **Yoga Quest**

The Microsoft Outlook video commercial begins with a close up of an arrow clicking to open the Outlook application to its weekly calendar view, accompanied by sitar music. The first calendar item is ‘Yoga,’ scheduled for 7:00am. The frame of reference shifts to the perspective of a woman beginning a yoga move – a downward dog asana. The angle of the camera reflects the view of the protagonist, pulling the commercial’s viewer into her body. A chirping interruption from the mobile phone at the edge of the yoga mat prompts a hand to reach out to pick up the device and view a message soliciting a replacement for a sick parent in the neighborhood carpool. Our protagonist selects the ‘Yoga’ event in the calendar and moves it to 12:00pm.

The scene shifts to a car dashboard, a crossing guard, and the inferred suggestion of a task accomplished. After waving goodbye to a young child (revealing the cuffs of a blue jersey sweatshirt), we are returned to Outlook, this time on a computer display at the end of a kitchen counter. To a new upbeat soundtrack, reminiscent of an industrious scene from *Snow White and the Seven Dwarves*, the video quickly moves to a view of the calendar’s task list and its

direction to “Complete Contoso logo design.” We see a PowerPoint presentation being edited, and then fingers toggle between a Work calendar and Home calendar – it is time to take the car in for an oil change. Immediately we are driving into a mechanic’s garage. While waiting in the car, the protagonist’s hands take out a dual laptop-tablet computer that is already open to Outlook’s calendar view. Fingers tap off the three completed tasks from a longer list and linger for a moment over the next one: Yoga.

The shot cuts to Outlook’s email view where our protagonist receives a tweet-like recommendation for a new local restaurant, Lou’s. She also sees a message about the logo presentation, “Scheduling conflict tomorrow. Reschedule for today?” We see a response typed out: “No problem. I’ll take him to Lou’s.” This necessitates another rescheduling of yoga. The video cuts to a coffee shop landscape, a handshake (the protagonist’s sleeves now suggesting a black suit jacket and cuffed collared shirt), a computer hand off (when our protagonist’s laptop proves to be out of power), and the presentation of the Contoso logo design via cloud-based file access.

That job accomplished, we are back with our protagonist on the yoga mat just as scheduled in the calendar (though the exact time of day has become unclear). She stretches out bare arms (no longer wearing long sleeves) onto the mat, beginning the downward dog pose once again. The music returns, briefly, to the sitar.

Just as before, the smartphone on the corner of the mat chirps; this time the Outlook app reveals an “urgent” message. The elementary school needs a book reader at 2pm; and so yoga is delayed again. The music changes back to an upbeat melody and we are transported to a classroom of kids and a shot of hands (no sleeves visible) flipping through a colorful picture book. This image bleeds into a scene of a home play-date with kids running around a living room. Meanwhile, our protagonist uses her smartphone to scroll up and down through the things on her ‘agenda’ with no empty time slots left. Up next: a PTA meeting at 5pm.

We see our protagonist sneak a bite out of a box of donuts, presumably at the meeting. Then the scene jumps back to the computer monitor at the end of the kitchen counter. Coffee cup in hand and weekly calendar view in sight, we watch as yoga is dragged downward through the day, but see that there is no empty slot in which to drop it.

We see a shared calendar labeled “Michael” open (presumably belonging to her husband), and a new event, “Pick up Caroline,” is added to his strikingly empty schedule. Included in message-event are the location of the soccer field and a note to “Bring dinner!” This shifting of responsibility opens up time, finally, for yoga. The video closes with our protagonist in lotus pose, sitar music again in the background. The message ‘*How do you achieve balance?*’ flashes on the screen immediately followed by the icon for Microsoft Outlook.

### **Circumscribed Time**

The “Yoga Quest” video embeds a number of assumptions about the nature of time that reflect a dominant temporal logic – specifically that time is *chunkable*, *single-purpose*, *linear* and *ownable*. While this is not a comprehensive or exhaustive list of dimensions, we provide this prototypicality as a way of stimulating discussion among scholars interested in further theorizing the nature and implications of temporal logics beyond our particular perspective.

#### *Time is chunk-able*

The expectation that time is chunk-able is conditioned by an understanding that **time exists in units (a second, a minute, a year) and that temporal units are equal** – that can be swapped and exchanged with relative ease. The yoga video exemplifies this understanding with its vision of seamless temporal shifting and manipulation. Calendaring systems like Outlook usually default to 30 or 60 minute chunks that can be dragged across various slots with ease.

As our protagonist continually drags her coveted yoga activity from one time slot to the next, the implication is not only that she can manipulate time like a Tetris game, eliminating any open spaces, but that each chunk of time is equal. According to this logic, doing yoga at 6:30pm after an incredibly long day is the same experience as doing it at 7:00am. Her constant rescheduling of activities underscores her and others’ expectation that one time slot is as good as another for any particular activity.

Understanding time as chunk-able is the basis for what has been referred to elsewhere as ‘gridded’ or ‘clock’ time, which holds that time is unitized and measurable. This temporal orientation emerged in the 17<sup>th</sup>-19<sup>th</sup> centuries alongside the adoption of clocks, watches, and railroads [55, 61]. Chunking time into measurable units is now so normalized in most institutions and policies that it appears unremarkable – the hourly wage, the measurement of sick days, the scheduling of a doctor’s appointment. Time chunks open up the possibility for future-oriented temporal manipulation and valuation; they assume that we are able to know, in advance, the duration of tasks and experiences.

Further, gridded calendaring systems rarely suggest that we account for unanticipated activity when planning time, (i.e., the client running late, traffic jams, etc.). By rendering time into apparently equal measurable units, such systems encourage an assumption that activities form to the shape of temporal units rather than vice versa. In addition such applications also perpetuate a sense that time is malleable and responsive; a single swipe of a finger can transform a 2pm appointment to a 3pm appointment with no regard for the possible domino effect of such a move.

#### *Time is allocated for a single-purpose*

Aligned with chunk-able time is the assumption that **each chunk of time, or its particular gridded arrangement, is allocated to a single purpose**. The clear delineation between the protagonist’s ‘home’ and ‘work’ calendar in

the video suggests an underlying assumption that any one chunk of gridded time is inhabited solely by ‘home’ or ‘work’ activities. This understanding is held constant even though we see our protagonist engaged in the Contoso presentation while getting her car fixed. She is layering ‘home’ and ‘work’ activities in practice, but the calendar’s representation does not accommodate this complexity.

The common rhetoric of ‘family time,’ ‘work time,’ and ‘me time’ suggests that certain activities are appropriate only in certain social spheres. These practices are all the more noticeable in a culture both fascinated and fearful of the promise of multi-tasking, wherein people maintain a taken-for-granted correspondence between certain ‘types’ of time and the tasks, ways of being, and social roles that (rationally and normatively) inhabit temporal ‘buckets.’

#### *Time is linear*

The dominant temporal logic also conceptualizes time as linear. In other words, **one chunk of time leads to another in a straight progression**. While chunks of time can be manipulated and reordered in the course of a day (or week, or month), each chunk of time has a limited duration and each activity has a beginning and an end. An hour is an hour, and in the course of a day (or a lifetime) hours stack up like a vector, moving one forward in a straightforward progression. While we only see one day in the life of our ‘yoga quest’ protagonist, her day nevertheless unfolds in a straightforward progression even as this overarching linearity is achieved through micro-manipulations of temporal units within a given day.

The various ways in which we account for historical evolution in terms of timelines or display visions of the future as straight trajectories perpetuate a notion of linear progress. Timelines, calendars, course syllabi, 10-day forecasts, etc. all underscore the temporal logic that time moves forward at a standard rate.

#### *Time is owned (ownable) by the individual*

Finally, **time is understood as a resource that is owned by an individual and thus needs to be managed and apportioned by that individual**. Like personal income, time is a resource that the individual has both the burden and responsibility to manage well. This vision of time reflects an assumption there are ‘better’ or ‘worse’ ways to use, spend and save time and it is up to the individual to engage in practices of temporal ownership. Controlling time does not suggest that an individual can speed up or slow down time, but rather, suggests that time can be personally configured to meet individual aims or goals.

The protagonist in our video appears to be fully in charge of her life as a parent, homemaker, and professional. Her ability to respond to last minute requests and manipulate her schedule at will suggests that she is in complete control of her own time. Her movement of tasks between time slots – and between calendars when she assigns her husband to ‘pick up Caroline’ – showcases both her perceived agency

and authority over time. She is portrayed as a skilled master, controlling the ordering of time with intentionality and playful rigor.

These four aspects of time illustrate a temporal logic that is embedded in American norms, discourses, institutions, and technologies. While we have focused on the advertisement as a way of unpacking this dominant logic, this is simply an illuminating device. This logic is not tied to this one advertisement or only to calendaring technologies. Logics about time seep throughout institutions, bureaucracies, and everyday social norms. For example, some U.S. academics are expected to sign paperwork that states that when funded by federal grants during the summer months, one will spend their full work-week on the funded research. Course planning or other university work must happen in addition to this ‘normal work week.’ Furthermore, the ‘normal’ week is not defined in hours, but rather the ‘typical’ amount of time one works during the academic year. So if one is working a 70 hour week because of teaching and research during the school year, this is the ‘normal’ work week that should be devoted only to research in the summer.<sup>1</sup>

We call this prevailing temporal logic ‘circumscribed time.’ We use this label to highlight the underlying orientation to time as a resource that can, and should, be mastered. A circumscribed temporal logic infers that time should be harnessed into ‘productive’ capacity by approaching it as something that can be chunked, allocated to a single use, experienced linearly, and owned. In turn, the norms of society place the burden on individuals to manage and ‘balance’ time as a steward, optimizing this precious resource by way of control and active manipulation.

### TEMPORAL LOGIC TENSIONS

One of the ways that a temporal logic becomes visible for analysis and critique is through the tensions that emerge when its assumptions and norms do not align with daily experience. In our collective fieldwork we have observed multiple examples of mundane daily practices coming into conflict with the logic that time is, or should be, chunkable, singular purpose, linear, and/or owned. These tensions help bring to the fore the extent of the dominant temporal logic and showcase the inadequacy of this narrow set of assumptions to fully describe temporal experiences.

### Conceptions of time as porous

In witnessing how people struggle to orient to the dominant temporal logic, we find it is insufficient to encapsulate temporal experiences. Thus, we now theorize a set of expanded notions, an initial typology that we call ‘porous time’. Notably, these terms do not reflect emic articulations

<sup>1</sup> We would like to thank one of the anonymous reviewers for this excellent example of how, “the dominant temporal logic is a logic that becomes quantifiable, and then mathematical, and completely ignores the rhythms of the year.”

from our participants, but are our own labels. To date, we have found that our subjects have a minimal ability, and almost no language, to discuss the vagaries of time. In general, people attempt to negotiate their subjective experiences of time through the assumptions of the dominant temporal logic outlined above. In outlining the logic of ‘porous time’ we aim to provide a vocabulary for expanding the discussion and research about how temporal logics interweave throughout American life.

### *Time is spectral*

Our data reveal that not every temporal experience is easily articulated, planned for, measurable or able to be rendered into a schedule. We call these temporal experiences *spectral time*, to capture how time trails or ghosts in ways that cannot always be expected, planned, or accounted for. Spectral time references moments that do not lend themselves to scheduling (i.e. chunking), either because the act seems too mundane to justify articulation (i.e., getting dressed), because it is difficult to assess (i.e., travel time) or simply because it cannot be anticipated (i.e., creative phases). In alignment with Reddy and Dourish’s concept of temporal trajectory [45], spectral time suggests that temporal experience is more than a grid of accountable blocks; multiple temporalities create flows that often defy both logical rendering and seamless manipulation.

We see an example of how spectral time relates to gridded time in the excerpt from the schedule left by Olivia, a mother of two and small business owner, for her daughter’s caregivers when she took a weeklong trip (Table 1).

|                        | Wednesday   |
|------------------------|---|
| <b>Father AM</b>       | Drop Tessa off at school & then Opal & Nora before 8:45am for late start, or coordinate with Neighbor for her to drop older girls |
| <b>Father PM</b>       | Pickup Tessa from swim at 7pm   |
| <b>Grand-father AM</b> | Pick up Nora & Opal from School at 1:55pm and drop them both off at our house.  |
| <b>Grand-father PM</b> | Take Opal to Swimming at 4pm & come back to our house   |
| <b>Grand-father PM</b> | Drop off Tessa at Mathnasium at 4:45pm. Make sure Tessa takes all swimming stuff with her in the car.                             |
| <b>Grand-father PM</b> | Pick up Tessa from Mathnasium at 5:45pm & drop off at swimming by 6:00pm. Wait for Opal and pick her up from swimming at 6pm.     |
| <b>Neighbor PM</b>     | Pick up Ishan and Tessa from school at 1:15pm & 1:30pm and take them to Art Class from 2-4pm.                                     |

**Table 1. Excerpt from caregiver’s spreadsheet**

Olivia’s attempts to articulate the requisite temporal coordination provides a gridded view of how she imagines the week will proceed. Yet tightly fitted as it is, this schedule does not reflect how Olivia would actually navigate these activities as observed during fieldwork. Picking her daughter up from school at 1:55pm actually means leaving the house at 1:43pm. The time between Mathnasium and swimming can vary up to 6 minutes

depending on streetlights. It is also not uncommon for Olivia to pull over to the side of the road to scribble notes during a work-related call while performing these activities.

Although the grid tried to align everyone to regularized temporal patterns, it could not reflect the temporal reality of the week, which included many fits and starts and much waiting. The spectrality of time, whether experienced by a habituated parent like Olivia or a neighbor filling in on childcare duty, shines through in the details and impromptu workarounds that pad every cell of this temporal grid.

We find another example of the spectrality of time in our fieldwork with PCT thru-hikers. Like many other hikers, Seth created an Excel spreadsheet to serve as a mailing plan for his mom who would be sending him resupply packages. Knowing that his predictions would be imperfect, before beginning his hike, he showed her how to tweak the digital version of the schedule as he hiked. He used a spreadsheet to link together the dependencies of each event such that the time of the hike could expand or contract in response to what happened in reality. In contrast, Seth gave a paper copy of his schedule to his girlfriend, whom he planned to meet a few months into his hike. This printed copy was not only inflexible, but approximate:

*I just dropped in averages. I didn't know how far [I would actually hike]. ... It wasn't figuring in off days and that kind of stuff. So, when [my girlfriend] saw, 'Okay, he should be here then.' It was like 'No no no no no!'*

Like an optimistic Outlook user who schedules back-to-back meetings with no room for running long, Seth's original plan proved unrealistic and the un-walked miles started to accumulate in the way that items on a to-do list accrue toward the end of a day or week. The spectrality of time asserted itself as Seth's pace aligned to a different rhythm than his original schedule. Notably, this lack of predictability had large social, rather than individual, implications—a finding that strongly echoes prior CSCW research [1, 4, 13, 15, 20, 22, 34, 35, 36, 38, 45, 46, 59].

#### *Time is a mosaic*

In contradiction to the assumption that time is allocated for a single purpose, our fieldwork reveals that people occupy time less as a discrete whole and more as a mosaic of interactions each tied to roles, identities, and social spheres. By *mosaic*, we mean that time is often simultaneously inhabited by multiple types of interaction that are forced to form a coherent whole. Unlike concepts like *multi-tasking* (doing multiple tasks 'at once') or *polychronicity* (a reported preference for doing multiple tasks at once) [44], mosaic time refers to the negotiated merging of multiple social spheres into a layered or fitted set of simultaneous interactions. Successful inhabitation of mosaic time occurs, if at all, when these multiple pieces of temporal life appear coherent, like a mosaic.

Mosaic time questions the assumption that time can or should be accorded a singular purpose. For example, does

being with family eating dinner equal 'family time' when the mother is checking work-related email under the table? Is going for a run with a smart phone considered 'me time' when one's wife is concurrently texting with a shopping list? As we find repeatedly in our data, a multiplicity of identities and activities inhabit any individual time chunk.

Fiona, the wife of a senior consultant and mother of three young children, provides one example of this mosaic aspect of time. She expresses frustration when her husband invites a partner in his firm, visiting from out of town, for a last minute dinner:

*Fiona is half-laughing, describing the dinner as a "disaster." She says something like, "I'm sure we horrified him. The kids were being their usual crazy selves and David was trying to have adult conversation with the Partner and I was like, are you serious?" According to Fiona the kids were tired and having a rough night. Melody broke down and Brandon was throwing food. She, "just wanted to scream" at David and say something like, "Can't you just be a dad?"*

This is mosaic time at its most obvious—when the boundaries and borders between activities are highly evident. With effort, this family manages to mash together identities, social worlds, temporal rhythms, etc., and to experience them, at least somewhat, as a temporal whole.

We also observed a more seamless mosaic, where tasks, worlds and identities seemed more integrated; tiles of the picture less obvious. Chad moves in and out of his role as father of two and the demands of being a corporate executive with apparent ease – merging worlds and identities rather holistically. When one of his daughters suggested playing the board game *Clue* on a Sunday afternoon, we all (mother, father, older daughter, younger daughter, and ethnographer) gathered around the board, moving our pawns, bantering, and deducting the details of the murder. Between each round of the game, when others were clearing the pieces and rearranging the cards, Chad typed on his iPhone until it became clear that it was time to begin the next game. Chad was able to keep track of the progress of the game and merge his work into this scene harmoniously. No one around him appeared to be frustrated and Chad was actively engaged with his family. When asked later what he was doing, Chad listed various substantive emails that he wrote during this time. In his words, it was "real work."

Thinking about time as mosaic raises numerous questions about: when the mosaic is and is not obvious; what forms of interaction (or tiles) are given priority in any one moment; what skills are needed to engage in mosaic time with more or less effort; and what the effects of mosaic time are on concentration, stress, and affect. Mosaic time appears most successful when people engage in attention switching in order to enact multiple social roles at once. Yet, it is not without its moments of charged, circumstantial dynamics – priorities, power relations, and complex 'choices' are key parts of when and how people experience mosaic time.

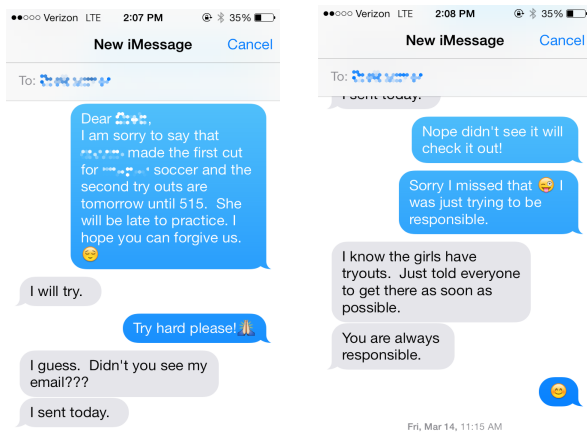
### *Time is rhythmic*

In contrast to the assumption of time as linear, with ordered chunks progressing in a straightforward manner, people often negotiate time rhythmically, arranging time in patterns and tempos that do not always co-exist harmoniously. In line with earlier CSCW findings [e.g., 4, 9, 45, 46], we term this *rhythmic time*, which acknowledges both the rhythmic nature of temporal experience as well as a potential disorderliness or ‘dissonance’ when temporal rhythms conflict. Like mosaic time, bringing dissonant rhythms into semi-alignment requires adaptation, work, and patience.

For example, Lisa attempts to navigate the multiple sports teams and activities that her three children are engaged in. Snorting with laughter at an incoming text message (see Figure 1), she explains to the researcher,

*Danielle has soccer tryouts for school next week and it is going to go into her club soccer practice so I'm writing the coach to warn him. And I'm totally kissing his ass. Because last time this happened he was an ass about it. Yeah, he took it out on Danielle and there's nothing these girls can do about it.*

Rhythmic temporal dissonance in Lisa's life forces her to think ahead about misalignments in schedules and undertake the social work of mollifying egos to help her children navigate the overlap between activities.



**Figure 1. SMS exchange between mom and soccer coach**

We also see dissonance in a more protracted timeframe. Nancy, a single mother of two and director for a hotel management firm, finds herself stressed, overwhelmed, and with a chronic headache every fall. Starting in August her company engages in an intensive budgeting process that requires extra time and attention. This is the same time of the year that her son starts a new grade in school. His annual transition to a new teacher and classroom environment, as demanded by the calendaring and grade-level-based organization of the education system, is anxiety producing for both of them. This autumnal rhythm of stress and emotional and physical exhaustion is what Nancy experiences rather than contemporaneous chunks of

intensified tasks at work and at home. Moreover, the tempo of budgeting is sped up during this period, and the pattern of school-day normalcy is slowed down as her son adjusts to his new surroundings. Nancy succeeds in making these dissonant rhythms livable by persistent accommodation, and by telling herself everything will balance out come January when the budget is complete and her son is more adjusted.

### *Time is obligated*

Finally, our data reveal how much we exist in social worlds – professional, personal, family, etc. – in which time is experienced in relation to others. This social state *obligates* individuals to navigate a temporal web of moral and professional expectations, and accountabilities to others. These temporal obligations affect temporal agency. Obligations emerge from numerous origins: workplace policy might delineate proper response times for emails and people feel normative pressure to ‘be there’ for colleagues, to push forward the work and to show themselves as dedicated and responsible colleagues; parents express an unqualified obligation to be available to their children; and people often assume certain friends ‘deserve’ their time in ways that perpetuate trust and gratitude. A close look at the ways that people continually navigate the expectations and rhythms of those around them reveals how much the rhetoric of time management and control, built on the assumption that one is a solo temporal agent, is a fiction. To be considered a success in various social arenas (either via internal assessment or external validation) means that individuals often cannot choose whether or not to attend to certain temporal obligations.

These social arenas have evident hierarchies. This is particularly vivid in the case of Matt, a corporate attorney, who describes how his elite position in the firm (partner) does not excuse him from a sense of needing to be available to those structurally below him,

*Where I sit now, there are many kind of pyramids. And I'm at the top of each pyramid. So, people, they're not going to make a move without checking with you. So, you become, whether you like it or not, a kind of a bottleneck in the process. So, this [holds up his smartphone] is a way to clear the bottleneck.*

Matt's words reveal how social roles and information and communication technologies are often tightly coupled. Tools like smartphones appear to appease the pressures of social obligation, but at the same time they also perpetuate new expectations of availability. This paradox is evident in the case of George, a private criminal defense attorney, who believes that by being available to work via his iPhone every Wednesday afternoon, he can come home early to spend time with his son, often attending a Little League baseball game. Yet, the promise of social control afforded by information and communication technologies belies the inadequacy of the dominant temporal logic. The possibility of working remotely, of taking the office to the baseball game, becomes an obligation to take advantage of the



technology for his family's benefit. Yet, George cannot control when his clients call; their positions within the US legal system demand immediate attention. Thus, he cannot inhabit his time at his son's baseball game with singular purpose. He is simultaneously obligated to his family and his clients; he must enact time's porousness in each of his actions – an incredibly difficult challenge. Both George and his wife express frustration at not being able to focus on their child's game because they are receiving emails and phone calls. Yet, they also value the mobility that they credit with making it possible for him to even attend the game at all. Each of these moments of obligation invokes questions of power, economies of attention, time valuation, and the invisible work that goes into managing obligated time alongside spectral trails, dissonant rhythms, and time's mosaic qualities.

Taken together, an orientation to time as *spectral, mosaic, rhythmic (dissonant)*, and *obligated* suggests a possible alternate understanding of what time is and how it can work. An initial typology of porous time honors the fluidity of time and its unexpected shifts; it also acknowledges novel integrations of time in everyday practice. Addressing these alternate temporal realities allows us to build on CSCW's legacy of related research to question the reach and scope of the dominant temporal logic. Our rendering of porous time imagines a new perspective on time, in which the dominant temporal logic expands beyond ideals of control and mastery to include navigation (with or without conscious attention) of that which cannot be gridded or managed: the temporal trails, multiple interests, misaligned rhythms and expectations of others.

## DISCUSSION

In the spirit of Wajcman's call for theorists of temporality to incorporate long-standing STS theorizations of "the technical as part of the constitution of the social" [62], this paper presents a vocabulary to re-inspire the discussion of time in CSCW. Comparing the logic of temporal circumscription with the experiences of daily temporal struggles surfaces a nascent set of alternate—*porous*—ways of orienting to time that are *spectral, mosaic, rhythmic (dissonant)*, and *obligated*. Like a pool spilling out and absorbing into concrete, the logic of porous time avers that lived time contains unpredictable directions, patterns, integrations, and negotiations that seep out beyond gridded boundaries to create an unstable temporal landscape.

The idea of porous time acknowledges the inadequacy of a temporal logic centered on 'managing' time and suggests an expansion of the dominant temporal logic to include more improvisational and fluid relationships to time. Such a reframing provokes us to reassess what 'normative' engagements with time should or could look like. It creates a space to reimagine these 'successful' temporal practices.

### Temporal Experience, Success and Power

Interrogating the temporal logic of circumscribed time raises three related sociotemporal concerns particularly

relevant to CSCW: *lived experience, visions of success, and power relations*. We address each concern in relation to key theoretical works to show how the insights presented here both point to the limitations of the dominant temporal logic of circumscribed time and demand expanding this logic to include those orientations suggested by porous time.

#### *Lived Experience: The Disparity of Time*

The temporal logic of circumscribed time portends that temporal units are neutral. This resource-based view orients time as a set of equal units that can be regulated and managed, reflecting the earliest use of the clock in Benedictine monasteries. Well entrenched in American society [15, 52, 65], this logic begets calendaring tools representing all the days in a month – or hours in a day – in a visually similar way: a regular grid. The apparent equivalency of these time chunks mask the affective experiences and emotional intensities of lived temporality – that practicing yoga at 6:30pm is a different subjective experience than at 7:00am. It perpetuates guilt and frustration in those who find themselves unable to live up to the expectations of time management and control implicit in circumscribed time [26].

In addition to these moral and political concerns, the disconnect between lived experience and tools for coordination is particularly salient for CSCW. For example, as readers of this paper are likely familiar, some people prefer to write in the mornings, and others in the evenings. When co-authoring a paper, taking such rhythms into account can be a critical aspect of a successful collaboration. When creating tools for scheduling and coordination, it is crucial to provide ways for people to take into account not just the multiplicity of (potentially dissonant) *rhythms* [22, 46], but also the differential affective experiences of time rendered by such rhythms.

In the context of collaboration, we are reminded that temporal units also differ along a dimension of *obligation*. An hour of work at 7am might set up another person's work at 8am. Dragging that hour of work down through the day and rescheduling it for 7pm is not the autonomous task that appears on a calendar screen. In many ways, one 'chunk' of time is not equivalent to any other 'chunk.'

#### *Visions of Success: Balance, Busyness, & Temporal Control*

The temporal logic of circumscribed time tacitly defines a 'good' day as a 'full' day – a day in which there are no unchecked boxes and no empty slots in the calendar. This valuation underscores both a sense of success (getting it all done) and a sense of identity (busyness is perceived as 'good' [26]); both of which harken back to the virtuosity of industriousness espoused by the Protestant Work Ethic [52, 64, 66]. Leshed and Sengers's research reminds us that calendars are not just tools for the management of time, but are also sites of identity work where people can project to themselves and others the density of their days and apparent 'success' at doing it all [26]. These seemingly innocuous artifacts can thus perpetuate deeper normative logics about

busyness and productivity that compete directly with values of presence, focus, or prioritizing leisure time.

A social vision of success influenced by these Protestant tenets is well aligned with the idea of achieving ‘balance’ by adding more (and more) to each side of an imaginary scale. The Yoga Quest protagonist schedules a business meeting directly after an oil change, with no time to change clothes or drive between locations. How efficient! How virtuous! In reality, we encounter a much messier scene. Time trails in *spectral* ways and the innumerable tasks and activities that ‘get in the way’ of perfect efficiency often leave people feeling constantly bereft of time and failing at any attempt at mastery.

The goal of balance implicitly suggests that individuals can allocate chunks of time to a single purpose, add them, and compare them. However, our research participants describe Saturday mornings as ‘personal time’ even as they read work emails or review documents in advance of a Monday meeting. How do we understand such *mosaic* time in terms of striving for balance? Temporal units are rarely single-purpose and their boundaries and dependencies are often implicit. What sociotemporal values should we be honoring? How can we account for time that fits on neither side of a scale? How might scholarship rethink balance or efficiency with different forms of accounting, with attention to institutions as well as individuals?

#### *Temporality, Values, and Power*

Finally we draw our attention to the ways that temporality is inherently political and power-laden at interpersonal and societal levels.

Our fieldwork examples draw into relief the ways that people’s relationships to time are differential, especially in the context of dissonant temporal *rhythms*. Our participant, Nancy, has no choice but to accommodate other aspects of her life to the institutional requirements of budgeting season. Her time is that which must flex to accommodate the temporal demands of the workplace. Far from being individually controlled, her time is multiply *obligated* – tethered to her children, her co-workers, her subordinates, her superiors, her friends, and her family.

As Sharma describes temporality, it is “uncompromisingly tethered and collective” [51]. In our observations of parent-workers trying to negotiate such multiple social roles, questions of power and value often rise to the surface, not only in negotiations of obligation, but in related negotiations of *single-purpose* versus *mosaic* time as well. People are constantly faced with choices about where to ‘spend’ their time, with who, and how much attention they should direct to an interpersonal interaction, business meeting, or family dinner. Each of these choices reflect power dynamics and conflicting tensions. Desires for ‘presence’ or singular focus often conflict with obligations to be responsive and integrate ‘work’ and ‘life’ [21].

A focus on temporality also calls to the fore theoretical work on the relation between temporal regulation and the development of industrial capitalism [64]. Scholars have long argued that the regularity and mastery of time is a necessary condition for capitalism, because it requires a mechanism for exchanging labor for a wage. This conceptual premise has reified and institutionalized a functional understanding of time as chunkable, single purpose, linear, and ownable. The valuation of busyness or density of time use corresponds directly to a system that thrives on continuous effort and perpetually unsatisfied need. Recent scholarship on time and structures of power have emphasized the political and moral implications of such a temporal logic [51, 63]. We, too, call for continued work to build an understanding of “how differential relationships to time organize and perpetuate inequalities” [51:137]. What would it look like to more explicitly acknowledge power dynamics in information and communication technologies? In the tradition of critical and reflective design [50], how might CSCW scholarship think about designing technologies that ‘protect’ users from temporal obligations and render messiness and disorganization a possible way of engaging with time?

#### **Inspiration for Change**

By making the dimensions of circumscribed and porous temporal logics explicit and visible, we hope to inspire the CSCW community to embrace new ways of thinking about, orienting to, and designing for (and with) time. By introducing the concept of temporal logic and teasing apart the limitations of the dominant logic, we provide a generative framework and vocabulary that invites future discussion, scholarship, and elaboration on the fundamental concept of time. In moving forward, we recognize that additional conceptions of time and/or temporal practices exist and we assume that other temporal logics will surface as scholars continue to examine and debate the ways that people orient to time in the context of institutions, organizations, families, social circles, and daily life. We hope that future work continues to make visible the power of temporal logics in shaping our most basic orientations to daily activity and perpetuate new ideas about how to navigate, rather than control the unpredictability of life.

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## REFERENCES

- [1] Bardram, J. Temporal Coordination: On Time and Coordination of Collaborative Activities at a Surgical Department. *Computer Supported Cooperative Work*, (9) 157-187, 2000.
- [2] Bardzell, J., Bardzell, S., DiSalvo, C., Gaver, W. and Sengers, P. *The humanities and/in HCI*. City, 2012.
- [3] Bauer, J. S., Consolvo, S., Greenstein, B., Schooler, J., Wu, E., Watson, N. F. and Kientz, J. ShutEye: encouraging awareness of healthy sleep recommendations with a mobile, peripheral display. In *Proceedings of the SIGCHI*, 2012.
- [4] Begole, J. B., Tang, J. C., Smith, R. B. and Yankelovich, N. *Work Rhythms: Analyzing Visualizations of Awareness Histories of Distributed Groups*. City, 2002.
- [5] Berger, P. L. and Luckman, T. *The Social Construction of Reality: A treatise in the sociology of knowledge*. Anchor Books, New York, NY, 1966.
- [6] Besharov, M. L. and Smith, W. K. Multiple institutional logics in organizations: Explaining their varied nature and implications. *Academy of Management Review* (In press).
- [7] Bizzi, J. and Tanenbaum, J. *Well Read: Applying Close Reading Techniques to Gameplay Experiences*. ETC Press, City, 2011.
- [8] Bowker, G. C. *Science on the run: Information management and industrial geophysics at schlumberger: 1920-1940*. MIT Press Cambridge, MA, 1994.
- [9] Brdiczka, O., Su, N. M. and Begole, B. Using Temporal Patterns (T-patterns) to Derive Stress Factors of Routine Tasks. *CHI Extended Abstracts*, 2009.
- [10] Charmaz, K. *Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis*. Sage, London, 2006.
- [11] Egger, E., Wagner, I. TIME-MANAGEMENT: A Case for CSCW. *CSCW Proceedings*, 249-256, 1992.
- [12] Edwards, K., Mynatt, E. Timewarp: Techniques for Autonomous Collaboration, *Proceedings of CHI*, 1997.
- [13] Fisher, D. and Dourish, P. *Social and Temporal Structures in Everyday Collaboration*. *Proceedings of CHI*, 551-558, 2004.
- [14] Gonzalez, V. M. and Mark, G. *Constant, Constant, Multi-tasking Craziness: Managing Multiple Working Spheres*. *Proceedings of CHI*, 113-120, 2004.
- [15] Gonzalez, V. M. and Mark, G. *Managing currents of work: multi-tasking among multiple collaborations*. Springer-Verlag New York, Inc., City, 2005.
- [16] Gregg, M. *Work's Intimacy*. Polity, Malden, MA, 2011.
- [17] Gregg, M. *Presence Bleed: Performing Professionalism Online*. In Mark Banks, Rosalind Gill and Stephanie Taylor (eds) *Theorizing Cultural Work: Labour, Continuity and Change in the Creative Industries*. Routledge, City, 2013.
- [18] Gregg, Melissa. Getting Things Done: Productivity, self-management and the order of things in *Networked Affect*, Ken Hillis, Susanna Paasonen and Michael Petit (eds) Cambridge: MIT Press, forthcoming 2014.
- [19] Grudin, J. A Case Study of Calendar Use in an Organization, *SIGOIS Bulletin*, Vol. 17, No 3., 49-51, 1996.
- [20] Grudin, J., Palen, L. Emerging Groupware Successes in Major Corporations: Studies of Adoption and Adaptation. In *Proceedings of WWCA*, 1997.
- [21] Harmon, E. and Mazmanian, M. Stories of the Smartphone in Everyday Discourse: Conflict, Tension & Instability. In *Proceedings of CHI*, 2013.
- [22] Jackson, S. J., Ribes, D., Buyuktur, A. G. and Bowker, G. C. Collaborative Rhythm: Temporal Dissonance and Alignment in Collaborative Scientific Work. *Proceedings of CSCW*, 2011.
- [23] Knouf, N. A. HCI for the real world. *Extended Abstracts CHI*, 2009.
- [24] Lee, H. Your time and my time: a temporal approach to groupware calendar systems. *Information & Management*, 40, 159-164, 2003.
- [25] Lee, H., Sawyer, S. Conceptualizing time, space and computing for work and organizing. *Time and Society*, 19(3), 293-217, 2010.
- [26] Leshed, G. and Sengers, P. "I Lie to Myself that I Have Freedom in My Own Schedule": *Productivity Tools and Experiences of Busyness*. ACM, City, 2011.
- [27] Lounsbury, M. A tale of two cities: Competing logics and practice variation in the professionalizing of mutual funds. *Academy of Management Journal*, 50(3), 289-307, 2007.
- [28] Mark, G., Iqbal, S. T., Czerwinski, M. and Johns, P. *Bored Mondays and Focused Afternoons: The Rhythm of Attention and Online Activity in the Workplace*. City, 2014.
- [29] Mark, G., Volda, S. and Cardello, A. "A Pace Not Dictated by Electrons": An Empirical Study of Work Without Email. In *Proceedings of CHI* (2012).
- [30] Marcus, G. E. Ethnography in/of the world system: The emergence of multi-sited ethnography. *Annual Review of Anthropology*, 24, 95-117, 1995.
- [31] Mazmanian, M. Avoiding the trap of constant connectivity: When congruent frames allow for heterogeneous practices. *Academy of Management Journal*, 56(5), 1225-1250, 2013.
- [32] Mazmanian, M. and Erickson, I. The Product of Availability: Understanding the Economic Underpinnings of Constant Connectivity. In *Proceedings of CHI* (2014).
- [33] Mynatt, E., Trullio, J. Inferring Calendar Event Attendance. *Proceedings of IUI '01*, 121-128, 2001.
- [34] Neustaedter, C., Brush, A.J.B., Greenberg, S. The Calendar is Crucial: Coordination and Awareness through

- the Family Calendar. *ACM Transactions on Computer-Human Interaction*, 16(1), 2009.
- [35] Neustaedter, C., Brush, A.J.B. "LINC-ing" the Family: The Participatory Design of an Inkable Family Calendar. *Proceedings of CHI' 2006*, 141-150, 2006.
- [36] Nilsson, M. and Hertzum, M. Negotiated rhythms of mobile work: time, place, and work schedules. *GROUP*, 2005.
- [37] Nowotny, H. *Time: The Modern and Postmodern Experience*. Polity Press, 1994.
- [38] Palen, L. Social, Individual and Technological Issues for Groupware Calendar Systems, *Proceedings of CHI*, 17-24, 1999.
- [39] Palen, L. a. G., J. *Discretionary Adoption of Group Support Software: Lessons from Calendar Applications. in Implementing collaboration technologies in industry*. City, 2003.
- [40] Perry, M., O'Hara, K., Sellen, A., Brown, B., & Harper, R. Dealing with Mobility: Understanding Access Anytime, Anywhere. *ACM Trans. Computer-Human Interaction*, 8(4), 323-347, 2001.
- [41] Perlow, L. Boundary Control: The Social Ordering of Work and Family Time in a High-Tech Corporation. *Administrative Science Quarterly*, 43(2), 328-357, 1998.
- [42] Perlow, L. The Time Famine: Toward a Sociology of Work Time. *Administrative Science Quarterly*, 44 (57), 57-81, 1999.
- [43] Pine, K. and Mazmanian, M. Institutional Logics of the EMR and the Problem of 'Perfect' but Inaccurate Accounts. In *Proceedings of CSCW*, 2014.
- [44] Poposki, E. M. and Oswald, F. L. The Multitasking Preference Inventory: Toward an Improved Measure of Individual Differences in Polychronicity. *Human Performance*, 23, 247-264, 2010.
- [45] Reddy, M., Dourish, P. A Finger on the Pulse: Temporal Rhythms and Information Seeking in Medical Work. *Proceedings of CSCW*, 344-353, 2002.
- [46] Reddy, M. C., Dourish, P. and Pratt, W. Temporality in Medical Work: Time also Matters. *Proceedings of CSCW*, 15, 29-53, 2006.
- [47] Rouncefield, M. Hughes, J., Rodden, T., Viller, S. Working With "Constant Interruption": CSCW and the Small Office. *CSCW Proceedings*, 275-286, 1994.
- [48] Scott, W. R. *Institutions and Organizations: Ideas, Interests, and Identities*, Thousand Oaks, CA: Sage Publications, 2014.
- [49] Sengers, P. A Moral Order of Time. *Intel Science & Technology Center for Social Computing: All Hands Meeting* (Atlanta, Georgia, 2014).
- [50] Sengers, P., McCarthy, J. and Dourish, P. Reflective HCI: articulating an agenda for critical practice. In *Proceedings of the CHI: Extended Abstracts* (2006).
- [51] Sharma, S. *In the Meantime: Temporality and Cultural Politics*. Duke University Press, Durham, NC, 2014.
- [52] Snyder, B. H. From Vigilance to Busyness: A Neo-Weberian Approach to Clock Time. *Sociological Theory*, 31(3), 243-266, 2013.
- [53] Steinhardt, S. and Jackson, S. Reconciling Rhythms; Plans and Temporal Alignment in Collaborative Scientific Work. In *Proceedings of the CSCW*, 2014.
- [54] Strauss, A. and Corbin, J. M. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. Sage Publications Inc., 1998.
- [55] Su, N. M. S. *Street Fighter IV: braggadocio off and on-line*. City, 2010.
- [56] Thompson, E. P. Time, Work-Discipline, and Industrial Capitalism. *Past and Present*, 38 (December, 1967), 56-97.
- [57] Thornton, P. H., Ocasio, W. and Lounsbury, M. *The institutional logics perspective: A new approach to culture, structure, and process*. Oxford University Press, 2012.
- [58] Tomitsch, M., Grechenig, T., Wascher, P. Personal and Private Calendar Interfaces support Private Patterns: Diaries, Relations, Emotional Expressions. *NordiCHI 2006*, 401-404.
- [59] Tullio, J., Goecks, J., Mynatt, E., Nguyen, D. Augmenting Shared Personal Calendars. *UIST'02 Proceedings*, 4(2), 11-20, 2002.
- [60] Volda, A., Dombrowski, L., Hayes, G. R. and Mazmanian, M. Shared Values/Conflicting Logics: Working Around E-Government Systems. In *Proceedings of CHI*, 2014.
- [61] Volda, A., Olson, J. S. and Olson, G. M. Turbulence in the Clouds: Challenges of Cloud-Based Information Work. In *Proceedings of CHI*, 2013.
- [62] Wajcman, J. Life in the fast lane? Towards a sociology of technology and time *The British Journal of Sociology*, 59(1), 59-77, 2008.
- [63] Wajcman, J., Rose, E. Constant Connectivity: Rethinking Interruptions at Work. *Organization Studies*, (32) 941-961, 2011.
- [64] Weeks, K. *The Problem with Work: Feminism, Marxism, Antiwork Politics, and Postwork Imaginaries*. Duke University Press, 2011.
- [65] Weber, M. *The Protestant Ethic and the Spirit of Capitalism*. Routledge Classics, 1930 (2001).
- [66] *Yoga Quest: Microsoft Outlook 2010*. <https://www.youtube.com/watch?v=HFD-agsuBAI>.
- [67] Zerubavel, E. The Benedictine Ethic and the Modern Spirit of Scheduling: on Schedules and Social Organization. *Sociological Inquiry*, 50(2), 157-169, 1980.
- [68] Zerubavel, E. The Standardization of Time: A Sociohistorical Perspective. *The American Journal of Sociology*, 88(1), 1-23, 1982.

