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The familiar folk saying, "Measure twice, cut once," with origins in carpentry design certainly indicates that the issue of measurement is central to good design work. The equally important—if implicit—wisdom to which it points is that it takes more time, or a careful pace of action, to do so properly. To develop our central arguments about the temporality of communication design, we first describe how the consideration of varying time scales offers great utility in the communication design enterprise and elaborate on the designable features of temporality for human interaction. Next, we draw on Ballard's typology of work-based activity cycles to offer some temporally based design principles for the design of work. We then apply these insights to various work activities that unfold at various time scales and illustrate how concern with temporality (rather than only time) may lead to a redesign of communication. In the conclusion, we attend to an underlying issue implicated throughout the preceding discussion: the pace at which the designer proceeds.

Keywords: Time Scale; Temporality; Design; Communication

The concept of design is playing a key part in an ever-broader sphere (Latour, 2008), and more people who are not professionally identified as designers are actively designing new systems and practices (Brown, 2009). Latour (2008) argues that the more matters of fact are turned into matters of concern, the more they are rendered into objects of design. In particular, the field and practice of design have grown substantially in the last few decades in two areas: comprehension (more areas are formally "coming under the umbrella of design") and extension (design is being applied to "ever larger assemblages of production"). In our field, Aakhus and Jackson

Dawna I. Ballard is Associate Professor and Thomas McVey is a doctoral candidate in the Department of Communication Studies at the University of Texas at Austin. The authors thank Mark Aakhus and Sally Jackson for their helpful suggestions. Correspondence to: Dawna I. Ballard, Department of Communication Studies, University of Texas at Austin, Austin, TX, USA. Email: dballard@austin.utexas.edu

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(2005) have contributed to this growth in design, in part, through articulating starting points for a communication design enterprise. Defined as "an activity of transforming something given into something preferred through intervention and invention" (Aakhus, 2007, p. 112), our design objective here is to explore a communication intervention—i.e., a temporal approach—which can offer a new look at existing understandings of a problem.

Our interest centers on a common concern for organizational and group communication scholars, the design of work. Following the familiar folk saying to, "Measure twice, cut once," we argue that engaging in effective communication design begins with the thoughtful—sometimes iterative—(temporal) measurement of communication processes in advance of selecting an appropriate invention or intervention. While the adage has its origins in carpentry design, the issue of measurement is central to design more broadly, as it suggests that considering different ways to "size up" one's object of design has important consequences. In the design of work, the presumption that measurement matters leads to exploring how various *time scales* or "the size of the temporal intervals, whether subjective or objective, used to build or test theory about a process, pattern, phenomenon, or event," (Zaheer, Albert, & Zaheer, 1999, p. 725) may capture (or fail to capture) relevant group and organizational communication processes.

Notably, we illustrate the particular problem of time scale through examining how work can be designed (and communication redesigned) through a focus on temporality and offer a communication tool (Aakhus, 2007) for doing so.

We readily acknowledge that the more limited notion of "time" in job design has, of course, given rise to many popular approaches, including Taylorism, Fordism, and Six Sigma to name a few. Our interest, however, is on the "temporality" of work: while time refers to discrete, quantifiable, and independent moments (typically seen as resources for some social or material end) that point toward an activity, in contrast, temporality references the activity itself along with the process, change, and emergence which accompany it (Fraser, 1992). As Bennett (2000) succinctly states, "Time is a framework we impose that captures succession, change or evolution. Temporality is the actual activity or process of succession and change" (p. 157). Thus, rather than a more limited, context-free notion of *job* design— i.e., how time is used toward some end—we are interested in advancing a temporally sensitive approach to the broader process of *work* design—which centers on work activities and extends to the social and organizational contexts which shape and are shaped by those activities.

Below, we describe how the consideration of varying time scales offers great utility in the communication design enterprise and elaborate on the designable features of temporality for human interaction. Next, we draw on Ballard's (2009) typology of work-based activity cycles to offer some temporally based design principles for the design of work. We then apply these insights to various work activities that unfold at various time scales and illustrate how concern with temporality (rather than only time) may lead to a redesign of communication. In the conclusion, we attend to an underlying issue implicated throughout the preceding discussion: the pace at which the designer proceeds.

Measure Twice: The Designable Features of Time

We can begin to discern the designable features of time that matter for communication vis-à-vis certain temporal language and discourse: consider the multiple possible construals of the term "now." Although it typically goes unexamined, this term presumes a given length of the temporal interval (i.e., "now"). This concept of multiple "nows"—and especially that temporality is a feature of interaction that can be designed to produce particular forms of communication—is central to the mission of the Long Now Foundation.

Brian Eno, a musician and member of the Board of Directors for the Long Now Foundation, tells the story about how the organization was named. It was borne of his frustration upon moving to New York City and finding that whenever he queried others about the projects with which they were engaged, the answers were inevitably centered on that very day or week. He was interested in their larger concerns and questions beyond that week or month, and he wanted to talk about "now" in much more expansive ways. He wanted to interact around artists' vision and career trajectories, and that opportunity was lost when considering only events within the time scale of a week or less. Thus, Brian Eno and his colleagues created the "long now" to rhetorically direct the conversation toward a longer time scale, allowing others to better understand their interests as well as inviting them to engage at that temporal interval.

Bluedorn (2002) also writes about the different perspectives of "now":

> On the stock exchange it's today, on the Net it's a month, in fashion it's a season, in demographics a decade, in most companies it's the next quarter … For most of us most of the time … "now" consists of this week … This is the realm of immediate responsibility, one in which we feel we have volition, where the consequences of our actions are obvious and surprises limited. The weekend is a convenient boundary. (p. 112)

The week (marked by the span of time from one weekend to the next) is an example of a given time scale that facilitates some types of interaction and constrains others. Depending upon the particular goal(s) one has in mind, this may be exactly the temporal interval needed for the desired interaction to unfold. In other cases, opportunities will be missed because this interval is too small to allow time for the type of interaction needed or, alternatively, too expansive to properly focus interactants. An historical example regarding stakeholders' concern with a time scale that seemed drawn too widely occurred during World War II when Winston Churchill was criticized for having a preoccupation with British history. He responded: "The longer we look back, the further we can look forward." So while Churchill was confident about the relevant temporal interval, this can be a hotly contested issue by other stakeholders with different short or long-term goals. Thus, the matter of choosing a proper time scale involves attention to a number of related factors as captured in Ballard's (2009) typology of activity cycles, elaborated below.

Cut Once: Drawing on Design Principles

Ballard's (2009) typology of activity cycles allows communication researchers to consider the multiple and overlapping "nows," or activity cycles, within which organizational members find themselves engaged—from very brief activities with little task variability to deeply extended activities that may be inherently unknowable. Ballard (2009) utilizes a vocabulary developed by Monge and Kalman (1996) that centers around metaphorical windows and frames used to depict temporal aspects of the communication process. Because shifting perspectives, or time scales, in the typology literally opens (or closes) a window into different aspects of communication and temporality, it is an ideal tool for engaging the communication design enterprise.

In order to illustrate the various aspects of this typology, we offer a running example throughout this section: consider a large global technology company preparing to develop and release the next version of a piece of software. Various assumptions about the temporal interval which encompasses this activity—an effort that involves organizational members across multiple time zones and continents—will influence how organizational members enact it and how related stakeholders construe it.

For instance, assumptions about the beginning and end of this process, as well as an understanding of the smaller cyclical patterns that will occur in the longer expanse of time, will determine a number of subsequent decisions by team members. Individuals may make different day-to-day decisions about how long to separate themselves from distractions via email or social media, or maybe even pulling an all-nighter in anticipation of relief of the following day. The same temporal assumptions will shape how related stakeholders—like family members—construe team members' availability (perhaps, as scarce for family and social events for just one week or for the entire month or even quarter).

Decisions made at any of these levels, which presume a temporal interval that is either too short or too long, can lead to deleterious consequences including mistakes on the project, burnout for the team member, and frustration for any number of stakeholders. Thus, as the maxim warns, the implications of poor measurement in design can be costly. Instead, shifting regularly across windows that offer a view of different time scales permits more accuracy. The typology described next offers a vehicle to assist these shifts.

Viewing Communication through Activity Cycles

Activity cycles, the temporal "containers" of work processes, both reflect and facilitate members' entrainment with various temporal structures, or structures "created and used by people to give rhythm and form to their everyday work practices" (Orlikowski & Yates, 2002, p. 685). Entrainment is the process by which one cyclic process becomes disrupted by, and set to oscillate in tune with, another process. Group researchers have appropriated this construct to describe how particular sociotemporal patterns develop (Ancona & Chong, 1996; Kelly, Futoran,

& McGrath, 1990; Kelly & McGrath, 1985; McGrath & Kelly, 1992). The internal rhythms of individuals and group members can become collectively entrained, or synchronized, to powerful external pacers (temporal structures) altering the phase, periodicity, or magnitude of their endogenous rhythms. This rhythm, imparted by temporal structures, creates a dominant temporal ordering that exists as a compelling coordination mechanism in teams and organizations. Thus, temporal structures both enable and constrain members' behavior through the symbolic functions they serve, as well as through the ways in which they direct members' interaction patterns.

In the communication design enterprise, understanding the activity cycles within which organizational members find themselves is a key starting point for dialog. Further, understanding in which type of activity cycle the process—in this case, work—unfolds is another critical aspect.

Ballard (2009) notes at least three characteristics of activity cycles. First, activity cycles occur at multiple time scales, such as the workday, task timeline, and fiscal year (Ancona & Chong, 1996). Considering software development within a global technology company, examples of two time scales within which central activities occur are the workday and the fiscal year. At the time scale of a workday, a project manager based in the US Central time zone must organize communication between engineers based in the US Pacific time zone, testers based in Asia, and others. Not surprisingly, the workday activities of the project manager are driven by standardized time zones, a temporal structure drawn upon everyday in global commerce. (Ballard, 2007). The mornings for the project manager are relatively quiet periods used to catch up on email and assigned tasks. At 11 am Central, communication with California picks up and impromptu communication and scheduled cross-team meetings begin. Finally, after the US time zone workdays come to a close, testers in Asia start sending their current test results and project updates. A second relevant time scale in this scenario is the fiscal year planning cycle where decisions are made about which software development projects will be prioritized, funded, and staffed in the coming year.

The second characteristic of activity cycles is that organizational members are engaged at various points within multiple activity cycles at any given point in time. Our project manager example above typifies this idea. The project manager is perpetually shifting focus across time scales—from a day to a year and longer. The project manager works at the micro level as an interface design decision is made or a tactical fix is approved for an issue. Attention is also given to a larger level as the health of the whole project is assessed based on whether milestones are being met. Additionally, the macro level is attended to while participating in strategic planning that looks ahead up to three fiscal years in the future. This issue is underscored in Marks, Mathieu, and Zaccaro's (2001) temporally based framework and taxonomy of team processes. They assert that teams perform in temporal cycles of goal-directed activity called episodes, and that members are simultaneously engaged in multiple episodes. Input–process–output relationships also unfold over a series of related cycles, where the outcomes from initial episodes can be inputs for the next cycle. For example, in any software development enterprise, potential improvements and fixes are de-scoped from the plan throughout a project. This occurs often for many

reasons including the cost to develop, the time needed to implement, and the return on investment from making a change. Those items that are moved out of one project often roll into the next or a more general holding-place for future enhancements.

This second characteristic of activity cycles has corollaries to the various rhythms of life. In both the design of work and natural aspects of temporal design, regular attention to multiple time scales is required in order to create and maintain proper coordinative mechanisms. For instance, one's wellness over the lifespan depends upon meeting certain annual milestones (in terms of growth or health maintenance) that also depend upon activities (such as rest and nutrition) unfolding on a daily or hourly time scale. As well, neglect of activities at the weekly or monthly time scale risks longer time viability, as when lifestyle illnesses (e.g., atherosclerosis or type 2 diabetes) develop due to a sedentary lifestyle. We see the breakdown of these coordinative mechanisms across the various time scales when compromises at one time scale influence the outcomes at another.

The third characteristic is that various activity cycles signal different interaction genres (Orlikowski & Yates, 1994). Interaction genres are:

> socially recognized type(s) of communicative actions—such as memos, meetings, expense forms, training seminars—that are habitually enacted by members of a community to realize particular social purposes … A genre established within a particular community serves as an institutionalized template for social action—an organizing structure—that shapes the ongoing communicative actions of community members through their use of it. (Orlikowski & Yates, 1994, p. 542)

The habitual nature of interaction genres draw attention to the, sometimes, cyclic nature of communicative processes. This cyclicity is underscored as they continue:

> Members of a community rarely depend on a single genre for their communication. Rather, they tend to use multiple, different, and interacting genres over time. Thus to understand a community's communicative practices, we must examine the set of genres that are routinely enacted by members of the community. We designate such a set of genres a community's "genre repertoire." (p. 542)

While communication can be routine without being part of a cyclical process, Ballard's (2009) typology of activity cycles centers on communication that is both routine and cyclical.

Each of these three characteristics of activity cycles—that they occur at multiple time scales, that members are engaged in varied and overlapping cycles at any given time, and that different interaction genres typify each type of cycle—is captured in the typology, elaborated below.

Redesigning Communication through a Temporal Frame

Monge and Kalman (1996) offer a set of key terms that constitute a vocabulary for building frameworks that depict communication processes: *time windows, moments*, *panes, cycles*, and *frames*. Ballard's (2009) typology (reproduced in Figure 1) applies

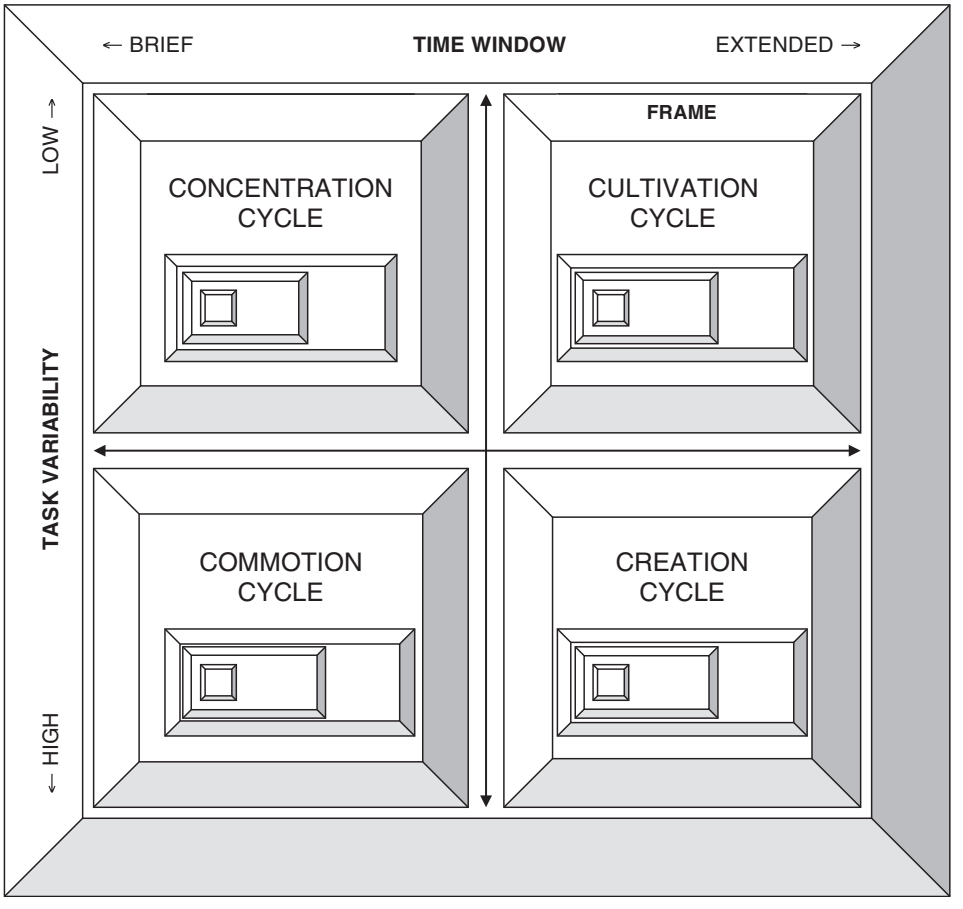

Figure 1 Typology of activity cycles.

this vocabulary in considering various activity cycles. The broad metaphor of windows and panes is used to discuss cycles, process, and the related sequentiality, simultaneity, and synchronicity that might characterize them. Thus, *time windows* represent the temporal boundaries of, or the time required to contain, a given communication phenomena or interaction genre. This can be brief (as in a 5-minute instant messaging conversation) or extended (as in a quarter-long assignment or even a 5-year research & development project) and reflects both micro and macro pacers, respectively. Time windows lie between *moments* that serve to define the boundaries of a window and are typically instantaneous (e.g., in call center work) but may consist of longer periods of time (e.g., nursing shift schedules may include four days on and three days off) and may even vary in size (e.g., the winter semester break versus the summer semester break). Put differently, the time between moments, or recurrent activities, constitutes the time window.

Time windows also contain *panes*, which are smaller regions of time that constitute the window, like miniature time windows (as we might imagine in a

multi-pane window). They reflect the fact that different-sized windows will offer a view on different phenomena or aspects of the same phenomena (Zaheer et al., 1999). Consider the examples of the software development team and project manager referenced in this larger section. Activities are occurring simultaneously with different durations. All are aspects of the phenomena of the development process, yet some are immediately raised and resolved while others extend across whole project phases or the full project cycle. Thus, it is important to look through windows and panes of varied sizes before choosing the best time scale to view the phenomena of interest. Hence, the maxim of measuring twice is apt. For example, the proper time window(s) to understand a software developer or project managers' work processes are different than the proper window(s) to understand the process of research and development (Dubinskas, 1988).

Particularly, choosing too small of a window will obscure important features of the temporal structures of given work and the related interaction genres which typify it. Consider that researchers who focus on the electronic communication flow between a tester who identifies an issue, the engineers who propose a solution, and the project manager who approves and communicates the decision to organizational leaders will glean understanding into the design of the communication processes. Additionally, considering this communication flow in the context of the larger time frame of how projects are defined and continue to evolve holistically within the organization may add additional insight and understanding for one researching these phenomena.

Pane size is directly related to cycles. *Cycles*, of which activity cycles are an example, are marked by at least two panes in a window and illustrate a pattern of events over time. This underscores the need to be sensitive to window size or time scale. The relative position of panes helps to illustrate the potentially overlapping nature of varied activity cycles. Finally, *frames* are bracketing events and activities that emerge in social interaction (rather than clock time). This is the work itself as defined by the temporal structures. The temporal structures associated with various types of work create different frames and are represented by unique activity cycles. In entrainment terms, these structures introduce an exogenous cycle. An example of a framing event at the larger project level would be a three-day design review summit where engineers present the holistic picture of the software that will be developed, and representatives from all affected areas of the business agree to the plan. Examples of frames on a smaller time scale include creating and reviewing daily email summaries of the previous night's testing, coordinating a daily call where individuals report their status on a variety of emerging issues, or hosting a weekly touch-base call where more general questions and concerns are raised and discussed.

Because frames are created by varied temporal structures, members will often have to contend with entrainment to multiple, often competing, activity cycles either due to multiple group memberships or as associated with one role. Frames are powerful symbolic tools that shape and guide human interaction due to their temporal structuring of members' day-to-day practices. It is important to note that a given activity is usually framed by multiple temporal structures. For instance, a software engineer interacts with particular technologies including email, Internet chat, and

bug-tracking software. She is also guided by a specific deadline that is perpetually communicated and reified, and she uses appropriate coordinative methods in order to complete a task.

Ballard's (2009) typology in Figure 1 draws upon this vocabulary and the entrainment perspective to illustrate the ways in which activity cycles shape members' temporal experience. The time window depicted here refers to the length of time it takes organizational members to perform a complete task, the timeline of their activity. This may range from a few seconds to several years. Task variability references the level of uncertainty and unpredictability involved in task execution. This may range from a mundane, routinized task with fairly predictable results to a completely novel task with highly uncertain outcomes. Together, these two axes form four different types of activity cycles, characterized variously as *concentration*, *cultivation*, *commotion*, and *creation cycles*. The multiple frames make up an activity cycle that suggests a particular communication process or practice. (For instance, the beginning and end of a daily coordinating call would make up the frame that alerts the project manager to the proper actions to take within that window.)

Examples of Communication (Re)Design across Activity Cycles

In the area of work design, common objectives are about improving job satisfaction, effectiveness, work quality, and the employee experience. The information environment surrounding these topics is made up of diverse, sometimes incompatible, understandings of the issues being addressed. One source of these different perspectives comes from the activity cycles within which a given stakeholder group is engaged at a particular point in time. For instance, the US-based nonprofit organization, Take Back Your Time, centers on the issue of overwork and has as its primary concern an issue—vacation time—situated at the time scale of one year. At the organizational level, opposition to this issue may come from executives of publicly traded companies focused primarily on quarterly earnings statements. As well, individuals who are self-employed may focus on weekly or monthly goals that make vacation time appear to be a luxury they cannot afford in a lean economy. Take Back Your Time conducts various outreach activities—including publications, documentaries, interviews, and newsletters—to encourage employers and their employees to expand the time scale within which they consider their "work" so that vacation time becomes part of a healthy lifestyle or work design. Below, we consider some work (re)design examples situated in particular activity cycles.

Concentration cycles. Concentration activity cycles take place within a brief span of time and are highly routinized. Organizational work that occurs within these cycles is often tied to modest changes in the day-to-day operations of an organization owed to the common quality of sameness and small time windows within which these activities unfold. Sending and responding to email as part of a daily routine is an example of the kind of interaction genre that typifies this activity cycle.

Kalman and Rafaeli (2011) examine norms around email response times. Through using a vignette where job applicants were rated, they found that applicants suffered negative evaluations when their response latency was longer than one day. While the time scales they investigated were limited to one day versus two weeks (compared to no response at all), the focus of their study offers an excellent context within which to consider the importance of temporality to communication design, in general, and work design, in particular. Recently, a great deal of research has considered the problem of email overload with which contemporary knowledge workers contend (Barley, Meyerson, & Grodal, 2011), as well as the trend of shrinking response times (Ballard, 2007; Dabbish, Mark, & Gonzalez, 2011).

Specifically, as popularized interventions (e.g., Inbox Zero) respond to concerns about email response time by viewing the problem from within the concentration cycle time window, the relationship of email practices to other aspects of work that occur within larger time windows (e.g., cultivation cycles) is lost. Thus, the problem of operating on a tactical versus strategic level, described earlier, characterizes much of the design effort around this interaction genre. Research that considers the problem through a more expansive time window reveals different work design needs (Dabbish et al., 2011), finding that typical patterns of email usage, characterized by truncated response times, can lead to ineffectual, interruption-filled work episodes (Mark, Voida, & Cardello, 2012). Thus, a communication design effort that focuses solely at this smaller time window may overlook data that a responder is violating email response expectations because their attention and efforts are focused in a larger expanse, such as a cultivation cycle. As well, consider that an individual who is highly focused on managing and responding to email in a timely manner may be losing effectiveness by inordinately focusing on concentration cycle activities.

Work design around complex software development in a large global company offers a relevant example. Email traffic is voluminous, often resulting in individuals receiving hundreds of emails a day. Also, as "bugs" emerge in development and testing phases, adjustments to coding and to affected systems are doled out across many employees. The act of receiving the request, implementing the change, and reporting this update to a chain of affected individuals happens with an expectation of a short turnaround time, in a highly routinized fashion, and amid a network of call and response activities moving across multiple teams. Much of this occurs outside of email and so individuals may return to Inbox Zero once the larger project timeline (which may take months) is complete.

Cultivation cycles. In contrast to concentration cycles, other work unfolds over an extended period of time. This more extended period reflects *cultivation activity cycles* that involve long-term processes—such as employee satisfaction, recruitment, and retention—outside of one's immediate control but within established parameters of development. For instance, in an examination of the communication design of a software development effort, other cultivation-level activities would focus on those aspects that more traditionally fall in the perspective of the project manager; that is, the planning, organizing, and resourcing of the effort. One might also focus on the

sets of responsibilities that coincide with clearly stated phases of a software development effort such as the requirements gathering, interface design, development, or testing phases.

A cultivation cycle perspective on work often calls into examination work that is more representative of titles such as "corporate attorney" or "manager." This is unlike the work contained in the concentration cycle, as people are not typically hired under a job-title of "email answerer." Work that unfolds within cultivation cycles often lends itself to a set of procedures that guides the sense-making process.

A study by Kuhn (2006) on the long working hours, or "demented work ethic," observed across two organizations illustrates why the larger time windows needed to contain cultivation cycles are often ignored by organizational members. In examining the temporal structures that supported this type of time commitment, Kuhn found that—rather than this being the result of clear dictates by management—how individuals allocated time in the workplace was the result of an array of efforts they put forth to portray a positive and distinct identity in an organizational culture that reinforced this behavior. He also found that this was supported by organizational and social structures that, in turn, helped to shape those identities. Hence, Bluedorn's (2002) observation about the weekend being a common temporal frame offers some insight as to why weekly hours logged serves as a time-based metric that reflects identity and commitment.

Perlow (2012) recently explored the short-term and long-term ramifications of organizational cultures that encourage nonsustainable working hours in a study of the Boston Consulting Group. Through a new intervention called Predictable Night Off, a six-person team at this elite management-consulting firm agreed to curtail their working hours one planned night a week. The impact of change within this smaller time window was enormous for outcomes that unfold in the larger time window centered on cultivation: employee satisfaction rose, reports of greater work-life followed, recruitment and retention improved, and client satisfaction increased as well. In fact, this work redesign which focused on the long-term impact for this small six-person team eventually led to a global initiative involving more than 900 teams.

While an examination of the communication design at this level is informative, the understanding would be incomplete without also understanding the communication design that is in play during fast-paced and chaotic moments of project crisis, described below.

Commotion cycles. People working in software development in large global tech sector companies continually collaborate in fast "crunch-time" scenarios at every stage of the process. Typically, teams work in different geographic locations around the world developing different parts of the software. Decisions made by one group both inform and affect decisions made by others. As different challenges and questions bubble up, different groups temporarily form long enough to discuss and decide on courses of action. Gaining a level of understanding that comes close to a comprehensive grasp of the communication design of this kind of work necessitates understanding the nature of communication occurring in commotion cycles.

The "crunch-time" scenario of software development groups identifies key aspects of the commotion cycle time frame—wherein specific tasks are inordinately variable but must be executed over a defined and, generally, brief span of time. The variability arising from each task does not inhere in a novel undertaking per se, but in the intrinsic capacity of the situation to dramatically change hinged on the slightest perturbation. As such, basic job duties for some work may occur within *commotion cycles*, characterized by moment-to-moment, rapidly unfolding, and changing events that must be managed instantly.

This type of activity cycle typifies the interaction genres used by organizational members working on virtual teams who, on the basis of working virtually, have an ongoing disruption of space while simultaneously seeking a new sense of place. Shockley-Zalabak (2002) explores how virtual team members adapt and respond to a "changing series of involvements with people, ideas, and activities" (p. 232). Her work culminates in identifying what she terms, "Protean Places," which is the ever-evolving creation of a sense of place by team members in the face of turbulent times characterized by ongoing change. She stresses that in order to understand the communication processes that define and continually redefine the character of teams who operate within constant cycles of commotion, that multiple and iterative vantage points must be taken and repeatedly shifted. Thus, even on a small time scale, no singular activity cycle adequately captures their work due to the daily contradictions these team members face.

In her final recommendation for practice and research, Shockley-Zalabak (2002) ends by observing, "communication scholars and practitioners alike are challenged to examine our own taken-for-granted assumptions about communication and consider our own imperatives for shapeshifting as we explore the increasingly complex and important world of organizational communication" (p. 249). We concur with this suggestion and further propose that this iterative process of shapeshifting is a necessary precondition for any communication design, particularly in the twenty-first century. Our discussion of creation cycles below underscores how the nature of contemporary work requires special attention to temporality in communication design.

Creation cycles. Creation activity cycles are highly extended across time and characterized by enormous task variability. The work and processes are more iterative than linear. The fundamental task of these groups is to create new things—neither the timeline nor the outcome of which can ever really be known. Researchers and developers often carry on this type of work. The need to focus on long-term outcomes may partially obscure sensitivity to the day-to-day shifts noticed quickly by others. To best understand the aspects that comprise creation activity cycles, one draws information gleaned from the other three cycles described above. A shifting of perspectives across these time frames increases what one can glean from an examination of work design and more holistically broaden the design perspective.

A perspective drawn across time spans becomes more complex in modernity, particularly in an area like the global technology sector. While many are involved in

developing a particular piece of software, there is a comparably large and complex set of people adapting to new directions in a quickly changing economic environment. This group is calling for changes to software currently under development while also strategically planning and securing funding for the development that will occur in the next two fiscal years. Typically, teams might be developing, for example, versions 5.0, 5.1, 5.2, and 5.3 of a piece of software while others are outlining the direction of the 6.x series.

This new age of attention management suggests that there is a growing spectrum of needs and activities with varying tinges of urgency competing for one's attention to the degree that time frames become more difficult for workers to parse from reflections on their experience. Consider Rushkoff's (2013) argument in his book *Present Shock* that:

> There's no story, no narrative to explain why things are the way things are. Previously distinct causes and effects collapse into one another. There's no time between doing something and seeing the result. Instead the results begin accumulating and influencing us before we've even completed an action. And there's so much information coming in at once from so many different sources that there's simply no way to trace the plot over time. (pp. 198–199)

On the surface, Rushkoff's description of this increasingly chaotic environment suggests an attention to commotion activity cycles. However, he is referencing the ways in which processes that traditionally were contained in larger windows of time, come into view much quickly in contemporary, globalized work and culture: the creation of new things happens (or is perceived as happening) more organically and spontaneously, leading more activities to become encompassed by the "now."

Thus, "present shock" has important implications for work design. As background, early work by Lawrence and Lorsch (1967) compared teams on the basis of the types of activity cycles within which much of their work is directed (based on membership in one of four departments: sales, production, applied research, and fundamental research). They found that the temporal structures that enable and constrain members' work shape their time horizon, or the windows they consider on a daily basis. Members of the sales department considered the smallest time windows followed by members in the production department. The most expansive time windows were viewed by members in the departments responsible for fundamental research projects, followed by members of the departments responsible for applied research projects. In sum, Lawrence and Lorsch found support for their hypothesis that work groups' temporal structures (in this case, their feedback cycles) impact their temporal views.

Equally important, work by Lorsch and Morse (1974) found a recursive relationship between the temporal structures that guide members' work and the time windows they consider. Specifically, when members of research and development groups (who view their work through temporally expansive windows) were required to submit regular progress reports—inconsistent with the inherent time window of their projects and corresponding temporal views—they had poorer

performance, compared with groups who were allowed to demonstrate their progress following the actual temporal structures that guide their work. Thus, in considering work design for organizational members whose primary work processes inhere in very large windows of time (at the level of creation cycles), the difficulty caused by "present shock" is clear. Informed by a temporal perspective, a communication design approach to addressing this problem points to the need to resist a focus on speed and short-term gains for work that unfolds in creation cycles. Central to such an endeavor will be considering the proper role and use of interaction genres like email and quarterly earning reports in designing the workflow.

Below we conclude by reviewing how taking seriously the issue of temporality can assist in the redesign of work in a communication design enterprise.

Implications and Conclusion

Thus far in our discussion of the temporality of communication design, we have focused on the object of design. However, an equally important issue that we have alluded to in this discussion is the temporality of the communication designer. While the adage, "Measure twice, cut once," is concerned with measurement (as we have detailed in the foregoing discussion), the equally important—if implicit—wisdom to which it points is that the thoughtful, potentially iterative, measurement of communication processes initially takes more time, or a careful pace of action. Thus, design should be reflective and unhurried at its earliest stages in order to determine the true scale of the problem, adding an eighth consideration to the list of seven critical things that Aakhus and Jackson (2005) recommend: building in enough time to examine the format. We conclude our discussion below by examining how one of Aakhus and Jackson's (2005) three starting points for a communication design enterprise—*designs as hypotheses* (with its focus on format)—buttresses our tripartite argument that: (1) there are designable aspects of time; (2) guidelines for the design of work can be developed through attention to the relevant activity cycles at play in a given context; and (3) in advance of selecting an appropriate invention or intervention, it is critical to build in enough time to contemplate the various measurement possibilities.

A Tripartite Perspective on the Temporality of Communication Design

Aakhus and Jackson's (2005) assertion that designs are hypotheses implicitly indicates that multiple designs may be tested in process of communication design, as designers consider how a given format influences the practice and study of communication. Aakhus (2007) explains that, "where other approaches to communication focus on the behavior that occurs within a communication format, design focuses on *what those formats presuppose* about communication and with what consequence the new format is taken up in communicative practice" (p. 114, italics added). Time scale constitutes a pivotal aspect of communication format because it presupposes certain types of interaction and constrains others. This leads to our first

argument elaborated previously: *temporality has designable features that have consequences for communication*.

The impact of format is illustrated by recent conversations in the larger world of design (e.g., those professionals designing pencils and coffee mugs), where the narrower time scale that defines "now" has evolved over the course of the industrial age. It has coincided with the shrinking scope of the field of design to the point that the scale is small, with the designer focused mostly on the design of singular objects (limited to pencils or coffee mugs; Brown, 2009). This short "now" is reflective of a particular communication format (with a small interval) that presupposes a given interaction genre (that can unfold within a small interval). It leads to our second argument elaborated previously: *through directing attention to communication format, our typology of activity cycles offers principles for the design of work*.

The relationship between interaction genres and the communication afforded by a given format is reflected in Brown's (2009) observation that unsuccessful design efforts to build adequate prototypes (the equivalent of hypotheses) may be impacted by both: (1) a rush to move past a given aspect of the process; and (2) only a partial understanding of the time scales within which both the problems are contained and within which key stakeholders make find themselves. This observation centers on *the importance of the temporality of the designer to adequately consider various designs*, our third argument implicated in the foregoing discussion. Therefore, the issues of *time scale* (i.e., to measure the whole; Bluedorn, 2002; Zaheer et al., 1999) and *speed* (i.e., a deliberate pace; Ballard & Seibold, 2003; Gleick, 1999) are both pivotal design considerations, pointing to the broader issue of temporality in the design process as well as in the ultimate object of design.

The Speed of Design

Given the importance of pace to successful design—even as the age-old carpentry adage points—it is ironic that Thackara (2006) notes one of the functions of design has been to increase pacing throughout the society:

> Our designed world reinforces the value we place on speed. We produce and consume at an ever-increasing pace, and speed is worshipped uncritically as an engine of investment and production … The signs are that speed is a cultural paradigm whose time is up … When continuous acceleration is the default tempo of innovation, it leads to 'feature bloat' in products. Absolute speed … remains powerfully attractive for many of us, but *acceleration* seems to have lost its allure. (p. 29)

He contends that design has supported a culture of increased pace and acceleration but this cannot be sustained. Further, since this accelerated pacing has been a notable factor in the development of complex problems on a global scale, pacing must be considered in the design of solutions and new processes to alleviate the problems that have emerged over the course of the industrial age. For organizational communication scholars, paramount among the examples of these complex problems has been

the increasingly unsustainable design of work (Ballard & Webster, 2009; D'Enbeau & Buzzanell, 2011; Zorn & Collins, 2007). By unsustainable, we refer to work design that does not account for the long-term consequences at individual, team, organizational, or environmental levels.

Speed often leads to a focus on individual tasks and deadlines to the detriment of larger, more complex, systemic issues and problems; in other words, functioning on a tactical level rather than on a strategic level. One reason for this problem is that design is largely based on the feedback of individuals whose perceptions and understanding of a problem are hurried. When the design process is hurried, it is often difficult to appreciate the benefits of longer-term thinking and to apprehend the weight of time scale. As Shockley-Zalabak's (2002) and Rushkoff's (2013) observations illustrate, examination of processes that inherently exist across more than one of the four activity cycles highlights the complexity of communication design work, underscoring the need for a careful pace. As Ballard, Tschan, and Waller (2008) observe that the time-consuming nature of (re)considering time scale, an act of communication design, makes the iterative aspect of this practice onerous and unattractive. The window framework developed by Monge and Kalman (1996) and applied in Ballard's (2009) typology to address work design offers an effective way to deal with the complexities of multiple temporal structures and overlapping activity cycles.

In conclusion, design and temporality appear to have a natural relationship across contexts, raised again and again—from the old carpentry adage that centers on time to the metaphorical use of frames by Monge and Kalman (1996) to elucidate their observations about the temporal nature of communication. It is no surprise, then, that cultural anthropologist Edward Hall famously declared, "Everything occurs in a temporal frame." The imagery evoked by this observation points again toward deep interrelationships between design theory and time that hold important opportunities for communication design. We have elaborated three of these opportunities and recommendations in the foregoing discussion. There are designable aspects of time that permit us to intervene on the "framing" of activities in ways that may enlarge our understanding of communication. For instance, thoughtful interventions on the framing of our interaction may actually improve communication and, in the case of work (re)design, improve work as well. As well, guidelines for the design of work (and potentially other sites of interaction) can be developed through attention to key temporal aspects of a given activity. Finally, considering the consequence of various formats necessitates building in enough time for the communication design process to allow for iterative and thoughtful design.

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