Models and Metaphors of Temporality: Supporting Individual- and Group-Based Time-Management and Coordination Work

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Introduction

Temporal experiences are typically described with respect to clock time, manifesting as a linear chronology of past, present and future. However, there is a need to define temporality more broadly to holistically integrate individual and social orientations to time in the twin realms of cooperative work and crowdsourcing. To respond to these design challenges, our research is in the process of adopting a social psychology perspective to reveal how individuals position themselves within different temporal models and how they contextualize time through metaphors.

Related CSCW work on cyclical representations that alternate between progressive moments and stability [7] and an emerging framework of *temporal logic* [8] inspires this research and informs our initial perspectives on and orientation to the work.

Time Perspective Theory

Time Perspective (TP) is largely an innate, involuntary process of assigning temporal cognitive frames as a means for sensemaking, recall and prediction [15]. There is an established body of theoretical work in this

space, along with significant interdisciplinary empirical research that parses, extends and critiques TP theory, models and instruments from a variety of perspectives.

The TP framework is appealing as a theoretical mechanism for the design of interactive CSCW systems for several reasons. First, it incorporates two established social psychology concepts—Lewin's life space model [6] and Bandura's self-efficacy theory [1]—that can be applied to individual, group and societal functioning. The Zimbardo and Boyd approach [15] also accounts for a sense of personal agency and the capacity to prompt more optimal, context-specific TP-shifting behaviors.

Second, the prior work in applied cognitive research provides helpful guideposts for addressing some of the thornier design challenges for individual- and collaborative systems that rely on time-based sensemaking (e.g., time-management and coordination tools). In particular—as Zimbardo and Boyd note—TP is a pervasive, multi-dimensional and largely unconscious process in which "people are rarely aware of its subtle operation, influence or biasing powers." [15] Time perspective is constructed from a variety of individual tendencies and environmental forces which, in turn, form the basis of other related social constructs, habits and personal motives that influence time- and task-management behaviors.

One of the ways that we are looking at connecting theory to the practice of conducting this CSCW research is in utilizing (and, potentially, extending) the Zimbardo Time Perspective inventory (ZTPI), an instrument that we anticipate will be very helpful for persona development, iterative design, and field work. An important consideration in this research is the capacity to dually account for personal and collaborative group approaches to time- and task-management as well the ability to prompt time-shifting optimizations.

Underlying Social Psychology Theories and Models: Looking Back to Uncover Nuance in Temporality Models

Zimbardo and Boyd build upon four different domains of psychology in their work. These theories and models may also provide some needed focus to CSCW research in wrangling multiple TP dimensions and each of their underlying factors. Lewin's life space model considers how past and future temporalities define an individual's time perspective [6]. Time as a circular concept is an existential Eastern philosophy. This stands in stark contrast to the more linear Western point of view where lost time cannot be reclaimed. From the standpoint of the underlying usability/experience of time- and task-management system design, it will be important for us to understand whether/how non-linear time manifests (or doesn't) in individual vs group time perspectives as well as whether/how it may need to be accommodated (or not) as common experience or dismissed as an edge case.

Nuttin's work expanded on Lewin's premise that future and past events influence present behavior as long as they are active cognitions [11]. Bandura integrated all three temporal dimensions (past, present and future) as factors in *self-efficacy*—a personal belief that one can accomplish a task [1]. The sense of self-efficacy is an important element of social cognitive theory which posits that human behaviors are acquired and encoded by modeling. The behavior replication concept has implications for system design heuristics that may help

promote optimal time perspective switching in users/groups through persuasive technologies or collaborative techniques borrowed from peer production processes. Carstensen, et al's work further advances the multi-dimensional relationships between time perception, social goals and various psychological states, e.g., cognition, emotion and motivation [2]. Decision-making around goals and tasks are affected by three temporal factors: the perception of time, the span between decision and action, and time pressure, according to McGrath and Tschan [9]. With respect to workplace time management, Wu [14] describes how people use patterned external constructs, internal rhythms, and organizational norms as *temporal structures* in relation to their TP.

Hassan argues that people adapt their daily work cycle to technologies embedded in the urgency of clock time [4]. In our research, we are considering what might be gained by flipping that dynamic by designing information systems to accommodate TP, instead.

A Methodology for Looking Forward: Metaphor Analysis to Explore Contemporary Experiences of Temporality

Metaphors are expressions of thought that structure and influence language, information processing, reasoning, problem solving, and action [3, 5, 10]. People most often use metaphors to mentally map an experience in the language of a different experience to understand complex topics or new situations [13]. Metaphors help to simplify more abstract phenomena, like time, and can also symbolize individual's time perspectives [12]. The flexibility of metaphor analysis offers long-standing prior work and empirically validated methods to simultaneously cross examine

several relevant factors, e.g., information processing, situational context, multiple forms of data, etc.

For the CSCW community, it will be important to consider how the multitude of factors, dimensions and psychosocial states can, should, and/or ought to be evaluated as potential independent, dependent, and confounding variables. Therefore, our initial exploratory study and empirical work up through the system design process will likely lean on the existing ZTPI instrument, metaphor analysis and other interpretative methods to help surface the unconscious influences and environmental factors that compel reasons, decisions and actions about time and tasks.

Theory Transfers? Workshop Participation Goals

Although Dr. Voida has significant prior experience conducting research on related topics, including multitasking, task awareness, and interruption, and Ms. Norris comes to this project with a good deal of practical experience in the journalism and digital humanitarianism (DH) domains, the research directions discussed in this position paper reflect a new, interdisciplinary research direction for both members of our (fledgling) research team. We are hoping to leverage our inclusion in this year's CSCW workshop to (1) contribute to a broader discussion about best practices for adopting, appropriating, and amending/extending theories and theoretical frameworks from CSCW-adjacent disciplines into CSCW research and (2) elicit high-level feedback about the suitability of the particular theoretical frameworks outlined in this position paper to informing the design, implementation, and evaluation of future time-

management and coordination platforms supporting individual self-reflection and small-group collaboration.

About the Authors

Wendy Norris is a second-year PhD student in the Department of Information Science at CU Boulder. Her research focus is crisis informatics, human–computer interaction and social computing in collective intelligence/knowledge search systems. The overarching goal of her work is building social computing systems that advance collective intelligence and leverage temporality in the context of natural disasters and humanitarian crises.

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