# Time Perceptions as a Material for Designing New Representations of Time

**Mert Yıldız**
Koç University – Arçelik Research Center for Creative Industries
34450, İstanbul, Turkey
mertyildiz18@ku.edu.tr

**Aykut Coşkun**
Koç University – Arçelik Research Center for Creative Industries
34450, İstanbul, Turkey
aykutcoskun@ku.edu.tr

## Abstract
Time is a growing topic of interest in HCI. Technological developments and changes in everyday life routines are creating new perceptions of time that are getting widespread in HCI. While these perceptions expand our current understanding of time, designing for them is an important yet an overlooked challenge. In this work, we investigated five time concepts from HCI literature (*right time, clock time, digital time, plastic time*, and *collective time*). We conducted a photography capturing task with four design researchers to understand how they interpret and perceive these time concepts. We then created two design speculations based on their perceptions and interpretations to illustrate how emerging time concepts can inspire new design ideas around representations of time.

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the Owner/Author.

CHI'20 Extended Abstracts, April 25–30, 2020, Honolulu, HI, USA
© 2020 Copyright is held by the owner/author(s).
ACM ISBN 978-1-4503-6819-3/20/04.
https://doi.org/10.1145/3334480.3382950

## Author Keywords
Time; Temporality; Perception of Time; Design Insights; Design Ideas; Interactive Systems; Design Speculations

## CSS Concepts
• **Human-centered computing~ Interaction Design**; *Empirical studies in interaction design*



**Figure 1:** *Experience Clock*,

Small Circle represents having a lunch and medium circle represents meeting with a friend. They both move to intersect with each other. When the center of the circles meet with each other, a blue area becomes visible to show that time flows accordingly. The user can see how much time has been spent on the inter-connected experience.

## Introduction

Time is an inevitable part of human existence. It influences the way we construct, shape, and manage our lives. In Western Societies, time is often regarded as universal, linear [13], and fast-paced [4] concept that is measured by abstract-numerical methods [8].

This understanding of time has been recently challenged and extended by HCI studies. Researchers have raised issues and identified future directions for studying time in HCI, particularly for designing interactive systems that examine alternative temporal scenarios [7,10,18]. For example, design artifacts such as *Olly* and *Slow Game* revealed how temporality can trigger long-term experiences and reminiscence by spreading the interaction over time [11]. *LUNE* [5] and *Takt* [2] experimented on visualizing time for rethinking our natural connections. Other researchers focused on revealing diverse understandings of time. They discovered new narratives of time by looking into aboriginal communities and their time management practices [17], examined new ways of valuing time by utilizing *Timebanking* to shift time as a currency [16], and identified new challenges for the normative notions of time, shifting the notion of time to a collective and entangled phenomena [6].

This growing body of work on time and HCI has led the emergence of new perceptions of time including "time as collective and entangled" [6], "time as socially coordinated" [13] "time as a slow-paced rhythm" [3,9], and "time as a subjective phenomenon" [13]. Although these perceptions are widening our current understanding of time, their potential as a design inspirational source for design is underexplored, i.e. how can we design with these various perceptions of time and how they inspire new ideas around time and HCI. Addressing this gap, we conducted a two-phase study to explore how new perceptions of time are understood and interpreted by design researchers, and how their interpretations can be used to inspire new design ideas.

In the first part, we recruited four design researchers and gave them five key time concepts from HCI literature [6,17]. These concepts are "right time", "collective time", "digital time", "clock time" and "plastic time". We then asked them to take a photo that illustrates each concept along with a brief description of the photograph and its relation to the concepts. In the second part, based on the analysis of participants' photographs and their explanations, we devised two design speculations: *Experience Clock* (Figure 1), a tabletop clock that shows inter-connected everyday life experiences (e.g., having lunch, meeting with people), and *Disappearing Clock*, a regular clock whose numbers and hour-minute hands become invisible upon users' immersion into an experience (Figure 2).

## Emerging Perceptions of Time in HCI

As stated above, we inspire from five new perceptions of time discussed in HCI literature [6, 13]. These concepts discuss the social and relational aspects of time, how they affect people's lifestyle and the fractured rhythms of everyday life. They uncover some problematic parts of universalized time understanding (e.g., the disconnection from our natural lifestyles with the emerging digital technologies). In the remainder of this section, we explain each concept in detail.



**Figure 2:** *Disappearing Clock*,

From top to bottom, as the user is getting immersed in a daily life experience, hour and minute hands of the clock starts to disappear. The clock visualizes the experience that is being lived, with an aim of enhancing it. It prioritize lived experiences over the time spent on them by visualizing them through abstract shapes (e.g., blue color for having fun, green color for being relaxed at the same time).

*Right Time*
Proposed by Taylor et. al. [17], right time discusses that *"understanding time in interface design not as a point on a calendar or clock, but as a set of converging circumstances that constitute "the time" for happenings to take place (p.1)."* By conducting case studies with Aboriginal People, the authors propose that the combination of tangible (e.g., people) and intangible (e.g., energy) circumstances construct a "right time".

*Collective Time*
In Making Time, Lindley et. al. [6] discusses time as a concept collected and entangled with our social relations. They explain that, fractures in people's everyday routines lead to a perception of time as disconnected and personal. They further propose that time may be considered as collective, not necessarily spending time together but valuing the inter-personal connections in personal time intersections.

*Plastic Time*
Introduced by Rattenbury et. al. [14], plastic time is a concept that is often regarded as neither leisure nor work related time. It is unanticipated, un-reflexive and fluid (e.g., watching TV and skipping channels or checking social media accounts). In other words, with the growing interest of accelerated living and technology use, the empty time spaces in busyness create the concept of plastic time.

*Clock Time*
Clock time is a concept that is related with current timekeeping technologies [1,12]. It is a time concept that begins with the invention of clocks that shift humans' lifestyles from their natural settings to abstract connections with numbers (e.g., eating not when you are hungry but when the clock shows 12:00)

*Digital Time*
Explained in Tomlinson's book [15], with the rise of the digital media, the notions of "being online" and "immediacy" created the concept of digital time. It is a time concept that feeds itself with the flow of information rather than our chronological time understanding.

## Photography Capturing Study

We conducted the study with four design researchers since our goal is to introduce emerging time concepts found in the HCI literature to designers, by encouraging them to relate these concepts with their everyday experiences. We reached out them via our personal networks and later via snowballing. We first asked them to fill an A4 size paper template which explains each time concept in a few sentences. This template contains a space for designers' photographs relevant for each time concept, and a place for explaining why a particular moment (photograph) is suitable for selected time concept. After 10 days, we collected the templates and conducted semi-structured interviews. We asked questions about the photographs, reasons behind capturing them, and how time concepts are perceived and interpreted by the participants.

## Perceptions of Time Concepts

We gathered 20 photos and descriptions in total. Participants not only widened the scope of the concepts by adding new interpretations, but also emphasized unclear parts of the concepts. Next, we will explain how participants interpret each time concepts with example photos and descriptions.



**Figure 3 (right time)**: *Grandmother cooking a soup, checking for the right time to add ingredients, and coordinating them*



**Figure 4 (right time)**: Participant took this photo and mentioned spending time with the things she loves. *"I barely cared about the actual time but rather it was the moment that I felt as by myself."*

*Right Time*

Participants found *right time* engaging and easy to perceive. They constructed *right time* as a time usually associated with coordination of things, observation of actions and senses, and tracking clues of daily life. For example, one participant mentioned of her grandmother's cooking experience (Figure 3). She said*"…there is no fixed-numeric time that can measure these; but the eyes, the nose and the textures tell the right time."*. Another participant modified the *right time* concept by calling it a *possible time*, where he can have flexibility in the daily life tasks (e.g., utilizing the time either for work or leisure). On another level, one participant said that (Figure 4), *"it is me-time, where I can be as by myself and it's a time that I wished it could freeze at that moment." and utilized right time as an opportunity for self-reflection moment.* Last participant observed her dog's tail moves to understand whether it is the *right time* to take the dog out.



**Figure 5 (collective time)**: A group of co-workers, celebrating New Year's Eve by playing instruments and chatting with each other's.

*Collective Time*

In *collective time*, participants focused on the meaning behind togetherness rather than just spending time together. They mentioned concepts such as sharing experiences together, collective understanding of a knowledge, and being on the same page. For example, one participant called *collective time* as a *shared time* (Figure 5). She said, *"However, once we can arrange such out of the ordinary events [referring to everyday lunch breaks], I believe that it becomes a shared time. We learn new things about each other and while doing so we forget about the time".* Another participant mentioned *"two buddies in this photo seems to me as if they don't have any idea about actual time but they share an experience together in which they have a mutual understanding and experience of time. And as a person who sees them, I am somehow coincide with that mutual time even if it is for a second."* (Figure 6).



**Figure 6 (collective time)**: Two buddies sitting together at the rear of a seashore

*Plastic Time*

Participants found *plastic time* a challenging concept to capture and think of. They mostly assigned negative feelings towards this time concept. They pointed out the gaps in the time periods in daily life (e.g., waiting on the airport and not being able to do any leisure and work activity, Figure 7). They further called it as an



**Figure 7 (plastic time)**: Participant waiting on the airport. She describes as, *"I can't listen/read because there is too much going around me. I feel a bit on edge and try to be more aware of my surroundings."*




**Figure 8 (clock time)**: *"In this photo, I wanted to demonstrate the psychological time of eating. Our constantly exposed time [referring to clock time], also effects our biological time. Eating before this hour is too early. If you go after too later than this time, it is late."*

obligatory empty time because of the blurry time spent in daily life gaps (e.g., commuting to airport). However, one participant mentioned that this time needs to be filled with a meaningful activity like sleeping, learning, or reading a book.

*Clock Time*

According to participants, *clock time* was easy to capture since everyday life is resolving around it. However, in this concept, they questioned the reason behind living with numbers and clocks. They mentioned about how they are disconnected from the natural ways of living (e.g., Figure 8) and the problems of adjusting mind and body to clocks and forced routines (Figure 9). One participant criticized the current infrastructures of everyday work life as *"We used to have winter-summer time adjustments to get the best of the daylight. But since this tradition have been abandoned, numbers that represent time are only placeholders, without what they used to represent."*

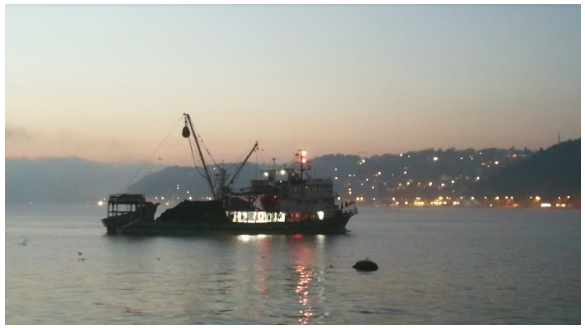


**Figure 9 (clock time)**: *"This photo is taken at 08:03. The sun is yet to rise, it is only dawn. Whereas the day has already started due to our constructed clock time."*

*Digital Time*

For the participants, *digital time* became a concept that is highly related with the time spent on digital technologies. While a participant mentioned *digital time* as an opportunity for exploration and improvement (Figure 10), another participant perceived it as a tool for connection (Figure 11). Moreover, they thought that, *digital time* sometimes helps to feel connected, showing presence and being able to respond to the situations.

## Design Speculations Based on Perceptions of Time Concepts

We observed that participants revealed social and cultural aspects of time related to how we experience time differently in our daily lives. They indicated that current infrastructures of timekeeping technologies (clocks, numbers, schedules) may fail to deliver the experience behind everyday activities. They thought some of these technologies are superficial (e.g., disconnected hour problem in Figure 9), and fail to deliver immersive experiences in their lives. Moreover, as in the example of *collective time*, participants valued on the shared experiences. This showed the necessity of shifting our perspective about time from thinking it as a checkpoint between tasks (e.g., looking at the watch, and deciding to eat or socialize) to thinking it as a connect different everyday activities. Inspired from these findings, we speculated *Experience Clock*, where the clock shows lived and upcoming experiences in the daily life (Figure 1). It does not illustrate any numbers, but the user can see how the daily life experiences (e.g., going to lunch together or meeting with a friend for a coffee break) are getting connected throughout the day. When the circles' centers get in a straight line, *Experience Clock* shows that, relations between these

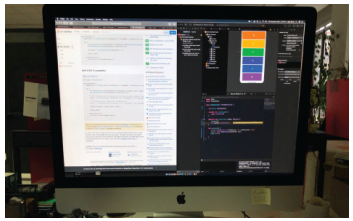


**Figure 10 (digital time)**: *"For me, digital time is a time period where it enables us to use technology efficiently and purposefully, it is not only watching tv series. Here I am learning coding as a part of having a leisure."*

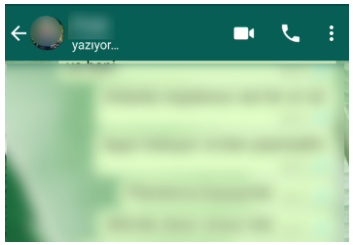



**Figure 11 (digital time)**: *"Typing...", Even though my friend is in the US, we are online at the same time- in different time zones. When I see online and especially the 'typing' notification, I feel very connected to and present with the person on the other line.*

experiences have been achieved (as mentioned in the Collective Time, Figure 5), and the time flows accordingly. Further, users can interact with the clock by adding or removing circles that represent new everyday life experiences.

As mentioned by several participants, the numbers and minutes became pointless when they are immersed in an everyday experience e.g., celebrating New Year's Eve with friends (Figure 5) or having self-reflection moment in a nice environment (figure 4). However, they pointed out the necessity of enriching interactions through timekeeping technologies while having these daily life experiences. In some cases, they did not pay attention whether a clock is there but emphasized different ways of interacting with the clock. In this regard, we speculated *Disappearing Clock* (Figure 2) which slowly obscures hour and minute hand as participants are immersed in a personal (right time, figure 4) or shared (collective time, figure 6) experience. This speculation aims to prioritize lived experiences over the time spent on them by visualizing them through abstract shapes (e.g., blue color for having fun, green color for being relaxed at the same time and orange color for self-reflection in the same experience).

## Conclusion and Future Work

In this paper, we shared the initial findings of an ongoing user study about various perceptions of emerging time concepts and how they can inspire new concepts. Even though we gave the participants definitions of time concepts, they came up with their own interpretations and definitions of these concepts. This showed that time is a subjective phenomenon, and that designing interactions and representations for subjective time experiences are needed. Moreover, the participants even questioned already existing time concepts in their lives (*clock time*). Based on these subjective interpretations, we created two design speculations: *Experience Clock* and *Disappearing Clock.* The purpose of these speculations is not to provide the best solution for representing time; rather, they aim to raise new questions around time in HCI that trigger debate and future research. Thus, in the scope of future work, we plan to explore: in which alternative worlds would these speculations be meaningful? would these alternative worlds interpret the time in the same way as our present world? What kinds of social relationships can exist for these speculations to make sense as consumer products in alternative worlds?

As for the methodology, we found that, five time concepts enhanced participants' understanding of time and helped them to get familiarized with the concepts. In this regard, photography capturing task became an effective tool for working on these kinds of abstract topics. Furthermore, the photography capturing task requires thinking reflectively on abstract concepts and relating these concepts with concrete things in everyday life. Since design researchers are typically trained in reflective thinking and used it frequently in their work practices (Schön, 1983), we chose to recruit design researchers in this preliminary study. In the scope of future work, we plan to use the method with participants having different backgrounds to explore more personal interpretations of time.

## Acknowledgements

We thank all the participants for their valuable inputs. We also thank all the reviewers for their feedbacks and providing future directions for this our work.

## References


[1] A. Roger Ekirch. 2010. Paul Glennie and Nigel Thrift. Shaping the Day: A History of Timekeeping in England and Wales, 1300–1800. Oxford: Oxford University Press, 2009. Pp. 456. $70.00 (cloth). *Journal of British Studies*.

[2] P. Eriksson, S., Gustafsson, F., Larsson, G., & Hansen. 2017. Takt: The Wearable Timepiece That Enables Sensory Perception of Time. *In Proceedings of the 2016 ACM Conference Companion Publication on Designing Interactive Systems. ACM.*: 223–227.

[3] Barbara Grosse-Hering, Jon Mason, Dzmitry Aliakseyeu, Conny Bakker, and Pieter Desmet. 2013. Slow design for meaningful interactions.

[4] Lars Hallnäs and Johan Redström. 2001. Slow technology - Designing for reflection. *Personal and Ubiquitous Computing*.

[5] Sung ho Lee, Seong beom Kim, Byoung hern Kim, and Hui sung Lee. 2019. LUNE: Representing Lunar Day by Displayed Lighting Object. In *Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems - CHI '19*, 1–4.

[6] Siân Lindley. 2014. Making time. *CSCW 2015*, 56: 33–34.

[7] Siân Lindley, Robert Corish, Elsa Kosmack Vaara, Pedro Ferreira, and Vygandas Simbelis. 2013. Changing perspectives of time in HCI.

[8] Reed Martin and Henry Holtzman. 2011. Kairoscope: Managing time perception and scheduling through social event coordination. In *Conference on Human Factors in Computing Systems - Proceedings*. https://doi.org/10.1145/1978942.1979227

[9] William Odom. 2015. Understanding Long-Term Interactions with a Slow Technology: An Investigation of Experiences with FutureMe. In *Proc. CHI 2015*.

[10] William Odom, Siân E. Lindley, Larissa Pschetz, Vasiliki Tsaknaki, Anna Vallgårda, Mikael Wilberg, and Daisy Yoo. 2018. time temporality slowness: Future directions for design research – Workshop at ACM Designing Interactive Systems in Hong Kong | June 10 2018. *DIS '18*.

[11] William Odom, Ron Wakkary, Ishac Bertran, Matthew Harkness, Garnet Hertz, Jeroen Hol, Henry Lin, Bram Naus, Perry Tan, Pepijn Verburg, and Emily Carr. 2018. Attending to Slowness and Temporality with Olly and Slow Game : A Design Inquiry into Supporting Longer-Term Relations with Everyday Computational Objects. *Proc. of CHI*.

[12] Thomas A. Offit. 2014. Objects of Time: How Things Shape Temporality. *American Anthropologist*.https://doi.org/10.1111/aman.1208

[13] Larissa Pschetz and Michelle Bastian. 2018. Temporal Design: Rethinking time in design. *Design Studies*. https://doi.org/10.1016/j.destud.2017.10.007

[14] Tye Rattenbury, Dawn Nafus, and Ken Anderson. 2008. Plastic: A metaphor for integrated technologies. In *UbiComp 2008 - Proceedings of the 10th International Conference on Ubiquitous Computing*.

[15] Sarah Sharma. 2009. Book review: John Tomlinson, The Culture of Speed: The Coming of Immediacy. London: Sage, 2007. 192 pp. ISBN: 9781412912037, £60 (hbk). *European Journal of Cultural Studies*.

[16] Patrick C. Shih, Victoria Bellotti, Kyungsik Han, and John M. Carroll. 2015. Unequal time for unequal value: Implications of differing motivations for participation in timebanking. In *Conference on Human Factors in Computing Systems - Proceedings*.

[17] Jennyfer Lawrence Taylor, Alessandro Soro, Paul Roe, Anita Lee Hong, and Margot Brereton. 2017. Situational When: Designing for Time Across Cultures. In *2017 CHI Conference*.

[18] John C Thomas, Y Pan, T Erickson, E Blevis, C Letondal, and A Tabard. 2013. Avec le temps ! Time , Tempo , and Turns in Human-Computer Interaction. *Proceedings of CHI 2013 EA*.