Future Convergences: Time Matters

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Abstract. While in the history of design, spatial qualities have been central to the search for techniques and tools, temporal qualities have come to take part in design, with the advent of the digital revolution, as qualities capable of deforming, compressing, reconfiguring spaces, and supporting new ways of living.

The essay investigates various time-based approaches, developed by scholars and designers from different disciplines, to build tools that can identify convergences capable of generating various forms of future.

The time-based design approach will allow future studies to explore:

Spaces: Digital algorithmic design/production technologies will make spaces and components adaptable and able to govern kinetic and sensory performance.

Experiences: Time-based technologies will make perception and emotions more adaptable, through a continuous dialogue between humans and inhabited spaces and by employing machines and computer systems capable of formulating personalized proposals.

Behaviors: Media technologies, have changed people's behaviors and their interaction with spaces, with people, with objects. Through temporal analysis we could understand parameters such as presence, speed, proximity, to redesign spaces and services.

The essay explores the directions taken by design that can be considered time-based, to identify the temporal and convergence tools that can prefigure future spaces and ensure coherent and congruent visions based on collaboration rather than competition, presence rather than absence, optimization of space rather than unsustainable waste of resources.

The essay aims to demonstrate the relevance of temporal dimensions, which offer increasingly reliable tools, called chronotopes, available to Future Studies to identify trajectories and possible configurations of the world in which future generations will live.

Keywords: Time-based design · Chronotopes · Futures · convergences · Spatial design

1 Temporal Geometries

Time has always been a parameter in the design of spaces and all cultures have tried to represent it, both in a symbolic way to explain it, and in a semantic way to be able to use it.

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Exploring the different forms of time, we will find different geometries, each serving to represent, but sometimes also as a design tool:

– *linear* which is often how the story is treated, as a single line of sequences
– *circular* which is linked to seasonality and the cyclical nature of small recurring events
– *parametric* that draws the deformation of space over time
– *layered* that allows a simultaneous reading of distant events
– *overlapped* that represents multifunctionality
– *porous* that represents the unused spaces able to absorb small growths and compressions without collapsing the system.

2 To Design Form of Time

What is increasingly evident is that, in recent years, we are engaged in designing forms of time, much more than forms of space. This has become evident with the digital revolution, but even more so because of the current pandemic.

Designing with time has been happening forever, even the technologies of the 20th century were technologies of speed, of acceleration, but digitization has led to other dizzying movements, to a compression of spaces due to co-presence, ubiquity, overlapping, increasing congestion of spaces and peak stresses on infrastructure and spaces.

Those who study the future must think that managing the forms of time, and coordinating them, is a necessary step toward sustainability. The spaces that the 20th century has left us, are spaces designed on an analog world, where the coordinates to be measured were all internal to the same space. Today, our experiences are simultaneously analog and digital, spaces need to be reconfigured because they are oversized or stressed because they are designed with outdated logic.

Research into the potential, that the digital revolution has brought to architecture, began in the early 1990s and the explorations, both in design, theory, and construction, have been visionary and promising of spatial experiences. In contrast, today there is a sense of inadequacy related to the real estate market and the actual spaces in which we live. Static built spaces, insensitive to the new forms of living that the revolution of digital technologies has introduced (Carpo 2013).

Today we live in a multi-temporal connection in a continuous and 'liquid' flow. When the concept of 'liquid modernity' was introduced (Bauman 2007), a deep reflection on the spatio-temporal morphology of places, relationships and technologies was initiated and is still ongoing.

From that moment on, interior design could no longer be the same as before, because the fluidity of time would also reshape space. Spaces were no longer the frame, the reference set, of human actions but became one of the possible media, able to allow adaptability and flexibility, in a continuous flow of changes characterized by an endemic uncertainty.

The concept of liquid space was adopted by many scholars, architects and designers who adapted it to different contexts. Among them Marcos Novak, who argued "A liquid architecture" is an architecture whose form is contingent on the interests of the beholder; it is an architecture that opens to welcome and closes to defend; it is an architecture without doors and corridors, where the next room is always where it should be and what it should be.

Novak introduced the concept of "liquid architecture" as an expression of the "fourth dimension," incorporating time alongside space, among its primary elements. Novak's liquid architecture would bend, rotate, and change in interaction with the person inhabiting it (Panahi 2017) (Fig. 1).

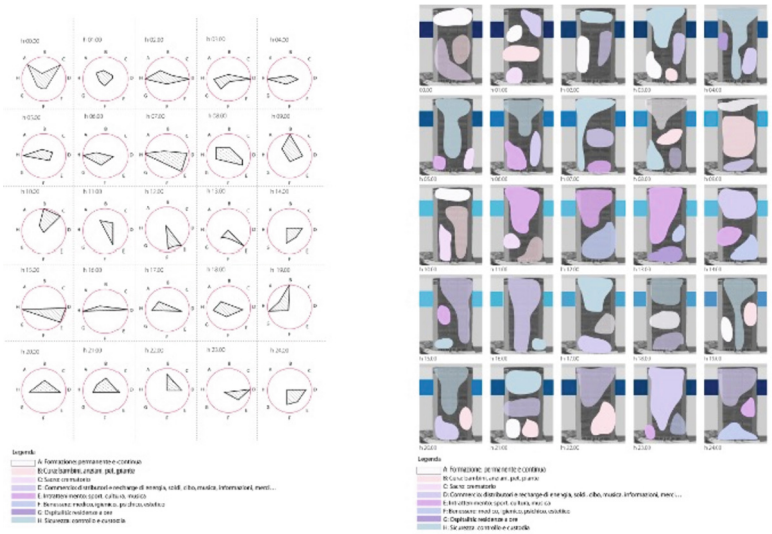

Fig. 1. ON-OFF Chronotopes. Cronos and Kairos project, exhibited at the Venice architecture Biennial in 2010, Designed by the author

3 Time-Based Design

The definition of time-based design comes from Leupen, Heijine, and van Zwol (Leupen, Heijine and Van Zwol 2005) since they began to investigate how the design of spaces should involve time. Leupen recognized that "the speed of modernization, and the unpredictability inherent in the process, makes it very difficult to establish reality for a medium that moves as slowly as buildings (Fig. 2)."

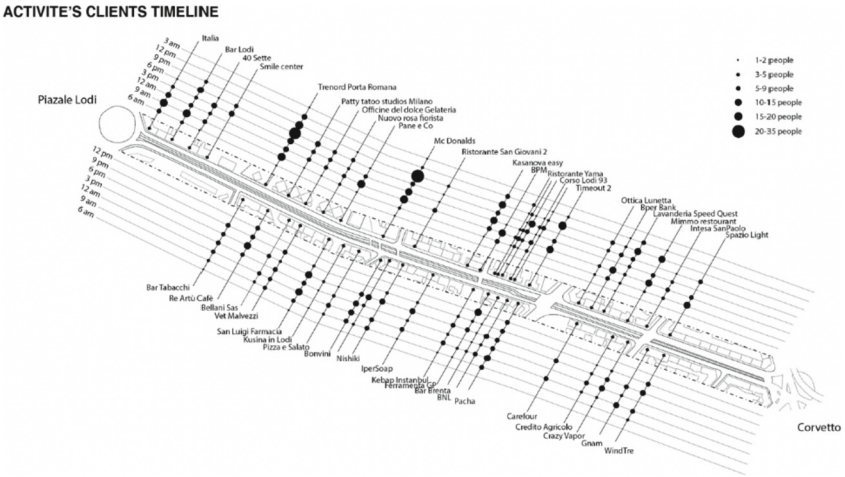

Fig. 2. Chronotopes designed by the students of the ephemeral lab, Politecnico di Milano, a.a. 2021–2022

The term, borrowed from video, sought to describe the difficulty for spatial designers to establish a living relationship with places, while the transformation was underway.

The issue has a genealogy in the 1930s, when Johannes van den Broek and Mart Stam began experimenting with forms of time-based architecture, in an attempt to enhance spaces, questioning the flexibility of environments during the hours of the day. The solutions were very flexible and visionary, so much so that they became a reference, many decades later, when the master plan and design of the International Passenger Terminal (2002) in Yokohama was designed by FOA (Carpo 2013).

Time-based design approach has its own history, that has several strands in space design: those that explored the digital revolution as a possibility to modify spaces over time, such as Eisenman, Lynn, Oosterhuis, and Novak; those that rooted transformations within physical space, as a bottom-up requirement.

The utopian strands of radical architecture also touched on the time-based approach, considering that the temporal dimension would transform buildings into living machines, vehicles on a building scale, adaptable to inhabitants and contexts in a dynamic relationship with people and places (i.e. Walking City by Archigram, Generator Project by Cedric Price and John Frazer).

Others sought to make humans, and their spaces, interact through computers and robots capable of accommodating time spent in spaces.

Finally, the revolution introduced by smart technologies has led to a further possible scenario in time-based design, related to the mediation, between humans and spaces, that these devices play in acceleration, compression, temporal overlap. They can accommodate ever-changing temporal and functional instances within real spaces (Hassanein 2017) (Fig. 3).

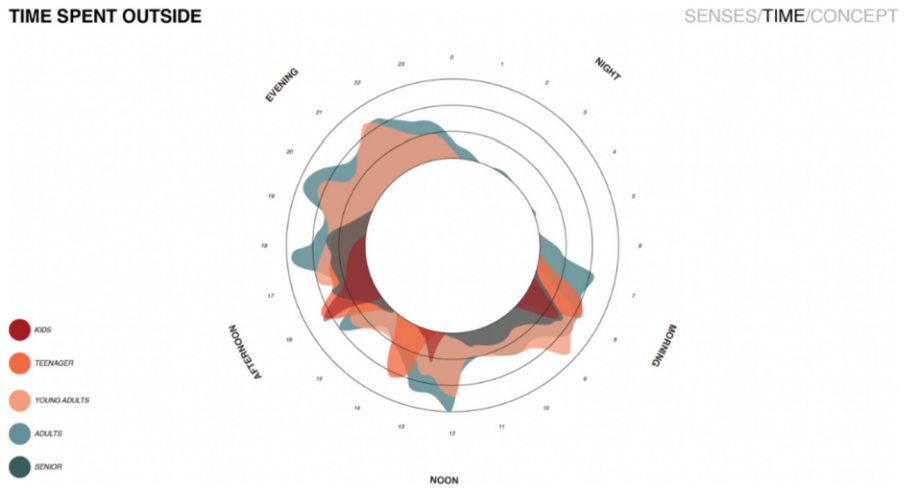

Fig. 3. Chronotopes designed by the students of the ephemeral lab, Politecnico di Milano, a.a. 2021–2022

4 Time Design in the Media Era

Indeed, the most significant implication is related to the advent of smart technologies, which reshape spaces, interiors, architecture, buildings, and infrastructure according to needs, desires, and environmental conditions, as well as personalize the experience (Carpo 2017).

The impact of digital technologies on time-based design concerns not only the production and construction of spaces and their performance, but also the possibility that space "can be controlled, enacted, and animated by digital means" (Bier 2018).

Temporal space, as configured by new media, replaces, or adds new possibilities, but more importantly intensifies social presence. Mobile media have increased spatiotemporal flexibility in social interactions. Time and space have amplified degrees of freedom requiring more flexibility, negotiation, and reconstruction of roles and rules, both in private and in public (Barbara 2020).

Communication makes many activities shareable. When we are connected, we experience co-presence because, in Heideggerian terms, the physical space we are in is juxtaposed with the phenomenological space.

This is a negotiation based on a subjective sense of space and time that, to ensure the process of interaction, requires maximum involvement and identification. The greater the inclusion and involvement, the better the interaction. Context, the space in which the body is physically present, becomes the background and not the scene of the action (Light 2006).

Not only does this give us extra space, but it makes us open, in real time, to monitoring, control, and most importantly, availability. Places and times of disconnection are increasingly rare: everything that can be done online is open 24/7 (Barbara 2012).

5 Chronotopes

If time becomes strategic to design, it is necessary to find forms of representation, measurement, semantics able to help projections for the future.

By constructing chronotopes, we begin to investigate the relationship between space and use, between mobility and digitalization.

Chronotopes can be indispensable tools to analyze, monitor, and project the future of spaces, communities, and entire pieces of cities. Whether it's a house, oversized and inflexible, with respect to the advent of digital; whether it's an existing building, whose function has expired, and new functions need to be reprogrammed; whether it's a train station crowded, for a few hours a day and left otherwise empty.

What should be the correct sizing of a school considering spaces based on their actual use?

One interesting suggestion that emerges is that, for example, many spaces could accommodate many more functions than they have, simply by staggering the program of activities. But this should be given to designers as a starting brief, that is, to think about all the possible lives of the spaces they design.

Chronos et Kairos, in fact, was a project exhibited at the 2010 Venice Architecture Biennial, which tried to host, within the Pirelli skyscraper in Milan, a program of functions that kept changing according to the hours of the day and night. It was filled with commuter-based amenities and spaces to be open 24/7. A way to reuse a building with new lives.

Similar situations could be found in parking lots, or stadiums or stations… and the list could be long.

Does anyone who designs a stadium think about the fact that it only works on Sunday afternoons, maybe even Saturdays, and empty or closed for the rest of the week? What happens on other days? Is an empty stadium a sustainable cost to the owner, to the communities, to the land? (Fig. 4)

It follows that the city is filled of spatial voids, that are temporary, sometimes because they may have fulfilled their function, so they are momentarily empty.

These spaces are not those kinds of voids, the large disused areas, but to the emptied spaces, like the huge subway stations sized only during rush hour, the rooms we don't use because we are in offices…. the spaces during their off- time.

The buildings we will design in the future, will increasingly be "time clocks", which we will ask to synchronize the timing of activities and communities. We can no longer afford monofunctional spaces.

Buildings must be designed to be adaptable over time… because even when they are closed, they use energy, and have social and economic costs.

An empty school at night, or a train station deserted 90% of the time, are unsustainable forms of waste (Barbara 2012).

Using chronotopes, for example, we can measure the on-off activities expected in spaces. This analysis is very interesting because it allows us, for example, to understand how much there are oversized spaces compared to their use and how to downsize them. And if you think about post-pandemic offices you can see how important this assessment is. (Ling and Campbell 2010).

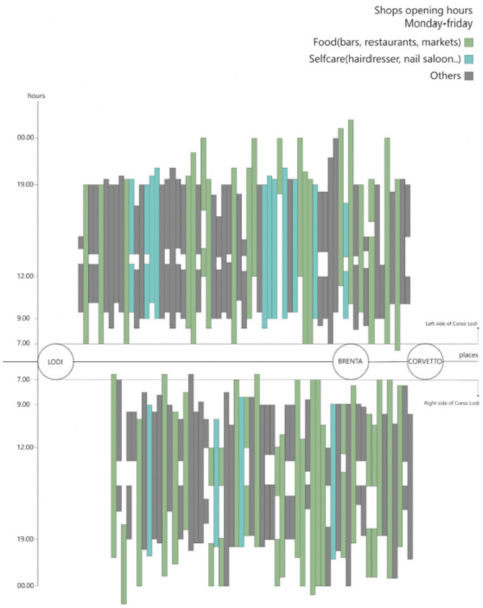

Fig. 4. Chronotopes designed by the students of the ephemeral lab, Politecnico di Milano, a.a. 2021–2022

Therefore, chronotopes have developed over the years, which are forms of analyzing, representing, and writing about the world in motion, the temporal aspects of space (Devron and Gwiadzdzinski 2017) (Fig. 5).

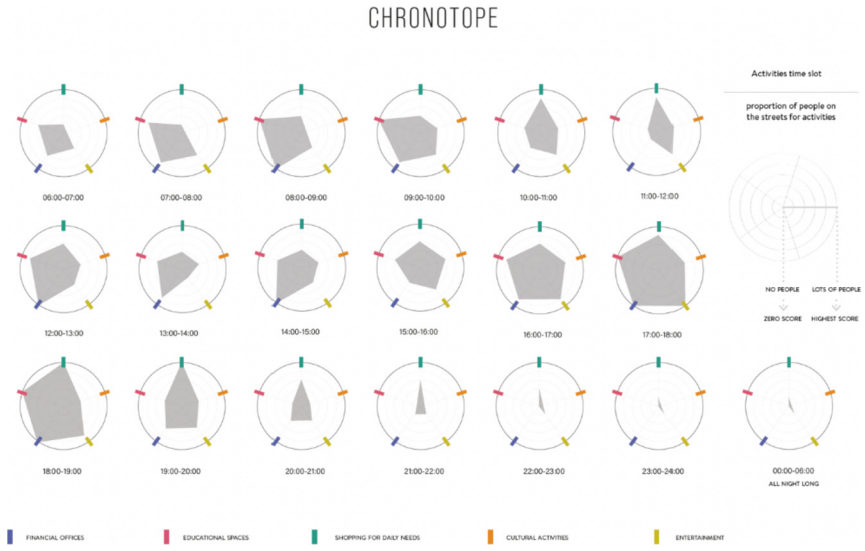

Fig. 5. Chronotopes designed by the students of the ephemeral lab, Politecnico di Milano, a.a. 2021–2022

6 Can We Use Chronotopes for Creative Futures?

If time then becomes measurable by space-linked algorithms, then it is conceivable that Future Studies would be able to use them to investigate forms of futures in space design, architecture, and planning. They would become not only a tool for projection, but also a tool for transformation, control, and guidance of alternative futures.

In addition to the algorithmic dimension, we must add the narrative one, which is able not only to simulate and narrate, but also to connect, as happens in cinematography, temporal, and spatial sequences according to a not exclusively linear logic.

As it happens in cinematography, where some movies draw a multi-chronemic narrative, moving along stories, creative sequences, and developments, able to bend time and space according to compelling geometries, so in Future Studies the construction of temporal architectures, dynamic and parametric, could allow spatial reconfigurations more suited to the ongoing transformations.

There are movies, we all know, such as Interstellar, Tenet, Inception, and others, where the story jumps around in time, back and forth in a way that is sometimes almost impossible to follow.

But it's interesting, because it represents just that multi-temporality that we're experiencing, even with the same feeling of vertigo.

Chronotopes also help us understand that there is not just a unique present and a single future.

It is evident that we can no longer speak of a single time, but of temporalities that move at different speeds and on different planes. The alternative present, as well as the possible, desirable, probable futures, etc., are the same (Raby and Dunne 2013) of a community, or an economy, or a country do not move in sync with each other. The future of one area of the planet may coincide with the near past of another, or our present coincide with desirable futures of some other country.

Our future may yet happen or perhaps somewhere it has already happened (Fig. 6).

Fig. 6. Chronotopes designed by the students of the ephemeral lab, Politecnico di Milano, a.a. 2021–2022

7 Conclusion

The liquidity that Bauman wrote about, adopted by Novak and designers inspired by the digital revolution, is therefore mixed with the temporal revolution introduced by the media in our daily lives. These are all the elements to start a time-based design exploration in the Future Studies about the spaces we live in.

It is therefore necessary for Future Studies to adopt new paradigms, make a synthesis of existing approaches and define criteria for the measurability of the results achieved.

Above all, it is necessary to graft the know-how and the results of these experiments into the profession, even in the most ordinary design, and into the spaces where we will live.

Chronotopes should be the tools of analysis and representation to understand the new relationships between time and real and virtual spaces; to introduce in architecture and in architectural education methodologies and software able to model spaces through time. Regarding the production and construction of time-based forms of space, robotics will continue to intervene in the customization of possible shapes, sizes, interactions. Finally, for experience design, an interactive dimension will be able to manage spaces adaptively according to the demands of an increasingly diverse society.

These conclusions are not the goal, they are the result of exercises carried out in my Laboratory of Spatial Design at the Politecnico di Milano, where we are designing a process of systematization of the existing spaces for educating designers capable of developing Future Studies including time-based qualities in future projects and spaces.

Designing the forms of TIME must not mean designing speed, but it will also have to mean designing rhythm (Lynch 1960) or designing slowness (Sennett 2018). It will not have to mean designing only the future of a small, wealthy elite. The competitive time we have experienced so far has created a divergent future that we can no longer sustain.

We will have to design times that are conciliatory (Bonfiglioli 1990), that slow down, if necessary (Sennett 2018), that decrease eventually (Latouche 2021), that are collaborative with neighboring communities (Manzini 2021), and inclusive of futures, able to bring together innovation and sustainable development accessible to most people.

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