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Temporal Design

design for a multi-temporal world

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Abstract

Our lives are composed of multiple rhythms, but many of us, living in Western industrialised societies, believe that the world is moving ever faster. Many of us also feel the range of negative impacts that this supposed condition of acceleration brings to everyday life, to social interactions and to the natural world. From attempting to reconfigure our bodies through caffeine and other stimulants to working longer hours to manage the rush, or wondering how it is damaging our environment, we all eventually experience a sense of powerlessness regarding this supposed rule of acceleration.

Acceleration, however, does not correspond to how the world *is*, but how it *is presented* for *some* people, in *some* situations. The notion of acceleration as a universalised condition is just an expression of dominant narratives of time, which are embedded in accounts of what it means to be modern or postmodern, and which have been recently demystified in the social sciences and the humanities. The world is comprised of multiple temporal expressions, which continue to play important roles in our lives, despite being disregarded within dominant narratives.

This thesis analyses the role of these narratives as well as different approaches to time in design. It suggests that the hegemony of such accounts has been restricting design practice in three main ways:

1. by monopolising designers' understandings of time and precluding the exploration of alternative expressions and more recent theoretical work on time;
2. by locating temporality within technological artefacts and systems and ignoring the breadth of expressions beyond and around these technologies; and
3. by simplifying proposals for a diversification of temporal notions that would otherwise contribute to promoting more varied perceptions of rhythms. This simplification is particularly noticeable in the outcomes of the Slow Technology and Slow Design movements, which have failed to acknowledge such narratives and have become integrated in them rather than challenging them.

The research proposes *Temporal Design* as a new perspective on time in design, one focused not on a particular rhythm or temporal expression, but on the multiplicity of ways in which we

all inhabit time, in its contrasts, combinations, changes and superpositions. *Temporal Design* is based on three principles:

1. identifying dominant narratives and attempting to challenge them so as to reveal more nuanced expressions of time;
2. drawing attention to specific alternative temporalities; and
3. tactically exposing networks of times so as to illustrate multiplicity and variety.

The research invites designers to disturb taken-for-granted notions as a method of approaching principle (1) outlined above. It discusses the limitations of current Speculative and Critical Design approaches to tackling more complex issues of time, proposing instead a *critical affirmative attitude* toward approaching principles (2) and (3) outlined above.

Temporal Design is explored in this research via three design interventions, namely the Family Clock, the Printer Clock and the TimeBots, which have been performed in both family homes and schools. The interviews conducted in the context of these interventions showed how dominant narratives are deeply embedded in the language used to describe temporal expressions. The interviews, however, also demonstrated how multiple temporalities are manifest beneath these concepts, how practices come together to construct multiple expressions of time and how temporal interpretations are essentially detached from issues of value. Most importantly, the interventions demonstrate how designers can foster temporal empathy, and disclose more nuanced, situated and complex temporalities and rhythms.

Many authors have argued that design has the power to change perceptions of the world. By shifting the focus from individual modes to diversity, *Temporal Design* attempts not only to change the way designers perceive and approach time, but also to change more broadly the way designed artefacts and systems come to affect temporal perceptions among the general public. Perhaps through design, we will all come to recognise that acceleration is not the rule, but just one among many expressions of the rich temporal texture that constitutes time in the world.

Acknowledgements

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Part I

Introduction

Chapter 1

Introduction

1.1 Overview of context

An often-referenced passage in works on *time* is an excerpt from St Augustine's *Confessions, Book IX* where he states *''What then is time? If no one asks me, I know: if I wish to explain it to one that asketh, I know not.''* The popularity of this aphorism reflects the complexity of studying time as a subject. Time is not only fuzzy and mysterious, but also very mundane. We are never quite sure what it is, but it is taken for granted, so much that it can disappear from sight, becoming a simple fact of the world.

This invisibility of time is nevertheless dangerous. As a range of social scientists have shown, time is not neutral. Rather than being a single, all-encompassing flow as Newton suggested, our concepts and experiences of time are culturally shaped. In Western industrialised societies this includes the dominant narratives of ''clock'' and ''network'' time, which promote notions of temporal discipline, optimisation and acceleration in the first case, and constant connectivity, flexibility and real-time in the second. However, even though the concepts of clock-time and speed, designated by these narratives, seem relatively self-evident, they do not capture the variety of ways in which time is mobilised in everyday life. Therefore, incorporating and sustaining such narratives narrows the vocabularies used to understand the temporal condition,

generating difficulties in expressing and intervening in problematic experiences of time. It also has negative impacts on rhythms of the everyday, on social organisation and on our relationships with the natural world.

Most of us are familiar with these impacts. Promoted by these narratives, the notion of acceleration as a universalised condition is becoming ever more pervasive, implying that everyone's status is precarious. This supposed dominance of acceleration introduces internalised pressures, creates hierarchies of rhythms and justifies the appropriation of other people's times in inequitable ways. Furthermore, the flattening of temporalities into one objective, linear and progressivist notion conflicts with the rhythms of the natural world, which are contextual and multidimensional and which manifest in qualitatively different ways (Adam, 1998; Bastian, 2012).

As with society more generally, the dominance of these narratives influence design practice in different ways. By monopolising designers' awareness of the role of time in social life, it prevents them from considering alternative rhythms. Thus, although designers have been exploring issues of time for decades, these explorations are still restricted to treating time as a parameter of artefacts and systems, incurring different degrees of technological determinism. A few proposals that demonstrate a more reflective attitude towards time have recently emerged, but as they do not challenge dominant narratives of time, they have been simplified and integrated into the same discourse they attempted to criticise, and temporality in design has yet to evolve toward more pluralist accounts.

This research, therefore, calls on designers to challenge these dominant narratives of time, and proposes *Temporal Design* as a new perspective on time in design. In this perspective, designers would tactically map alternative temporal expressions and affirm them within contexts monopolised by single notions. In this way, artefacts and systems would lead individuals to reflect on the variety of rhythms around them, changing the focus from single to multiple times. In this work, *Temporal Design* is explored through three design interventions, which not only map the influence of these narratives, but also demonstrate the potential for design to create environments that support participants in becoming more aware of multiple expressions of time.

1.2   Questions, aims and objectives

The main research question addressed by this study is:

How can design contribute to an expansion of perceptions of time and rhythms?

This main question leads to the following sub-questions:

1. What are the current theories that can contribute to a better understanding of time in design?
2. How do artefacts and systems shape perceptions of time?
3. What is design's role in shaping these perceptions?
4. How can alternative notions of time be explored through design?

The aim of the research, therefore, is to analyse the current state of theories of time in general, and of time in design more specifically, and to look for methods of exploring alternative notions *through* design practice, in order to promote an expanded perspective of time in design.

To answer the research questions above, the following objectives were defined:

1. to identify critical trends in theories of time;
2. to map current design attitudes towards time;
3. to bring current critiques of dominant narratives of time, available in other areas of study, into the design context;
4. to investigate design opportunities for exploring perceptions of time;
5. to seek out models that might help with an exploration of alternative perspectives of time in design; and
6. to produce a series of practical design examples that exemplify these alternative perspectives.

1.3   Scope and methods

This thesis examines the scope of the theories of time developed by philosophers, historians, human geographers, anthropologists and social scientists, focusing in particular on recent discussions around the dominant narratives of ''clock'' and so-called ''network'' time that have been established by influential works such as Mumford (1963); Thompson (1967); Castells (2003); Virilio (1995); and others. In this discussion, a concern has been raised that such narratives are monopolising theorists' interpretations of time; this is expressed, for example, in the work of Adam (1995); Birth (2012); and Glennie and Thrift (2009). This research transferred this critique from the humanities to the field of design, through an analysis of a similar influence on the way designers have approached time over the last few decades. The elaborated theoretical review in other areas of study was therefore essential for situating current approaches to time in design within a larger discussion of issues of temporality, identifying current limitations as well as possibilities for expanding the scope of design practice.

The theoretical review has been conducted in dialogue with the development of practical design artefacts and interventions, which in this thesis, and for the sake of clarity, have been divided into two groups:

1. In the first group, the practical work is referred to as *Design Exercises*. These were deemed responsible for guiding reflections on the way design has approached temporality over recent decades. The overall research was motivated by a concern that time has been under-explored, and viewed as a feature of interfaces or something that is regulated by artefacts and systems. This consideration resulted in an in-depth investigation into more reflective approaches to time in design. The discussion of each of these approaches was extended through practical exercises, so that each major issue was explored both in theoretical and practical terms. The three artefacts that resulted from these explorations are presented in this thesis together with their respective discussion themes. Importantly, these artefacts were mostly grounded in current design contexts, while the interventions below were aimed to explore participants' perceptions.

2. In the second group, the practical work is referred to as *Design Interventions*, which were specifically developed to explore the multiplicity and interconnectedness of time, as is manifest in the *Temporal Design* proposal. These interventions consisted of a designed artefact and a set of participatory exercises intrinsically connected to the artefact. They were conducted in family homes and schools and were further investigated through semi-structured interviews, shifting attention from the design context to participants' reactions. The three interventions developed in this research were based on sets of different methods. The first was inspired by Harold Garfinkel's (1964) ''breaching experiments'', which are social science experiments that attempt to unsettle familiar perceptions in order to enable a deeper understanding of practices that are taken for granted in everyday life. Perceptions of time are often constructed by carrying out activities in time in an unreflective way. Therefore, disturbing the ''time-as-usual'' perception can help participants to discuss how they think and relate to time in their daily routines. The other two interventions called for a renewed critical attitude toward design, which contrasts with the approaches associated with Speculative (Dunne, 1999) and Critical Design (Dunne and Raby, 2001), as it focuses on the present condition and on affirmation. In this *critical affirmative approach*, alternative temporal expressions would be reinforced and promoted as part of the temporal context. Finally, the artefacts developed for these interventions attempted to leave space for participants' interpretations (Sengers and Gaver, 2006) in an approach to practice that considers the designed artefacts to be a probe, a trigger for reflection or a stimulus for understanding social practices (Hutchinson et al., 2003).

This research can therefore be considered as carried out *through* the design practice, in the sense that the application of design skills was key to addressing the problem of temporality in design (Frayling, 1993) and that the resulting artefacts provoked reflection and articulation of new insights (Gaver, 2012).

This thesis presents the research in a rather linear way, starting with the theoretical review, which is followed by the analysis of time in design, the definition of Temporal Design and the design interventions. The process, however, has not necessarily followed this order. The first design intervention, the Family Clock, was carried out in parallel with other Design Exercises and triggered the investigation into cultural assumptions about time, which then led to the theoretical review drawn from other disciplines. Similarly, the concept of Temporal Design was defined iteratively with the Design Interventions presented in Chapter 6.

1.4   Research contributions

The major research contributions of this work are as follows:

1. **Design perspective:** the analysis reveals the narratives of time we live by, inviting designers to reflect more generally on the kinds of narratives they support, and the ones they would like to construct. It also reveals the need to increase dialogue with other disciplines and approach theory in more critical ways.

2. **Design subject:** the research inaugurates *temporality* as a renewed topic of research in design, pointing to the plurality of expressions of time.

3. **Design approach:** the work proposes a new approach to time in design, referred to as *Temporal Design*.

4. **Design examples:** a final contribution relates to the designed artefacts that incorporate the *Temporal Design* approach.

1.5   Structure of thesis

This thesis is divided into five parts; the first and present one has given an overview of the thesis in terms of its theme, aims and contributions. The part following on from this (Part II) provides an overview of different theories of time in the disciplines of philosophy, history, human geography, anthropology and social sciences. This overview is key to understanding the issues addressed by this research, as it explains in detail what is meant by dominant narratives of time, how these narratives have been constructed, why they are problematic and how they have been contested by recent theories. It concludes by exposing how different theorists have indicated ways of reconstructing perceptions of time based on a plurality of narratives.

Part III of this thesis moves the focus back to design. It is divided into two main chapters (3 and 4). Chapter 3 reveals how designers have unwittingly supported these narratives throughout the years, while Chapter 4 presents recent attempts to diversify approaches to time in design, and argues that formal movements such as Slow Technology and Slow Design have nonetheless been appropriated by these dominant narratives. This chapter also includes a discussion of attempts to redesign the clock, as a way of emphasising alternative perceptions, some of which will be later recovered in Part IV of this thesis. The chapter is structured by three *Design Exercises* developed in this research, each regarding a proposal to support a diversification of rhythms.

Part IV introduces the concept of *Temporal Design*, and describes and assesses the three *Design Interventions* carried out to explore this concept, while the final part discusses the main contributions of this work to the field of design, establishing directions for future work.

Part II

Understanding time

Chapter 2

Narratives of time

Since Isaac Newton wrote his *Mathematical Principles of Natural Philosophy* (1687), different theories have continued to nurture the idea that time is uniform and universal and moves linearly towards a more developed state. According to this notion, there is one single temporal expression, to which everyone is equally submitted, and whose change is often associated with technological developments. New technologies would therefore promote the replacement of one notion by another, and individuals would have little choice but to fit in. These accounts are tailored in accordance with broader narratives of what it means to be modern, post-modern, or part of the network society or any other trend that gives identity to the Western culture; naturally, they produce great simplifications.

Generally speaking, it is possible to define two main trends within narratives of time: one associated with a modern and another with a post-modern narrative. According to the first, humans have lived, in a distant past, in a state of basic harmony with their bodies and with natural rhythms. They would have then evolved to acquire a temporal organisation based on tasks, still in a relative equilibrium with the environment; however, this scenario would be completely altered by the arrival of industrial capitalism. The harmonic temporal order would then be subsumed by the rule of the clock and introduction of rigid schedules, inaugurating a new temporal discipline that would affect every single person and thing. Clock-time is therefore often considered the opposite of natural time, and its invention is held responsible for irreversibly changing temporal perceptions of Western industrialised societies. The second trend, associated with post-modern narratives, builds upon the modern ''rule of the clock'', but

in this case the industrial notion of time would have been overthrown by a fragmented notion of network-time. While the first evokes discipline, optimisation and acceleration, the second, often referred to as a ''compression'' of clock-time, would be based on constant connectivity, flexibility and real-time.

This chapter gives an overview of these narratives, discussing main problems of acceleration and temporal hierarchies, and finally presenting current alternative approaches to theories of time in the social sciences and humanities. Understanding these narratives is essential to considering how they have influenced design practice over the years. The more we focus on accounts of ''clock'' and ''network'' time, the more we disregard a multiplicity of other temporal expressions that are characteristic of social and natural contexts. This way, several practices, individuals and social issues are also disregarded, while others are reinforced, creating hierarchies of time and consent inequalities that affect both the social and natural worlds. By supporting these narratives, even unwittingly, designers are restricting themselves to narrow interpretations of time, which limits their imaginative and material possibilities; this will be later discussed in Part III.

2.1   Dominant narratives of time

2.1.1   Clock-time: discipline, optimisation and acceleration

Several theorists support that the notion of linear progressive time, which is so intrinsic to Western industrialised societies, started to gain shape with the Enlightenment. According to this line of thought, the valorisation of reason, epitomised by Descartes' *''cogito ergo sum''*, brought a new consciousness to European intellectual elites, who started to recognise that progress could be advanced by method, organisation and institution. These elites would have assumed that the rhythms of the world could and should be shaped to achieve progress, inaugurating a long term dichotomy between ''forward-looking'' expressions of time, related to technological and economic progress, and the slow and stable time of nature. David Harvey states: *''progressive elements within the bourgeoisie could reasonably hold to the Enlightenment sense of time [...], recognizing that they were fighting a battle against the enduring and ecological time of traditional societies and*

the retarded time of recalcitrant forms of social organization'' (Harvey, 1989, p.261). The wish to control ecological time, however, can be identified in several human practices that predate the Enlightenment. Barbara Adam (1994) maintains that the effort to impose control over the external temporal world, or ''embedded time'' in Hagerstrand (1988, p.10) terms, is a human characteristic and an expression of the will to transcend the timespan of their existence.

While the Enlightenment may have been responsible for giving the elites a progressivist desire to seize control of time, the invention of the clock and succeeding intensification in the use of timetables and schedules are often held responsible for the success of the industrial project, as they enabled the organisation of the masses and promoted the rhythms of the factory. This narrative is best captured by historian Lewis Mumford in *Technics and Civilisation* (1963); he affirms that the roots of industrial capitalism can be found far back in history, in the routines of the ancient Benedictine monasteries, which helped to create the temporal infrastructure that sustained industrialisation:

> *[the clock] spread outside the monastery and the regular striking of the bells brought a new regularity into the life of the new merchant and workman. The bells of clock tower almost defined urban existence. Time-keeping passed into time-serving and time-accounting and time-rationing... [the clock] dissociated time from human events and helped create the belief in an independent world of mathematically measurable sequences* (Mumford, 1963, p.14).

Mumford's account has deeply influenced the literature of timekeeping devices as technological determinism. According to his theory, clocks were given the single role of serving industrialisation and capitalism, disregarding the complex range of practices they mediate (Glennie and Thrift, 2009, p.71).

Another strong influence on subsequent literature on time was E. P. Thompson's *Time, Work-Discipline and Industrial Capitalism* (1967). The paper analyses how the establishment of a new temporal organisation based on clock-time shifted the organisation of labour from a regime based on tasks to one based on hours. This shift is understood as affecting all aspects of everyday life, beyond labour and work environments. It is therefore assumed that time, for pre-industrialised societies, was expressed by an array of tasks. In other words, instead of referring to clock-time, one would refer to an activity in order to describe the timing of an event or its duration. Thompson (1967, p.58) presents that, in the 17th century, the cooking time of an egg was measured by an Ave Maria said aloud. This task-based form of time was regulated

on a higher level by religious activities and natural rhythms, and would have been gradually replaced by clock-time expressions and subsequently regulated based on hourly throughput, which resulted in an increasing sense of *''time-thrift''* (Thompson, 1967, p.78).

The association of clock-time with time-thrift is epitomised by Frederick Taylor's influential scientific management studies. These studies broke down human productive activities into component actions, which were timed and rearranged across workers so as to compose the most efficient workflow. This organisation prevented workers from understanding the full process in which they were engaged, alienating them from the final products (Montgomery, 1989, p.223). Time here is conceived via its objective expression, which many claim to be directly influenced by the Newtonian vision of time as ''absolute, true and mathematical'' and which ''flows equably without relation to anything external'' (Newton, 1687, p.6). This objective time could therefore be re-interpreted as sequences of discrete units subjected to rational order, which, according to capitalist logic, should be reduced as much as possible in order to maximise profit. This way, work is dissociated from the produced artefacts, in contrast to the more thorough process followed by artisans. Time, then, became an abstract container. It could be divided, filled up or even expanded by the intervention of labour-saving instruments. As famously illustrated by Charles Chaplin's *Modern Times* (1936), workers were submitted to the habituation of this new disembodied temporal discipline, which ruled with the help of clocks as an external authority, independent and indifferent to human presence; many claim that this opened up a divide between ''life time'' and ''world time'' (Nowotny, 1996, p.48).

Within this narrative, it is assumed that all social spheres contributed to instilling and maintaining the temporal discipline of the factory, from families to churches and schools (Thompson, 1967, p.84). A series of innovations, such as the railway, the newspaper, the telegraph etc., is also assumed to have contributed to the spread of temporal exactitude and discipline from work and productive realms into the everyday (Thrift, 1996, p.173). As larger groups started to schedule their activities into timetables, leisure, sleep and meals would also start to conform to regular times. The demarcation between ''work time'' and ''life time'' (Nowotny, 1996) was then extended to the whole of society, a demarcation that would come to define a distinction between duty and pleasure, between what one does and what one is made to do and between the actions that are carried out of one's own free will and those that are dictated by an external will.

Taken altogether, this literature offers a picture of the way time has been considered within the modern narrative of the clock; this narrative reduces temporality to the metaphor of a container

that can be squeezed with tasks to increase throughput, increasing the sense of time-thrift and acceleration. However, as mentioned in the introduction, while this narrative has become almost common sense there have been strong criticisms of several of its aspects. Although such accounts are important when considering how capital appropriates the time of workers, e.g. diminishing personal time and controlling the boundaries of the working day, they also result in several simplifications.

The notion of temporal discipline as an external imposition that is internalised as natural has been questioned on different levels. Tim Ingold (1995) maintains that the time intrinsic to the experience of coping with clocks is not itself clock-time. Individuals may seek to attune their activities to resonate with the rhythm of the clock, or to gain a feel for hours and minutes, but that does not turn their bodies into pieces of clockwork. Martin Heidegger's and Maurice Merleau-Ponty's phenomenological studies have inspired some theories that consider time as embodied practices. Pierre Bourdieu (1977, p.8), for example, translates the phenomenological way of understanding the world through acting towards it into a temporality that is expressed through practised bodies and bodily practices; this is also explained by Chris Gosden (1994, p.34) who states that *''people create time and space through their actions. Time and space, in turn, become part of the structure of habitual action, shaping the nature of reference between actions''* (Gosden, 1994, p.34).

Since practices are not confined to specific contexts, temporalities can take on a life of their own, extending to other contexts and combining into other temporal senses (Glennie and Thrift, 1996, p.289). Michelle Bastian (2012) proposes a re-contextualisation of clocks within the social complexity of practices, by considering how they are used as tools of coordination within different social groups. Although the notion of time as an external imposition still mediates most of our temporal experience, it has been increasingly recognised as a well developed narrative that does not correspond to the way time *is*, but instead as one *interpretation* of time in the world.

The propositions that production replaced task-orientation with clock-time (Thompson, 1967) and that social time was replaced by a sort of scientific time (as in Sorokin and Merton, 1937) are both equally disregarded by Ingold (1995), who argues that task orientation is ''indestructible'': it persists in both domestic and industrial environments, especially in contexts with which individuals are familiar, or in which they feel ''at home''. Other authors demonstrate, by means of historical records and ethnographic studies, that not only task-based but also other forms

of temporal consciousness, such as those related to natural rhythms and social agreements, have remained despite the widespread adoption of clocks (e.g. Adam, 1995; Birth, 1999; Gell, 1992; Glennie and Thrift, 2009). For example, Kevin Birth (2012) shows how labourers in the Middle Ages negotiated changes to work conditions based on time spent on the job rather than utilising a task-based time, while Paul Glennie and Nigel Thrift (2009) demonstrate that clocks were in widespread use, and clock-time widely utilised, many centuries prior to the industrial revolution. Thus, these and other critics point out that perceptions of time typically regarded as exclusive to industrialised societies were in fact extant in the past, and, conversely, that so-called pre-industrial approaches to time still occur in the West.

Despite increasingly critical approaches, narratives that describe time as a single disembodied expression represented by the clock and imposed through the logic of production are deeply embedded in Western industrialised societies. These narratives lead us to believe that time is something external with which we need to cope, instead of a multidimensional concept that is created through everyday practices. The idea that clocks control machines and humans alike is an example of technological determinism, which will become even more evident when discussing the role of new technologies in changing perceptions of time.

2.1.2 Network-time: connectivity, flexibility and real-time

Technology-defined time: three characteristics

From the narrative of the triumph of ''clock'' over ''task'' time we move to a narrative of the triumph of ''network'' over ''clock'' time. According to this narrative, information and communication technologies, together with a 24-hour service infrastructure, enabled a new dominant temporal order based on flexibility, fragmentation, and ''real-time'', which is considered to undermine, in many ways, the ''rules of clock''. The technological developments that enabled this temporal order are often assumed as having ultimately freed individuals from the boundaries of natural time, allowing activities to be carried out independently of time and space. This narrative of the triumph of technology-enabled time is characterised by three arguments, as described below.

1) Irrelevance of natural rhythms

The first argument maintains that technological advances have rendered natural rhythms irrelevant to social organisations. Electricity would have blurred the boundaries between day and night rhythms (Melbin, 1987), allowing for work and social activities to take place at any time of the day. The Internet later allowed for these activities to be dynamically carried out asynchronously at any time. The idea of an interchangeability of hours and irrelevance of day and night, however, works only if time is considered in its objective clock-time expression. It ignores, for instance, that the rhythms of the body cannot be simply altered by conventions - as demonstrated by a large literature on the impact of night shifts and sleep deprivation on the health and productivity of workers (e.g. Banks and Dinges, 2010; Weibel and Brandenberger, 1998; Whitehead et al., 1992). As Birth affirms *"human biological circadian cycles are cued by the Sun, then making solar time irrelevant also asserts that those biological rhythms are irrelevant"* (Birth, 2012, p.128).

2) The end of local temporalities

The second argument asserts that technologies would have detached individuals from local temporalities. The invention of the telegraph, radio, telephone, and later the Internet would have eliminated the time necessary to overcome spatial distances (Kern, 2003). John Tomlinson (2007) and Manuel Castells (2000), observe that technologies do not simply accelerate the speed of industrial time but instead replace them with a different sort of "real-time". Immediacy would then have replaced speed with proximity and instantaneity, things that were considered fast, but nonetheless still *"there and then"* are now interpreted as *"here and now"* (Tomlinson, 2007, p.91).

This instantaneity would then have allowed social networks to spread across the globe. Anthony Giddens (1986) uses the term *"time-space distanciation"* to describe the *"stretching of social systems across time-space"* (Giddens, 1986, p.181). Distanciation is directly related to the scope of what Giddens terms *"mechanisms of integration"*, e.g. writing or telecommunication systems. In a similar vein, Harvey shows how satellite communication and declining transport costs have enabled the spread of decisions over a wider space, shrinking the time horizons of private and public decision-making, and leading to a state of *"time-space compression"* (Harvey, 1989, p.147). Focusing on the "network society" (a term used by different authors to identify the group of people affected by the spread of computer technologies), Castells (2000) presents a social-spatial logic that he terms *"space of flows"*, and which refers to the *"technological and organisational possibility of organising the simultaneity of social practices without geographical contiguity"*

(Castells, 2000, p.14). This space, characterised by circulation, speed and flow, is said to have ''superseded'' the world of places. The spread of social systems that become united by networks of communication would therefore have detached social networks from concepts of co-presence and geographic location (see for example Cresswell, 2006; Urry, 2007).

It is, however, important to remember that even if actions are organised and coordinated through a globalised network of time, the existence of this network does not exclude local, idiosyncratic and context-dependent time awareness (Adam, 2008). Different cultures, social groups and individuals may treat and negotiate time based on different rules and rituals, delaying or anticipating time through their everyday practices. Furthermore, the globalised sense of standard time might render other temporalities invisible (Adam, 2002, p.17), but even if unseen, local and situated temporalities are still felt. Night hours are spent differently from sunlight hours (Adam, 1995, p.91), and bodily rhythms are still influenced by changes in natural light. Birth (2012, p.129) affirms that local temporalities, defined by situated social practices and natural rhythms, have not disappeared, but also there is a conflict between the logic of globalised, malleable time and the lived time of experience, which risks making experiences of duration, sequence and daily cycles irrelevant.

3) Radical flexibility

The third argument claims that technologies have allowed for fully flexible schedules, freeing individuals from the rigidities of the clock. With new information and communication technologies, a greater number of collective actions could be temporally uncoupled. Technology-enabled asynchronicity dispenses the necessity of transmitter and receiver, producer and consumer or worker and machine to be present simultaneously in an ever-greater number of cases (Nowotny, 1996, p.94). This asynchronicity, together with a more varied 24-hour infrastructure of commerce, is said to have established a more fluid structure of work-time, exemplified by a recent move away from regular employment schedules towards flexi, part-time and temporary arrangements (Harvey, 1989, p.150). Harvey (1989) shows how modern modes of production, such as those based on the assembly-line, have been challenged by new models based on flexible accumulation, characterising what he defines as the ''condition of post-modernity'': *''capitalism is becoming ever more tightly organized through dispersal, geographical mobility, and flexible responses in labour markets, labour processes, and consumer markets''* (Harvey, 1989, p.159).

Temporal flexibility is often publicised as an advance, but it does not come without a cost. Although for some workers, temporal and spatial flexibility can mean greater autonomy of schedules and perhaps more control over the allocation of their own time, for others it has instead meant a major loss of control, with more unpredictable schedules, more time spent on coordination, more work on weekends and even less time spent with family members (Adam, 1995, p.103). The detachment of work time from collective, public, and familial rhythms impacts both private and public time. Multiple rhythms of daily life are submitted to production time, as individuals need to be constantly available for work, as argued by Nowotny: *"only the availability of people and their substitutes, technological artefacts, opens up the testing of temporal patterns of uncoupling and coupling that can be optimised, which need the temporal norm of flexibility to legitimise them"* (Nowotny, 1996, p.98).

The price paid by workers is in fact often too high, ranging from illness and accidents to divorce and social hardships. According to Adam, it is necessary to admit that *"workers do not operate exclusively in the commodified, rationalised and mechanised time of industrial employment but in a complexity of times which, in turn, need to be synchronised with the times of significant others and the society within which these employees live and work"* (Adam, 1995, p.104).

Narratives that suggest the triumph of network-time and flexibility are not neutral. Neither are personal devices and systems that function as 'temporal masks' (Nowotny, 1996). There is a general belief that technological devices give more freedom to individuals, as implied by John Urry (2007, p.173), who affirms that clock-time *"is increasingly supplemented by a negotiated network of fluid time of mobile communications. Now people can not only be on time or running late but refuse to accept clock time by emailing and especially texting that they are late"*. However, network time is not a refusal of clock time but an extension of it. The focus on devices as mediators of temporal freedom again risks a particular kind of technological determinism, where time is defined by time keeping and communication devices. Furthermore, the freedom to reschedule appointments at will, or what Urry refers to as *"refusing to accept clock time"*, is less contained by devices than by the complexity of social rules in which hierarchies often define who acts and who is left to wait. The idea that flexibilisation means decentralisation is inaccurate; it hides hierarchies and presupposes another, renewed centralisation at a higher level, including extra mechanisms to hold the temporal connections together.

Network individualism and the need to look beyond narratives of time

The three arguments set out above are directly related to a criticism of ''the network'' (or the asynchronicity and spread of social groups in which it results), the criticism being that it promotes both cultural fragmentation and individualisation, and consequently hinders social organisations and puts democratic institutions at risk. This criticism, however, again reinforces the idea that the dynamics of social organisations are determined by the introduction of technologies in a top-down way.

Castells affirms that with the rise of the ''network society'' a new discontinuous pattern of subcultures has emerged (Castells, 2000). The network experience is fragmented through the construction of self-communicative universes; this is considered problematic because *''the more we select our personal hypertext, under the conditions of the networked social structure and individualised cultural expressions, the greater the obstacles to finding a common language, thus common meaning''* (Castells, 2003, p.204). For sociologist Norbert Elias (1992), however, time is an expression of a search for a determination of positions, intervals and the speed of change with a view to one's own orientation. Selecting themes, times, frequencies and listeners is not exclusive to the network environment, although it might be exacerbated by it.

In analysing the behaviour of mobile media users, Barry Wellman (2002, p.15) notes that *''the shift to personalised, wireless worlds affords a networked individualism, with each person switching between ties and networks''*. People switch between networks to obtain information, collaboration, support a sense of belonging according to their needs at each moment (Wellman, 2002). Howard Rheingold (2002) affirms that when it is easier for individuals to connect with multiple social groups, they tend to have limited involvement in each group, which both diminishes the control the group exercises over the individual, and decreases the individual's commitment to the welfare of the group (Rheingold, 2002, p.192).

There have, however, been a few authors who have attempted to consider timekeeping and communication devices within a more complex landscape of rhythms. Glennie and Thrift (2009), for example, draw from Bruno Latour's actor-network theory (1987) to propose a shift in the interpretation of clocks: *''[timekeeping devices] are assemblages of signs and things which are,*

simultaneously, elements of material-semiotic networks within which particular inscriptions of time vary according to how they are used in particular practices, according to particular forms of expertise [...] clock time is not simply a notion projected by human individuals, but a social process, socializing people, devices and institutions'' (Glennie and Thrift, 2009, p.74).

Abandoning the top-down notion of a single time would allow us to analyse how practices are organised around timekeeping devices, and understand how these practices as well as other objects and services influence the complex temporal mesh of everyday life.

Richard Coyne (2010, p.9) uses the metaphor of tuning to describe the way people use pervasive digital media such as mobile phones, personal stereos, handhelds and their support network to *''adjust their interactions with one another and with the places they occupy''*. Coyne argues that because pervasive media introduce small, tactical changes in interpretations of the environment, they can help to formulate a sense of place in a way that is similar to the tuning of musical instruments, through a *''subtle process of recalibration''*. Mobile phones, social media and presence in online spaces does not displace experience but instead complements it (Coyne, 2010). Similarly, designers should consider how artefacts and systems can enable a reconnection with local temporalities, helping to challenge the dominant notion of a single unified time.

The main problem of these narratives, both of clock and network-time, does not reside in their observations but in their inability to recognise other forms of time. Even when a critique is made, it is too often done so in a way that reaffirms the authority of a disembodied notion of time. Such criticisms often focus on what the world has *turned into* within this logic, instead of questioning the very narrative and its inability to include alternative expressions of time, which are consequently relegated to the periphery of these accounts. This is not to say that expressions of clock and network time do not exist, or that they have no impact on everyday life, but the dominance of this narrative is dangerous. There have been a number of pressing issues that invoke the necessity to redeem the multiplicity of times in the world, as well as the need to create new representations that include these expressions. Questioning the dominant narrative would allow us to recognise that clock and network time are just part of this multiplicity of times, and that the negative consequences of their dominance are not inevitable, but instead constructed, and as such can be avoided.

2.2   Negative impacts of dominant narratives

2.2.1   Acceleration, technological determinism and hierarchies of time

Narratives of both clock and network time have helped to sustain the idea that the world is accelerating. The conception of time as a resource that can be monetised leads to the rationale that *''if time is money then fast is better''* (Adam, 1994, p.39). As labour produces goods, and a set amount of time produces a set amount of money, time in idleness becomes equivalent to that amount of money lost, and faster workers become the equivalent of extra gains. While this is the logic of industrialism, network-time in fact reinforces the Marxist notion that the *''economy of time, to this all economy ultimately reduces itself''* (Marx, 1973, p.173), allowing time to be even more freely divided and recombined for the sake of accumulation.

The idea of a world controlled by increasing acceleration has been both enthusiastically supported and vehemently criticised throughout history. At the turn of the 18th century, while Italian Futurists (Marinetti, 1909) declared *''that the splendour of the world has been enriched by a new beauty: the beauty of speed''*, the belief that travelling by rail at 20 miles an hour caused heart disease was widespread (Mumford, 1963, p.198) In *American Nervousness*, George Beard (1881) describes a mental illness caused by the accelerated rhythm of life made possible by the telegraph, railroads and steam power (cited in Thackara, 2006, p.29). Even earlier, at the beginning of the 17th century, Goethe complained that *''wealth and speed are what the world admires and what everyone strives for. All kinds of communicative facility are what the civilized world is aiming at in outpacing itself.''* (cited in Klein, 2008, p.151). Nowadays it is easy to identify a similar love/hate discourse around speed in the media and popular accounts; the value of speed is often emphasised by new technological equipment, work or social practices, all promising to help adapt to an accelerated world. As will be discussed in Part III, design also plays an important role in promoting such discourses.

Speed and the technological paradox

Among theorists, media theorist Marshal McLuhan (1987) is one of the few enthusiasts of technological acceleration. He was convinced that the speed of new media and communication systems would promote a more equitable world, as they would enable individuals to experience across-the-world issues as if they were in their vicinity, spreading awareness of critical issues at a global level (McLuhan, 1987, p.5). The majority of researchers, however, follow a Marxist critical vein. Paul Virilio (1995), a pioneer and still very influential thinker of speed, questions the impact of technologies built for acceleration and faster-moving capital in democratic societies. He proposes that speed and real-time processes would take over from physical spaces, the apparent real ground of politics. These processes would also bring a whole range of practices that would support an overall increase in the feeling of acceleration.

When looking more closely at everyday practices, however, it is clear that the relationship between technological developments and feelings of acceleration is more complex. Time usage is defined more than by the technology at hand. The feeling of temporal scarcity, for instance, cannot be simply related to an increase in work hours, as the trend in time-usage studies shows that work hours have in fact been decreasing throughout history (Gershuny, 2003). Based on this observation, Dale Southerton and Mark Tomlinson (2005, p.232) distinguish three mechanisms that could generate different senses of time scarcity:

1) the substantive *volume of time* required to complete tasks regarded as ''necessary'', which raises the issue of what constitutes a ''need''; these are in great part socially defined, for example in the case, cited by the authors, of young employees who would work more hours in order to consume more and raise their status within their peers;

2) the *difficulty in co-ordinating* social practices when collectively organisations of schedules is becoming ever less common;

3) the *allocation of practices within time*, which, instead of an actual increase in volume of practices, refers to how certain practices are allocated within temporal rhythms in order to create a sense of intensity. This mechanism regards experiences of time that can be described as ''juggling'' or ''multi-tasking'', which are particularly encountered in accounts of working women.

The three mechanisms described above are strongly influenced by socially constructed paradigms: the culture of consumption that blurs boundaries between ''want'' and ''need'', the individualisation of activities and lifestyles and the still-persistent identification of women with domestic practices. Social conventions and expectations overtax experience and are considered by Niklas

Luhmann (as cited in Nowotny, 1996) as the key mechanism for the creation of temporal scarcity. What all this suggests is that time itself is not scarce; scarcity results from a discrepancy between experience - what individuals do, or the time of the practice - and expectation - what they are expected to do, or the time of the dominant narratives.

The relationship between technological devices and an increasing feeling of acceleration is seen as paradoxical by sociologist Hartmut Rosa (2003), who defines three main categories of acceleration: **1)** *technological acceleration*, which accounts for the speeding up of transport, communication and production; **2)** *acceleration of social change*, which refers to the realms of the family and private institutions; and **3)** *acceleration of the pace of life*, which refers to the speed and compression of actions and experiences in everyday life. Rosa identifies a paradox between the first and third categories: if technological acceleration means that less time is needed, this should create more free time, which in turn would slow down the pace of life. It seems, however, that rather than becoming abundant, time is becoming increasingly scarce (Wajcman, 2008).

Nigel Thrift (1996) explains how technological developments might counter-intuitively fail to decrease time constraint. He demonstrates that the spread of the railway system and other innovations in transport, which were meant to reduce commuting time, instead helped to promote the phenomenon of suburbanisation (Thrift, 1996, p.173); as a result, those who spent half an hour walking to work in the 18th century still spent half an hour travelling to their destination in the 19th century, as they lived further away and had to commute longer distances. Bertrand Russell observed the phenomenon much earlier, noting that *''each improvement in locomotion has increased the area over which people are compelled to move''* (as cited in Mumford, 1963, p.272).

In the 1970s, John Robinson and Philip Converse (1972) observed another counterintuitive relationship between domestic equipment and domestic working time: the increase in availability of technology meant that more time was spent on such tasks. According to Jonathan Gershuny and Robinson (1988), the explanation lies not in the technology itself but in cultural and social norms which identified women, those responsible for domestic tasks, with housework; the introduction of technology merely served to specify higher standards of house care. Washing machines did not save time since clothes were washed more often (Cowan, 1983, p.98), and vacuum cleaners were used to clean the floors more frequently (Hardyment, 1988, p.89). Appliances did not immediately save housework time because they were not accompanied by any rearrangement of distribution of labour at home. The time that should have been released by

the simplification of tasks was therefore quickly allocated to increasing the frequency at which the task was performed.

In a study of the way temporal practices evolve with the use of different devices, carried out at a time before the widespread use of mobile phones, Karl H. Hőrning and colleagues (1999) propose three temporal figures to demonstrate how the same technologies, in this case personal computers, video-sets and answering machines, are used to relate to time in different ways: the ''surfer'' figure embraces the technologies using a purpose-oriented and functional approach in order to save time; the ''sceptic'' considers them to cause time pressure and thus limit technology usage; and the ''gambler'' operates them so as to increase time flexibility and juggle different time frames. The study suggests that there is no temporal logic inherent in artefacts. It indicates that technologies in themselves do not lead to either velocity or slowdown, but rather provoke multidimensional practices of time and new meanings of temporality. Although influenced by the objects and systems in their environments, individuals could, at least potentially, opportunistically appropriate these technologies in order to set the pace of their activities according to the rhythms of their lives.

Similarly, for Robert Hassan (2003; 2004), the temporality of the network is accelerated if taken as a whole, because it still follows the logic of commercialism, but this only occurs because most individuals still do not exert real autonomy in their use of technologies. However, *''as users of technologies within an open web, people and groups are able, potentially at least, to learn to become both culturally competent and technologically sophisticated''* (Hassan, 2005). In other words, they become skilled in the use of information and communication technologies and are able to situate their use within the larger cultural context in a way that is ''self-empowering'' instead of ''self-alienating'' (Hassan, 2004).

As will be discussed in the following part of this thesis, designers often take for granted both the necessity of acceleration and the ability of artefacts and systems to determine such senses of speed. An expanded notion of temporalities and rhythms would allow designers to expand their repertoire of time and consider the effect of technologies in more complex terms.

Social concerns and hierarchies of time

These studies of technological developments and speed, however, still too often consider acceleration as given, looking at practices in isolation, without considering socio-political impacts of discourses of acceleration; this is also the way designers often regard time, particularly when considering tools for social coordination (see Section 3.2). Even when considered within the social group, running out of time is often regarded as an individual problem. Sarah Sharma (2013; 2014), in contrast, examines the complexities of social times and the temporalities of those who sustain, but exist in the periphery of accelerated contexts, in order to describe how temporalities take place in a ''grid of temporal power relations'' (Sharma, 2014, p.9) She argues that the discourse of speed has the effect of opening the way for institutions of power to intervene in bodies in invasive and ''inequitable'' ways: *''Claiming that speed is a universalized condition means that everyone is precarious''* (Sharma, 2014, p.9). There are a number of familiar symptoms that show how this culture of speed justifies bodily interventions, from being led to *''maximise our lifestyle with caffeine hits, working breakfasts and television dinners because our unstimulated bodies tend to run at too slow metabolic rate for the work rate expected''* (Wood, 1998, p.97) to a feeling of ''social jet lag'' (Roenneberg et al., 2012) resulting from the reduction of sleeping time and the use of others' time, often in precarious labour conditions, all to avoid and sustain the threat of a sped-up world. More understated, however, is the way the culture of speeding-up justifies the exertion of power by institutions such as the state, the market, enterprises etc., through investment and disinvestment in the temporalities of particular groups (Sharma, 2014). The business traveller and the corporate executive are often at the centre of these narratives, while at the periphery remain those who are invisible but still help to sustain this temporal infrastructure, often equally or more overworked, but receiving low or no wages:

> *the imported domestic servants and housecleaners with no rights to education, health care, or other forms of social welfare and the unpaid labor of women at home are just two of the many examples of populations who have long been disinvested in by institutions of modern power* (Sharma, 2014, p.19).

Sharma (2013) also provides a powerful critique of the emergent cult of slowness. For the anthropologist, slowness occupies spaces where anxieties about the pace of life are pacified. Slow temporal spaces depend on the social relations of the ''fast world'', the same world they are attempting to criticise. This relationship of dependency is also present in the expressions

of Slow Technology and Slow Design movements, which have been widely taken up in the field of design as an activist response to an accelerated society (as discussed later in Section 4.3). The criticism resulting from these design movements, however, also legitimises the narrative of acceleration.

Sharma affirms that focusing on the issue of fast or slow pace without a nuanced and complex conception of the temporal does an injustice to the multiple time-based experiences characteristic of different social groups. There are those who are kept waiting, those whose labour is disinvested by the narrative of acceleration and others. In Sharma's view, more important than a perceived fast world is the fact that people are kept in and out of time, which characterises current forms of capitalism. The world is not moving faster for everyone, in the same way, all the time.

2.2.2   Progress and the rest of the world

Temporal narratives that describe time as linear and progressing towards a more developed state have also served to differentiate Western societies from others cultures, and to increase the gap between interpretations of social and natural rhythms. By embracing these narratives from an uncritical perspective, designers also contribute to perpetuating such structures instead of challenging them.

In their accounts of time, anthropologists have often interpreted practices in a way so as to emphasise the contrast between ''modern'' and ''traditional'' cultures. In these accounts, they propose that the time of traditional cultures is cyclical rather than linear, qualitative rather than quantitative, oriented to stability rather than change etc.[1] (Adam, 1994). Such dichotomies, however, do not really represent the temporalities of these cultures, as they assume a temporal uniformity across populations and across individuals, as well as a consistency in cultural forms that ignore a range of more subtle aspects of time. Instead, these dualistic accounts reinforce the narrative that Western industrialised societies are progressive, up-to-date and more prone to progress than the traditional, backward societies that are locked inside their temporal cyclicalities. By defining more or less developed notions of time, these assumptions

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[1]Such dichotomies have also been used to determine how time is expressed differently for men and women, which is often criticised as a way of arguing for inequalities between the genders (Adam, 2002).

also create hierarchies that do not really exist outside the narrative. Alfred Gell highlights this inconsistency by declaring that:

> *[there is no] struggle between different kinds of time, but the struggle between different classification systems and the real world [...] The 'conflict' is between this attitude, faith in the ability of a certain set of event-and-process classifications to embrace all foreseeable events, and the unfortunate tendency of real events not to occur normatively. The clash is between classifications and reality, not between irreconcilable features of reality* (Gell, 1992, p.53).

The narrative of linear progress not only renders other times irrelevant or minor, but also makes natural world issues invisible. The linearity and supposed objectivity of these narratives do not allow for acknowledgement of complex temporalities of the natural world, which are usually contextual and multidimensional (Adam, 1998, p.9). In other words, they depend on a variety of factors that are interconnected across multiple levels, e.g. slight changes in oceanic temperature may affect local and global weather, or impact natural life on different scales over shorter or longer periods of time. The linear notion also demands that causal connections be established, but the effects of human intervention on the physical world are often not linear, not tied to the time or place of emission, and there are often long periods of maturation before symptoms appear. A shift in perspective to a time defined by the embodiment of practices would therefore have tremendous benefits for environmental action (Adam, 2008).

Furthermore, the progressive time of humans and the time of the natural world are too often considered as belonging to different realms. While human life is regarded as part of an accelerated kind of time, the earth is seen as working on a different timescale, which changes at a very slow pace, and therefore provides a stable ground for human-made progress (McKibben, 2008, p.39). In the face of this contradiction, Bastian (2012) criticises current temporal representations based on the clock and timetables, because

> *while the clock appears to do very well in affording the 'demonic fast-forward' of contemporary capitalism, the equally alarming acceleration of climate change seems to be occurring in a different realm from the everyday lives of many of us* (Bastian, 2012, p.26).

Some authors argue further that this inability to acknowledge the issues of the natural world, together with the above-described social inequalities and increasingly pressing feelings of acceleration, among other other things, is discrediting the idea of progress and of time as running towards a better state. Douglas Rushkoff (2013) maintains that the belief in progress serves to stabilise the differences between experience undergone and expectation of what is to come:

> *Experiencing the world as a series of stories [...] helps smooth out obstacles and impediments by recasting them as bumps along the way to some better place - or at least an end to the journey. As long as there's enough momentum, enough forward pull, and enough dramatic tension, we can suspend our disbelief enough to stay in the story (Rushkoff, 2013, p.13).*

There is, however, a growing feeling that linearity and the continuous pushing out towards the future is becoming an unfounded and unsustainable hope. The gap between the experience of reality, accelerated and superseded, and the expectation of a better future, constantly opening up, has increased too much to be sustained (Nowotny, 1996, p.48). Rushkoff speculates that the narrative structures through which we used to make sense of the world are starting to collapse (Rushkoff, 2013, p.15). This break would lead individuals to look less to the past and future and attend more to the present. This shift in focus could at lest potentially draw attention to pressing issues in the current context, instead of shifting these issues to a later stage. This new context may therefore open up a space for looking at alternative notions of time, which may also expand the repertoire of time in design.

2.3   Visions of polyrhythmia

As argued so far in this chapter, experiences of time are intrinsically related to social conventions, which are supported by dominant temporal narratives that predominantly describe time as uniform, universal, linear and accelerated. This temporal simplification is however becoming increasingly problematic on different levels, as indicated by increasing feelings of hurriedness, persistent social inequalities and disregard for natural rhythms; these symptoms have also become a major concern in design. They have been indeed criticised for several decades - for example by Marx (1973) and Castells (2000) - and more recently, the narrative itself has become

a target of criticism in areas such as social theory (Adam, 2008), anthropology (Birth, 2012; Gell, 1992) and human geography (Glennie and Thrift, 2009). This section discusses proposals that, even if not directly related to this criticism, have challenged the dominant narratives of time by focusing on the multiplicity of temporal expressions.

One of the earliest attempts to approach time in its varied expressions was proposed by Georges Gurvitch in *Spectrum of Social Time* (1964). Gurvitch follows Marcel Mauss' principle of "total social phenomenon" (1954), which criticises the then-common practice of studying social activities in isolation, and considers them as manifestations of an overall social context. Following this idea, time should be considered in all its manifestations, and Gurvitch defines different levels of analysis to help in this complex task, which he terms: ecological level; organisational level; level of modes, rules, signals, signs; level of conducts that hold a relative regularity; level of social roles, collective attitudes, symbols, ideas, collective values and cultural production; and finally the level of collective mentality. He also proposes a model for considering different kinds of time, namely: enduring time; deceptive time; erratic time; cyclical time; retarded time; alternating time; time in advance of itself; and explosive time. These multiple kinds of time would manifest themselves in different proportions in particular contexts, and at the different levels of the context. One could, for instance, refer to the time of modern societies as consisting of mainly "alternating times" if considering the succession of technological inventions, or mainly "erratic times" if considering the time of working classes, of "advance and delay" as manifested in cultural values and symbols or "leaping forward" as manifested in the dynamic of cities etc. (Gurvitch, 1964, p.133). In this vision, different kinds of social groups and different forms of sociability would move across these expressions so as to define their own temporalities, but they should not be considered as isolated as they are intermeshed and affect one another. Although Gurvitch's structuralist approach is problematic, his classification system can be considered too rigid, it interestingly illustrates multiple manifestations of time and the complex ways they clash with and complement each other. According to Gurvitch's definition, groups constantly compete over choices of appropriate times, as *"social life always takes place in divergent and often contradictory manifestations of social time"* (Gurvitch, 1964, p.13).

In a more open-ended manner, Adam (2008) proposes the concept of "timescapes" as a representation of the mixture and clustering of temporal relations in social life. These timescapes are intrinsically social and dialectical, emerging from practices through interactions between individuals, and with the natural and built environments. Adam's notion of scape indicates that context matters; it is where times converge to create an implicit temporal meaning, and where

individual perceptions come together to create a social structure of time. The way this encounter takes place, however, is a complex issue. It is beyond particular groups, and, as suggested by Gurvitch, involves several levels of action. Contrary to Gurvitch's rigid structure, however, they should be understood as a malleable and fluid dimension, set up through everyday actions, and it is this malleability that opens up space for interventions that usually reinforce dominant narratives, but can also be tactically placed in order to challenge them.

Everyday actions play an important role in these strategies. A powerful example of time as created through everyday actions is shown by Henri Lefebvre's concept of Rhythmanalysis (1992). For Lefebvre, individuals experience both inner rhythms (biological rhythms such as respiration, blood circulation etc.) and social rhythms (the result of cultural processes), and both converge on the body in the everyday life. Everyday rhythms are therefore produced both by direct interactions with systems, artefacts and other individuals and by indirect entities such as the structures that support economic and political dynamics:

> *The everyday is simultaneously the site of, the theatre for, and what is at stake in a conflict between great indestructible rhythms and the processes imposed by the socio-economic organisation of production, consumption, circulation and habitat (Lefebvre, 1992, p.73).*

It is within the everyday that rhythms emerge from different impositions are naturalised. These impositions can be manifested indirectly, for example as a social exigency, or be directly imposed, as in the case of commerce hours. They can be impersonal or personalised and appear in the form of employees, societies or an organism, but they confront individuals as something given, something that is part of the natural order of the world. A good example of this naturalisation is presented in Southerton and Tomlinson's (2005) studies of time usage discussed above, in which socially created values blur the boundaries between ''needs'' and ''wants'' . Lefebvre agrees that, although behaviours are strongly influenced by structures of time and well-established rhythms, they still leave the impression of being spontaneously defined, as *''we attribute what results from external constraints to an essential need''* (Lefebvre, 1992, p.75).

A redefinition of time, therefore, is only possible by looking beyond single interactions and into higher-level conventions of social time. Even if thought of as individually determined, temporal strategies always have in them the mark of social time, as people cannot free themselves of the temporal patterns that connect them to others. Strategies of time often take place around

conflicts between the necessity of coping, at a social level, with the limitations of time in the world and the necessity of structuring the time available so as to optimise it towards one's own needs (Nowotny, 1996, p.132). These strategies occur through accelerations and slowing-downs, fixing deadlines, promising, waiting and keeping others waiting, deciding on or committing one's time and myriad other behaviours that situate and negotiate actions in time.

Pierre Bourdieu's famous temporal aphorism *''to abolish the interval is to abolish strategy''* (Bourdieu, 1977, p.6) draws attention to the importance of tactically aiming at practices of time in order to change temporal structures. The interval is what remains negotiable, open to counter strategies, even for the powerless person that waits and to whom power differences are subtly expressed (Nowotny, 1996, p.145). People fix time by inventing intervals, playing with them and making time in everyday ritual gestures and customs. The interval is what links social actions together; it is how people fix time symbolically. It is by acting on the interval and the temporal actions that situate individuals in time, by purposefully tweaking them, that the social structures of time can be challenged. Technologies, in turn, can be used to act purposely on the interval, as suggested by Coyne (2010) in Section 2.1.2 *Network Time*.

Nowotny proposes that these strategies should be employed so as to afford a complete re-definition of times as expressions that are strange to all participants within the hierarchy, in a way that *''each part accepts a bit of alienness in order to overcome alienness''* (Nowotny, 1996, p.147). According to the Nowotny, only when a common time is created as a reference, which belongs to no particular group or hierarchy, can constraints of time be loosened. Artefacts and systems could help to support these strategies by spreading awareness of hierarchy and the hidden structures of social time. However, they mostly work as what Nowotny calls temporal ''masks''; tools such as the appointment diary that individuals imprint with the supposed power to control their time, disregarding that it is they themselves who fill out their diaries. The clock and the diary encourage people to think that these artefacts embody time that passes without human agency:

> *we believe we have to be governed by them, whereas they merely reproduce series of movements which are shaped as symbols in such a way that we are able to orient the coordination of our own activities by them. For it is we human beings who make time* (Nowotny, 1996, p.7).

As will be discussed in the following chapter, designers can help to shift this paradigm by promoting awareness of multiple expressions of time and consequently revealing inconsistencies within dominant narratives. Instead of creating further temporal masks, they can develop tactical interventions that reveal unacknowledged temporal expressions, changing the way people perceive time as a whole and ultimately challenging the dominance of simplistic accounts. As discussed in the following chapter, however, designers, as with society more generally, are still strongly influenced by these narratives, although recent approaches indicate that there is a growing interest in reverting this scenario.

2.4 Summary of Chapter 2

This chapter has introduced and discussed different theories of time in the humanities and the social sciences, arguing that Western understandings of time are strongly influenced by dominant narratives, which have been reiterated for many centuries. These accounts describe time as uniform and universalised, evolving from ''natural'' forms of task-based time to a regime structured around the clock, and finally reaching a state of flexible organisation based on network-time. The problem with these narratives is not the forms of time that they present, but instead the way these forms are presented as absolute, which subsumes other forms of temporality, such as contextual habits and rhythms that are created dynamically through everyday practices or are attached to natural rhythms such as changes in daylight. There is no doubt that clocks and communication technologies exert great influence on the way Western industrialised societies relate to time, but problems emerge when these tools are treated within narrow frameworks, which become so dominant that all other temporal expressions (which are created through practices and may be cyclical and multidimensional) are completely disregarded. The dominance of narrow assumptions of time limits the understanding and hinders investigations of temporality, pushing forward problematic notions such as the idea of acceleration as a universalised condition; these notions promote hierarchies among temporal expressions, consequently producing further hierarchies among individuals and groups and among social and natural entities.

The final section of this chapter outlines the way researchers from social sciences and humanities have challenged the hegemony of such paradigms by demonstrating that expressions of time

that are typically attached to specific artefacts are expressed in other contexts, and expressions that are presented as dominant tend to present a similar level of influence in everyday life. The analysis of these narratives is important to understanding how designers consider time within their practice, as will be discussed in the following chapter.

Part III

Time in design

Chapter 3

Following dominant narratives of time

As seen in the previous chapter, Western interpretations of time have been dominated by a few accounts that reduce temporality to single perspectives, often describing time as objective, decontextualised and flowing in a linear direction indifferent to human practices. Designers have also traditionally incorporated this view, mostly by advocating temporal efficiency; even though, more recent approaches have attempted to expand such notions. This chapter will open a discussion around expressions of time in design by presenting mainstream endeavours to promote optimisation, efficiency, more flexible lifestyles and accelerated product modification. This analysis will later be complemented by the more reflective attitudes to time presented in Chapter 4.

This chapter is divided into three main sections. The first situates modern and postmodern design within temporal narratives of clock and network time, which have both emerged within discourses of modernity and postmodernity. The second focuses particularly on the design of tools for coordination and personal productivity, which are often seen as central to flexible organisations of time and accelerated temporal contexts. The third section takes a closer look at the way time is approached in interactive systems, moving away from the field of design and more towards the field of Human Computer Interaction (HCI).

3.1   Time in discourses of modern and postmodern design

For most design historians, a major shift in design practice occurred with the introduction of mechanisation in production and the consequent split between conception and production in product development (Fiell and Fiell, 2013; Raizman, 2003). While crafts before industrialisation are considered to have evolved based on recurring contact between form refinement and use, with mass production design became a clearly separated process (Redstrőm, 2013). Form definition could no longer take place through several iterations of continuous modification, and instead had to be optimised to a final and definite form before being sent to production. The final form was required not only to suit its consumers but also to save production time and materials. As a result, the time necessary to produce, transport and consume a certain product needed to be carefully studied in order to guarantee product replacement, and should be minimised as much as possible in order to increase profits.

The way industrialisation is considered as determining time in design could be related to the way it is considered as determining new forms of time, as discussed in Chapter 2. While the introduction of modern modes of production is regarded as having replaced a nuanced form of task-time with clock-time; modern production is considered as having rendered other forms of design, such as crafts and domestic production, obsolete unless connected to a ''heroic'' individual designer (Buckley, 1986). The trend of constructing a linear narrative for design history has, however, been criticised by a number of design historians. Clive Dilnot (1984) criticises conventional approaches to design history in the 1980s for perpetuating a *''self-evident empiricism''* warning against *''the very real possibility of turning the writing of [design] history into the writing of myth''*, referring to Roland Barthes' Mythologies (1972). In the same period, Cheryl Buckley (1986) warns against the excessive focus on aesthetic values, as well as the obsession with ''good design'' and the prioritisation of creation over use. More recently, Charlotte and Peter Fiell (2013, p.352) show how institutions such as the Moma NY have strategically spread ideas of ''good design'' in the early 1950s, influencing designers and educators. Design trends,

like dominant notions of time, are part of broader narratives about it what means to be modern, postmodern, which disregard or simplify many micro-social aspects.

While design movements are created around particular sets of ideas, designed artefacts and systems materialise these ideas and create environments that influence individuals' lives and perceptions; these, again, feed back into the consolidation of these ideas, in a self-referencing loop. This cycle creates a comfort zone for designers, but also restricts their practice in many ways. In terms of time, dominant narratives prevent designers from taking a closer look into practices, thus restraining them from investigating alternative expressions of time in the world. Limited to a narrow understanding of temporality, designers tend to promote notions advocated within hegemonic accounts, as if these suited any circumstance or person. This self-referencing cycle is evident in accounts of time within discourses of both modern and postmodern design. These accounts continue to legitimise and promote narratives of clock and network time, disregarding a range of alternative temporal expressions.

3.1.1 Modern design: temporal optimisation and technological determinism

Temporal optimisation characteristic of the production line narratives, which are described in Chapter 2, have long predominated both in design practice per se, and in the assessment of the quality of final designs. Among design historians, a highly influential reference is Sigfried Giedion's *Mechanization Takes Command* (1948), in which Giedion argues, similarly to Thompson's (1967) and Mumford's (1963) accounts (see Chapter 2), that the process of mechanisation has promoted an *"assembly line attitude"* (Giedion, 1948, p.78) characterised by a desire for mass production and speed and a resulting division of tasks and removal of friction, even outside the factory.

The idea of an unified culture of mechanisation promoted by the factory is implicit in principles of modern design, which suggest that function, objective and neutral, would lead designers to the perfect form, which would be universal and suited to everyone. As Moholy-Nagy affirmed in the early days of the Bauhaus, *"the optimal form demands mass production"* (Moholy-Nagy 1923 as cited in Redstrőm, 2013). This universalisation, however, is not all neutral. Judy Attfield stresses that the modern aphorism of *"form follows function"* indicates that form, soft, decorative

and frivolous, should be subjugated to the functional areas of design-science, technology and industrial production (Walker and Attfield, 1989, p.199-224). These areas also correspond to the objective realm of rights and wrongs that again contrasts with the subtleties employed in order to assess *form*. The functionalist mindset, together with the assumed universalisation of an assembly-line-attitude, has nurtured the idea that artefacts and systems should necessarily minimise human effort and reduce the time to perform a certain task, restricting the discussion on temporality to a very specific context.

Temporal optimisation has been highly influential in design discourses, as design quality is still often defined based on efficiency, both in physical and cognitive terms. Donald Norman's (1990) early work on affordances has been highly influential in indicating how designers can reduce cognitive overload. Norman argues that humans can understand how the multitude of human-made objects work, partly because of their ''natural'' features and partly due to the *''ability of the designer to make the operation clear, to project a good image of the operation, and to take advantage of other things people might be expected to know''* (Norman, 1990, p.12). A classic example, described in Norman's *Design of Everyday Things* (1990), is the arrangement of burners and controls on a kitchen stove. A standard stove with four burners arranged in a rectangle rarely has its controls arranged in the same way. People therefore need to learn which controls go with each burner, which takes time and leads to errors. As such designers are advised to layout controls and burners in the same way so as to reduce cognitive effort. This line of reasoning also applies to graphic and information design, which should allow information to be grasped instantly (Tufte, 1998). Such principles of optimisation have become central to design education, and are manifest in a variety of products, from bottle openers to microwaves and software shortcuts, all claiming to be more straightforward than their predecessors. Although not without its merits, the focus on efficiency also restricts the way temporality is considered in design. Norman's discussion of affordances implies that perceptions derive solely from the artefact or system disregarding a range of sociocultural influences that play a role in interactions (Sun, 2012, p.73). Temporality is also consequently simplified to a great extent, reduced to objective, compressible expressions that disregard more complex factors not prone to optimisation.

The consideration of affordances, as attached to artefacts and systems, also leads to the conclusion that mass-produced artefacts standardise human behaviour. If artefacts define perceptions, those submitted to the same artefacts would have similar perceptions and, arguably, similar reactions. A further common criticism, which is closely related to narratives of pre-industrial and industrial practices, is the affirmation that this standardisation has resulted in a loss of

autonomy in comparison to so-called ''traditional'' practices. Mass-produced artefacts are often seen to be removing the nuances of manual practices, as will be discussed further in Chapter 4. In a kitchen scenario, for example, while manually mixing ingredients is considered to involve nuanced rhythms, the automatic mixer offers a simple set of velocities and a single movement, which reduces effort but also impoverishes the experience of cooking. This argument, however, ignores the fact that people still appropriate such devices in many different nuanced ways so as to suit their own needs. More recent analyses of the role of design, often influenced by Bruno Latour's actor-network theory (1987), admit that the meanings of artefacts and systems are constructed in the practice, in a process that is often referred to as ''domestication'' (Sorensen, 2005). Although individuals might be ''locked into'' (Hoerning et al., 1999) their material and technological contexts, they still appropriate contexts to suit their lifestyles, and the first step in promoting new rhythms is to admit and support such appropriation.

The idea that artefacts and systems are able to determine affordances is complemented, in deterministic narratives, by the notion that technologies follow a linear path of development from simple to more enhanced or advanced modes. This notion has been particularly promoted by Marshall McLuhan's ''laws of media'' (1992), which assert that human-made artefacts inevitably enhance or accelerate a certain process or thing while ''obsolescing'' others. Even though the previous medium is not eliminated, it loses its reputation and apparent effectiveness. Hand-operated machines, for instance, would have superseded manual knitting, and were further developed into large-scale factory machinery. According to this rationale, the pursuit of medium enhancement and effort reduction follows a linear path whereby one object replaces the other in the same way that more complex notions of time replace each other in dominant narratives of time. This perceived linearity can, however, be contested by taking a closer look at practices before and after innovations. While a microwave cooker, for example, may be considered more advanced than slower, traditional cookers, it cannot be said that one has replaced the other. A survey carried out in 2011 by the UK Department of Energy and Climate Change[1] reports that 97.3% of the 2.616 participating households owned a traditional hob or cooker, and that these were used more often than microwaves; approximately 70% of hobs, compared to 50% of microwaves, were used seven or more times during the week. Almost four decades after microwave ovens were introduced in the UK, they have still not superseded traditional hobs. From this survey it is possible to speculate that each appliance has come to cover a separate part of cooking practices, and that these are likely to resemble pre-microwave

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[1] Available at www.gov.uk/government/uploads/system/uploads/attachment_data/file/274778/9_Domestic_appliances_cooking_and_cooling_equipment.pdf

practices in many ways, as slow and rushed cooking has always been practiced independently from specific appliances.

The aim of this discussion is not to dismiss the influence of technologies on human practices and perceptions, but to put them in perspective and challenge the assumption that technologies invariably accelerate everyday rhythms. Even though particular temporal expressions may be reinforced or hindered by the introduction of new technologies, these will coexist with a myriad of others, in the complexity of the temporal context. The assumption that new developments supplant existing ones, or even that they follow a unidirectional path of development, is misleading. It is part of a belief system that has been nurtured for over a century, examples of which can be found in different sources and literatures[1]. New developments offer new ways to perform certain practices, but do not necessarily eliminate or render other artefacts obsolete or inefficient.

3.1.2   Postmodern design: commodification of rhythms and acceleration

In contrast to modern design principles, postmodern design is said to have given designers the freedom to explore aesthetics and practices beyond the strict frameworks of utility and functionalism. Studios such as Alchimia and Memphis, which are often referred to as the cradle of postmodern design, are said to have liberated designers from contracts with particular companies, giving them the freedom to pursue directions beyond the parameters of ''good design'' (Raizman, 2003, p.355). *Form*, then, did not have to be subordinated to *function*, and in fact the function of an artefact or system was now considered of equal or less relevance than its form and the ''experience'' it provided.

As seen in the previous chapter, postmodernity in its broader sense meant a shift from industrial to more flexible means and scales of production, based on dynamic stocks that were more adaptable to variable rates of consumption. With the help of new technologies, business could afford to design, manufacture and market products with increasing speed, responsiveness and sophistication. This new socio-economical organisation enabled greater variation of styles,

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[1]Edgar Allan Poe (1842) considered the novel out of touch with the then newly busy routines, and believed that the short-story format would be more appropriate for a growing need for brief moments of relaxation. In the 1990s, media theorists speculated about whether online media would replace print news (e.g. Negroponte, 1996; Stoll, 1996), and later wondered if User-Generated Content would replace traditional news agencies (Crawford, 2001)

as well as a focus on more segmented audiences; these factors are usually referred to as the main characteristics of postmodern design. Products became more adaptable and their aesthetic qualities more ephemeral. The fashion industry, as well as car makers and food companies, started to incorporate greater aesthetic variation in their products. While the Swatch company provided fashionable and inexpensive wristwatches that could be changed to match different outfits, Heinz introduced colour variations such as the green ketchup, which was reported to increase sales by 5% (Whiteley, 1993, p.23). Computer technologies contributed strongly to enhancing the exchange between designers and manufacturers. The possibility of introducing small differences to similar products expanded consumer choice and accelerated rates of obsolescence. David Raizman (2003, p.355) describes how the ease of changing machine-knit patterns quickly generated a range of different sweaters via easy-to-use software tools. Advances in software technology also helped to introduce fast-paced product replacement and continued style creation that is still strongly present in design. The idea of celebrating diversity, which is usually presented as a main characteristic of postmodern design, in fact represented an intensification and acceleration of both the design process and rates of consumption.

Within this wave of individualisation, the term ''experience'' became particularly popular among designers. Initially taking the form of ''user-experience'' (Norman, 1999) and later reframed as ''experience design''[1], the term was employed to suggest a focus on the quality of experience users have when faced with a particular product or service (Norman, 1999), suggesting that not only capabilities but also cultural backgrounds and more subjective characteristics such as playfulness should be considered.

Although it is tempting to believe that ''user-experience'' suggested an expansion of the vocabulary of time in design, the trend did not promote more inclusive perspectives. In the same way that postmodern design has ultimately promoted a diversification of formal attributes that support the economical model of flexible means of production, the focus on experience was eventually directed to extending the repertoire of brands, in order to market so-called ''brand experiences'' (Hummels and Lévy, 2013). Rhythms were now considered in the design process as a way of pushing consumption forward. Through music, colours, lighting and furniture, pauses were strategically placed in shops and supermarkets (Yalch and Spangenberg, 2000). Fast-food chains which had traditionally pushed individuals to consume as quickly as possible, started to question the effectiveness of acceleration, tactically planning the rhythms experienced

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[1]The term ''user'' was later reconsidered, as it suggests a depersonalisation of those involved in the process and was subsequently removed from ''experience design'' (Norman, 2012)

in their shops. The iconic McDonalds fast-food chain was rebranded with more sober colours and more comfortable seats[1], while Starbucks baristas were sometimes instructed to slow down[2]. This consumer culture of slowing down has not, however, represented a shift away from the culture of acceleration. Products and services are marketed as "slow" so as to promote an escape from accelerated rhythms, but they make little sense outside the culture of speed, and are therefore intrinsically dependent on it. From ready meals to relaxation massage devices and corporate yoga classes, a range of products and services not only depend on but also praise the culture of acceleration (Sharma, 2014), supporting and perpetuating it at the same time.

While the modern paradigm of functionalism has supported the notion of time as decontextualised and rationalised, the expanded postmodern model of experience design has appropriated rhythms into a commodified logic that ultimately operates to support acceleration. The promotion of efficiency and the belief in the centralised power of artefacts and systems in determining affordances, as well as the idea that these artefacts and systems follow a linear path of development and replacement, tend to constrain the way designers think about time. Even though functionalism intends to improve quality of life, and experience design promises more personal ways of engaging with products, their attachment to dominant narratives prevents designers from looking at more complex practices and therefore more complex structures of time. These movements are in fact important components of such narratives, sustaining them in different ways. As production is increasingly decentralised and organised into 24-hour globalised systems, affecting individual lives on different levels worldwide, new challenges arise for designers and technologists, as discussed in the following section.

3.2   Supporting efficiency within temporal fragmentation

The emergence of more flexible systems of production and labour markets described in Chapter 2 has begun to transfer the responsibility of organising schedules from institutions and

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[1]See http://first.emeraldinsight.com/samples/mcdonalds2.pdf
[2]See http://online.wsj.com/news/articles/SB10001424052748704164004575548403514060736

governments to individuals. Adam (1995, p.104) affirms that this flexibilisation is only possible in a society when its members have accepted a standardised, decontextualised and commodified time as the norm. Although this flexibility suggests that individuals have more autonomy over their rhythms, the decontextualisation of time more often than not implicates a loss of control. Despite promises of improving quality of life, flexitime demands that individuals adapt to ever changing rhythms, requiring more temporal discipline and the willingness to be ready to work at all times.

As flexibilisation impacts collective rhythms, individuals need to invest greater effort into coordinating the flexible and inflexible elements of their lives as well as those of their family members, friends and co-workers. *"The more flexible and/or unpredictable the work pattern, the more time has to be spent by those involved and their families on the task of synchronisation"* (Adam, 1995, p.104). Though designers and technologists have not focused on synchronisation in particular, they have put great effort into supporting asynchronous coordination of everyday tasks by developing tools that help with scheduling events and keeping track of activities. A growing enthusiasm for the role of technologies in guaranteeing levels of productivity has led designers and technologists to expand efficiency in other realms of human life, leading to the creation of self-tracking devices. This enthusiasm again fits with narratives that attach rhythms to specific technologies, but is not always shared by those who use these technologies, as discussed below.

3.2.1 Coordination tools and misinterpretation of "real-time" as "human time"

As schedules become more fragmented designers and technologists start to invest greater effort in developing tools for scheduling and coordination, involving different levels of computing capabilities. Calendars can nowadays be synchronised across devices and across groups, making sure everyone remains on track with their schedules. Setting appointments is facilitated by services such as *Doodle* (doodle.com), *Meet-o-matic* (meetomatic.com) and *Scheduly* (scheduly.com), where a set of possible dates and times are suggested by one individual, and

others provide their availability so as to elect a date on which most participants are available. Other services facilitate the organisation of more specific collective activities such as buying a present, e.g. *Shareagift* (shareagift.com) and *Present Perfect* (simple-present.org), or deciding who should approach a client and when, such as the *Capsule CRM* (capsulecrm.com) system. By allowing activities to be coordinated asynchronously, with reduced email exchange and discussion, all these services reduce the number of interpersonal interactions and also hinder the social strategies of excusing, persuading and negotiating times. In contrast to traditional social conventions, strategies of time are sometimes reduced to ''being there first''. In a scheduling system such as Doodle, participants who fill their dates out first are likely to influence the following participants, who will see little point in ticking a date no one else can attend unless the intention is to drop the appointment altogether. More nuanced ways of discussing priorities are often considered neither necessary nor desirable.

A number of designers feel that the answer to busy lives and complex coordination is to hand over complete control of time to computing systems. Design theorist John Thackara, for instance, suggests that the way out of acceleration is ''real time'', arguing that dynamic information would release us from ''traditional static schedules'' and thus reduce the sense of acceleration (Thackara, 2006, p.46). *Fluid Time* (2002), designed by then RCA students Michael Kieslinger, Francis Li and William Ngan, is based on this idea. The designers affirm that ''real time'' would release the burden of following ''fixed timetables''. As people live increasingly flexible lifestyles, they *''are often dependent on fixed timetables that do not reflect the actual changes of events, and thus do not accommodate people's personal time flow very well''* (Kieslinger et al., 2002; Kieslinger and Polazzi, 2004). Similarly, Reed Martin and Henry Holtzman (2011) present *Kairoscope*, a system where time is fully based on flexible appointments as a way to remove ''the burden of time precision''. In Kairoscope, appointments are defined via mobile phones on the fly, and can even be automatically adjusted according to contextual information. The system dynamically changes appointments so as to minimise ''awkward gaps'' in a schedule such as *''situations where a time space between events is long enough to feel annoying but too short to engage in another activity in the interim.''* Removing time precision permits the system to adjust events, allowing for instance for a 30-minute cancelled meeting to automatically ''bump up'' the following meeting if the ''impacts are minimal''. The system also learns if a meeting regularly takes more time and adjusts it accordingly.

Such tools give the impression of offering alternatives to the single dimensional representation of time embodied by clocks and calendars, which is widely regarded as perpetuating the idea

of time as external to human practices and therefore susceptible to manipulation. Because they offer some sort of adaptability, designers often claim that these systems provide more "human" ways of dealing with time. The problem, however, is that the changes are not defined by humans. The use of algorithms for temporal adaptation reifies time and provides as many (or more) constraints as traditional calendars and clocks. Furthermore, by automatically adapting personal schedules, systems like Kairoscope inhibit traditional person-to-person means of handling appointments, thus excluding part of people's improvised temporal strategies. Such activities can be a burden to productivity, but attempting to replace them with computing mechanisms would mean either delegating a large number of social strategies to computer systems, or compromising the usability of the same system.

3.2.2   Personal productivity tools and temporal identity

In addition to schedule and coordination tools, other services have been developed to allow individuals to keep track of their activities and level of productivity. Dedicated task management services such as *Rescue Time* (rescuetime.com), *Remember the Milk* (rememberthemilk.com), *Todoist* (en.todoist.com), *Toodledo* (toodledo.com) and others allow subscribers to set different priority levels, set the range of goals as short, middle or long term and visualise how often these goals have been met. Gilly Leshed and Phoebe Sengers (2011) argue that these personal productivity tools not only allow people to keep track of what to do next and how they have spent their hours, but also influence the way they perceive themselves. By renegotiating goals and priorities and managing ever-changing real-life interactions, they feel socially committed, in control and able to construct their identities as fitting the dominant culture of being busy. In their qualitative research with 13 participants, Leshed and Sengers also identify the feeling of the pressure of constantly having to do something, negative feelings on the part of those whose time is not acknowledged within the productive system (such as the unpaid labour of women) and the assumption embedded in these personal productivity tools that one should be busy all the time. In their interviews, time for "relaxing, unwinding, lingering, or goofing off" was compared to concepts of dead times, marginalised and seen as gaps between productive activities. Again, these are all negative impacts resulting from the dominant narratives of time, which disregard temporal expressions that are not acknowledged by the productive system.

Within these dominant narratives, alternative notions and rhythms, as discussed in Chapter 2, are often regarded as something that does not belong to Western cultures; this notion disregards

the fact that the lives of Westerners are not and cannot be completely dominated by acceleration and productivity. Rhythms regarded as external to the productive system, which do not follow or indirectly sustain its models, are consequently considered less valuable, minor; this, again, helps to reaffirm the supremacy of dominant narratives and what has been defined as *the* Westernised lifestyle. This simplification of temporality reinforces a dichotomy of being *in* and *out* of time, not only within Western societies, but most evidently in the relationships between the ''West'' and other cultures. Following this dichotomy, John Thackara (2006), one of the few design theorists that has paid closer attention to time, suggests that *''different temporal regimes than our own already exist in some cultures''* and that Westerners could learn from these ''other'' cultures. The opposition between ''our'' and ''other'' cultures of time is however most evident in his example of the way ''other'' cultures can learn from ''our'' culture of time; he mentions that, in Israel, *''an elaborate set of time-teaching exercises is designed to train children from developing countries to adapt to Israel's mainstream pace of life. The children are taught about different conceptions of punctuality and learn to translate appointment times depending on the culture of the person making the appointment''* (2006, p.48). Thackara's example demonstrates how the dominant narrative of time is used to create differences. It implies a uniformity of temporality in these cultures that does not exist, and consequently leads to a range of prejudices, including the idea that Israeli children are more apt to adapt to industrial conceptions of time than children from developing countries. Furthermore, instead of integrating both cultures, the teaching of concepts of time to children from developing countries may cause them to feel, first, that they do indeed have a conception of time that is intrinsically different from that of Israeli children, and second, that this supposedly different conception is minor and less valuable and should be changed in order for them to fit into the new, more developed, society. This example demonstrates that time is clearly not a neutral flow, but is instead used to create hierarchies within and across cultures.

The development of tools for coordination and personal productivity are a reflection of a dominant culture of time that, although intrinsically embedded in the culture of Western societies, does not correspond to the multiplicity of temporal expressions within these societies. They therefore indirectly contribute to the creation of hierarchies and a sense of exclusion across individuals within society, as exemplified by Leshed and Sengers' research. This feeling can arise on different levels, contributing to widening differences between cultures, as exemplified by the time courses for children from developing countries in Israel. Thackara's core argument of fostering greater understanding across concepts of time, although shadowed by his support of dominant narratives, is highly relevant. Instead of reinforcing differences, designers could help to encourage greater temporal empathy within and across social groups.

3.2.3 Quantification of rhythms in the narrative and in practice

The culture of efficiency and the belief in the ability of technology to influence perceptions is taken to a different level by the *quantified-self movement*. The movement advocates the monitoring of everyday activities and its visualisation in a way designed to make people more aware of unhealthy practices and potentially persuade them to adopt more sustainable attitudes (as advocated by Consolvo et al., 2009a,b; Froehlich et al., 2009). A range of sensing devices, such as *FitBit* and Jawbone's *UP*, have therefore been developed; they offer the ability to track background rhythms such as number of hours slept, number of steps walked, amount of calories burned and even changes in blood pressure, body temperature, and so on. Users can then choose to be notified if their practices do not conform to a given standard, if they have been sedentary for too long, when they should pay more attention to their sleep habits, when they are close to exceeding the daily amount of calories, etc.

Such monitoring strategies not only attempt to extend the logic of efficiency to all aspects of human life, suggesting that behaviours should be levelled to optimal standards, but also reveal practices that previously only existed in the background of individuals' minds[1]. By bringing them to the foreground they create new needs that could previously only be guessed at and thus could be overlooked or more openly interpreted. The increase in knowledge of background rhythms, such as the rhythms of the body, also increases the pressure to make more productive or healthier choices, introducing yet another issue to be taken into account. Sengers (2011) affirms that the large number of choices and social connections characteristic of the network society correlates to an increase in the feeling of being busy. With the increase in the number of choices comes the need to make them wisely; similarly, the increase in personal connections results in a loss of focused attention.

The reading speed tracker of Amazon's *Kindle* gives a good example of the way background actions are brought to the foreground. The eBook reader continuously calculates users' reading speeds, predicting how long these users will take to read sections and whole books and

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[1]These systems also point to what Nowotny (1996, p.54) terms an ''extended present'', meaning that the awareness that actions in the present have an impact in the future is increasingly causing individuals to handle the future in the present. Considering that in Western societies efficiency is paramount, the widened horizon of the future is transformed into angst regarding the future impacts and consequences of every small action in the present. While designers and technologists are attempting to help individuals avoid negative consequences in the future by bringing potentially negative behaviours to their attention, they also imply that future and present are part of the same temporal dimension.

displaying this information back to them. The display is updated according to the reader's average speed, and, as of the time of this writing, this information can be hidden but not disabled. While reading speeds are usually implicit in traditional books, they are brought to the foreground by the device, adding a further element to the reading practice.

In other cases, dedicated monitoring devices simply fail to engage users in the long-term. In a recent long term study with 22 participants about their self-tracking practices, John Rooksby and colleagues (2014) found that participants switched between devices, used them in bouts, and rarely for more than a few months. Participants carried out periods of tracking, but did not do it constantly. Rooksby's study questions the idea that these technologies can provoke behaviour change, as has been widely claimed by different researchers. Such devices were used mostly as a support to achieve previously defined goals instead of triggering change by themselves. Quantifying and insisting in behavioural change towards a particular model not only disregard the importance of more nuanced rhythms, but also compromise the usage of artefacts and systems.

While the logic of efficiency is extended to background rhythms of everyday life through the development of monitoring devices and mechanisms, the irregular usage of these devices demonstrates a reluctance on the part of individuals to be constantly reminded of the impact of their actions, or to fit straightforwardly with expected standards. This attitude demonstrates, again, that rhythms are not attached to technologies but instead constructed by social interactions in the everyday and are therefore multiple and complex; they cannot simply be changed by appealing to some technical logic. Instead of attempting to implement behavioural changing technologies that impose a particular rhythm, designers could focus on understanding how practices construct rhythms, and this implies an awareness of and a critical position on dominant narratives of time.

3.3   Time in interactive systems

Several of the works discussed in the previous section, although mostly produced by design researchers, were in fact published in journals and conference proceedings targeted to the field of Human-Computer Interaction (HCI). Although nowadays design and HCI tend to

approach similar problems, their methods are still essentially different, with HCI presenting more clear-cut methodologies often narrowed to the studied system and still very focused on efficiency; this can, in turn, be related to modern principles of design. However, current methodologies and more complex design rationales, which will be discussed in the following chapters, have been increasingly integrated into HCI.

As both disciplines become more enmeshed there is a risk that designers end up limiting their scope of study to more technical issues. This is not only because technical studies are more well-established in HCI, while newly introduced design issues are often regarded with some level of scepticism, but also because of the technological determinism that pervades Western industrialised societies as described previously in this thesis. The above discussion and call for a closer look at these practices is an attempt to prevent designers from limiting their scope of study in terms of time; this applies to HCI researchers as well. Given the increasing interest of HCI in practices, rhythms and perceptions, this section will provide an overview of the way approaches to time have been changing within the field, even if they are still limited to particular systems.

The discussion around temporality has permeated the field of Human-Computer Interaction (HCI) since its early days. For a long time, however, as with other subjects in the field, the discussion has taken place within a narrow perspective of the interaction with the system, without attending to more complex rhythms. For decades, HCI has discussed aspects such as the best ways to deal with perception of waiting times (e.g. Harrison et al., 2007), speed of response (e.g. Geelhoed et al., 1995), and interruptions and sense of continuity (e.g. Faconti and Massink, 2000); these themes will remain relevant as interaction contexts continue to change (i.e. as interfaces become more dynamic and computing capabilities migrate to new devices and objects (Hildebrandt et al., 2004)). Issues of real-time and time constraints, such as emergency response, have also been widely discussed. Frameworks developed to consider time in direct interaction with systems are most frequently based on traditional task analysis (Hildebrandt et al., 2004), but also on qualitative approaches and mixed methods, as well as narratology. These approaches seek a solution that would satisfy usability criteria such as efficiency in use, lower rates of error and so on (Hackos and Redish, 1998). More recently, there has been significant interest in subjective aspects of time when ''experiencing'' an interface (Liikkanen and Gómez, 2013) including negative perception of interruptions, pauses, delays etc. Huang and Stolterman (Huang and Stolterman, 2011), for instance, analyse attention fragmentation over time for various technologies. Considerable attention has also been paid to investigations

of time perception in games and immersive environments (Brown and Cairns, 2004), including the influence of music (Sanders and Cairns, 2010) and the pace of the narrative. These analyses often reference Csikszentmihalyi's theory of flow (Csikszentmihalyi and Csikzentmihaly, 1991), which refers to a state of mind characterised by deep engagement and effortless concentration, in which individuals are so immersed in their current activity that they stop perceiving the passage of time.

Steve Benford and Gabriella Giannachi (2008) define different levels that should be taken into account when designing systems that provide narrative-driven experiences, such as games and performances; they define the concept of ''temporal trajectories through user experiences''. The overall temporal structure could then be described by five distinct ''layers of time''. The authors refer to the first layer as *story time*, which concern the structure of time in the *''underlying fictional universe of the story''*. Given that a story can be narrated in various forms (as a book, film, game, performance) *story time* should be mapped onto *plot times* that describe the timing of the narration of events in the story. There should be multiple *plot times*, representing alternative ways of narrating in different media and by different authors. These narrations should then be translated into experiences, introducing the third layer, *schedule time*, which is determined by publishers, promoters etc. Once the narration is defined, participants arrange their *interaction times* according to availability and choice, for example in choosing when to play a game, read a book, attend a play or watch a film. Finally, these participants reconstruct their own sense of the original story according to their perceptions of these interactions, which is captured in a final layer called *perceived time*; this concerns the ways in which people actually perceive the timing of events, for example, whether or not they are in a state of ''flow''. These temporal layers are further explored, leading to the conclusion that each participant might have his or her own trajectory, and that the orchestration of trajectories is an important design process (Benford et al., 2009). This approach draws attention to different ways of framing time within a complex interactive system, but, as often occurs in HCI, does not look beyond the analysed interactive system.

Sus Lundgren and Theo Hultberg (2009), on the other hand, attempt to explore multiple perspectives of temporality, drawing from cinema and game design. The authors present six different temporal themes, namely: *Live Time*, which represents the ''now'' or time in its present expression; *Real Time*, which, as *Live Time* implies, is a concept of linear sequential time on a similar scale (1 minute would represent 1 minute) but does not entail any connection with the ''now''; *Unbroken Time*, when time passes as an unbroken sequence but speed may be altered or

stopped; *Sequential Time*, in which events are still in chronological linear order but some might be skipped; *Fragmented Time*, which represents events that are shuffled in time; and *Juxtaposed Time*, which is when events that originally happened after each other are shown simultaneously, like when a time traveller meets him or herself. The authors compare several of these themes with the structure of movies and games. *Fragmented Time* is the structure used in the plot of movies such as *Eternal Sunshine of the Spotless Mind* (2004) and *Timecode* (2000), and *Live Time* is the temporal structure of the online multiplayer game *World of Warcraft* (2004).

The themes escape the common assumption of temporal efficiency in interactive systems, which too often simplify time so as to fit pre-defined parameters for evaluation. While Huang and Stolterman, for example, criticise interruptions and pauses, Lundgren and Hultberg look for situations in which they may be beneficial. By understanding different expressions of time as another medium for design they expose the fact that time is not necessarily linear; it can be broken down, mixed and distributed. Design should benefit from such complexity. Lundgren (2013) later elaborates on this concept, arguing for a deliberate and systematic exploration of potential temporal behaviours of interactive artefacts, either as a means to add new functions or to change the interaction with them. Lundgren and Hultberg's six themes were then employed by different students in order to create a variety of time-related products, such as fridge magnets that challenged the notion of linearity by displaying scattered snippets of conversations that had previously taken place on Skype, or a digital notebook where notes changed colour to indicate when they were created. Interestingly, these pieces are embodying or ''testing'' concepts of time that emerge from the fragmentation of online experiences.

These investigations seek to create frameworks for approaching time in interactive systems as well as different ways of shaping the temporality of interactions. They are, however, restricted to the designed system, and thus ignore the fact that the effect of such systems can be multiple and usually positioned within polyrhythmic contexts. With the exception of Benford and Giannachi's framework, they are also mostly restricted to analysing time in its clock-time perspective, and even though they demonstrate an aspiration to move from straightforward ideas of efficiency to more diverse approaches to time, too often they consider the system to define the temporal perception.

3.4   Summary of Chapter 3

This chapter has discussed the different ways design has supported dominant narratives of time. The first section provided an overview of the way mainstream design movements have been shaped by the same kinds of discourse that helped to determine dominant narratives of time. As such, both modern and postmodern design movements have incorporated time as an objective and disembodied dimension that is considered to be ultimately shaped by industrialisation and further technological developments. While modern design restricted itself to promoting ideas of temporal compression and optimisation associated with industrialisation, postmodern design, which initially suggested paying closer attention to experiences, has ultimately emphasised acceleration and notions of flexitime characteristic of globalised productive systems. This section showed how affordances in general, as well as perceptions of time, have been attached to technologies considered to follow a linear path of development; this disregards the role of wider social issues and also hinders the investigation of broader notions of time.

The second section further investigated the way that designers and technologists have supported acceleration and more ''flexible lifestyles'' characteristic of the so-called condition of postmodernity. It discussed the problematic issues behind a range of tools developed not only to support asynchronous social coordination and personal productivity but also to extend the logic of productivity to rhythms of the bodies. In regard to coordination systems, some designers have misleadingly claimed that network-controlled time represents more human notions of time, while personal productivity tools reinforce the need to be busy all the time and create a sense of inclusion and exclusion among individuals. Finally, tracking devices bring background issues to the foreground introducing needs that were previously only guessed and could therefore be overlooked or more openly interpreted, contributing to increase the feeling of busyness.

The final section provided an overview of studies of time in interactive systems, focusing specifically in the field of HCI. Although such attempts have demonstrated an increasing interest in practices, rhythms and perceptions of time, they are still restricted to considering time in its clock expression, narrowly placing it within particular systems.

Chapter 4

Reflective attitudes to time in design

While Chapter 3 concerned the way time is treated in mainstream design trends, this chapter will examine alternative approaches and movements that present more reflective attitudes to temporality. The projects presented in Chapter 3 exemplified how dominant narratives of time have been highly influential on design. In recent decades, however, the feeling that acceleration of production, consumption, and everyday life in general has come to affect quality of life on different levels has led an increasing number of designers to consider time in more critical terms.

As will be presented in Section 4.1 below, growing concerns about environmental issues have influenced designers and theorists to pay more attention to the lifespans of products and their relation to individual lifestyles and rhythms. The increasing production of waste in industrialised societies has influenced further investigation into the role of design in fostering greater attachment between people and objects. Moving from sustainability to the temporalities of human-object relationships, this discussion will split into two main directions, analysed in the subsequent sections of this chapter. One direction, presented in Section 4.2 is an analysis of the temporality of practices, investigating the way objects can set conditions for temporalities to emerge through the support of particular practices, as well as the way experiences and practices can come together to create time, with a particular focus on recent research on design and heritage. The other direction, presented in the Section 4.3, concerns the emergence and outcomes of the Slow Technology and Slow Design movements, which have received great attention in the last few years. These movements are an attempt to revert the effects of an assumed universalised condition of acceleration previously discussed in Chapter 2. The chapter

will conclude with a discussion of the existing proposals to redesign the clock developed as a way to rethink concepts of time.

This chapter will also discuss the three *Design Experiments* carried out in the context of this research, namely the *Long Living Chair*, the *Movement Crafter* and *Distance Clocks*. These practical exercises guided the research into different areas of design, helping to identify relevant projects and develop the reflections presented below. For the sake of clarity, they are distributed according to the section to which they are most strongly related; this does not necessarily correspond to the chronological order in which they were developed. In contrast to the *Design Interventions* that will be presented later in Chapter 6, these three artefacts were not focused on investigating the reactions of a particular group, and were therefore not formally tested with participants.

4.1   Encountering the temporalities of people and objects

Sustainable Design was one of the first design movements to take a more reflective position on time in design. Although design theorists such as Victor Papanek and Buckminster Fuller had been pointing out the harmful consequences of certain design practices for the environment for decades, the movement gained force in the late 1980s due to a renewed global interest in sustainable development. Involving fields of architecture and urbanism, it inaugurated a discussion on reaching a balance between ecological, economical and social aspects, so as to guarantee: *''(1) protection and enhancement of natural ecosystems and resources; (2) economic productivity and (3) provision of social infrastructure such as jobs, housing, education, medical care and cultural opportunities''* (Dominski, 1992 as cited in Fuad-Luke, 2009, p.23). The movement influenced designers to develop what has been called Life Cycle Analysis, which was an attempt to balance all phases of a product in order to minimise environmental impact: from the choice of raw materials to production, consumption, disposal and finally recycling. Although it had limited scope, the method introduced the notion that products have lifetimes which intersect with the lives and rhythms of consumers at different points, and became highly relevant to later research in the field.

Critics of Life Cycle Analysis include Peter-Paul Verbeek and Petran Kockelkoren (1998), who suggest that the method only addresses the symptoms of unsustainable practices rather than the deeper issues that enable them; they affirm that *''Life Cycle Analysis may make it possible to design products that are friendlier to the environment, but leaves a fundamental problem unaddressed: the short lifetime of our products.''* (Verbeek and Kockelkoren, 1998, p.28). Verbeek (2005, p.28) argues that people are faced daily with a ''trash-call'' in which they are asked to exchange the artefacts they own for new ones, and explains that, although products are expected to possess duration, this duration is negated because they are quickly replaced by new commodities.

Verbeek and Kockelkoren (1998) assess that design suffers from a Platonic stigmatisation. While designers value the world of concepts and ideas, materials are treated as mere shadows of these ideas. The consequence is a failure to meet the challenge of durability: by associating artefacts with symbolic concepts while dissociating them from material qualities, designers allow these artefacts to be disposed as quickly as new ideas emerge. For Verbeek and Kockelkoren, the functionalist orientation of modern design, which by definition reduces artefacts to their function, shows that it is not the object that counts, but the function it fulfils. Similarly, postmodern design focuses on the meaning of products, turning products into icons, symbols or signs. In both cases, material embodiments are of secondary importance; it is a ''derivate''. In postmodern design, matter is even less important, as products do not even need to be durable like they did in modern design. Verbeek and Kockelkoren consider this ''Platonic anti-materialism'' as the cause of increasing rates of disposal: because ideas change quickly, piles of things are thrown away everyday.

Ezio Manzini (in van Hinte, 2004) addresses a similar criticism of a supposed need for constant change in relation to the design of services. Manzini explains that services have to provide certain emotions that can be sold and consumed for a very short time; they have to be transformed or innovated so that consumers come back for more, which in his view is comparable to night clubs: *''to be cool they have to function only for a short time, and afterwards they have to change them completely''* (in van Hinte, 2004, p.152). Interestingly, both Manzini and Verbeek and Kockelkoren refer to dominant ideas of acceleration embedded in Western industrialised societies[1], but develop their analyses independently from these narratives.

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[1]Such criticism of rapid rates of consumption can be identified in the work of several theorists, including Zygmunt Bauman (1999, p.37) who critiques the volatility of current society's ''engagements with objects of consumption'' in a rather similar tone.

In 1997, the Eternally Yours Foundation and the Netherlands Design Institute organised a conference to discuss ways in which design could contribute to the development of more durable products. The dominant idea at the conference was that design could promote longer-lasting relationships between people and objects, which would prevent users from disposing of items, or at least encourage them to keep them for longer. There was a feeling that designers could help things to age more beautifully and that material traces of usage could embody personal characteristics and therefore create greater identification for users. In the publication resulting from the conference, Ed Van Hinte (1997, p.188) affirms that *''some products allow the user's perception of them to change over time, either by a certain richness of detail or by slowly unfolding, thus displaying more sides of their personalities''*. The feeling that designers could foster emotional links between people and objects was manifest in the images of a couple in love that illustrated the publication, and was received with great enthusiasm by the design community. It is indeed the main argument of Jonathan Chapman's book *Emotionally Durable Design* (2005), where the parallel between human relationships and their relationships with objects is evident. Chapman asserts that people's detachment from products reflects a disappointment resulting from an imbalance between consumers' expectations and reality, and suggests strategies that could be adopted in order to increase attachment, including ensuring that objects deliver what they promise, giving objects the appearance of having a mind of their own and providing them with inherent feedback (Chapman, 2005, p.63).

Although issues of personal attachment still remain largely relevant, the creation of personal bonds as a strategy for reducing product disposal has been later questioned on different levels. The 2004 *Eternally Yours Conference* presented a less optimistic perspective on the role of design in fostering long-lasting human-object relationships; this is clearly shown in the propositions listed at the end of the resulting publication. Proposition #9 declared that *''Creating an emotional bond between user and product is based on naive sentimentality''* (van Hinte, 2004, p.349). Manzini summarises this feeling by affirming that *''we cannot love 100 or 1000 artefacts we encounter in our lives''* (van Hinte, 2004, p.154). The relationship between people and objects, however, was now regarded from a different perspective, as shown by Proposition #10, which affirmed that *''Design for endurance is a matter of strategy and setting conditions''*; this returns to the general feeling that designers should look beyond objects towards more complex social and economic issues. For example, more attention should be given to everyday practices according to Proposition #11, which states that *''Products need the ability to take root in human habits''*. Van Hinte (2004, p.71) also affirms that *''we don't necessarily feel a bond with things that are used a lot, like household equipment, wardrobes and computers, but we do feel ill-equipped and frustrated when something is wrong with*

them, or when they are gone'', indicating that things do not have to foster emotional bonds in order to play an important role in users' lives. The resulting publication also hints at the idea that helping people to slow down would lead to more sustainable attitudes, as described in the document's penultimate proposition: *''Wasting time saves the environment''*. This notion later evolved into the movements of Slow Design and Slow Technology, which will be discussed in more detail in Section 4.3.

Verbeek (2005) later reflected on the work of the Eternally Yours Foundation when developing his concept of ''material aesthetics'', arguing that it is the material rather than the semiotic dimension of artefacts that mediates experiences and consequently shapes the relationships between humans and objects. The starting point for these ideas is the work of phenomenologists such as Heidegger and Merleau-Ponty, who sought to refute the Cartesian dualism of mind and body, as well as the single-focus on rational thinking as the defining factor of what it means to be human. In Heidegger's view, people and their activities are always ''in the world''. People interpret the meaning of things by acting out and experiencing contextual relations in the world: *''the less we just stare at the hammer-Thing, and the more we seize hold of it and use it, the more primordial does our relationship to it become, and the more unwieldy is it encountered as that which it is - as equipment''* (Heidegger, 1962, p.98). Verbeek draws from these ideas and also uses the work of Don Ihde and Bruno Latour to explain how subjects and objects constitute and co-shape one another. For Idhe, human experience is relational, experience is always experience of something and this relation constitutes and shapes humans themselves. For Latour, objects have the ability to act in the world. This way, neither subject nor object is absolute; each determines the other. Verbeek therefore draws from these theorists to analyse the mediation of technology in experience, concluding that the answer for durability is to develop products that clearly communicate the way they function. His ''material aesthetics'' are therefore represented by this functional transparency, which enables attachment in two ways: (1) by preserving it even when the product breaks, and (2) by allowing people to become involved with products as material entities (Verbeek, 2005, p.227).

Verbeek's analysis, however, restricts mediation to interaction with the object itself and disregards more complex social phenomena. The role of materiality in shaping experiences proposed by Verbeek is highly relevant, and his recurrent criticism that too much attention has been paid to conceptual aspects of design and not enough to material aspects is understandable. This thesis, however, takes the standpoint that the essential problem is not designers' inclination towards concepts, but that the concepts that designers have been promoting all come to legit-

imise a single-sided dominant narrative of what it means to be part of a Western industrialised society. According to this dominant view, products are meant to be replaced a long time before they break, and so people have little time to develop deep involvement with materials. Acknowledging these narratives and their inconsistencies would therefore be the first step in allowing people to pay more attention to practices and accept alternative rhythms as they are, without having to justify them within productive models. People would then be better able to appreciate the way their relationships with objects evolve over time, and more open to concepts such as Verbeek's ''material aesthetics''.

Human-Computer Interaction (HCI) researchers have recently carried out studies investigating issues of attachment in the particular context of computing technologies[1]. In a study of the ability of objects to improve with age, William Odom and James Pierce (2009) suggest that visible wear and tear may enhance people's relationships with artefacts, especially when this wear is associated with personal narratives. Drawing from Verbeek's discussion on design and durability, Odom and colleagues (2009) investigated why people ''preserve some things and discard others in the context of interaction design'' according to the title of their paper. The researchers asked participants which objects they loved, which they thought they would love but did not, and which they thought they would not love but they did. They reported that non-digital artefacts enjoyed a higher degree of attachment than digital artefacts, even though participants mentioned electronic artefacts (including mobile phones, mp3 players, game consoles etc.) when asked about their most cherished possessions. It was further concluded that single-function objects are more likely to endure, and that the development of personal symbolic attachment, although admittedly hard to predict, and the perceived quality of materials were also related to higher strength of attachment. The authors pointed out the need to augment objects in order to suggests ''reuse, renewal or customisation''; this relates to Verbeek's concept of ''material aesthetics''. Odom et al's research brings the design discussion to a practical level, reintroducing some of the topics discussed at the second Eternally Yours Conference. In the

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[1] Also in HCI, other researchers have sought to analyse how the user-experience changes over time (Fisher and Dourish, 2004; Huang and Stolterman, 2011; Karapanos et al., 2009). Evangelos Karapanos explains how the finding that ''*48% of returned products are not attributed to a violation of product specifications*'' (2011, p.11) has motivated his research on long-term use of technology. In a qualitative study of six iPhone users, Karapanos and colleagues (2009) found a ''*shift in users' concerns over time from ease-of-use to usefulness.*'' While early experiences related mostly to *a priori* expectations and the hedonic aspects of the product, prolonged experiences depended on the context of users' personal lives. Here, again, the authors draw attention to the need to look beyond a narrow temporal framework of use and pay attention to longer term practices. The analysis of iPhone users also returns to the paradox of product attachment and disposal: although users apparently cherish their phones, they are also willing to replace them with upgraded versions of the same hardware. They do it not because the object has lost its usefulness, but rather because of a wish to be ''up-to-date'', which relates to the narratives of linear progress constructed around technologies discussed in Chapter 3.

second analysis, the researchers defined parameters for higher or lower degrees of attachment, but they focused on cherished objects (or objects that were expected to be cherished) rather than the range of artefacts that come to form the material context into which people are immersed, such as things that are discarded with little reflection or even acknowledgement. The focus was on duration rather than variations of rhythms.

The search for ways to extend the lifespan of different artefacts, and the consequent interest in enhancing human-object bonding, evidenced by the first Eternally Yours Conference, may not have contributed significantly to reducing consumption and product disposal. It did, however, inaugurate relevant discussions about the role of artefacts in mediating different rhythms and temporalities. From the discussion above, three of the outlined propositions from the second Eternally Yours Conference are particularly relevant to issues of time in design. The first regards the role of designers as mediators, responsible for strategically setting conditions instead of defining behaviour alone, and understanding artefacts and systems as part of a wider, complex context. The second relates to the need of artefacts and services to ''take root'' in human habits; this indicates that designers need to pay more attention to nuanced rituals and activities, which ultimately come together to construct time. The final proposition concerns the connection between acceleration of everyday life and unsustainable practices. While the first and second will be further analysed in Section 4.2 below, the third will be discussed later, in Section 4.3.

4.2   Extending the temporality of practices

The discussion of product attachment brought about by growing environmental concerns has drawn attention to the potential for design to explore the relationships between people and objects through usage traces, beyond the moment of the interaction. This new subject of exploration also reveals the importance of investigating more complex and multidimensional individual and social practices created through and around artefacts and systems.

The notion that artefacts can foster different kinds of relationships with users by embodying aspects of their usage over time, and possibly some of the characteristics of their owners, has resulted in interesting design concepts. *Broken White* (2004) by Simon Heijens, for example, is a ceramic set that is white and undecorated at purchase, but the pieces of which develop small

crack lines on their surface as they are used, slowly growing and changing their pattern in a continuous process depending on the frequency of handling. Another example, the *Synesthetic Recorder of Involuntary Memory* (2011) by Weiche Wu, allows users to record their behaviour onto different objects in order to reflect their own life events. One of the pieces, the *Weight Recorder*, is a scale that physically records a person's weight every time it is used. Owners can then remember periods of their lives by making associations with their change in body weight.
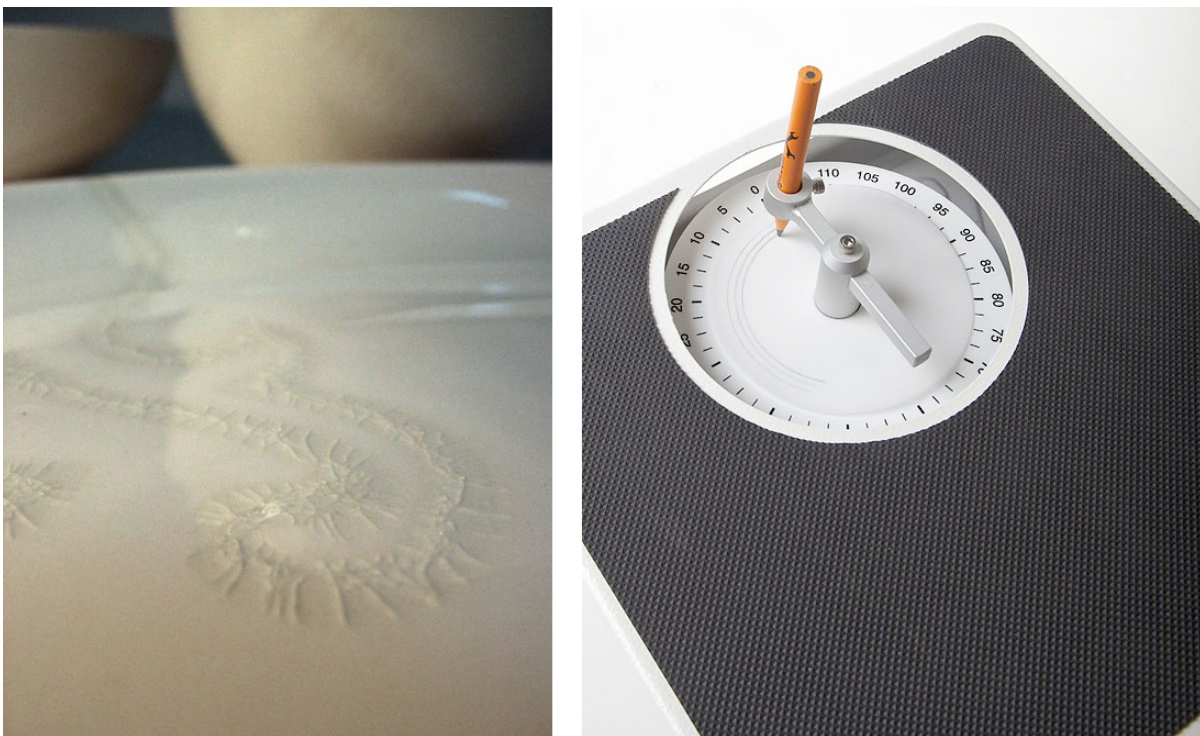
Figure 4.1: *Broken White* (2004) by Simon Heijens and *Synesthetic Recorder of Involuntary Memory* (2011) by Weiche Wu

These projects introduce interesting temporal questions, such as how the traces of usage recorded on them change the way people relate to each other over time, whether these records change the way the artefacts are passed down through generations and whether the traces help artefacts to endure across multiple lifespans, as well as more practical and ethical ones, such as how precise and permanent these records should be or even whether they should be produced at all. The *Broken White* project, for instance, raises questions such as whether individuals would attempt to distribute traces across the different ceramics in the set, or focus on a particular piece in order to claim ownership of it, and what this behaviour reveals about their personalities. These practices may vary across individuals, and could reveal a variety of social relationships and strategies within specific groups. Furthermore, assuming that the ceramics would reflect

the behaviour of a person or family, one might wonder how the set would be perceived if inherited or sold to a different family. In terms of ethics in the production of these records, while *Broken White* carries some level of ambiguity in the marks produced by users, the *Weight Recorder* displays weight data precisely but allows for this data to be removed from the object, suggesting the intention of allowing people to forget their own records, or to clear those of previous users.

All the temporal considerations raised above are further complicated by the introduction of digital capabilities into everyday objects. The ability to gather and store digital information regarding usage and its context has introduced new parameters that must be taken into account by designers, including the level of permanence that these traces and records should have and the ability to connect to other databases and possibly infer further contextual information[1] This way, the usage of artefacts and systems can be expanded in terms of both long term thinking and social reach. The possibility of integrating digital capabilities into everyday objects has, therefore, the potential to extend the temporal scope in design, not only with respect to material disposal, as was the initial intention of Eternally Yours, but also with respect to social practices, as will be discussed below.

It is easy to connect the exploration of traces of practices discussed here with the quantified-self movement described in Chapter 3, as the same sort of sensing technology can be applied in both cases. The important difference, however, is the attitude designers have towards time. Records, here, are produced or embedded in artefacts not to support the rhythms promoted within dominant narratives of time, but to foster a new relationship with the artefact. The ambition is to co-construct perceptions of time that are personal and may eventually influence practices. Importantly, this influence is left open-ended instead of attempting to determine behaviour alone.

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[1] The way this recording, storing and sharing takes place has indeed become a subject of great concern. Issues of privacy are a major worry, not only in design but also in other domains, from informatics to economics and law. Given the wide scope of the subject, and its tangential relationship to the problem of temporality approached in this research, issues of privacy regarding such data will not be further discussed in this thesis

4.2.1   Digital traces, artefacts and multiple practices

As mentioned above, digital technology has increased the number of possibilities for exploring the role of usage traces in everyday objects. The new range of possibilities, however, does not come without a cost. Designers, in this case, need to confront well-established assumptions associated with digital technologies, including paradigms of ''network time''. In this context, physical formats are often considered to embody more permanent temporal expressions than digital ones do; the latter are considered as embodying the ''real-time'' aspect, as often reiterated by theorists investigating social interactions supported by computing technologies (e.g. Castells, 2003; Tomlinson, 2007). In these interpretations, digital records are considered intrinsically ephemeral, as they can be produced and discarded instantly and are therefore more prone to rapid exchanges and modifications. The straightforward reaction towards this perceived ephemerality is to seek more stable media, which, in the logic of linear narratives of time, means returning to analogue media - and this has indeed been the attitude of several designers who criticise ephemerality and speed, as will be discussed in Section 4.3.

More reflective approaches, however, have attempted to investigate the role of this ephemerality, considering the way the integration of digital features into physical objects can enable new temporal affordances. One example of this attitude is Jayne Wallace's series of lockets (2010-2011) (see Figure 4.2), which are enhanced with digital capabilities in order to investigate how the ephemerality of digital traces can be appropriated to define unique personal moments. *Remember*, the first locket designed by the jeweller, stores a series of personal images and displays a different one each time it is opened; the second, *Forget*, holds one single image that degrades every time the locket is opened. The third locket, *Daguerre*, contains a small camera that allows the recording of one image to keep in the locket. This image is erased each time a new one is recorded, forcing its owner to take care in selecting the moment to be displayed. The final locket, *Orpheus*, also contains a camera that records an image to be stored in the locket; in this case, however, the picture can only be seen twice: first when it is recorded and secondly when it is then deleted from the locket's memory. Owners are hence influenced to be careful when considering whether they would like to re-experience a memory for a last time. Here, Wallace looks at practices and uses technology to introduce pauses; these gain new meanings and are turned into personal moments. The lockets offer a reflective approach to recording, keeping and accessing information, which creates temporalities that transcend issues of value or simple narratives of efficiency and acceleration.

Figure 4.2: Interactive lockets designed by Jayne Wallace in chief collaboration with James Thomas and Dr Karim Ladha (2010-2011). Work supported by RCUK Digital Hub SiDE (Social Inclusion through the Digital Economy), Newcastle University.

Similarly, adopting a reflective attitude to the temporality of digital media, Richard Banks (2011) investigates how practices of reminiscing can be supported as the amount of digital records increase in industrialised societies. Banks acknowledges that reminiscing implies a sort of temporality that differs in many ways from the logic of efficiency associated with personal computers, which nowadays store most personal records such as photographs, personal texts and correspondence that would traditionally be used to support reflection on the past. In *The Future of Looking Back* (2011), Banks discusses different projects that introduce material affordances into digital contents, so as to reinterpret the role of these contents in order to support reminiscing. The *Digital Slide Viewer*, for example, designed by Mark Selby, consists of a traditional slide viewer that can be ''loaded'' with photos from the photo-sharing service Flickr; the *Timecard*, another example by Banks, is a digital photo frame that enables people to assemble, present and hide away digital content of multiple family members along a chronological timeline; and the *Backup Box*, also by Banks, is a physical box that locally stores a person's Twitter archive on a daily basis, displaying appealing visualisations of this data. These projects transfer records from personal computers, where they are often restricted to a single user, to physical artefacts that can be placed in shared spaces such as the living room, where the digital content can be accessed by family members, or simply a quiet space away from the production environment of computer screens. David Kirk and Abigail Sellen (2010) discuss how the practice of archiving is more complex than, as commonly assumed, the intention to support reminiscing and a connection to the past. Such practices are not only part of social processes; some artefacts are kept as a way to construct identity, frame the family, honour beloved ones, fulfil a sense of duty or even forget.

Digital photography in particular has been considered to epitomise the shift from material (as permanent) to digital (as ephemeral). Susan Sontag (1977) and Roland Barthes (1981), in their classical analyses of photography, concluded that its main purpose was to archive memories and support reminiscing; digital photography, in contrast, which materialises immediately, ready to be shared via cell phones and social software, is considered to have a more performative, short-term, and expressive use (van Dijck, 2007). The real-time aspect of digital photography is therefore often considered to intensify the frequency at which records are produced and shared, supporting practices that differ in many ways from those mediated by traditional photography. The real-time effect, however, is not intrinsic to photography itself but to the practice it is supporting, as Wallace's and Banks', examples illustrate.

Media theorist Rushkoff (2013) presents an interesting metaphor for the variation of rhythms in the world, which can be employed to analyse the contrast between the perceived performative role of digital photography and the archival role of analogue photography. In *Present Shock* (2013), he argues that rhythms in the world can be defined by the alternation of two modes: flow and storage. ''Flow'', in this case, refers to a dynamic element of change, while ''storage'' refers to a condensation of the things that flow. Data can therefore be treated as either flow or storage, depending on the point of view and the considered system. In the case of photography, analogue formats may be considered as tending towards ''storage'' while digital photography, in the example of instant sharing, may be considered as tending towards ''flow''. Twitter data, in Rushkoff's view, should be treated as ''flow'', while emails and books should be treated as ''storage''. The migration of media, traditionally dedicated to storage, to digital formats that can enable experiences of flow may therefore create confusion, as systems might try to cover both modes, and people may not have a clear model for treating these formats. As such, individuals and designers may have trouble distinguishing between ''data flows'', which are supposed to be skimmed, and ''data storage'', which is supposed to be fully consumed (Rushkoff, 2013, p.142). In Facebook timelines, for instance, content produced as flow, or as people live in the moment, is eventually treated as storage (Lindley, 2014); this may result in problematic experiences, such as when content creation becomes self-conscious or when stored content is produced ''on the flow'', preventing it from acquiring personal meaning. As argued by both Daniela Petrelli and colleagues (2009) and Elizabeth Thiry and colleagues (2013), pause and reflection embedded in experiences of memory creation are important, as they allow people to elaborate their identities and sense of self. Content produced ''in the flow'' should therefore go through a phase of selection and curation. Hence, in order to provide meaningful memories,

designers should promote more awareness of these tensions, intentionally choosing particular temporal modes they are attempting to support.

The examples above demonstrate the potential for digital records to enable temporal expressions and rhythms, which are nuanced and cannot be simply classified as ephemeral. They also transcend simplistic solutions of attempting to return to the supposed linear path of technological development, as well as dominant narratives of time that mainly focus on optimisation and speed. Technology-enhanced artefacts present great potential for temporal explorations, particularly if designers concentrate on fostering reflective attitudes, investigating practices that go beyond the taken-for-granted of specific formats and paying close attention to the kinds of rhythms that they intend to support.

4.2.2   Practices and experiences constructing collective times

While the examples above illustrate different ways in which technology-enhanced artefacts can expand notions of time at the level of single or closely connected individuals, it is in approaches to community, and more specifically to heritage, that the complexity of practices that come together to create time have begun to be investigated.

Rushkoff's alternation of rhythms (2013) again provides an interesting metaphor for analysing temporality in terms of communities. In his model, while the individual is ''flow'', the dynamic part of rhythms, the community is ''storage'', the stable part of the equation (2013, p.194). In other words, while the individual is the one who takes actions, it is the community that absorbs the impact of these actions over time. Rushkoff argues that people should stop looking into ''individual futures'' and instead become more aware of what *''connects them to everyone and everything else''* in the present (2013, p.194). This criticism relates to Sharma's argument, presented in Chapter 2, that time is too often interpreted as an individual concern, when it is in fact an expression on social practices and cultures of time.

The two modes of temporality proposed by Rushkoff can be related to Elisa Giaccardi's (2011a) analysis of heritage in terms of duration and pause. She argues that heritage is expressed in the ''duration'' of a mix of perceptions, memories and hopes that is open to change and which persists over time in its difference and repetition. Design for heritage sites and museums, on the other hand, focuses on the brief moment of the visit to the site, which consists of a

"pause" in the fluidity of events process. Heritage can therefore be considered a pause to think about the past and re-enact stories that will help shape our sense of belonging, identity and culture (Giaccardi, 2011b). Museums accumulate experiences, but these experiences are mobilised across time. Giaccardi draws attention to the need to develop a framework of extended temporality and provide a shift in focus from the centrality of individual experience to multiple and repeated interactions.

This notion of individual practices coming together to create a larger culture is further investigated by Wallace and colleagues (2013) in the *Tales of I* project. The group developed an interactive project that allowed clients, staff and visitors at a mental health unit in the UK to play footage of remarkable events within the community to which they belonged. Through this project, the researchers attempted to provide a "way in" for staff and family members to engage with these clients. By reflecting on this project, Wallace also reflects on how cultural heritage is constructed and becomes part of people's identities; she explains that *"[heritage is] an investment in a group or community where history and being part of an ongoing story mean more than the details of the present alone."* (Wallace, 2013). It is the sense of belonging that extrapolates the present, and the need to construct narratives based on shared events that forms what one would call heritage. Both Giaccardi and Wallace shift the perspective of heritage from grand narratives of *the past* to the mesh of practices that come to construct collective moments in time, as well as the way people relate to these moments within their personal perspectives.

These approaches to heritage contemplate time as embodied. Events are considered, not a point in a linear narrative, but instead accumulations of practices and experiences, which in turn create a sense of belonging in each of their actors, and furthermore, in those who directly or indirectly experience, relate or identify themselves with these events. By focusing on individual accounts, which come together to construct a certain context, one would therefore realise how multiple temporalities are expressed in the world. Such an approach is likely to reveal expressions that will ultimately challenge dominant narratives of time.

Design Exercise I: Long Living Chair

One of the practical *Design Exercises* carried out in the context of this research concerned the temporality of digital traces of usage, and the way they can help people to consider their objects within extended temporal frames. This challenges the usual assumption that artefacts, in particular digitally enhanced artefacts, are designed and produced to be short-lived. The exercise was called the *Long Living Chair* (Pschetz and Banks, 2013) and was developed together with Richard Banks at Microsoft Research Cambridge.

As the name suggests, the Long Living Chair consists of a rocking chair, which is enhanced with a motion sensor and a digital memory and can therefore recognise how often it is used. For about 100 years, the chair records how many times it is rocked and displays this information back to its owners. After this period, its memory is reset and the chair starts counting again, day after day, how many times it is used. The recorded information, however, is not meant to be accessed frequently, as the chair does not want to call for attention. Instead, all it wants is to construct its own role in the world, and the way it interprets the world is by identifying that it is being used, and rocked; therefore it counts, day after day, how many times it is rocked. Or perhaps it does not count, remaining silent, static, waiting somewhere in a basement or storage space to be used again, period during which its memory will register a gap, a blank space of usage. All this information, however, is kept by the chair away from the sight of the person sitting on it, as the information mainly concerns the chair itself, and for this information to be found, some amount of intention is demanded.

The demonstrator built for the Long Living Chair is an augmentation of the iconic RAR rocking chair designed by Charles and Ray Eames, which was chosen for its recognition as a high design standard and desirable object. In the prototype, one of the chair rails was carved and embedded with a motion sensor and a small display. The display is divided into two main areas. The top area contains the graph that represents interactions in the long term. On this graph, each pixel represents a time span of 146 hours, or approximately 6 days. Activity is represented by pixel brightness: the brighter the pixel, the more the chair has been rocked in the respective period. Pixels are chronologically organised from bottom to top and from left to right, each column representing one year. Since the display contains 96 columns, it also displays the information for 96 years. The time represented begins when the chair was produced, or more specifically at the moment the display was embedded in the chair; 96 years later, once the 96 columns are full, the memory is automatically reset, and the display begins to be filled from its first pixel

again. The second area of the display, located at the bottom of the main graph, is used to signal movement. In this area, pixels move horizontally from right to left, crossing the display at one step per second. Therefore, each pixel represents one second of activity, and the entire display is turned off when the chair is left to rest for 96 seconds.

Figure 4.3: *Long Living Chair*: display close-up

The display was positioned on the inside of the right-hand rail of the chair. The intention was that owners would forget the display completely and would only access the information once in a while, in life-changing moments, for instance, when the chair needed to be moved
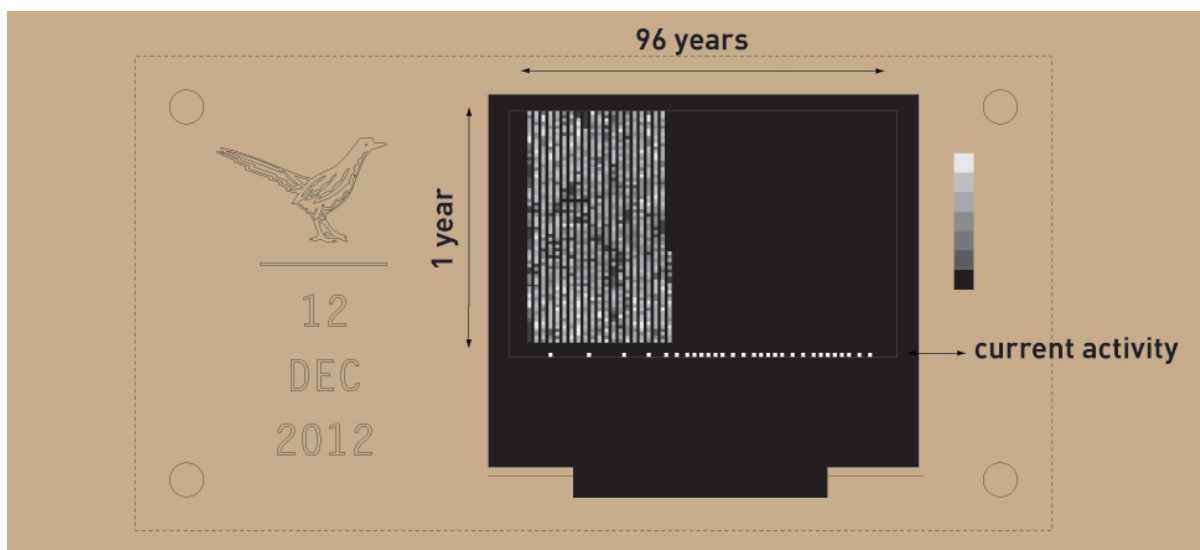
Figure 4.4: *Long Living Chair*: display schematics

or repositioned, such as when moving house, or when the space needed to be rearranged to support a new activity or the arrival of a new family member. At these moments, owners would be able to ascertain periods of high and low activity and even wonder about patterns left by previous owners.

The slow, almost invisible pace at which the information on the display changes indicates that the chair lives in another tempo. The slowness and invisibility of the change helps the recorded information to remain in the background of its owners' lives. In fact, given its slow pace of change, temporally forgetting the existence of the display helps them to see how the information has changed when they access it again. As with the physical wear of artefacts, minimal incremental changes become invisible in the everyday, and can be better recognised after a period away from the object.

Here, and again in contrast to the quantified-self movement, the digital information is not intended to enhance the object's functionality, but instead serves as a way of giving it autonomous characteristics. The fact that the chair records its own experiences independently of its owners gives it a sense of autonomy and puts it in a different perspective, as if to reinforce the idea that things continue to exist even when out of sight, and that they too have a story of which the present owners only play a small part.

As the chair records and displays information for almost 100 years, it suggests that it should be preserved for at least the same amount of time. In fact, this suggests that the chair will cross

generations and have multiple owners, which again brings a different temporal perspective to the object. There have in fact been very few examples of projects that consider or accommodate multiple lifespans. One such example is the *Tales of Things* (2009-2013) project, led by Chris Speed and spanning several UK universities. The project consists of a platform where people can print out QR-codes that they can attach to any physical artefact. This code is recorded on an online database, where people can leave stories about the artefact. The physical QR-code can then be scanned with the inbuilt cameras of smartphones, which will connect to the website and fetch details about the item. The system has been used, for instance, to track stories about second-hand objects and clothes, works of public art and other things. Interestingly, the system provides a social patina to these items that enriches physical traces of wear, which is similar to the usage information displayed by the Long Living Chair.

The Long Living Chair was one of the three practical design exercises carried out in parallel with the reflections on alternative approaches to time in design reported in this thesis. It departs from questions of physical traces, for example how these traces give autonomy to the object and how they would perhaps mediate social practices differently. It ends up, however, questioning issues of long term relationships between people and objects, attempting to shift the focus from single to multiple owners as well as to longer lifespans. Batya Friedman and Lisa P. Nathan (2010) argue that one of the problems of designing for multiple lifespans is that technological conditions are shifting too quickly, and that it is impossible to predict how things will develop in the long term (Friedman and Nathan, 2010). The supposedly sped-up rate of change of digital technologies, however, should not prevent designers from asking how technologies can be meaningfully placed within social practices across generations. Again, in this case, narratives of speed seem to discourage explorations of time in design.

4.3   Slowness and diversification of rhythms

The notion that particular artefacts and systems can promote different kinds of temporalities, as well as the increasingly noticeable negative impacts of dominant narratives of acceleration on both social relationships and the natural world, have influenced several technologists and

designers to focus particularly on slowness as a strategy for promoting more sustainable attitudes and a better quality of life.

The approach to slowness in technology-related fields, however, is different from that of traditional areas of design. As the two areas have different backgrounds and influences, they consequently formalised their calls to a *slowing down* using two distinct agendas, *Slow Technology* and *Slow Design*, which proposed different aims and outcomes. Although these original proposals demonstrated a genuine aspiration to a diversification of rhythms, their outcomes have been strongly influenced by dominant narratives of linear development, which not only narrowed their scope to a great extent, but also levelled their differences to the point that both started to be considered interchangeably. This section will analyse the initial proposals behind these two calls and the way they were eventually appropriated by dominant narratives of time, ultimately converging into one single concept.

4.3.1   Slow Technology and technological avoidance

Given the common association of technology with acceleration and ephemerality, it is not surprising that the discussion of the role of artefacts and systems in promoting slower rhythms appeared earlier in the field of computing rather than in design. In 1997, computer scientists Mark Weiser and John S. Brow published a seminal paper advocating the design of Calm Technology, in which they argue that technology, embodied in pagers, cell phones and web services that ''frenetically'' call for attention, is an ''enemy of calm.'' They advise that, as technological devices become ubiquitous, they should be designed in a way that addresses the periphery of human attention, providing contextual information without demanding conscious effort and allowing people to shift their focus only when necessary.

Five years later, Lars Hallnăs and Johan Redstrőm (2001) proposed Slow Technology, calling for researchers to ''*put back the time into design*'' and arguing that, due to the history of computers in office automation, technology has traditionally focused on promoting efficiency and productivity, thus supporting an overall culture of acceleration. They argue that, with the expansion of computing technologies to other realms, this culture of productivity and acceleration is consequently extended to all contexts of human life. Slow Technology, therefore, would provide a new agenda for the design of technological artefacts and systems that would enhance ''*reflection and moments of mental rest rather than efficiency in performance*'' and would be

explored through three main themes: (1) reflective technology, i.e. design of technology that invites reflection or *''is reflective in its expression''*; (2) amplified environments, i.e. design of settings for the enlargement and amplification of given environments; and (3) time technology, which refers to the *''design of technology that through its expression amplifies the presence, not the absence, of time''* or *''which stretches time and slow things down''* (Hallnas and Redstrőm, 2001).

In contrast to Weiser and Brow's concept of Calm Technology, Slow Technology does not intend to make technology invisible. Instead, it aims to expose it and extend it over time. Fast and slow, in this case, do not relate directly to time perception, but to what the authors refer to as time presence: *''when we use a thing as an efficient tool, time disappears, i.e. we get things done. Accepting an invitation for reflection inherent in the design means on the other hand that time will appear, i.e. we open up for time presence''* (Hallnas and Redstrőm, 2001). Hallnăs and Redstrőm illustrate this concept with the example of a doorbell that plays a fragment of a long melody each time it is pressed. Only over time, and only if its behaviour is reflected upon, would one realise which melody it is. ''Presence'' here involves temporal duration and is almost in opposition to ''use'', which is closely related to temporal efficiency. While the doorbell has an obvious use, its presence is only realised over a certain period of time.

For Hallnăs and Redstrőm (2002), ''presence'' refers to the existential definitions of a thing based on the way people accept it as part of their ''lifeworld'', while ''use'' simply refers to a general description of objects' use. Although the parallel has not been explicitly established by the authors, these concepts can be directly related to Heidegger's (1962, p.103-105) notions of ''present-at-hand'' or ''ready-to-hand''. For Heidegger, ready-to-hand refers to equipment that is used in order to achieve something. As long as it works effectively, it remains concealed from its users' view. Present-at-hand, in contrast, refers to objects as present in consciousness, such as when they are invoked in an abstract sense. Broken tools are thus present-at-hand, as they become obtrusive once they no longer function effectively; it is the same for all physical concepts that occupy a distinct point in time and space. For the philosopher, all entities oscillate between these two separate modes: the withdrawal of readiness-to-hand and the explicitness of presence-at-hand. In the example above, the doorbell is ready-to-hand as it fulfils its function of calling for attention. Its fragmented melody, however, reinforces its aspects as present-to-hand. It is exactly this concept of presence that Hallnăs and Redstrőm want to explore in technology, arguing that such exploration could lead to more reflective attitudes and a slowing down.

A well-studied example of Slow Technology is the *Photobox* (2009), (Figure 4.5) designed by Mark Selby and later studied by William Odom and colleagues (2014). The device consists of a wooden chest connected to a person's Flickr (www.flickr.com) account, which occasionally prints a randomly selected photo from her or his online collection. However, the intervals between prints are long (e.g. once a week), irregular and unpredictable, which challenges usual assumptions of technology as "ready-to-hand." A long term study (Odom et al., 2014) carried out with the *Photobox* revealed that although participants had an initial reaction of frustration and disappointment with the slowness and unpredictability of the device, this disappointment eventually turned into acceptance and even sometimes anticipation.

Figure 4.5: PhotoBox (Odom et al., 2014)

Expressions of Slow Technology can also be recognised in recent commercial products, such as the PlayStation games *Flow* (2008) and *Journey* (2012), which invite players to slow down while exploring a scenic landscape. In *Journey*, players also eventually meet each other in this virtual environment, but they have no way of directly talking to each other, only emitting bird-like tweets. Another example of temporal stretching is the RSPB bird-watching cameras that allow

users to watch and listen to birds that visit their gardens remotely, either online or on their television sets. Although not framed within the Slow Technology movement, such products promote a stretching out of time that contrasts with functionalist approaches of design in digital media. They also demonstrate that, even if such examples are relatively scarce, technology is not intrinsically fast.

Despite the nuances of its original proposal, Slow Technology, or ''slow tech'' as it is often abbreviated, has been increasingly interpreted in the popular media, other academic fields, and even recent design practice as a reaction to an assumed supremacy of technology in everyday life and with a call to reject these technologies. The movement is then reframed as an attempt to limit *''excessive access to technology''* (Clijmans, 2014), or as advice to parents to restrict children's use of electronic devices (e.g. Hofmann, 2014); even designers have interpreted it as a rejection of information and communication technologies, as demonstrated by the *Slow Tech* exhibition organised during the London Design Festival in 2011. The exhibition focused on criticising a perceived dependency on online services, presenting projects such as Hugo Eccles and Afshin Mehin's *Social Jammers* (2011), a series of conceptual devices designed to curb people's access to social network websites. The series features the *Social Timer* (Figure 4.6), which disables a particular type of communication for a short amount of time, such as during a family dinner, the *Social Bomb* that forces everyone in a space to take a break by secretly cutting all forms of technology and the *Social Thermostat* that allows different levels of connectivity in different rooms in a house.

Figure 4.6: *Social Timers* (2011), part of *Social Jammers* series by Hugo Eccles and Afshin Mehin

Even if it presents relevant themes for discussion, this new way of framing Slow Technology positions the movement as a mere reaction to the supposedly universalised condition of acceleration, which is attributed, not to a socially-created culture but to technology itself, in its form of devices and services. This simplification creates a dichotomy between slow and fast, and prevents designers from investigating alternative temporal expressions, ultimately legitimising the dominant narratives of speed that the movement initially aimed to criticise. As discussed in Chapter 3, although artefacts and systems may be designed to support a particular rhythm, they are not intrinsically fast or slow. These roles are constructed within social narratives and influence perceptions of rhythms; however it is people who appropriate them to be fast or slow, and this capacity cannot be underestimated.

As mentioned in Chapter 2, the idea that technological developments promote a state of continuous acceleration in the world is not new. This supposed condition has been often criticised and ultimately reiterated for centuries. In the 19th century, for instance, the figure of the flaneur became popular as a critique of the uniformity and accelerated rhythms of the technology-laden urban environment. The flaneurs would stroll around the streets of busy metropolises with a turtle on a lead, so that the turtle would set the pace of their walks, allowing them to enjoy a slower rhythm than the frenzy of cars, trams and urban dwellers rushing through their lives (Benjamin, 1968, p.197). As with the *Social Jammers* above, the turtles forced city dwellers to slow down. Instead of promoting slower rhythms, however, the flaneur became an iconic representation of the overwhelming acceleration of the city, whose rhythms would certainly have been more complex and varied than this simple metaphor can represent. Interestingly, almost two centuries later, we continue to follow the same narrative, denouncing technological developments for promoting continuous acceleration and proposing to solve this same supposed acceleration by forcing a supposed slower attitude by curbing access to these means.

With a similar motivation but different attitude, Ben Fullerton (2010) proposes the concept of *Design for Solitude*, which does not try to negate the value of connectedness, sharing and constant availability, but instead questions it, given that designers often support it with little or no thought. The author advocates the encouragement of moments of isolation, and demonstrates his concept using a feature of the 2007 Samsung mobile phone *Serenata* called *Pure Music* as he explains here: *''sliding up the built-in speaker activates the player and essentially turns the Serenata into a single-modal device: Any incoming communication is suppressed; the person listening to music isn't disturbed. Instead, when they exit 'Pure Music' mode, they receive a log of any phone-related*

activity they have missed'' (Fullerton, 2010). Fullerton considers that single modal devices, as the *Serenata* when using *Pure Music*, enable a higher level of focus on the interaction at hand and therefore richer experiences. Similarly, Phoebe Sengers (2011) criticises constant connectivity, reflecting on the way slower attitudes could be promoted by *''making fewer choices, accessing less information, making productivity less central, keeping our lives less under formal control''*; she further considers how this attempt at slowing down could be reflected in the design of digital social technologies, and whether this would make online communication more manageable. Both Fullerton and Sengers attempt to avoid dichotomies, inviting designers to support conditions that might enable different temporalities instead of simply negating technology as a whole, even if just as a provocation.

It is important to note that the narrative of technological determinism, which Slow Technology attempted to escape but in which it was ultimately caught up into, is strongly related to the typical modern faith in the power of applied and technical knowledge to improve human life; this has been mentioned in previous chapters, particularly in regard to clock-time and modern design. It is also important to stress that such beliefs have not been diminished by more recent accounts, and continue to play an important role in the design of technological artefacts and systems. Juergen Habermas (1981) describes the *''project of modernity''* as an effort to develop *''objective science, universal morality and law, and autonomous art according to their inner logic''*; this would reveal universal, eternal and immutable qualities of humanity. Scientific domination would then bring freedom from scarcity and the arbitrariness of natural calamities (Harvey, 1989, p.12). Although a vehement modernist, Habermas (1981, p.81) stresses that reducing practical questions about the *''good life''* to technical problems for experts would diminish the need for public and democratic discussion of values. Society would then be transformed, as neutral information, rational analysis and technical skills would take the place of ideology and traditional politics.

This faith in the impartiality of scientific and technical knowledge has sometimes transformed technology into an authority considered beyond human intervention. In *What Technology Wants* (2011), Kevin Kelly, founder and editor of *Wired*, a popular technology magazine and news website, holds that technology is an *''ever-ripening super organism, of which we are but a part, that is following a direction beyond our own making. Humans are both master and slave of their own technium and our fate is to remain in this uncomfortable dual role''* (Kelly, 2011, p.187). Kelly invites people to align themselves with *''the imperative of the technium''*, as he terms the technological universe, because to do otherwise would be to resist their *''second self''* (Kelly, 2011, p.188). By presenting

human relationships with technology as an ''embrace or reject it as a whole'', Kelly reinforces a dichotomy with no middle point. This technological determinism can also be observed in the way the so-called ''Moore's Law'' has been widely defended in the media, sometimes being used to argue for the certainty of a technological singularity or a moment at which artificial intelligence will bypass human intelligence. What, in 1965, was a simple observation made by Intel cofounder Gordon E. Moore, regarding the fact that transistor count in computer processors had doubled every so often (which later became a guideline for research) has been turned into proof of technological autonomy. Some even argue that it is necessary to defend the ''law'' that is currently ''under threat'', due to the fact that increasing computational power is becoming harder. Replacing computers every two years is therefore just a consequence of this ''natural'' progression towards the future manifest of technology. Jaron Lanier (2010, p.32) argues that the narrative of technological authority is so strong that *''People degrade themselves in order to make machines seem smart''*; this often leads to bad decisions, as when *''bankers believed in supposedly intelligent algorithms that could calculate credit risks before making bad loans''* or when teachers are asked to teach *''to standardized tests so a student will look good to an algorithm''*.

This notion of technology as following its own manifest destiny, to which humans have no choice but to acquiesce, makes any criticism appear impracticable or impossible. Suggesting a negation of technology, as in outcomes of the Slow Technology movement, can only be considered narrow and even naive. In this thesis it is argued that the way to revert such determinism is to step back and stress contradictions in dominant narrative trends. Humans are not subordinated to the technological universe, and instead of reiterating how much influence technologies exert in our lives, it is necessary to affirm the multiple ways in which everyday life is independent of such deterministic visions. The dichotomy of technological assimilation or rejection created over the concept of Slow Technology does not reflect the way people relate to technology, and in its narrowness, this dichotomy risks dismissing the proposal as a whole.

4.3.2   Slow Design and crafts

In contrast to Slow Technology, Slow Design has been defined in close relation to the Slow Movement, which started in the late 1990s in Italy as a reaction to fast food restaurants, and the loss of local identity and culture of acceleration that they represented. From Italy, the Slow Movement expanded to other countries and to domains as varied as travel, education and science. In Design, the movement was first referenced by Alastair Fuad-Luke (2002), who later

formalised it together with Carolyn F. Strauss (2009) into six main principles: (1) *Revealing*: experiences in everyday life that are often missed or forgotten, such as materials and processes easily overlooked - the authors illustrated the principle with the work of Julia Lohmann, who transforms sheep stomachs into aesthetic lamps; (2) *Expanding*: considering expressions of artefacts and systems beyond their perceived functionalities, physical attributes and lifespans - exemplified by Monika Hoinkis' *Living With Things* (2005), a series of objects that depend on human help such as a desk lamp without hinges that needs to be held by its users, (3) *Reflecting*: designing artefacts that induce contemplation and "reflective consumption", such as Katrin Svana Eythrsdttir's biodegradable chandeliers, which disappear over time; (4) *Engaging*: considering open-source and collaborative processes that rely on sharing, co-operation and transparency of information - this principle is exemplified by Martin Ruiz de Azua's Human Chair, which consists of an arrangement of people sitting on each other's knees; (5) *Participating*: encouraging users to actively participate in the design process, embracing ideas of conviviality and exchange, which constitutes a call to respect local knowledge built over time; and (6) *Evolving*: looking beyond the needs and circumstances of the present day.

These principles are highly relevant when considering alternative rhythms beyond dominant narratives of acceleration. Principles (4) and (5), *engaging* and *participating*, closely relate to the Slow Movement's overall call to respect local cultures, draw attention to the need to observe local practices and therefore promote local rhythms in their variety and idiosyncrasies. Principles (1) and (2), *revealing* and *expanding*, invite designers to observe everyday experiences and their relation to objects, again beyond paradigms of acceleration. The six principles also celebrate slowness as an answer to issues that have long been discussed in design. *Revealing* and *expanding*, for example, criticise design's typical enthusiasm for the new and for functionalism; *reflecting* addresses its contribution to increased levels of consumption; *engaging* points to users' lack of engagement with the functionality of artefacts, which is also discussed by Verbeek via his concept of "material aesthetics"; *participating* criticises the homogenisation of culture and disregard for local idiosyncrasies; and *evolving* approaches the challenge of long term thinking. By bringing these critical issues under the umbrella of Slow Design, Strauss and Fuad-Luke suggest that slowing down is a starting point for overcoming them.

Slow Design has inspired a variety of projects that have attempted to recover rituals and materials, attending to traditional practices as a way of reconnecting people to their environments, actions and the material qualities of things. Different examples have explored domestic rituals, such as Dick Van Hoff's *Tyranny of the Plug* (2003), which consists of manual versions of classical

kitchen appliances, the blender, the mixer and the orange squeezer, developed as an attempt to *''stress the pleasure in cooking and the actual experience of actions.''* According to Van Hoff, the manual appliances allow people to *''determine the speed of the process and enjoy the ingredients at hand.''* With *Root* (2012), illustrated in Figure 4.7, Gabriella Rubin and Kornelia Knutson propose a zero electricity food storage system consisting of cabinets , the sections of which have different temperatures and humidity levels calibrated for different kinds of food according to traditional practices. These projects suggest that electrical appliances convey a logic of speed and time efficiency that has prevented people from experiencing direct contact with materials and more embodied practices, which in this case are associated with non-electric utensils. Such concepts have also been explored in exhibitions and projects, sometimes framed interchangeably with Slow Technology. For example, the *Slow Tech* (2008) exhibition, curated by Francois Bernard at Museum de l'Objet in Paris, featured handcrafted objects and artisanal materials as a reaction to the increasing *''immateriality of things''*. Similarly, Distance Lab researchers Costas Bissas and Tomoko Hayashi framed their *Neuromantic* (2008) project, which investigates ways to introduce technology and encourage rural life without altering the uniqueness of local environments and resources, as a Slow Technology project.

Figure 4.7: *Root* (2012) by Gabriella Rubin and Kornelia Knutson

The emphasis on materiality and embodiment considered to be provided by manual utensils and manual practices is becoming far more predominant in expressions of Slow Design than its emphasis on local cultures. In fact, the movement has been increasingly associated with handicraft production, which in this case is considered intrinsically slow. In *Taking Time: Craft and the Slow Revolution* (2014), an exhibition that has toured several cities in the UK, the curator

Helen Carnac contributes towards establishing this association, explaining that crafting skills are acquired *''over time, cannot be rushed''* and are *''intuitively learned.''* Betsy Greer (2008) notes that handicraft activity such as knitting is nowadays considered a way to *''slow down in a fast-paced culture, subvert producers of mass manufactured merchandise, embrace the domestic, connect to people in their community, support communities across the globe, and express their own personal style and creativity.''* Wendy Parkins' (2004) study of celebrity knitting argues that knitting expresses a postmodern condition; individuals engaging in knitting are expressing a desire for a slower pace of life.

Figure 4.8: Poster and leaflets of *Taking Time: Craft and the Slow Revolution* (2014), exhibition curated by Helen Carnac

Here crafts are seen as a reaction to a pervasive culture of speed, which Parkins associates with a postmodern condition, in the sense that they escape functionalist tendencies of modernity. Under the perspective of temporal narratives, however, instead of an expression of postmodern rhythms, the focus on crafts as a way to slow down resembles more an attempt to return to an assumed pre-industrial temporality. Following the narrative of linear development of

forms of time, and therefore assuming that the world is invariably accelerating, a slowing down would be promoted by returning to practices that supposedly precede the introduction of alienating modes of production, which are held responsible for speeding up not only productive activities but everyday life as a whole. ''Returning'' in this linear narrative, to a supposed previous temporal condition therefore resembles an escape from the increasing pressures of this continuous temporal acceleration. Joanie Willett (2014) argues that crafts invoke imagined pasts where time runs supposedly more slowly, and that *''it proposes a binary opposite towards a characterisation of contemporary time and pace of life as frighteningly fast and ultimately destructive.''*

Crafting practices are not intrinsically slow, but because crafting practices are typically associated with pre-industrial forms of production, which in dominant narratives are considered slow, they are simply considered to promote slower rhythms, and are therefore narrowly related to the concept of Slow Design. As explained by Nicolette Makovicky (2010), the association of crafts with pre-industrial practices *''has led it to be immutably tied to economies of affect and gifting in the post-industrial world, and to sweatshops, exploitation, and child labor in the developing world. In one case, vernacular design stands for cozy anti-modernity, in the other it has been appropriated as industry's running mate''* (Makovicky, 2010, p.156). In dominant narratives of time, ''fast'' modes of production have relegated crafts to traditional, slower lifestyles, which has resulted in a nostalgic image of a practice that has little space or value in market economies. Even if associated with high quality and dependability, this slow speed of production is considered an expression of ''past'' practices, which may be considered as luxuries, but which are ultimately ''out-of-sync'' with modern lifestyles.

As the negative impacts of dominant narratives of acceleration have become more evident, the work of artisans, associated with a type of pre-industrial social agency based on collective inheritance and practice, have been proposed in Western industrialised societies as a reaction to over-production and consumption, and to industrial practices that detach workers from their final products. Crafts have therefore gained a subversive role, becoming an instrument of political criticism and a response to temporal experiences of postmodern forms of capitalism (Makovicky, 2010). Carnac suggests that crafts inspire people to take a critical position on consumer behaviour, *''questioning modes of production through new processes, looking at issues of stewardship and sustainability, as well as collective making and reworking everyday objects''* (Carnac, 2013). The term *craftivism* is increasingly used to refer to the use of crafts to address political and social causes, including strategically distributing specific crafts or engaging communities in manual work (Greer, 2014).

This new subversive role also prompted a surge in the popularity of such practices, which can be seen in dedicated exhibitions such as the *Radical Lace and Subversive Knitting* (2007) at the Museum of Arts and Design in New York, as well as in the increasing promotion of crafts as a public group activity, expressed in the recent expansion of knitting clubs and dedicated making spaces, as well as the greater number of web services dedicated to the commercialisation of handmade products (e.g. etsy.com and notonthehighstreet.com). This increase in popularity also clashes with the idea of crafts as being intrinsically slow. Rushkoff (2013, p.117) reports how the activity of a candle-maker changed as she joined etsy.com, and as her work became more popular. While she originally considered candle-making an eventual pastime, after she joined the website and saw an increase in demand, the practice became a standardised, faster and less enjoyable activity.

The growth of ''making'' and ''do-it-yourself'' movements, which range from traditional crafts to hobbyist electronics, and its development from a fringe into an emerging industry, has also provided new roles for crafts[1]. The discussion is of course broad, and goes beyond temporality, surpassing the scope of this dissertation. The main point is that these new developments have challenged the assumption of craft as an obsolete, pre-industrial practice, as well as its common association with domestic or less recognised industrial activities.

Even though crafts have gained new roles, it is still considered intrinsically slow by mainstream accounts, and it is due to this simplistic view that it is often associated with Slow Design. Both crafts and Slow Design would therefore benefit from a move away from the paradigm of crafts as pre-industrial. This move would allow designers to consider more varied rhythms involved in crafts as well as to turn their attention to other principles of Slow Design, expand their scope of study and challenge dichotomies of fast and slow as well as dominant narratives of pre-industrial and industrial times.

This section has shown how the movements of Slow Technology and Slow Design have been affected by dominant narratives of time. Although both movements present relevant principles for a diversification of rhythms, they have been appropriated by paradigms of dominant narratives that define technological developments as fast and place slowness outside the productive system, strongly narrowing the scope of both movements. The section has suggested

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[1]It is interesting to observe that even within the do-it-yourself movement, crafts are regarded as drawing less attention than more ''productive'' activities, such as electronics; this also involves issues of gender, as crafts are usually associated with domestic, feminine practices (Ames et al., 2014)

that, by rejecting dominant accounts, and turning their attention to the original proposals of Slow Technology and Slow Design, designers would be able to expand their approaches to temporality, creating artefacts and systems that go beyond assumptions of what supports slowing down or speeding up.

Design Exercise II: Movement Crafter

The *Movement Crafter* (Pschetz et al., 2013) was another Design Exercise developed as a reflective practice in the course of this research, also designed together with Richard Banks at Microsoft Research Cambridge. The project is an attempt to investigate possible relationships between technology and crafts without the common stigmatisations of fast and slow media. It focuses on the embodied practice of knitting, attempting to support this activity without disrupting its experience or placing it within issues of value, e.g. by attempting to stimulate it.

Figure 4.9: *Movement Crafter*

In their explorations of the way digital technology can support the activity of knitting, Daniela K. Rosner and Kimiko Ryokai (2010) studied the practices of 17 experienced knitters, mapping different themes that could be relevant to further designs. These themes included a perceived emphasis on the process and the perception of the activity as a social practice, as well as a search for inspiration and motivation, e.g. special projects such as a gift or a seasonal change. These themes indicate that knitters were interested both in the final piece and in the activity itself, with some even reporting it as a therapeutic practice that, according to the authors, reinforced their sense of self-productivity, although they still needed motivation to start the process. In the system they later developed, Rosner and Ryokai (2010) considered knitted pieces to be a timeline of the knitting process, which embodied a temporal dimension; however, the researchers also stress that it is not always obvious how long it has taken to produce each piece.

Drawing from Rosner and Ryokai's research, the Movement Crafter attempts to support the activity of knitting by providing a subtle motivation for learners, as well as exploring the social aspects of it through a subtle form of communication. The final demonstrator consists of two sets of knitting needles enhanced with Axivity (axivity.com) motion sensors, and two sewing boxes embedded with electronics and a dedicated screen. The needles track the activity of the craftsperson and transmit the data to the box via radio frequency. This data is then recorded and translated into different thread visualisations, which provide a complementary output for the knitting activity. Each stitch extends the path of the thread in a continuously growing mesh, and the thread visualisation representing the movements of one crafter is eventually merged with the visualisation of other remote knitters. The system is quiet and remains at the periphery of knitters' attention, but it is also an attempt to explore the concept of presence suggested by Hallnås and Redström, by embodying the temporality of knitting over time. It challenges the utilitarianism typically related to technology, as the produced visualisation simply grows to support aesthetic contemplation, which might or might not be interpreted into the original crafting movements.

The thread visualisation also offers a reward for the effort of knitting even when these efforts do not result in a material manifestation, as an additional display of ''productive'' use of time. It thus ironically refers to knitters' assimilation of the dominant culture of efficiency, as reported by Rosner and Ryokai. As with most skills, becoming a skilled knitter demands significant dedication, and the reward of seeing a yarn transformed into a multi-dimensional fabric is a relatively long term accomplishment. The Movement Crafter therefore attempts to motivate crafters to carry on with their practices even if the improvement is relatively slow.

The merging threads also provide a different sort of communication, one that is present, quiet and open ended, contrasting with social media services that requires verbal or written attention. To avoid disrupting the practice, and similarly to the screen on the *Long Living Chair*, the screen is meant to remain in the background, accessed only once in a while in order to provide a moment of contemplation, a feeling of accomplishment and the comfort that other people are performing the same ''slow'' task.

Figure 4.10: *Movement Crafter* in use

The project, finally, aims to reconcile the perceptions of the temporalities of digital technologies and of traditional crafting activities that are performed as a pastime. The introduction of digital capabilities seeks to avoid any relationship with efficiency or the support for a fast pace. In contrast to the quantified-self movement, presented in Chapter 3, the Movement Crafter does not attempt to measure or increase performance. It is meant to support the crafts practice without making the craftsperson overly self-conscious of their activity. It also avoids drawing attention to the need for crafting, respecting it in whichever role it gains in different contexts, either as an occasional hobby or as a well-developed skill. In other words, the project aims to support turned-slow activities without speeding them up (e.g. by attempting

to make them more ''up-to-date'' as the addition of electronics to manual devices is often perceived to do) and without necessarily advocating crafts as slow, i.e. presenting knitting as necessarily slowing down.

Exhibited in different occasions, the Movement Crafter has been warmly received as explorative project that aims to combine new technologies and crafts, but it has also often been interpreted as a productive tool that allows knitters to trace back missed stitches, or that could help people to monitor elderly parents remotely. The visualisation of the threads of different participants that come to enmesh each other has also been interpreted as a form of competition with remote knitters. This reaction demonstrates how difficult it is to escape technological determinism as well as the narratives of efficiency that are so easily connected to digital devices. It also demonstrates the importance of understanding narratives and the way they influence people's mindset, and finally of also investigating which kinds of practices escape assumptions of fast and slow and would therefore challenge this simplistic dichotomy. This feedback was essential when considering the more pluralistic approach to time expressed in the concept of *Temporal Design* outlined in Chapter 5.

4.4   Redesigning the clock

The sections above have identified and discussed more reflective positions to temporality expressed in different design movements, and in related artefacts and systems. In parallel to these movements, however, a number of designers, technologists, theorists and artists have presented independent proposals for alternative metaphors for the clock, as a way of rethinking concepts of time. These attempts differ in their perspectives, approaches and levels of criticism, ranging from monumental clocks and clock products to more conceptual approaches and artistic installations. Despite this variety, the proposals maintain the commonality of seeking alternative ways of considering time that challenge dominant assumptions of clock-time.

As discussed in Chapter 2, much has been said about the role of the clock in promoting time as decontextualised from human agency, single-dimensional, quantifiable and thus prone to commodification. In *Objects of Time* (2012), Kevin Birth argues that clocks influence people to think about time in certain ways and thus contain hidden assumptions that draw awareness away from more complicated natural and social rhythms. Birth affirms that the coexistence of several rhythms, or what Lefebvre (1992, p.16) calls polyrhythmia (as the rhythms are in fact often in arrhythmia, i.e. in conflict and dissonance with each other), are more common to the human condition than clocks and calendars are able to represent *''the moment one adopts these artifacts to meet cognitive challenges, one's thought is constrained, and one's ability to address issues emerging out of polyrhythmia severely curtailed''* (Birth, 2012, p.102). By offering simplified representations of time, these tools constrain our ability to consider and adapt to more complex rhythms, negating more nuanced temporal manifestations in natural and social relationships. Similarly, Adam argues that clocks and calendars not only offer representations of time, but also become time per se (Adam, 1995, p.106). This determination of temporal cognition through clocks is also analysed by Birth, who argues that *''the distribution and adoption of cognitive artifacts, then, becomes the distribution and adoption of particular thought processes mediated by these artifacts''* (Birth, 2012, p.170). For Adam, clock-time is non-temporal and is actually appropriated in order to deny forms of time outside the logic of production, with the effect that *''even the embedded, lived times of work and no-work are understood through the mediating filter of our own creation of non-temporal time''* (Adam, 1995, p.91).

Given the way clocks are considered to influence temporal cognition, challenging this iconic object is also a way of challenging the hegemonic notion of time as disembodied. There have been innumerable attempts to redesign the clock over the last few years, decades and even centuries. This section is not an endeavour to give an overview of all these efforts. Instead, it will discuss how some selected projects, which present relatively distinct motivations, have approached time in alternative ways, challenging common assumptions of what time ''is.''

Nowadays, one of the best-known examples of a clock attempting to challenge the dominant idea of clocks as representing industrial quantifiable time is the *Clock of the Long Now*. Proposed by the Long Now Foundation and computer scientist Danny Hillis in 1986, the clock is designed as a gigantic timepiece based on a 10000-year cycle, which *''ticks once a year, bongs once a century and the cuckoo comes out every millennium''* (Daniel Hillis in Brand, 2000). The timepiece is to stand 61 metres above the ground, and is currently under construction on a mountain in Texas, U.S., partially financed by Amazon's CEO, Jeff Bezos. The designers of the clock explain that

the idea was to create the same impact on long term thinking as images of the Earth from space have had on the environment, by creating something that is *''interesting to think about, and famous enough to become iconic in the public discourse''* (Brand, 2000). While it considers time from an extremely long perspective, it invites people to consider their lives within extended scales of time, and possibly even more ambitious plans stretching across several generations.

While the *Clock of the Long Now* is unique in its attempt to extend notions of time along a very large scale, a number of designers and artists have proposed clock metaphors that stretch the clock cycle to the span of human life. The *Life Clock* (2008) by French artist Bertrand Planes, for instance, ticks once a year until year 80, while the *Death Clock* (2003), by artist Tatsuo Miyajima, and *Tikker* (2013), by Fredrik Colting, both count down towards a designated time of death. These clocks have the dubious role of emphasising slowness, but also urgency, due to the knowledge that time is running away. This sense of urgency is also represented by Brigitte Coreman's *Life Clock* (2010), which attempts to show the stage of a woman's reproductive cycle. The *Life Clock* contains a necklace with 500 ceramic beads that represent the average amount of chances a woman has to conceive. Each 28 days, one bead from the necklace is counted down. The designer even included colours that *''inform on age and quality''* of the eggs: darker colours indicate a late stage in her reproductive cycle. These clocks attempt to put in perspective the moment in which one is currently living, but they still simplify time, representing it as a linear course towards an end. Coreman's clock, which has received great attention in the media, is particularly problematic, as it disregards the range of issues involved in a woman's decisions to conceive, which is far more complex than a simple matter of choice or lack of awareness of her body.

Another relevant clock is Martí Guixé's *Time to Eat* (2011), which emits the smell of cooked meals to activate senses and chemical substances related to memories and feelings. The approach of this clock is slightly different from other projects in this section, as it speculates about a future scenario in which everyday rhythms extrapolate tendencies to detach people from the rituals of cooking and sharing meals characteristic of industrialised societies. The author claims that the piece is a way to sustain a transition period in which we adapt our bodies to a radical change from cooked meals to a functional diet based on pills. With this piece, Guixé criticises both changes in eating rituals from cooking to simply consuming, as well as efficiency-oriented lifestyles more generally, which are promoted by dominant narratives of acceleration and time scarcity.

The Present (2013) by Scott Thrift, on the other hand, reinforces a cyclical sense of time. The clock is based on yearly cycles: instead of showing the usual numeric display, it displays the four annual seasons indicated by different colours, which blend together, mimicking the way nature gradually changes over the year. Thrift's aim is to reduce the sense of urgency in everyday life: instead of measuring time by hours, minutes and seconds, his clock measures it by the blending of seasons, inviting people to pay attention to changes in their environments. Thrift states, *''by shrinking time into tiny measurable bits the 'established system' robs us of the immeasurable qualities of time. We limit ourselves by thinking about time as something small and scarce''* (Thrift, 2000), which resonates with the critique of time as expressed by traditional clocks.

While Coreman's *Life Clock* presents a linear vision of a woman's reproductive cycle, Revital Cohen approaches the theme by highlighting the complexity of temporalities women are faced with in current industrialised societies. Her *Artificial Biological Clock* (2008) purports to collect information from a woman's doctor, therapist and bank manager via online feeds and, once this information aligns perfectly, the clock notifies the woman that she is ready to have a child. In this ironic attempt to solve the complexities behind women's reproductive choices through a networked system, Cohen not only provides a reflection on the impossibility of reaching a balance between all these factors, but also ironises the frequent problem-solving approaches embedded in digital technologies.

Figure 4.11: *Artificial Biological Clock* (2008) by Revital Cohen

Cohen's *Artificial Biological Clock* is particularly interesting because it brings the temporal discussion to a different level, considering the complexity of rhythms that come together to create time. As discussed in the last section of Chapter 2, and also argued by Birth above, human life and time in the world is characterised by a range of temporal expressions that are complex, divergent and conflicting, far from the well-paced, linear flow represented by clocks and calendars. Extending the temporal scale helps little with surfacing this complexity and enhancing discussion around temporality, which in fact represents a great challenge for designers. The conceptual clocks below extend this multi-temporal approach from different perspectives, and also demonstrate the immense potential for exploration of alternative perspectives of time by designers.

Bastian (2012) looks at the intersections between natural and human rhythms. She confronts the idea that clocks are fundamentally about linear and objective time by considering them as tools to help understand people's relationships with the world. Drawing from Aristotle's notion that the perception of time is linked to our capacity to perceive change, Bastian defines a clock as *''a device that signals change in order for its users to maintain an awareness of, and thus be able to coordinate themselves with, what is significant to them''* (Bastian, 2012). This definition moves away from the notion of clocks as devices that measure *the time* and even questions the relevance of universal time for social coordination. Bastian maintains that alternative clocks could offer ways to draw attention to pressing natural issues. She illustrates her suggestion with the *One Hundred Months* clock (2008), developed by activist groups in order to bring awareness to the urgency of taking action against climate change. The clock is based on the affirmation that 100 months is the time left in which humans must act before reaching a tipping point in the accumulation of greenhouse gases, after which climate change would be accelerate beyond control. By counting down the months, the clock clearly illustrates the time governments, corporations, activist groups and society in general have left to coordinate themselves in order to change harmful practices. Bastian further proposes that the population of leatherback turtles could be used as a climate change clock, as this animal is especially sensitive to temperature rises. In these two cases, the clocks do not represent the objective time of *chronos*, but the time of opportunity or *kairos*, or *''the political time where one must seize the opportunity to act before it is lost''* (Bastian, 2012). Bastian extends the human ''timescape'' to include complex tempos of natural rhythms and of other living beings. The temporalities of natural rhythms are often simplified to geological time, which is associated with the *Clock of the Long Now* above, but they are far more complex and constitute an important area for design exploration.

Another critic of the clock, John Wood (1998) suggests that clocks should be redesigned in order to foster richer, more reciprocal and playful relations with their users. These potential clocks would facilitate a better work-life balance and redirect attention *''from a quest for sustainability to a less teleological experience of synergy at all levels''* (Wood, 2009). The designer developed different concepts to illustrate this idea, such as the *Lovers' Clock*, in which a single clock is composed of two halves, and the farther these halves are placed from each other, the slower their mechanisms run, mimicking lovers' feelings when apart. The *Adjustable Focus Wristwatch*, in turn, allows different levels of temporal tuning, giving more freedom from its mechanical pace: a broader focus would, for example, make the display go blank or display a relaxing image. Tuning it to a narrower focus, the watch would begin to indicate that it is *''closer to afternoon than to morning.''* Increasing the fine-tuning further would allow it to show hours, then minutes, then seconds, then tenths of a second etc. The *Lived Time Wristwatch* works based on its users pulse, while the *Pressure Watch* contains an indicator of the ambient stressfulness: in a work environment, for instance, it runs fast or slow depending on whether the environment is more or less stressful than usual. Space-time pressure tables of wearers across the globe would indicate how work environments compare. An increased synergy between clocks and humans can also be observed in Chris Speed's *Looking Clock* (1998), which only works when someone looks at it. In contrast to the flexitime provided by systems discussed in Chapter 3, such as the *Kairoscope* (Martin and Holtzman, 2011), these clocks are not an attempt to replace human interpretation. Instead, they propose to expand it, by staying open to intervention, in fact also demonstrating that clocks cannot work without human interpretation.

By exploring different metaphors, as well as more complex issues and more synergetic relationships with the clock, the projects above indicate some directions for exploring alternative representations and expressions of time. There is, however, still a huge untapped potential for designers to explore more complex temporal notions, particularly around the question of what concerns more political intricacies of time. However, some examples of political discussions can be found in the field of contemporary arts, such as in the pieces presented at the *Time & Motion* exhibition at FACT Liverpool in 2013. In this exhibition, for example, Blake Fall-Conroy, discussed issues around the value of labour time through his *Minimum-Wage Machine* (2008-2010), which allows anyone to ''work'' for a minimum wage. Turning the crank of the machine releases one penny every 0.17 seconds, which is the equivalent of £6.31 an hour (UK minimum wage). If participants stop turning the crank, they stop receiving money. Another project that explores issues around time and work is Sam Meech's *Punchcard Economy* (2014), which discusses current experience of freelance creative work. After collecting punch cards detailing

visitors' working hour patterns, Meech turned this information into a knitting pattern that displays the *"8 hours labour, 8 hours recreation, 8 hours rest"* slogan coined by Robert Owen of the *Eight Hour Day* movement in 1817. Any hours worked outside of the traditional eight-hour day appears as a glitch in the pattern of the resulting fabric.

There is much scope for exploring the more political intricacies of time. These intricacies do not need to relate explicitly to labour, as the projects presented at the *Time & Motion* exhibition did. Instead, they may refer to politics and power relations that are expressed in the everyday, as in Revital Cohen's *Artificial Biological Clock*. They might also refer to community issues such as the inclusion and exclusion of different groups as discussed in Chapter 2. The Slow Technology and Slow Design movements have been critically aware of the technological determinism that has dominated much of the 20th century, and have attempted to situate design within a social, economic and environmental context; however, these movements have failed to explore more complex links, and have been instead incorporated into the same narrative they attempted to criticise. Although these movements have provided a hunch about exploring issues of time, this hunch became lost in dominant narratives and dichotomies of fast and slow. Design needs to recognise that we live in an entangled condition, a condition in which time is variable and multidimensional, where slow co-exists with and flips into fast and things are and will be appropriated in unexpected ways. Although no design framework has explicitly approached time in more political terms, isolated attempts as well as artistic provocations have touched on related issues, and approaches to time from social sciences and philosophy can be adapted in order to emphasise a more critical perspective of time in design. These approaches have been appropriated in this research to define a new perspective of time in design, which will be described in Chapter 5.

Design Exercise III: Distance clocks

The last Design Exercise developed as part of this research explored temporal complexities based on variations in the time necessary to reach someone. The *Distance Clocks* (2011) are a pair of clocks that constantly display the time necessary to reach each other, based on public transportation schedules. Each device has a GPS receiver and a wireless Internet module, which together allow them to identify their current locations and send this information to an online

database. The system then reads the location of each clock's counterpart from the database, calling up data on flights and public transport from Google Flights (www.google.com/flights) and Google Transit in order to find the next quickest connection between the two clocks. The system then calculates the time necessary to travel the given distance, adding to it the time each person needs to wait to start the journey. This total time is then displayed on the clock, counting down, second by second, how much time is needed to reach its counterpart. When the first transportation means is missed, the counting down is subtly interrupted and the display is updated with the information of the next available connection.

Figure 4.12: *Distance Clocks prototype*

Although in discourses of acceleration ever-fast means of transportation are considered a universalised condition, their access and availability is more complex, changing according to the influence of different geographic locations, and also throughout the day according to more or less influential hours. Places with greater political and economic prominence are usually (and historically) better served by transportation, and can be reached more quickly than those with less perceived relevance. In the same way, night shifts are often relegated to the periphery of temporality, and are worse served by public transportation means than commercial hours of

Figure 4.13: *Distance Clocks prototype*

the day. Time is therefore ''compressed'' by new means of transport, according to narratives of acceleration, only in some places, for some people and on some occasions. These relationships, however, deeply influence people's lives. Personal relationships and family connections are all affected by these invisible but well-felt differences between temporal zones that are well or badly served by different services, especially as more ''flexible'' work hours are increasingly encouraged and promoted by productive systems.

Each clock, at the same time, provides a dynamic portrait of the other person, displaying each other as more or less accessible according to location and time of the day; they also tie each clock-holder into larger social and political issues around power, service provision and others. The other clock-holder, therefore, serves as a reference to demonstrate the unevenness of time between social groups extended across geographic locations and time zones. The distance in time increases according to a range of factors that oscillate throughout the day, even if none of the parts change their geographical location. The temporal distance between the two clocks is likely to increase at night, when access to public transportation becomes more irregular. This also reveals how the narrative of interchangeable rhythms between night and day, and the promotion of 24-hour lifestyles, is a strong simplification of the way time is experienced across social groups. Extended periods of interaction with the clocks reveal the patterns of mobility of both participants, as well as larger social patterns of immobility represented by the infrastructure of cities, governments and economical policies and services.

4.5   Summary of Chapter 4

This chapter has complemented the discussion initiated in Chapter 3 (on the way time has been considered in design) by examining more reflective attitudes. The first section investigated how designers have become more aware of the importance of considering the temporality of objects and its relationships with individuals' lifestyles. This awareness was motivated by a concern regarding accelerated rates of consumption and product disposal, which led designers, initially, to consider the life-cycle of products, and later, to contemplate the way design could foster stronger bonds between people and objects. The idea was that artefacts and systems could be designed to mimic behaviours considered positive in human relationships. Materiality also gained a central focus, not only in terms of the way artefacts age, but also in terms of the way they communicate how they can be repaired. Although the role of design in fostering emotional bonds was quickly disputed, the discussion has influenced further reflection on the role of design in mediating perceptions of time and rhythms, through the mediation of practices and through deceleration, which have been discussed in Sections 4.2 and 4.3.

Section 4.2 investigated approaches that take into account the way artefacts and systems are situated within practices and can mediate perceptions of time. In contrast to earlier accounts that placed perceptions within artefacts and systems, these approaches consider practices in a broader sense, admitting that although artefacts and systems play a role, they cannot define practices alone. Temporality has been analysed with regard to the relationships between digital and material traces. While materials are enhanced with digital traces over time, digital records have been explored in terms of new material embodiments, enabling new practices. The discussion has been extended to the notion of communal practices and experiences, and the way they simultaneously construct and are influenced by concepts of heritage. This discussion on materiality and traces has been practically considered in the design exercise of the *Long Living Chair*, developed in the context of this research. The chair attempts to embody the practices of a family and invite them to reflect on the way the life of this object will play out for at least 100 years.

Section 4.3 discussed implications of the Slow Technology and Slow Design movements, arguing that their proposals have been negatively influenced by dominant narratives of time. While Slow Technology initially advocated an emphasis on extending the sense of presence of artefacts and systems in an attempt to inspire reflection, it has been simplified as anti-technology, which, within dominant narratives, is rendered as impracticable or naive. Slow Design, in turn, advocated an emphasis on neglected practices and rhythms with particular regard to local temporalities, but has been portrayed as advocating pre-industrial practices, which are considered, in this case to be intrinsically slow; this results in a dismissal of the proposal as backward-looking and nostalgic. The section concluded with the *Movement Crafter*, a practical design exercise that attempts to expand the discussion of the relationships between crafts and perceptions of rhythms.

The last section widened the focus to approaches from several disciplines that question time more directly, through the redesign of the iconic figure of the clock. While some of these examples are still focused on linear perspectives of time, others discuss more complex and political implications of temporality. The section concluded with a call for designers to think about time in more critical ways, and approach more controversial aspects of temporality, complicating the narratives of time and challenging dominant ones. A final practical design exercise, the *Distance Clocks*, was also presented in this section in an attempt to discuss the intricacies of public transportation and the politics of geographical and temporal locations.

Part IV

Temporal Design

Chapter 5

Definition of Temporal Design

5.1   Temporal Design perspective

As argued in Part II of this thesis, time is still predominantly regarded in its forms of "clock" and "network" time, both in the academy and in society more generally, and consequently among designers. This paradigm has been established over centuries by narratives that define time as objective, measurable and attached to technologies. The influence of such accounts in design, as argued in Part III, can be summarised as constraining the design practice in three major ways:

- They monopolise designers' understandings of time, restricting their imaginative and material possibilities and precluding the exploration of more recent historical and theoretical work on time;

- They locate temporality within technological artefacts and systems, ignoring the breadth of expressions beyond and around these technologies. As such they shift the temporal perspective away from human practices and specific contexts, towards a technological determinism that disregards the range of temporal expressions available in the world; and

- They simplify time as a single, universalised concept creating dichotomies of *in* and *out* of this dominant model, dismissing more complex and varied proposals that might otherwise have expanded the repertoire of temporality in design.

Both traditional design approaches and alternative proposals tend to be affected by at least one of the restrictions above. Some alternative accounts, for instance, still consider time as external to human practices. Others, which address the influence of practices on temporal perceptions, have been frequently misinterpreted as anti-technology, anti-production or nostalgic; this view emphasises dichotomies between ''fast'' and ''slow'' and between ''progressive'' and 'traditional' cultures of time, which simplifies temporality, narrowing the scope of research on time. To foster a more pluralistic and embodied sense of time, designers need to discuss and challenge simplifications created by dominant narratives, avoiding the dichotomies that only legitimise simplistic accounts.

Within this context, this research proposes a new approach, expressed by the concept of *Temporal Design*. Temporal Design acknowledges the dominant narratives of ''clock'' and ''network'' time as well as the range of narrow assumptions they promote, such as the idea that the world is uniformly accelerating and that technological developments alone determine individuals' perceptions. It attempts to challenge these assumptions by identifying the multiple temporalities of everyday rhythms, which are defined not only by direct factors such as the legislation of hours for work and commerce, but also by indirect circumstances such as cultural manifestations and social conventions.

Temporal Design aims to problematise the way designers approach time within the social context, by highlighting the intersections of rhythms and the power relationships that are manifest and pacified through socially created hierarchies of time; it thereby seeks to empower alternative notions, and thus calls for a re-evaluation of well-established structures. Instead of considering *network-time* as a dominant expression promoted by online systems, designers would then consider a *network of times* in order to accommodate a multiplicity of temporalities in the everyday, the natural world, and in intersections between these realms. Temporal Design differs from most other approaches to time, as it does not attempt to alter people's perceptions to comply with the temporal paradigm, as personal productivity tools do. Neither does it attempt to suit the perceptions of a particular individual or group, as is the case with traditional user-centred approaches to time. Instead, it seeks to bring awareness to the diversity and dynamics of rhythms and perceptions, exposing the mutuality and difference between individuals or

drawing attention to overlooked expressions, and consequently creating alternative narratives that would challenge the hegemony of the current paradigms of clock and network time.

Over the last few decades, discussions on time in design, as in other areas of the field, have evolved from a narrow focus on specific features of artefacts and systems to broader considerations of the influence of these artefacts and systems on perceptions of everyday rhythms. However, given the taken-for-granted nature of time, temporality has not been expanded to consider more complex social issues, such as tensions of perceptions of temporal value across individuals and groups. Temporal design would, therefore, constitute an initial attempt to move in this direction.

5.2   Temporal Design approach

The Temporal Design perspective described above is based on three general principles, divided into two steps:

- first, it calls for the identification of expressions of dominant narratives in order to recognise more nuanced expressions of time;

- second, it aims to affirm alternative expressions by either:
  a) drawing attention to a specific alternative temporality; or
  b) exposing the complexities involved in networks of temporalities, in order to illustrate multiplicity and variety.

These principles are divided into two steps to guarantee that the artefacts and systems designed within this perspective will take a critical view of dominant narratives. These principles have been explored in three design interventions, as will be described later in Chapter 6, and have deployed different methods. This section will present the rationale behind these methods, demonstrating that they can be further applied to other Temporal Design projects.

5.2.1   Step 1: Investigating nuanced expressions of time

In this research, it is argued that the first step to targeting more complex issues of time is to become aware of the way dominant narratives manifest themselves in the everyday, paying close attention to specific contexts that inform the way practices are carried out in time, the kinds of issues that constrain these practices, and how people reflect on rhythms. Time, however, is not an obvious object for study, and special effort is necessary to analyse its nuances, as discussed bellow.

Disrupting the taken-for-granted nature of time

As presented in Section 2.3 of Chapter 2, various theorists have attempted to suggest new ways of approaching temporality and its multiple manifestations. Some of them have discussed the problem of considering time as a fact of nature instead of a social construct, observing that its complexities are only visible in situations of disruption or conflict. Henry Lefebvre, for instance, affirms that everyday rhythms are invisible: *"rhythms enter into the lived; though that does not mean it enters into the known"* (1992, p.77). For Lefebvre, rhythms only become clear when they break down, in response to the ''onset of arrhythmia'', where we are thrown out of the temporal context, that is *"we need to be outside of rhythms to notice and analyse rhythms"* (1992, p.88). Similarly, Adam affirms that we only become aware of structures of time in situations *"when the discord created by the extreme imposition of clock time becomes too powerful to be reabsorbed into the taken-for-granted coherence."* (Adam, 1995, p.105). Adam (1998) also expresses the need to make the taken-for-granted explicit, bring to light what is constructed as mere knowledge of social life and make problematic what is assumed to be natural. In her view, only then will the constructed character of narratives around ''clock'' time be perceived in such a way that individuals will be able to understand power relationships as they pertain to time and explain why they are constructed in the shadow of what is considered time per se.

Sociologist Harold Garfinkel (1964) proposed recreating this breakdown in his *breaching experiments*, which were developed to help understand the familiar structures of everyday life, and which are relevant to approaching the first principle of Temporal Design. For Garfinkel, structures of everyday life are routinely produced and sustained through individual actions; these structures are invisible to those that are immersed in their practice. Practices are not

a response to an objectively given social world; rather, they are embedded in the world and render it intelligible and available to all members of a group. Familiar scenes of everyday activities are treated by members as natural facts of life, even though they are products of activities in the world, as well as facts of these members' daily existence.

According to Garfinkel, the question should not be whether social facts are objectively grounded, but instead how this objective grounding takes place: *"objectivity is a product of systematic practices, or members' methods for rendering our unique experience and relative circumstances mutually intelligible"* (as cited in Suchman, 1987, p.57). As will be discussed later in Chapter 6, members of a group construct the same kind of objectivity when seeking to communicate temporal structures. Garfinkel coined the term *ethnomethodology* to describe the investigation of how this mutual intelligibility is achieved through practices that are often taken for granted; and, in accordance with Lefebvre, claimed that only when problems occur do activities lose their ''transparency'' and become present. The loss of transparency of such activities can also be compared with Heidegger's (1962) notion of objects that turn from ''ready-to-hand'' into ''present-at-hand'' when they no longer function effectively. Therefore, for background expectancies to come into view, participants must be estranged from the ''life-as-usual'' character of everyday scenes, or become estranged from them (Garfinkel, 1964). Through *breaching experiments*, researchers would therefore attempt to disrupt common scenes, encouraging participants to disengage and examine their activities through different eyes. In Garfinkel's original proposal, a researcher would, for instance, ask people to explain things that they would normally assume to be understood as 'between the lines' or would introduce unexpected activities, such as unusual greetings, in order to disrupt common routines (Garfinkel, 1964).

Garfinkel's concept of *breaching experiments* serves as an inspirational method for approaching the first principle of Temporal Design, identifying expressions of dominant narratives. It has helped to shape the development of the first intervention carried out in the context of this research, described below in Section 6.1. Although this method of disruption might not apply to all temporal contexts, it is still relevant to an investigation of temporal perceptions beyond the observable world of calendars, schedules and clocks, or even an investigation of regular activities, facilitating access to more complex social implications.

Complicating the analysis

Garfinkel's *breaching experiments* may answer the question of *how* to look at more nuanced temporal expression, but they offer little suggestion of *what* one should look at when carrying out such investigations. The analysis in Part II points to expressions of narratives, which researchers may try to map and question in their analysis. Section 2.3 in the same Part discusses how time is contextual, and how it can be approached within more embodied perspectives. Such investigations may, therefore, attempt to map the uniqueness of each context. Gurvitch's analysis of the *Spectrum of Social Time* (1964) is referred to in the same section, offering some insight into how this analysis can be deepened into more complex social structures of time, as presented in the following paragraphs.

Although perhaps too rigid to be strictly applied to design investigations, Gurvitch's model of the social analysis of time is useful for realising the temporal complexities that a particular context might entail. Gurvitch's model is based on what he terms depth-analysis, i.e. the analysis of different levels in order to reach a thorough understanding of a temporal context. According to Gurvitch, researchers should move across these levels, attending to connections and differences, and analysing how they influence each other. Seven levels are defined to help in this task:

(1) The most superficial level is that **grasped by immediate observation**, including not only the world of objects, but also the natural world, the world of bodies and their observable actions. (2) The next level is the **organisational level** of the collective conduct, which admits the existence of a pre-established, stable and even hierarchised structure of time that constrains individuals and groups. (3) The following level would consists of collective rules, **signals and signs** and the social conducts of relative regularity. (4) The fourth level is defined by **social roles**, which, although apparently relatively stabilised, still allow for actors to make varied interpretations of how these roles play out. (5) The fifth level is composed of **collective attitudes**, which refer to the ''imponderables'' in the social atmosphere. (6) The sixth level is one of **symbols, collective values and cultural products**, which both depend on and invade other levels. (7) The deepest level constitutes the **collective mentality** and conception of time held by a specific group, and subtly affects all individuals in a society.

The rigid structure and simplification of complex ranges of temporal expressions into single levels are somewhat controversial in Gurvitch's model, especially given that designers themselves are shaped by the implicit nature of time. However, the model can be useful as a heuristic for

unveiling complex structures of social time and showing how different temporal manifestations meet, enter into conflict, combine and interpenetrate one another.

One example of such analysis provided in Gurvitch's *Spectrum of Social Time* (1964, p.24) concerns the analysis of temporal context during the institution of Daylight Saving Time in the United States. Following the method, one first attends to the level of *immediate observation*, as represented by the geographical breadth of the country, the location of cities and towns that are economically dependent on each other, the daily migration of workers from the suburbs to city centres, the network of communication systems etc. One then considers the *organisational level*, which corresponds with the requirements for national coordination and conflicts with democratic organisations that imply a choice based on local preferences. Looking at *signs and signals*, one then analyses the hourly designations that direct the scheduling of daily conduct, and the confusions that arise when individuals need to behave according to signs and signals that originate from different localities. In the network of *social roles*, one then analyses the tensions affecting the experience between family roles in the suburbs and occupational roles in the city centres. *Collective attitudes* in this case concern attitudes toward clock-time, and the *symbolic level* is represented by the dominance of city centres over the temporality of rural areas. The *collective mentality* could be described by the degree to which the notion of the power of human intervention can overcome the mental state of powerlessness, in order to resolve complex issues. Furthermore, Gurvitch (1964) argues that the adoption of equalised hours to replace unequal temporal periods must be understood as a fact proceeding from social action, and it is an oversimplification to say that the change arose because of the invention of the mechanical clock.

Gurvitch's model reveals how much richer temporal analysis can be. Designers should not be restricted to the analysing the role of artefacts and systems and the practices they mediate, but should look at how individuals and social groups organise and create social roles of time, how norms are transformed in social values and incorporated into a social mentality. This complexity, for example, will be revealed in the analysis of the Family Clock intervention, presented in Section 6.1 of Chapter 6.

As seen in the Part III, there exists significant scope for exploration of the way designers consider the social phenomenon of temporal creation - as time is still too frequently understood in reference to clocks and calendars, and as an individual concern. Gurvitch's model, therefore,

helps to provide insights into the kinds of subjects one could analyse when investigating a specific context.

5.2.2   Step 2: Affirming alternative expressions

Once the complexity of time has been recognised, the next step is to attempt to influence perceptions so as to expand narratives and challenge the hegemony of particular accounts. As mentioned at the beginning of this section, this research proposes two ways for this expansion to take place:

1) by drawing attention to specific alternative temporalities and

2) by exposing networks of rhythms all at once so as to illustrate variety.

A closer look at current design approaches, however, indicates the need for a renewed attitude in order to address the actions above. Nowadays, the field is pervaded by two forms of discourse; the first is considered mainstream and pro-market, including both the tendency to focus on functionalism, characteristic of modern design and user-centred approaches, and the tendency to foster brand experiences associated with consumerism as in attitudes of postmodern design. The other, which is more recent, defines itself as speculative, critical and often in opposition to the first - although it is necessary to note that not all forms of speculative design fit into this critical trend, as it might also be understood within a commercial context, i.e. as a way of predicting how successfully a product may perform in consumer markets. In its critical form, however, speculative design has taken a more imaginative role of looking at future scenarios and the new technologies, scientific developments and socio-political decisions that might negatively impact everyday life in the future; it is this critical form of speculative design that is discussed in the subsections below.

Critical speculative forms of design

Gilliam Crampton-Smith initiated a discussion on speculative design, calling for designers to adopt the attitude demonstrated by architects in their ''ideas competition''. The entries in this sort of competitions are not meant to be built, but will publically speculate on and disseminate radical ideas about how architecture and alternative ways of living might come to be conceived (Dunne, 1999, p.8). Since this call, the speculative design movement was reinforced by proposals

such as *Critical Design* (Dunne and Raby, 2001), *Design Fictions* (Bleecker, 2009) and *Design for Debate* (Dunne and Raby, 2007).

Critical Design is defined by Anthony Dunne and Fiona Raby (2001) as a sort of *"design that asks carefully crafted questions and makes us think"* and which contrasts with a form of affirmative design that is identified with commercial practices and with a focus on *"solving problems and findings answers"* (Dunne and Raby, 2001, p.58). As illustrated in Figure 5.1, Dunne and Raby define a series of binary contrasts between affirmative and critical design, which, since first brought to attention, have challenged dominant assumptions in the field.

```
(a)                            (b)

affirmative                    critical
problem solving                problem finding
design as process              design as medium
provides answers               asks questions
in the service of industry     in the service of society
for how the world is           for how the world could be
science fiction                social fiction
futures                        parallel worlds
fictional functions            functional fictions
change the world to suit us    change us to suit the world
narratives of production       narratives of consumption
anti-art                       applied art
research for design            research through design
applications                   implications
design for production          design for debate
fun                            satire
concept design                 conceptual design
consumer                       citizen
user                           person
training                       education
makes us buy                   makes us think
innovation                     provocation
ergonomics                     rhetoric
```

Figure 5.1: Affirmative vs. Critical Design (Dunne and Raby, 2013, p.vii)

These binaries, however, also create narrow assumptions about what ''critical'' and ''affirmative'' may represent. For example, there is no reason why one could not be critical *and* affirmative when considering ''how the world could be'' or when ''making us think''. Similarly, there is no reason why a critical attitude cannot be assumed when approaching aspects related to ''how the world is'', as there are plenty of issues in the world that are disregarded by mainstream, pro-market design. Placing critical issues in the future demonstrates that the manifesto is embedded with assumptions about linear progressive time. Critical issues do not need to be placed in the future, and designers could critically address issues already available in the heterogeneity of the present.

Additionally, by arguing that ''affirmation'' refers strictly to pro-market attitudes, designers would be left with ''negation'' if taking on a critical attitude. The binaries between affirmative and critical design resemble the paradox presented by the Slow Movement in relation to the supposed universalisation of acceleration. Critical Design assumes that all forms of affirmative design are unreflective and sustain consumption; thereby disregarding the range of creative possibilities that affirmative attitudes may facilitate.

Other movements that are part of the speculative design trend include *Design Fictions* and *Design for Debate*. *Design Fictions* was introduced by Julian Bleecker (2009) and made known by science fiction writer Bruce Sterling (2012) as the creation of stories that speculate about social practices that may be constructed around and through designed artefacts and systems. According to Bleecker (2009), the concept proposes the creation of artefacts that foster imagination about possible near-future worlds, on both large or personal scales, in order to tell stories that provoke reactions and raise questions (Bleecker, 2009, p.8). Referring to this proposal, Sterling (2012) explains,*"it's not a kind of fiction. It's a kind of design"*, and stresses the importance of developing prototypes that embody aspects of these future worlds.

Design for Debate, in turn, is presented as a way of enhancing discussion of new technologies, scientific developments or socio-political issues, which are often introduced into people's lives with little question and often with profound consequences. Tobie Kerridge (2009) argues for the development of speculative artefacts that would embody critical issues and would allow people to project themselves into imagined scenarios, in order to generate discussion around the potential impact of new developments. Once brought into the public realm, these objects would elicit reactions and prompt dialogue.

An intrinsic contradiction of these approaches, however, is their focus on the ''future'' as the context in which critical issues arise. This focus implies that critical issues approached by speculative design projects are not part of the present context. Indeed, this negation has recently been criticised in specific works, such as Burton Nitta's project ''Republic of Salivation'' (2012), which was exhibited as an example of speculative design at MoMA-NY. The project aims to discuss how the world would react in a future scenario of global food scarcity, a scenario that resembles the situation in which millions of people live nowadays in third world countries (Prado, 2013). Here again, instead of looking at the present as an heterogeneous context, the present is considered as uniform and following a linear trajectory toward the future. As with time, attempts to describe how the world *is* should be expanded in order to avoid these narrow

framings, expanding the considered context beyond one's own socio-economical group, culture and geographic location.

Indeed some of the projects mentioned in Section 4.4 can be placed within expressions of speculative design. Marti Guixé's *Time to Eat*, for example, can be described as an example of Design Fiction, while Revital Cohen's *Artificial Biological Clock*, Blake Fall-Conroy's *Minimum-Wage Machine* and Meech's *Punchcard Economy* all present a critical motivation. Although important for raising discussion, these projects take the critical attitude discussed above, and do not attempt to suggest alternative accounts. Instead of affirming a new order they restrict themselves to negating the current one. As argued by Birth (2012), there is considerable difference between criticising a temporal context and changing it *"it is easy to criticize clock time and suggest that it is artificial, but such criticism does not make it go away. It continues to shape the thoughts of the critic, if for no other reason than that it shapes the thoughts of those around the critic."* (2012, p.170). Criticising well-established notions of time will not suffice to make them less prominent, and alternative perspectives need to be affirmed in order to start challenging their hegemony.

The need for a renewed affirmative approach

As argued above, the main problems associated with current speculative design approaches are, (a) the opposition defined between ''affirmation'' and ''criticism'', and (b) the narrow perspective of present contexts, which disregards their heterogeneity as well as a range of critical issues expressed in them. In the context of Temporal Design, this research suggests a *critical affirmative approach*, which involves keeping a clinical eye and revising present rituals and complexities of time, mapping critical and disregarded temporal subjects and affirming them in order to foster more pluralistic accounts of time. Such analysis should not only point to temporal themes, but also indicate a suitable context into which to place designed artefacts and systems.

Although the speculative approaches described above suggest a promising (critical, reflective and provocative) attitude, their view of affirmation is highly problematic for challenging hegemonic narratives, as, at least in this context, affirmation is vital and not contrary to a critical attitude. The *critical affirmative approach* proposed by Temporal Design resists dominant narratives of time in a similar way to Critical Design's rejection of attitudes purely focused on sustaining consumption. The approach, however, does not simply indicate problems within

these narratives, but aims to affirm and legitimise alternative expressions as essential elements of the temporal context.

Alain Badiou (2013) argues that while criticism prevents paralysis, it is only through affirmation that new configurations emerge. Badiou uses the example of the Apostle Paul to discuss how events can relate to a new subjectivity: one must first create a new body and a new subjectivity before all negation and negative consequences can take place, as he explains:

> *The first thing is to create, to affirm the new subjectivity [...] the very beginning of something is always something like the pure affirmation of the new possibility as such. There is a resurrection; you have to affirm that! And when you affirm the resurrection, and you organize that sort of affirmation you create something absolutely new, not in the form of a negation of what exists, but in the form of the newness inside what exists. And so there is no longer negation on the one hand and affirmation on the other. There is rather affirmation and division, or the creation that grounds the independence of new subject from within the situation of the old* (Badiou, 2013, p.5)

This affirmation, however, does not necessarily lead to proposing something that is fully stranger to a given context, but might point to something that already exists in the heterogeneity of a given context. As mentioned above, and developed further below, it might be something hidden in the taken-for-grantedness of the everyday, something that would emerge from shifting perspectives within the system, and although it might be regarded as *new* in comparison with dominant accounts, it would in fact already exist in a suppressed, veiled way (Bastian, 2012).

Reaffirming hidden aspects of the present condition

The complexity of the present condition and the ability to generate ''new'' configurations within a given context is explored by Bastian (2012) when considering the challenge of developing instruments to signal the complex temporal dynamics of climate change. Bastian analyses the work of Jacques Derrida on originary performatives, arguing that alternative conceptual models already exist within the heterogeneity of the system that is being criticised. Derrida argues that each and every time, epoch, context, culture, and each and every national, historical or disciplinary moment has a certain coherence, but also a certain heterogeneity *"it is a system in*

which there are zones of greater and of lesser receivability" (Derrida, as cited in Bastian, 2012). When seeking to transform restrictive conventions, one should therefore *"look for something within a particular context that goes against the dominant currents and yet seems to call for greater recognition or awareness"* (Bastian, 2012). Bastian, therefore, concludes that developing new clocks to signal climate change *"would involve paying attention to the potential at work in the present, but with the realisation that these new devices will not be invented from scratch but are already immanent and embodied. Indeed they may actually already be telling our time."* (Bastian, 2012). In this way, she also points to the fact that designers might simply need to pay attention to the present condition and emphasise aspects that are neglected within dominant narratives in order to promote multiple perceptions of time.

This focus on the heterogeneity of the present implies changing the perspective from ''the future'' to multiple presents, encouraging greater effort to understand what is happening differently, and finally confronting grand narratives with alternative accounts. This shift from future to present would expose underlying concepts that are not fictions or imagined scenarios placed somewhere in the future, but are present, sometimes hidden in the unconsciousness of everyday life but in a way that can be brought into consciousness so as to reveal its importance.

5.2.3   Ambiguity and technology as a probe

Having mapped the context and attitude of Temporal Design or, in other words, having set guidelines to decide *what* to design, the next question that arises is *how* to design, or what kind of approach should be adopted in the design process.

As discussed in Chapter 2, dominant narratives of time describe clocks and computer networks, in particular, as defining rhythms and perceptions of time. This attachment of perceptions to artefacts and systems is also present in the functionalist conception of affordances discussed in Chapter 3. Birth's analyses in *Objects of Time* (Birth, 2012) also suggest a similar bias in considering the role of artefacts in perceptions. Although Birth's book has much to teach designers about time, its approach to design itself is arguable. In his analysis of the cognitive mediation promoted by artefacts of time, Birth argues that unlike language, which is fluid, artefacts are fixed and their *"fixity directly transfers to the fixity of thought"* (Birth, 2012, p.170).

A closer analysis of recent design theory, however, demonstrates that designs can have more or less malleable interpretations, and that accepting such malleability might help designers to play a role in establishing this flexibility. Phoebe Sengers and William Gaver (2006) challenged the assumption that systems should target single interpretations, which is characteristic of the traditional focus on utility and usability. The authors advocate for the design of objects that elicit multiple practices. This way, artefacts would include a certain level of ambiguity in order to allow different interpretations. One example is the *Home Horoscope* (Gaver et al., 2007), a context-aware system for the home that shifts the responsibility for interpretation from the system to the user. This differs from traditional approaches that measure and inform the status of a given context. The authors argue that, in this way, it is possible to *"build systems that interact with people at humanly meaningful levels, preserve privacy, and encourage engagement with suggested topics"* (Gaver et al., 2007). Instead of thinking about clock-like representations of the world that aim to display ''the time'', designers could therefore consider designing ambiguous supports in order to provide a platform for people to interpret time according to their personal viewpoints, cultural backgrounds and specific natural settings.

Referring in particular to technology, Sengers and colleagues (2005) define ambiguity as a characteristic of *Design for Reflection*. They offer several strategies to promote more reflective attitudes, regarding not only the practice and role of design, but also regarding the choice of issues approached and the activities and experiences enabled. These strategies include promoting ambiguity or ''interpretative flexibility''; rendering the ''familiar strange'' which can be compared to Garfinkel's ''breaching experiments''; ''designing technology as a probe'' (referring to Hilary Hutchinson and colleagues' (2003) concept of ''technology probes''); and ''inverting metaphors'', which is based on Phil Agre's (1997) notion of ''critical technical practice''. In Agre's words, this consists of *"identifying the core metaphors of the field, noticing what, when working within those metaphors, remains marginalized, inverting the dominant metaphors to bring that margin to the centre, and embodying the alternative as a new technology."* The concept of inverting metaphors is of interest for Temporal Design, as it can divert attention from dominant narratives to ''peripheral'' expressions.

The concept of ''probe'' deserves some special attention, as it has been widely explored in design. It has been initially defined as ''Cultural Probes'' by Gaver and colleagues (1999), in reference to an open-ended method for gathering insights into the lives of the people for whom one is designing, and consisted of a package with different prompts such as cameras, postcards, maps etc., which were distributed to a given group as a way of provoking ''inspirational responses''.

Gaver et al. argue that *"understanding the local cultures was necessary [...] but we didn't want the groups to constrain our designs unduly by focusing on needs or desires they already understood. We wanted to lead a discussion with the groups toward unexpected ideas [...] We were after 'inspirational data' with the probes, to stimulate our imaginations rather than define a set of problems."* Since then, the concept has been applied in a variety of scenarios, ranging from technology-driven projects, as detailed in Kirsten Boehner and colleagues' paper on *How Human Computer Interaction Interprets the Probes* (Boehner et al., 2007), to more elaborate ways of exploring nuanced notions of subjectivity and intimacy (Wallace et al., 2013).

The design interventions developed in the context of this research were strongly influenced by the notion of ''technology probes'', as referred to by Sengers and colleagues above, which evokes a context where technology is developed in order to act as a stimulus for understanding larger social practices, such as the way communication patterns evolve (Hutchinson et al., 2003). However, it is also important to note that the developed artefacts, especially in the final two interventions, embody participants' practices and as such are actively changed by them. Although this embodiment can hardly characterise them as the Cultural Probes originally defined by Gaver and colleagues (1999), or as the Design Probes defined by Wallace and colleagues (2013), the interventions do borrow aspects from both proposals.

In summary, this discussion of *how to design* suggests open-ended design methods that invite reflection and should be employed to promote the expansion of perceptions of time. Designs should remain open to interpretation through the consequent introduction of ambiguity (in its symbolic form, purpose or suggested meanings), embrace the notion of ''inverting metaphors'' and search for inspiration in methods such as Cultural, Technology and Design Probes (Wallace et al., 2013); this would provide space for design to be complemented by participants, in such a way that they can embody and represent their own experiences of time.

5.3   Summary of Chapter 5

This chapter has presented the rationale, main principles and related methods of Temporal Design, which is proposed as a pluralist shift in the way designers consider temporality in their practice. Temporal Design acknowledges and challenges dominant narratives of time, by

recognising that everyday rhythms are composed of multiple temporal expressions, defined by both direct and indirect factors. It differs from most approaches to time, as it does not attempt to change people's perceptions to comply with dominant temporal paradigms, or suit the perception of a particular individual or group. Instead, it seeks to promote awareness of the diversity and intricacies of rhythms and perceptions.

In this chapter, the grounding principles for Temporal Design have been defined as: *1)* identification of dominant narratives and attempting to challenge them, so as to reveal more nuanced expressions of time; *2)* drawing attention to specific alternative temporalities; and *3)* exposing networks of temporalities, so as to illustrate multiplicity and variety. Here, the principles are organised into two steps, in which the first principle should precede either the second or the third.

Different approaches are recommended for each of these steps. In the first, the disturbance of everyday perceptions and paying attention to more complex social issues of time are recommended, based respectively on Garfinkel's (1964) *breaching experiments* and Gurvitch's (1964) analysis of the spectrum of social time. For the second step, it is proposed that a critical affirmative approach, questioning aspects of current expressions of speculative design - including aspects of speculative movements such as Critical Design (Dunne and Raby, 2001), Design Fictions (Bleecker, 2009) and Design for Debate (Dunne and Raby, 2007) - is used. Finally, it is proposed that designers aiming for an expansion of temporal rhythms take inspiration from methods such as Cultural Probes (Gaver et al., 1999), Design Probes (Wallace et al., 2013) and Reflective Design (Sengers et al., 2005).

Chapter 6

Temporal Design in practice

The principles of Temporal Design introduced in the previous chapter have been explored through three design interventions that are presented below. As mentioned in the Introduction, the practical design work conducted as part of this research was key to determining the subject and principal issues to be studied, and to exploring ways of addressing these issues through design. As already seen, some of this practical work was referred to as *Design Exercises*, as it *informed* the research in respect to the current state of time in design, particularly concerning more critical approaches. These exercises were discussed in Chapter 4, each following the subject within which it is situated.

The second set of practical work has contributed more thoroughly to defining the focus of this research, and to delineating the Temporal Design principles introduced in the previous chapter. This work is discussed below, and is referred to as *Design Interventions*. These interventions were carried out in family homes and schools, and were composed of designed artefacts and systems, as well as particular activities and interviews conducted with participants. Therefore, the term *intervention* here refers both to artefacts and to the research practices defined around them, and hence the conception of design practice is expanded to include the definition of participatory exercises that are intrinsic to the designed artefact or system.

The three Design Interventions are introduced here according to the two steps defined by the Temporal Design principles. In this case, the first intervention has targeted Step 1 (investigating nuanced expressions of time), and was conducted in family homes, while the second and third

interventions focused on Step 2 (affirming alternative expressions) and were carried out in schools. As a result, the home and the school interventions are relatively different in nature. While the first focused on *understanding* participants' perceptions, the second attempted to *influence* these perceptions. This chapter discusses the design motivations, the process and responses of each of these interventions.
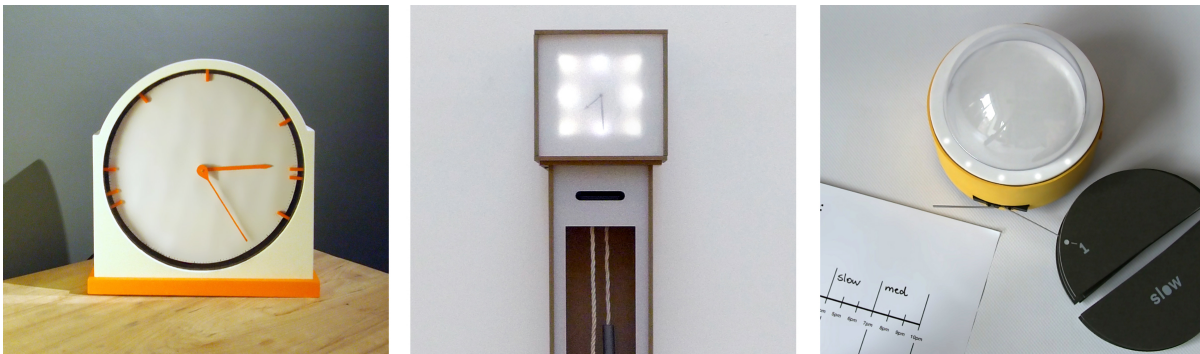
Figure 6.1: Artefacts designed for the three Design Interventions carried out in this research

6.1   The home: Family Clock intervention

As mentioned, the Family Clock was the first intervention developed in the context of this research. As such, it was more focused on understanding the temporal context, its nuances and its relation to social paradigms, than were the subsequent interventions carried out in schools. This intervention is inspired by Garfinkel's *breaching experiments* (1964), and demonstrates how the analysis of the studied context can go beyond what Gurvitch (1964) defines as the superficial levels of social analysis of time, or the levels composed by immediate observation. As explained in the previous chapter, time is not a straightforward subject of study. Its expressions are hidden in the taken-for-grantedness of everyday life and its perception is often submitted to the filter of dominant narratives. Garfinkel's *breaching experiments* suggest a process of defamiliarisation as a requisite to understand habitual processes, which is extremely relevant to Temporal Design and was one of the main inspirations for the Family Clock. Furthermore, this intervention also considers the complexity of social roles, collective attitudes, values, cultural products and references to the 'collective mentality of time' as proposed by Gurvitch in his *Spectrum of Social*

Time (1964). The analysis is motivated by Gurvitch's expanded analysis of social constructions of time, but does not attempt to follow its proposed structure.

Overall the intervention offers a reflection on the way schedules are interwoven inside the family: the tensions, hierarchies and power relationships around them. It also aims to investigate how family members learn to negotiate and agree on common rhythms. Finally, it attempts to be critical of the notion of flexitime that is often exalted in the context of new technologies, as discussed in Chapter 3.

6.1.1 Family Clock intervention: artefact and system

The Family Clock intervention introduced a physical clock (see Figure 6.2) as a probe to reveal tactics of coordination, synchronicity and shared timings, as well as perceptions of these particular practices, which were later investigated in interviews. The central artefact designed for this intervention consists of an analogue clock, which differs from regular clocks in three major ways:

1) First, its clock-face represents the period of a whole day. Thus, it does not display the usual 1-12 numbers, but the cycle of 24-hours divided into intervals of 5 minutes. The clock-face also includes movable markers that will be set by each family to indicate regular appointments or loose meeting points in their time plan.

2) Second, family members can set the Family Clock back and forth via a smartphone/tablet application in an ad hoc way (see Figure 6.3). Thereby, they can extend or compress the time between meeting points according to their individual constraints and paces of life. For example, if participants feel they need more time to perform a task, such as a finishing a job, game etc., they can set the clock back, or, conversely, they can set the clock forth if they would like to anticipate the next meeting point. Changes in the clock are then recorded in a database, transmitted to the physical clock and synchronised on all family smartphones/tablets. Once one member has changed the time, this change will be transmitted to the devices of other members, and will automatically ''postpone'' the following appointment for all of them. Other members may, however, react to this action, setting the clock back and forth again, for instance if they have a specific appointment with the person who changed the time. The aim is to invite participants to reflect on what constitutes clock-time, disturbing habitual, taken-for-

granted notions of the clock, in order to investigate its impact on social relationships. As explained in Chapter 3, technologists often advocate the promotion of fully flexible schedules controlled by technological devices, ignoring that time is also defined by social practices, values and conventions. Therefore, instead of focusing on the way technology may deal with this flexibility of schedules, the Family Clock investigates the reactions to and diverse consequences ofthis flexibility.

3) The third way in which the Family Clock differs from regular clocks is that the two clock-hands indicate, not hours and minutes, but time in intervals of 5 minutes (short hand) and speed (long hand). The long hand regularly moves at the speed of one tick per second, but accelerates or decelerates depending on how often family members change the time of the clock. If time is set back, the long hand moves faster, and if it is set forward, it moves slower, eventually catching up with standard clock-time. This way if a participant sets the clock back in 10 minutes, the following 30 - 60 ''minutes'', as represented on the clock, will pass slightly more quickly until it catches up with standard time. Similarly, if a participant sets the clock forward in 10 minutes, the following ''minutes'' will pass slightly more slowly.
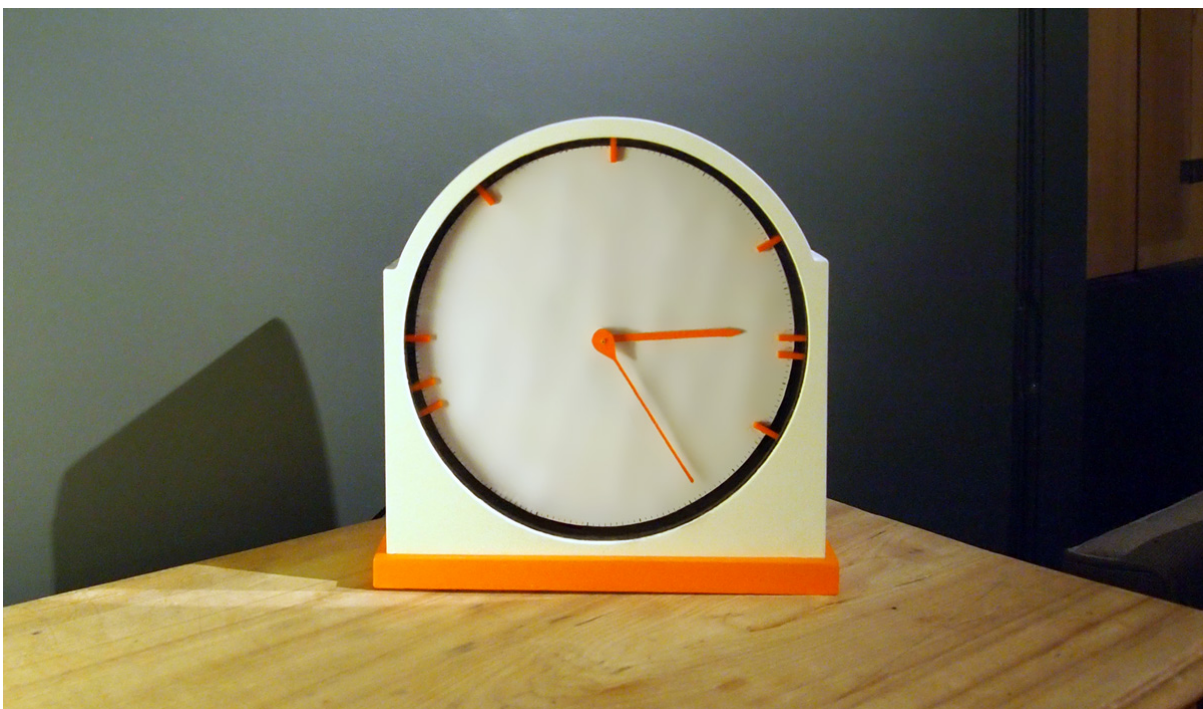
Figure 6.2: Family Clock artefact

The physical clock aimed to provide a tangible metaphor for the intervention in order to enhance participants' engagement. It was designed to be placed in a space shared by all family members, such as a living room or kitchen, in order to trigger conversation both inside and outside the family. The tangible artefact and the symbolism of physical clocks also elicit a range of responses that differ in many ways from the experience of interacting with screen-based timekeeping applications.

As advised in the *how-to* design for an expansion of temporal perceptions discussed in the previous chapter, the Family Clock aims to provide some level of ambiguity and stay open for interpretation. While it may give the impression of following technological narratives that promise flexibility of time, it incorporates this flexibility in a rather contentious way. Rather then focusing on the individual and their ability to recalibrate, as dominant narratives of clock-time do, the intervention treats time as a collective enterprise. Therefore, at the same time that it invites participants to reclaim time and challenge the rigidity of schedules and of clock-time itself, it reveals the external forces, and the individuals behind schedules. This complexity is manifest in situations in which participants feel empowered and situations in which they feel unable to change time, as will be discussed below.
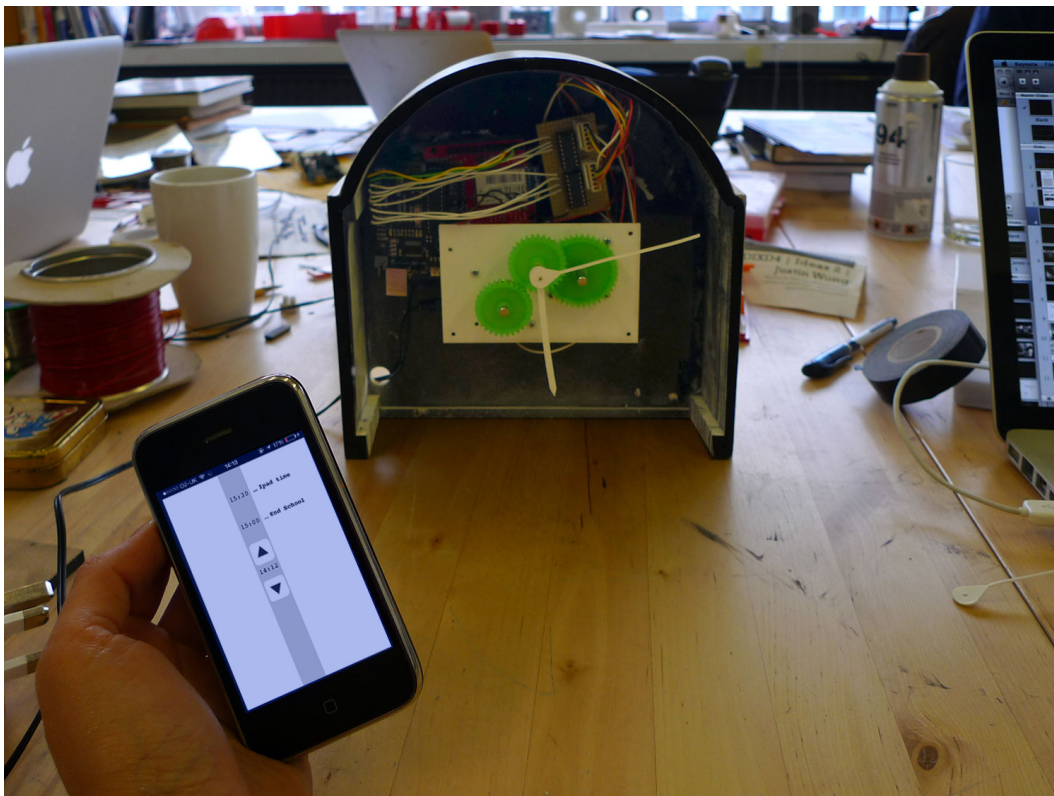
Figure 6.3: Family Clock prototype controlled via smartphone

6.1.2   Family Clock intervention: study

The Family Clock intervention consisted of inviting different families to host the clock, and allowing them to interact with it for a limited period of time, capturing their impressions through different interviews. The study was composed of two visits and a series of activities performed by family members while hosting the clock. The first visit to each family consisted of an introduction to the study and the clock, the distribution of informed consent forms, and the setup of the Family Clock. During this setup, each family was invited to reflect on their schedules and common meetings in time, which were then registered on the clock by shifting the clock-face markers and writing the meaning of each activity beside its respective marker. A paper sheet covered the clock-face, allowing appointments to be written down; this was replaced each time the clock was brought to a new host. These appointments or activities were also recorded in the Family Clock database. The application was then installed on the mobile phones/tablets of the family members, and notebooks were distributed to help them to record their thoughts. Having been agreed by all participants, the conversation during this meeting was recorded. The visit ended with an introduction to the task that the family should perform during the following days, and a simple instruction to reset the clock if necessary. This visit lasted from 1 to 2 hours.

After the first visit, participants were left with the clock for a period of 1 to 3 weeks. They were asked to interact with it in at least five situations, namely:

1) when they felt pressured about time,

2) when they would like time to run faster,

3) when they would like to influence someone to do something sooner,

4) when they would like to influence someone to do something later, and

5) when it would create a ''funny'' situation - where ''funny'' was left open for interpretation.

Participants were also asked to think about situations in which time is flexible and situations in which it is inflexible, and to use the notebook provided to record their impressions. These tasks invited participants to consciously reflect on the change of time and schedules, particularly on speed (Tasks 1 and 2) and the way time is intrinsically related to other people (Tasks 3 and 4). The tasks were also helped guide the conversation during the second visit.

The second visit consisted of a longer conversation divided into two parts. The first part was focused on the way participants understood the clock as an object; the way they explained it to

Figure 6.4: Family Clock with family appointments

other people; the things they liked and disliked about it; and any alternatives or improvements they could suggest. Given the ambiguity of whether the clock epitomised or challenged technological narratives of flexibility, participants' perceptions were expected to vary, revealing how they interpreted dominant narratives. Furthermore, these perceptions were assumed to influence the performance of the tasks outlined above. If participants were pleased with the object, they were likely to have a more positive attitude toward the study. In the second part of the interview, participants talked about the experience of living with the clock and the tasks they were asked to perform during the ''trial'' period. This second visit lasted between 1.5 and 2 hours. These conversations occurred in the presence of all family members, although in two cases, one of the family members was absent.

Three families participated in the study; they have been named the **Millers**, the **Clarkes** and the **Wilsons**. All names were altered in order to make it easier to identify them, but also to preserve their privacy. The Millers were a family of four: parents Ethan and Paula (35-45), and daughters Lily (7) and Alice (10). Paula worked regular business hours, and Ethan worked from home. They shared several temporal points, such as wake-up time and early/end-of-the-day meals, but nevertheless felt pressured in terms of time.

The Clarkes were also a family of four: parents Sally and Al (35-45), and children Emily (16), and Rob (12). The mother, Sally, worked mostly from home, and the children were old enough

to travel by themselves on public transportation. Although their lives were taken up with activities such as music, crafts and sports events, they did not consider themselves particularly pressured in terms of time, stressing that they had time to get together for tea, meet friends and have some time to themselves.

The Wilsons were a family of three: parents Tom and Mary (45 - 55) and Charlie (13), a single child. The parents, both academics, had relative flexibility at work in the sense that they felt they could define their own schedules. They nevertheless reported leading extremely busy lives. Furthermore, all members had relatively independent schedules. When setting out their schedules on the clock, they did it one by one, writing down their own activities, so that the clock had three different schedules with few overlaps. They also made sure to write their names beside each appointment, e.g. ''wake up - Tom'', ''wake-up Mary'' and so on.

The families were all white and middle-class, with mixed English and Scottish backgrounds, and all of their members considered themselves familiar with technology: they all had a personal smartphone, tablet or music player upon which the Family Clock application was installed.
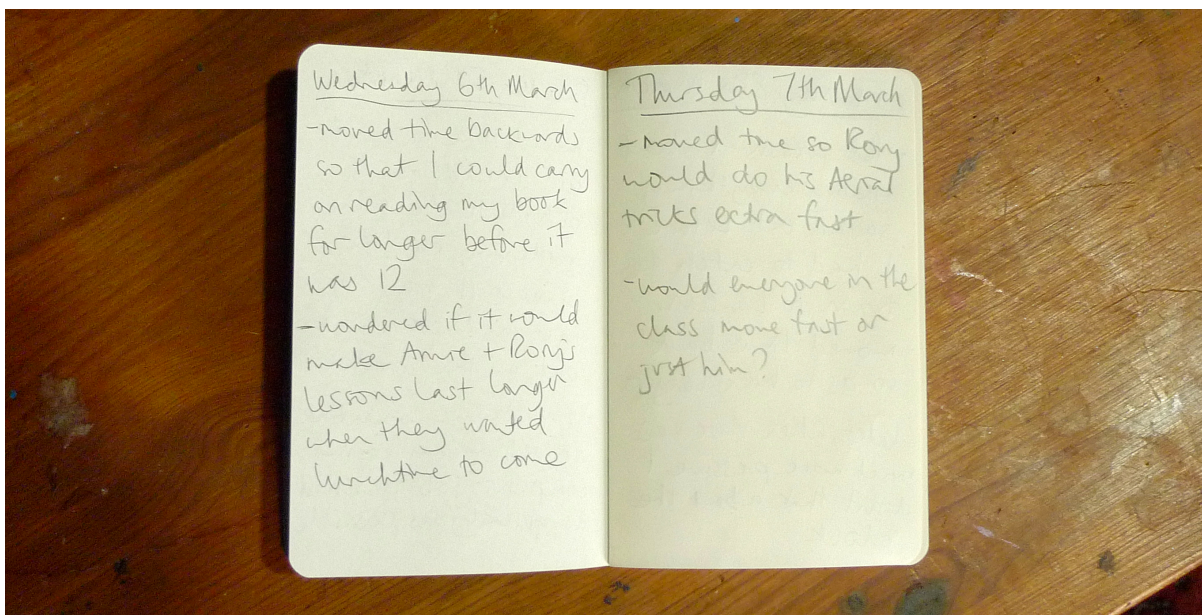
Figure 6.5: Participant's notebook

6.1.3   Family Clock intervention: responses

Multiple perspectives

Although they had relatively similar backgrounds, the three families that hosted the clock had significantly different reactions to the intervention, which indicates differences in the way they perceive and relate to time. While the Clarkes, for example, were very positive toward the intervention, emphasising the clock's connectivity, the Millers felt it particularly disruptive and the Wilsons criticised its apparent lack of function.

Rob Clarke (12), for example, described the clock as *"a thing that everyone in the family is connected to and you can speed up or slow down depending on when you want things to happen"*, and his mother Sally (35-45) noticed that *"there is a funny thing that I did feel slightly connected to you at school [...] because sometimes it was acting in a funny way and I thought a-ha, I knew it was some of you two doing something with the clock"*, Emily (16) also affirmed that *"I do like that it joins all up in a funny, quite abstract sort of way."*

Ethan and Paula Miller (35-45), on the other hand, considered the clock particularly disruptive, especially when it was taken over by the children: *"the girls kept speeding it up and it freaked me out when it started going really really fast. I think I didn't like it at all. For me it was something from a horror movie you know it was just watching the time disappearing so I didn't sort of play with it much at all."* Ethan had a similar perception *"I think that was the kind of unusual thing when you drew the time back, the one of the hands go around still clockwise but faster, after the shorter hand has reversed, and I think that was kind of we took a bit to get used to it. You expect a clock to work on a certain way, you know clockwise [...] I think it was kind of slightly enervating."* The children were also aware of the disruption caused by the clock: *"I would give it to my friend so that he would be annoyed too"* (Lily, 7). Paula interpreted the annoyance of the clock in subjective terms *"It was just a feeling of the ticking that time is running away from you. I always feel I don't have time anyway. So I don't know why I don't like it"*, while Ethan instead interpreted the annoyance as a disruption to the conventional understanding of clocks *"you know the small hand going back while the long hand would spin faster and that kind of puts you a little bit off, off balance. So I don't know if it was a dislike but it's like getting used to something. It has quite a nice tick though"* (Ethan).

Figure 6.6: Participants with the Family Clock

The Wilsons were particularly concerned with a perceived lack of function of the clock. *"there is a real question of what is its function [...] I played with it a few times, but like I said I didn't understand why I was doing it because it has no effect and I'm not one for toys. If it was maybe multifunctional"* (Tom, 45-55). The lack of shared temporal meetings may have contributed to this perception. The intervention, however, still allowed them to express their opinions and attitudes toward temporality.

When asked how the clock could be improved, the answers strongly related to the perceptions described above. The Clarkes suggested different features, such as the integration of a beeping mechanism that would let them know when an appointment has been reached: *"and if I need to go and get my train I know because the thing went off"* (Rob, 12), or the ability to report what each family member was doing: *"if you could put things that you are doing on your phone and it would somehow appear"* (Sally, 35-45). The Millers' ideal clock, in contrast, would be composed of a single button that would simply stop time, as described by Paula (35-45): *"I think I would like one that you could just stop time, at least for everybody else, and you could just sit and think ok, what should I do now. Like a panic button you just go STOP! and everyone would then go thruuuuaaah. And I would think alright, what can I do here, and then start again"*. The Wilsons in turn suggested a clock with independent schedules that would sometimes overlap: *"somehow the clock face told different times at the same time, maybe using colours or colour dials and disks or something, so you would have three*

people's time at the same time going around the clock and maybe there are three different transparent colour disks at the same time so the colours would mix so you would have Charlie's Mary's and Tom's disks mixed and then you could actually tell how the times interrelate to each other" (Tom, 45-55).

These different visions of ideal clocks illustrate the different interpretations of time between the families, which were consistent with their previous accounts of how they perceived the Family Clock. While the Clarkes viewed time as an interconnection of events that happened simultaneously, of which they would like to be aware, the Millers' clock emphasised a dissatisfaction with temporal acceleration, expressed in Paula's wish to stop time. The Wilsons searched for a metaphor to express the way they perceived each other's schedules as mostly independent but eventually overlapping. Overall, the coherence of perspectives was maintained within each family, which demonstrates how temporality is constructed through practices that are shared and rehearsed within each social context regardless of its dimension. These social agreements happen in the heterogeneity of the family, but also, as Gurvitch (1964) argued, in the heterogeneity of large social groups, who look for a common sense to communicate and refer to notions of time.

Internally and externally imposed times

More often than not, temporality is perceived through socially created values, which are nonetheless often interpreted as individual matters. Don Slater observes that people organise their subjectivity through the conduct of conduct, saying that routine *"is part of how we take a strategic position on self and other"* (Slater, 2009, p.217). The carrying out of routine activities and the interpretation of these activities within a system of values help to constitute individuals' subjectivities. In other words, the ways that individuals perform activities in time and perceive these actions in relation to the social order are constitutive of their selves. However, problems emerge when critical issues stop being regarded as a collective concern and are instead considered solely as personal traits; this prevents people from questioning such issues, and helps to sustain the status quo.

The way individuals position themselves within the social context plays an important role in defining their perceptions of rhythm and time. For instance, the Millers and the Wilsons, the two families that felt most pressured in terms of time, displayed significantly different interpretations of this feeling. While for the Millers the lack of time was considered negative,

as it was seen an external imposition, for the Wilsons it was considered almost as a reason for pride, as they felt they had the power to control not only their own time, but sometimes also (as will be seen later in this section) the time of others. While Paula M. (35-45) reported that she felt she never had any time at all, and her children complained that they didn't have enough time to watch TV (Lily M., 7) or play with friends (Alice M., 10); the Wilsons, with a mixture of satisfaction and resignation, described that they would be *"always working"*, in any place where they can *"open a laptop."* Tom W. (45-55), for instance, reported that *"often you've got multiple deadlines, all coming around the same time. and that's pretty normal, everyday."* This narrative of empowerment and status through the definition of one's own time is appropriated by narratives that promote flexibilisation of time through the enhancement of technological infrastructures. Tom W., however, did not consider such flexibility as creating ''flexible'' time, as he associated flexible time with pleasure and improvisation.

This way, although Tom W. had what would usually be described as ''flexible'' work schedules, he considered his schedules as inflexible, as his work was mostly subjected to deadlines created by third parties, which *"are inflexible, and they will collide in a chaos and then you got a problem of how can I do that if I also have to do that. So you have to do both, at the same time, so you have to multitask."* (Tom). Even though he could organise his own time, his busy schedule did not allow for much flexibility. Similarly, Paula M. (35-45) described flexible time as the time that she could control, in contrast with the inflexible time that was subordinated to an external will. The constraint, in her case, was not the perceived importance of those she met or worked for, but the fact that she was supposed to be somewhere during specific hours of the day. ''Flexibility'', for both Paula and Tom, was relegated to weekends, when they were able to do whatever they pleased.

The culture of being busy was further manifest in the responses participants gave for Task 4, in which they were asked to use the clock when they would like someone to do something later. The Wilsons felt unable to think of such a situation. Charlie W. (13) emphasised that *"usually I want people to do things sooner, so that they are done."* Among the Clarkes, Rob (12) and Emily (16) also reported having difficulties with this task: *"I was really stuck with this, I didn't know like the only thing I could think of was my teacher to give me homework later but that has to be a whole day and I thought putting it forward one day would be way too much"* (Rob).

Not surprisingly, waiting was often considered negative, not only in terms of temporal optimisation, but also because waiting is perceived as being at the periphery of others' schedules. This

was the primary reason for participants putting the clock forward, either to avoid waiting for a fellow student to go through an examination *"so it is just sitting for hours watching everyone else's because all of my classes I mostly watched before so I wanted to speed up time between so that I could skip through theirs and could do mine"* (Rob C., 12), or to avoid waiting for the train at the station *"I thought right, I'm gonna get there and I'm gonna get straight in the train and I will get home really early and then, every time, I had to wait 45 minutes for the train"* (Emily C., 16), or even to avoid waiting for another family member. Being at the periphery of others' schedules, as will be discussed below, was a major reason for tensions.

Efficiency, social values and ethics

Temporal optimisation was in some cases related to a range of social pressures. Emily C. (16), for example, reported that she would like to be able to set time back to appear ''quicker'' in relation to her peers *"you know when you do something or someone said something and you didn't say anything but some minutes later you are caught with something really clever you could have said. I wish we could rewind and say the really clever thing."* Tom W. (45-55), meanwhile, would change the clock to skip or manage frustrating situations in which he was misunderstood: *"in something like a meeting when you are talking about something and you realise nobody can understand what you are talking about, I would either make the time going really fast so that it is gone, past, and everyone has just forgotten about it, or get more time to explain what you mean. One or the other but definitely not the status quo."*

In some cases, ideas of efficiency provided grounds for participants to frame their routines as part of an ethical system. This interpretation can be identified in Ethan and Paula Miller's (35-45) valorisation of rigidly structured schedules. Ethan, for instance, considered that more flexible school structures would fail to engage students, as he states: *"is it Steiner school or Montessori school where they do this kind of, I can't remember which one it is that, where there is no fixed lessons and the kids can choose to attend the classes or not [...] I wonder how that works, I suppose they just don't turn up at all."* Time here is considered a disciplinary tool of social control. A structured schedule is therefore regarded as essential for the educational system to work. Paula also expressed a similar notion in relation to work times:

> LP: *do you structure Sundays as well?*
> Paula: *No, we just see whatever the weather is doing and we just decide what we are going*

to do and we get up quite late and it is just really nice.

LP: *do you think it [the organisation of time] should be more like that?*

Paula: *yeah, it would be brilliant. I mean, I probably would never get anything done but, I think it would be nice.*

The idea that structure is essential for efficiency justifies and creates a coherent narrative around their everyday practices. It gives meaning to certain routines within a large narrative of production, but also renders other possibilities invisible or impracticable. Ethan's perception that more flexible temporal organisations at school would fail to engage students, and Paula's notion that she ''would never get anything done'' in a less structured temporal organisation, are examples of how individuals dismiss alternative ways of organising time, legitimising their own practices within the perceived dominant temporal contexts.

The suppression of alternatives, in addition to reinforcing dominant narratives of time, helps to smooth conflicts within temporal attitudes that are perceived as conflicting, as the narrative is seen as a dominant order to which everyone is submitted. Ethan and Paula, for example, admitted that they related to time differently and that this difference resulted in a range of conflicts. Paula reported a preference for organisation and reliance on schedules so as to feel in control of time, and used this preference as a way to justify a tendency to see time as inflexible, as she states: *"That has probably to do with personality as well, because I tend to be more organised and like to have an internal schedule in my head, sort of what needs doing. Probably there is more flexibility but because I always organise things in my head so that I know what I'm meant to be doing [I feel there is not]"* (Paula 35-45). Ethan, meanwhile, was aware that his attitude toward time was more ''relaxed'' and that his position conflicted with Paula's, as he says: *"I must admit that time is a very flexible concept for me. I'm not a punctual person, not at all, and I've always been struggled with time and I'm sure Paula would testify."* He suggested that his temporal position was inherited: *"I mean my whole family is always late for everything and I struggle with appointments."* Ethan's interpretation of his relationship with time as a ''problem'' helped the couple to create a narrative that would smooth out their differences, but would also prevent them from questioning such structures. Interestingly, both Ethan and Paula interpreted their perceptions of time as a trait of their personalities instead of a response to socially created values and pressures - i.e. Ethan accepted that issues of punctuality were his personal problem rather than questioning expectations of punctuality.

The necessity of structuring schedules and the importance of following them is rehearsed until it becomes internalised and starts to be considered as a general rule of the world. Ethan and Paula, had both internalised temporal discipline. Similarly, while Charlie W. (13) suggested putting time backward to appear more efficient, he still felt that changing the time was somehow unethical: *"because I have to be mature about school and not immature speeding up time to get through the lesson but mature to get to learn something"*. He also found comfort in the regularity of school times:

> LP: *What do you think about all these schedules at school? Would you prefer to set up your own time?*
> Charlie: *I think it is nice that it is set up like this because you can sort of, you don't really have to think much about this. You sort of know you are meant to be there at that time, you don't have to decide to be there at that time, you just are there at that time, so it is easy thinking. I don't know if it's good, but it is easier.*
> LP: *Would you change it if you could?*
> Charlie: *Probably not.*

The assumption that people want to be liberated from habit and routine, as well as the idea that they aspire to more improvised lifestyles, helps to generate acceptance towards the development of supposedly more flexible infrastructures of time, to which anyone can be submitted. Within this infrastructure, individuals would be able to not only carry out work activities at any time, but also communicate, shop, bank, trade and work 24 hours. This flexibility is often celebrated as an empowerment of the subject. However, people's relations to time are far more complex. The interpretation of routine activities is strongly influenced by socially created values of time. Flexibility is not simply provided by new technologies or a redefinition of work hours. Instead, it demands a change of perception and the detachment of time from issues of value. This could be achieved by promoting empathy across temporal expressions in such a way that those who do not fit the dominant standard would not be regarded as problematic. This argument is further developed in the second and third interventions carried out in the context of this research, which are presented in the following section.

Temporal tensions

The accounts above reveal a number of tensions around the perception and organisation of time. Ethan and Paula Miller presented a clear tension in the way they interpret time, which was however smoothed by the context of dominant narratives. Externally and internally imposed times are also regarded as conflicting in the way participants perceive their amount of free time. A further source of tension, as mentioned above, is the perception of being at the periphery of other schedules, as in the case of waiting, which was mentioned by the Clarkes as a main cause of annoyance, although *"It definitely depends on what the little story is in your head" [...] "it quite depends on the person, if it is somebody that you often have to wait for."* (Sally C., 35-45). Among the Clarkes, Rob (12) was the most waited for, which created tensions, especially as he did not seem to realise the extend to which others' time was tied to his:

> Emily: *"I went there after the school and I was told that Rob would finish at 4:30."*
> Rob: *"But that was the time. What time did it actually finish?"*
> Emily: *"Quarter past five!"*

Making others wait can either provide a sense of personal importance or become a personal struggle for those who are in control. Sally C. (35-45) admitted struggling with the idea of controlling somebody else by changing the time. When asked about when they would use the clock to make somebody else do something the family agreed that *"it was quite hard to think of ones which weren't a bit cruel"* (Emily C., 16), which shows how temporality involves sensitive issues and that changing the time of others may be controversial.

Tom W. (45-55) further emphasised the complexity behind having to set up one's busy schedule, explaining that he had to prioritise some appointments in relation to others, which usually implies conflict of interest: *"usually the most important the problem or issue, the less flexible it is."* He considered ''flexible'' appointments as those that could be moved, usually with people whose time was perceived as less valuable than his, but he also admitted having ethical conflicts when considering these appointments of second priority: *"Some meetings can be flexible. Often tutorials with students, you can email the student or text them and say 'can we move the meeting?' and I do it all the time. But you got to be very careful that the things that are absolutely important not call the other things out of the way, and then they end up in danger of not getting done or not getting done well, or you start treating people as second class citizens, you got to respect them too."* Tom's remarks

show that time is clearly not a neutral flow. Instead, it is a negotiation and sometimes an expression of power where someone in a position of advantage can decide the time of others.

The Family Clock also revealed playful wishes to subvert hierarchies of time. Lily M. (7). for instance, would have liked to change the time constantly so that she did not have to go to school, as she declares: *"I would, when we go to bed at night, change it to morning, and then when we wake up it'd still be night time so I can have extra time of bed time and I don't have to go to school... and then I could just get to sleep all day and all night."* The Millers presented an interesting bedtime hierarchy. Lily, the youngest, went to bed first, at 8pm, Alice was next at 9pm and the parents went to bed at 10:30pm. Lily and Alice suggested that they would use the Family Clock to make the parents go to bed earlier, leaving them, the children, to watch television until later.

The idea of changing the schedule of parents was not simply a wish to disrupt routines, but also a strategy to put oneself at the centre of other family members' schedules. Rob (12) and Emily (16) suggested that they would put the clock forward so that they would miss the bus and Sally would find herself obliged to take them to school:

> Rob: *If I miss the bus ... I'd call mum.*
> Emily: *Because mum'd give us a lift.*
> Sally: *I have sometimes given them a lift to school.*
> Emily: *Yeah, twice.*
> Sally: *I was hoping once a term.*
> Emily and Rob: *[laughs]*

6.1.4 Discussion

The Family Clock intervention pointed to a variety of ways people interpret time in their everyday activities. In particular, it indicated how temporal perceptions are constructed by referencing routinely activities through socially constructed values that often refer to dominant narratives; Gurvitch (1964) refers to this as the collective mentality of time. It also indicated how such narratives create social pressures and how their interpretation as a natural order of the world prevented participants from questioning hegemonic paradigms, even if they are perceived as problematic; they looked instead for personal ways to adapt or find justifications for these conflicting issues. The intervention also showed how perceptions of time are nego-

tiated among family members who agree on common assumptions so as to reach a temporal understanding.

Furthermore, the study provided evidence that time is clearly not neutral, but expresses social hierarchies created between those who have the power to set schedules and those who are expected to wait. Such hierarchies influenced the way participants perceived time, whether as more or less flexible or more or less purposeful.

The intervention further demonstrated the difficulty of challenging dominant notions of time. Rob C. (12) for example illustrated this problem, considering himself unable to escape a linear notion of time: *"I was thinking about it 'cause obviously I would like to skip maths, but if I skip that, will I still have that lesson? So if it was in the future would I have learned everything? I did do it but would I have skipped it forwards to where I know I've done it, or would I just go through it in a faster speed?"* The insistence on maintaining a linear and universal concept of time also made participants wonder for whom time would change: *"I wanted to speed up Rob's class to see if he could do things really fast. But then I imagined that it would only be funny if it was just him, it wouldn't work if the whole class was moving really fast"* (Sally C., 35-45). Although Sally first considered that time would change for one person only, the idea of a universal time quickly overshadowed the initial image. Charlie W. (13) also wondered if time would change in a way that would be felt by those who experience it: *"do you mean that the clock is going slower but you are still perceiving things at the same speed or everything is just going slower, including your perception?"*, which demonstrates a struggle between the idea that people have their own time and the idea that time is supposed to be universal and the same for everyone.

Overall, the ambiguity of the clock allowed participants to reflect not only on the organisation of their schedules but also on "invisible" issues of time, such as its supposed linearity and universalisation. This reflection occurred, for example, in Sally (35-45) and Emily (16) Clarke's explanation of the clock as a *"sort of a more imaginative thing, that helped you imagine like if you could, you know, change time"* and as *"Something that made you think about time."* When asked about what she liked about the clock, Emily stated, *"I liked thinking about it. Normally you wouldn't think about when you would like to speed up time and when you would like to go back to what was good. It made me think about the day, what happened, and what you would like to change."*

6.2   The school: Printer Clock and TimeBots interventions

While the Family Clock intervention explored the first principle of Temporal Design, i.e. understanding perceptions of time and how they are influenced by the social context, the second and third interventions, the Printer Clock and the TimeBots, focused on the second and third principles, i.e. 2) drawing attention to a specific alternative temporality, and 3) exposing the complexities involved in networks of temporalities, so as to illustrate multiplicity and variety. These are considered a second step in the process of expanding the repertoire of time in design, as they require an understanding of the way social values operate to determine perceptions and create hierarchies of rhythms; this is suggested by the first principle and is regarded as a first step.

These interventions, therefore, aimed to influence perceptions by affirming alternative expressions and hence expanding notions of time beyond current paradigms of clock and network time as well as the notions of efficiency and acceleration promoted by these paradigms. As explained in the previous chapter, affirmation is essential in order to avoid creating dichotomies between rhythms or attaching them to specific artefacts or situations which do not correspond to how rhythms are expressed in the world.

Instead of family homes, these interventions were carried out in schools. The ambience of the school offered the opportunity to engage perceptions of time that were less habituated, and more loosely tied to each other, compared with the microcosm of the home. The school was also chosen as it is often regarded as a place for strategic action. As seen in the responses to the Family Clock intervention, school is interpreted as a key experience for shaping, resenting and playing with time. Charlie Wilson (13) believed that he had to be ''mature'' about school, while Ethan Miller (35-45) considered school schedules as essential for creating discipline, and Lily Miller (7) would have liked to change time indefinitely to avoid going to school. School has been both praised and criticised for influencing the establishment of social norms, e.g. by Mumford (1963, p.269), Thompson (1967) and Thrift (1996, p.173); it is where children learn not

only how to read the clock, but also how to live within quantified time, and to place themselves within the culture of temporal discipline (Adam, 1995).

Time in its various expressions is grasped at a very early age. The rhythms of the body and of one's natural, constructed and social environments are all grasped intuitively through everyday interactions. This variety of expressions is partly expanded and partly hindered throughout one's lifetime. Adam (1995, p.8) affirms that the *"institutional structures and practices of western-style education work to socialise, habituate and train young people into the clock-time approach to time which, in turn, has the effect of pushing into oblivion the myriad of times that make up the temporal complexity of everyday life."* While clock-time takes a more central role in our lives, other senses, such as personal biorhythms, their connections with the natural world and the rhythms that emerge within social groups, are all expected to become second priority.

It is also at a very early age that children learn to construct their own temporal tactics. They learn that there are right times to do things, and that they need to wait for these times or switch attention when appropriate. Psychologist Walter Mischel (2010) author of the famous marshmallow experiment,[1] maintains that it is through such exercises that children create strategies for coping with waiting and delaying reward, for example redirecting the focus of attention or altering a cognitive representation of a desired object (Mischel et al., 2010). Although these practices are first rehearsed at home, it is within the temporally quantifiable environment of the school that they become more valuable; it is there that they are refined, expanded and legitimised within other social groups and contexts. The importance of temporal discipline in the school environment is evidenced by its intrinsic connection to academic success. Angela Duckworth and Martin Seligman (2005), who lead a U.S. research programme to find techniques for school children to learn how to cope with time, among other things, affirm that self-discipline is better than IQ as a predictor of overall academic performance. As an important part of Western cultural identity, this temporal discipline creates hierarchies between more and less disciplined individuals, as some reactions to the Family Clock have shown.

The tendency is to exacerbate the contrast between these more and less temporally disciplined individuals. The reasons for correlating success and discipline in school and academic envi-

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[1]In this experiment carried out by Mischel and colleagues in the 1970's, a child was offered a choice between an immediate small reward or two small rewards if they waited for a short period (usually 15 minutes). In its numerous follow-up studies, it is suggested that the ability to delay gratification in children can be an indicator of success in Western societies, including higher academic scores, healthier body max index etc.

ronments are rarely questioned or discussed. Duckworth and Seligman (2005), for instance, advocate that parents and schools have been too loose with children and that the teaching of self-discipline should be reinforced. Peterson and Seligman (2004, p.255) even argue that *"there is no true disadvantage of having too much self-control."* Taking into account the logic of quantification that permeates schools and academic environments, if the aim is to support such structures, too much self-discipline might indeed have no disadvantage, as clock-disciplined students certainly facilitate the work of teachers and professors and legitimise the academic structure. A myriad of contemporary pressing issues, however, challenge the very temporal model on which these academic structures are based. From a lack of long-term thinking, to the challenge of the inclusion of minority groups and others, all these subjects cannot be regarded within the notion of a unique expression of time, quantifiable, linear and progressivist.

Rather than simply reinforcing self-discipline or encouraging children to learn how to accomplish tasks within specific timeframes, schools could invest more energy in making different expressions of time visible, encouraging students to pay attention to their own personal rhythms and those of the world around them and encouraging them to accept this multiplicity. In other words, more attention could be paid to promoting and connecting temporalities than to nurturing individual ways of coping with the time of the clock. The classroom itself is the optimal place to carry out such a project. Far from being restricted to timetables, buzzers and timed tasks, classroom time is a fusion of personal times, rhythms and temporal forces, as described by Adam:

> *Class-room times are not exhausted by how long members spend on certain activities, not even by the daily, weekly and yearly timetables that structure every aspect of educational activity. Rather, they are constituted on the basis of individual and collective histories and futures which, in turn, have a central bearing on any one moment of time generated by the group. The class thus creates class-room times in a pre given temporal setting based on clock and calendar time as well as schedules guided by norms, habits, tradition. It produces time that fundamentally extend beyond the visible present* (Adam, 1995, p.67).

Both the Printer Clock and the TimeBots aim to draw attention to this complexity of rhythms involved in the classroom and to expose students to the fact that clock-time is just one temporal expression among many. The two interventions were carried out at two different schools, the Holmewood School in London (a small school for children with learning disabilities, especially those diagnosed with Aspergers and Autism) and North Queensferry Primary School in the

village of North Queensferry (10km away from Edinburgh). While in Holmewood the study involved the whole school, including most members of staff, in North Queensferry it was only carried out with 4th grade students (9 to 10 years old, 19 in total). In a pedagogic sense, at this stage, children already possess advanced notions of time; they are able to understand sequencing of time on different scales, distinguish time and speed from visual dimensions like space and size, construct symbolic representations of time (Droit-Volet, 2011), understand subjective time distortions (Lamotte et al., 2012), and read a clock. They are also aware of subtle relationships between time and value, for instance the notion that some people's time is regarded as more important than that of others, and it is at this age that they start to reflect on time, for example by using verbal strategies (Droit-Volet, 2011). Droit-Volet (2011) explains that younger children may estimate time ''correctly'', but time does not appear to be relevant to them in the majority of everyday situations, so they do not spontaneously think of doing so. Although advanced in the pedagogic and developmental sense, children's perceptions at this age are still fresh and less tied to conventions characteristic of adulthood, such as attachment to routine and judgement (Friedman and Janssen, 2010). Children's impressions are also less likely to be restricted by judgement, as they lack the background information to perform more elaborate judgements; Edward de Bono (1995) suggests that this is a practice that diminishes creativity by forcing people back to their present position. The adult brain, according to de Bono, is not designed to create new thinking but instead to set up routine patterns of perception and behaviour and to make sure individuals do not deviate from these patterns.

6.2.1   Printer Clock intervention

The Printer Clock intervention explored the second principle of Temporal Design: affirming expressions of time that are disregarded by dominant narratives. By replacing usual clock readings with the activities carried out by the students at each school, the aim was to emphasise the embodied and situated nature of time, revealing the mesh of activities and characters that come together to create temporality, and ultimately foster a temporal empathy within the classroom.

Children were initially invited to document their routines. To help with this documentation, kits containing a small clock and a disposable camera (see Figure 6.8) were distributed to the students at each school, and to staff at Holmewood School. Participants were then asked to use this material to report their routines across a period of 2-5 days, from waking to bedtime;
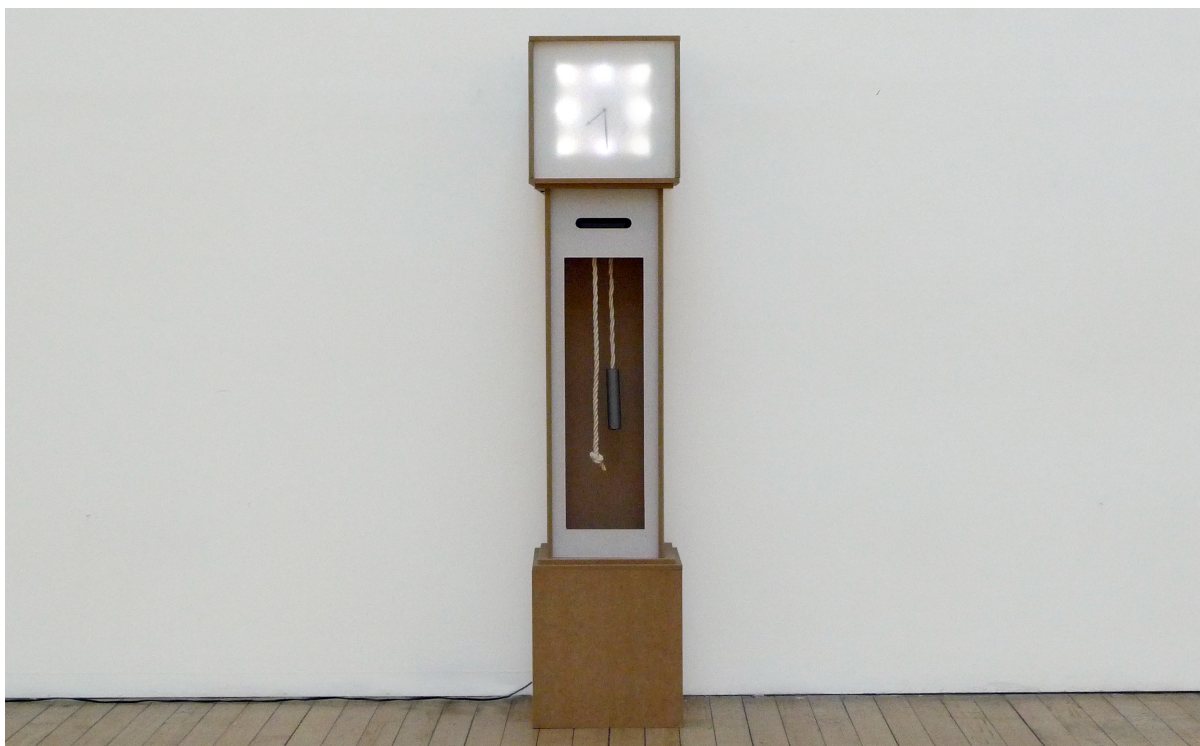
Figure 6.7: Printer Clock artefact

most importantly, they were asked to make sure that the clock featured somewhere in each photograph. Approximately 400 images were collected at each school. The combination of camera and clock allowed for recognition of the time each photograph was taken. These images were then time-stamped, and were used to build up a database upon which the Printer Clock artefact would draw.

Once developed the physical photographs were brought to each school (Figure 6.9) and students were asked to distribute them across a large timeline (Figure 6.10) which provided an overview of all students' activities, from morning to evening: the first photographs showing the children preparing to go to school and taking public transportation, and later ones revealing the rhythm of the day until the time they went to bed. The line of photographs showed the different things that students and their families did and what time they did them. This was an opportunity for the students to see how their times intertwined with the times of their peers.

Each student was then asked to introduce their routine to one of their fellows, and were then asked about others' personal times, for instance whether they could think of activities that friends and family members were carrying out at that specific moment - which on some occasions led them to consider different time zones. This exercise was an attempt to make them

think about their own times in relation to the times of their peers, and the present time in other situations and contexts.

Participants were then introduced to the Printer Clock artefact (Figure 6.11), which associated the images taken by the students with clock readings in order to challenge their usual perception of clock-time. The artefact resembles a grandfather clock; it is composed of a regular clock-face, a printer and a computer that stores the pictures. However, the clock-face is initially turned off. Pulling the cord inside the clock activates the computer, which lights up the clock-face and prints a picture of a student that was taken at that particular time in the past. These fragmented experiences from days in the past present themselves as the time-readings and invite the children to establish connections with the moment that they experience from the request. By exposing them to these multiple activities every time the time is requested, the clock invites the students to think about different temporal expressions within the classroom. Time is presented through the time of others and the variety of pictures reveals differences in the repetition of rhythms.

Figure 6.8: Kits that were distributed to participants

Figure 6.9: Distribution of developed photos

In the school, clock-time is assimilated as objective and as regulating human practices, but it masks a multiplicity of temporal expressions that bind students together. When looking at a clock, individuals usually think about their actions and what they need to do next, and seldom consider what that moment in time may represent. The Printer Clock, on the contrary, attempts to emphasise collectivity and contextuality. As soon as someone activates the clock, requesting the time, they are presented with an activity that is performed by a specific person in a specific place.

The clock was brought to the schools on two different occasions. On the first occasion, the timeline exercise was followed and the students were simply left to explore the clock. The second visit was organised into one-to-one recorded sessions (Figure 6.12) in which the clock was modified to show its clock-face, through which students could now select the time they wanted to print. This small change allowed them to choose, demonstrating their reactions and intentions. They were also asked to think of a general time they would like to print, and then consider a time in the past and a time in the future, and to name a person whose time they would like to see printed.

Figure 6.10: Building the timeline

Figure 6.11: Trying out the clock

6.2.2 Printer Clock intervention: responses

The printer clock was placed in the main hall of both schools. During the first session, the students would run over to the clock and keep pulling the cord in order to see what and who would appear in the next picture. The piece was rapidly taken over by the most outspoken students, who crammed themselves into a small space to look into the hole from which the prints would come out, and then shouted the name of the child that was in the picture. This behaviour defined two groups of participants: those who interacted with the clock and those who observed it from afar. The clock-face was ignored by the ones in control, to whom it was effectively replaced by the pictures that carried the time. This way, the disembodied time of the clock was personified by the students' activities.

The peak moment of excitement produced by the intervention was when children were faced with their own pictures. It became clear that the primary expectation in triggering the clock was to find familiarity in the pictures. In the very first session carried out at Holmewood School the database included some images not produced by the students. These images, selected from creative-commons licensed photos on Flickr (www.flickr.com), showed children from other countries playing or performing ordinary activities such as gardening or cooking. The expectation was that these images would become part of the discussion, extending the idea of community beyond the classroom or the school. They were, however, treated as something completely foreign, the same as participants would probably treat images taken from the news. As they failed to engage the students, they were removed from the database in subsequent sessions.

In the second session, when participants were asked to choose a time to be printed, they mostly made this choice based on an activity they particularly enjoyed *"it is my favourite time in the day because I watch TV before I go to bed"* (S2). They often referred to the practice first, then translated it into clock-time: *"probably when I'm doing karate, that would be around half past twelve to quarter past three"* (D1). The second most frequent strategy for choosing a time was based on a certain point in time in their weekly schedules, which represented clock readings of which they were constantly reminded when they were prompted to do a certain thing, such as leaving home to go to school, lunchtime etc. The final strategy was based on a combination of numbers, such as 03:09, representing a birthday date (in this case, the 3rd of September) or a lucky number. These strategies demonstrate the richness of associations prompted by clock-time. Activities, tasks, schedules, quantities and numbers were all intertwined in the students' choices.

Figure 6.12: Final one-to-one interviews

Overall, the children looked for identification in the printed images. There was a sense of satisfaction when the printed picture met this expectation, and conversely an attitude of disdain, sometimes preceded by surprise, when this expectation was not met - expressed for example by not wanting to keep or talk about the image. Similarly, when asked to choose a person whose time they would like to see printed, their primary choice was their best friend or a close family member.

The search for familiarity was achieved in a few cases, but in most cases participants received pictures of the activities of fellow students with whom they were not so familiar, or activities that they would not notice, as they did not directly appeal to them. The Printer Clock, therefore, indirectly attempted to invert what Castells (2003) refers to as the construction of *"self-contained communicative universes"* which he affirms is a characteristic of the ''network society.'' According to Castells, *"the more we select our personal hypertext [...] the greater the obstacles to finding a common language, thus common meaning"* (2003, p.204). They were therefore taken out of their comfort zone, and it is in this dislocation that an expansion of concepts of time takes place.

When asked to choose a time in the past, they referred to different scales, including historical time, time in a rather distant past (for example, when they were babies) or sometime in the past month, past week or earlier in the day. They also referred to measures of time such as ''any Tuesday'' or ''lunch time'' in ''any day''. When asked to choose a time in the future, only half of the participants came up with an answer, usually making reference to science fiction films, the weekend or a time later in that day.

The intervention drew attention to the way practices do not simply occupy but also create time. By exposing several practices and associating them with ''the time'', children were exposed to the complexity that comprise each moment represented on the clock. Documenting their days and reporting them to their peers allowed participants to reflect on the multiplicity of practices that shaped temporality inside their school community, putting into evidence the embodied and situated nature of time. Their responses showed a variety of perceptions and how they sometimes intertwined with clock-time. Drawing attention to alternative expressions of time is important; it prevents children from disregarding non-quantifiable temporal notions as clock-time gains more importance in their lives.

6.2.3   TimeBots intervention

The TimeBots intervention focused on exploring the third principle of Temporal Design: exposing the complexities involved in networks of temporalities so as to illustrate multiplicity and variety. While the Printer Clock approached the situated nature of time, creating a temporal empathy among students, the TimeBots drew attention to personal rhythms and the way they played out within the context of the classroom.

The aim was to challenge the narrative that the world is in constant acceleration by inviting children to reflect on the multiple speeds of their day. As discussed in Part II, the idea of acceleration as a universalised condition has become dominant through narratives of both ''clock'' and ''network'' time. Although we live under this dominant discourse, and struggle to keep up with what has become the dominant notion in the world, our lives do not strictly follow this model of acceleration. They are made up of slow and fast moments, even within perceived ''fast'' periods or when performing ''fast'' activities. Not only do activities have different cadences; they are also perceived differently by each actor and may even change over time. In contrast to the slow movement, which assumes that acceleration is a universalised

condition and attempts to counteract this condition by promoting opportunities to slow down, the aim was to draw students' attention to the variant speeds at which they lived their lives.

The artefacts central to this intervention were small three-wheeled robots that could be programmed, with the help of small tokens, to run as slow, medium or fast in a five-step sequence. The programme should, however, align with what each student felt about time during five periods of the day. Once this was reflected upon, each child would record their feelings on their TimeBots, and the bots would all be released into a pen, running in a loop that repeated the five speeds continuously, in order to enact the collective rhythm of the classroom.

Figure 6.13: TimeBot: artefact, programming sheets and tokens

The intervention started with a series of warm-up questions about the way the students felt about speed, for example when they felt they were fast and they were slow, whether they could think of different times in the day as having different speeds, what speed they felt was expressed in the present moment etc. The children were then invited to describe activities, people, places and objects considered slow, medium and fast, and mark them on a form. Finally, they were asked to focus on a regular week-day and describe their feelings of acceleration for five periods - morning, late morning, afternoon, late afternoon and night - and mark their

thoughts on another dedicated form. Following this reflection, the TimeBots were distributed and decorated (Figures 6.14 and 6.15) to create a sense of personal identification, and each child recorded their feelings of speed on their bots using the tokens (Figure 6.16). To conclude the session, the TimeBots were released into the pen (Figure 6.18), as described above. Students were later asked about these responses in one-to-one recorded interviews.

Figure 6.14: Decorating the TimeBots

6.2.4 TimeBots intervention: responses

The reported experiences of speed from similar situations varied greatly among participants: similar activities, places, people and objects were in some cases considered fast, medium, slow, or all at once, depending on the situation and the people involved, the mood of participants, the time of day etc. The students' teacher, for example, was considered slow, medium and

Figure 6.15: Decorating the TimeBots

Figure 6.16: Programming the TimeBots

Figure 6.17: Bringing the TimeBots to the pen

fast by one participant (S2) while others considered homework (S2), television (C4) and even horses (E1) as slow, medium and fast. Even activities and places that might intuitively be associated with speed were sometimes considered slow. Athletics, for instance, was reported by one participant as *"quite slow because one minute it's 6 o'clock and then you come back in and it's still about 5 past 6"* (A1), while *"high streets"* were considered very slow *"because there is so many people and I walk towards them and I just try to get through them"* (C1).

Although particular senses of speed were not intrinsically related to specific activities, people, places and objects and were constructed by actors through their personal experiences, it was still possible to identify some bias towards dominant narratives; slowness was regarded as negative and acceleration as positive, particularly in the ''activities'' topic, where slowness was frequently associated with displeasure and boredom and acceleration with pleasure and enjoyment, as illustrated by the above example of describing ''athletics'' as slow.

With people, on some occasions slowness was associated with ''inefficiency'': *"[he is slow] because he kind of can't really bother getting to work to get paid and he lives at home and doesn't pay the bills"* (R2), and acceleration with ''efficiency'' *"[dad is fast] because he gets right off the bed*

and ... he already had his breakfast, brushed his teeth and is ready to go to work" (R2). In other cases, however, slowness in people was also associated with pleasure *"my grandma... I like that she is slow"* (A2), or tranquillity *"because C3 is really peaceful she never shouts or anything"* (S2). Being busy, in this case, was associated with both acceleration *"my mum [is fast] because she is always busy working"* (C2) and slowness *"he just spends most of his time on the computer and once he is on it he doesn't go out"*(J1). In some cases speed was considered in its literal form, for example better runners being considered ''fast'' people.

Figure 6.18: TimeBots final performance

The discontinuity and variance of rhythms were manifest in people, practices and objects that were mentioned for various speeds. One could argue that the very notion of asking children to classify things based on speed makes little sense, as activities, people, places and objects are obviously polyrhythmic. The aim here, however, was actually to emphasise this obviousness, and how this polyrhythmia is too often concealed by dominant narratives that lead us to regard acceleration as a necessary condition.

The decoration of the TimeBots played an important role in identifying their owners. While at North Queensferry Primary School the students endeavoured to create faces that resembled their physical traits or some aspect of their personalities, at Holmewood School, the TimeBots were mostly graffiti-ed with themed messages, including references to technology, such as ''robots > humans'', or to pop culture, for instance references to pop songs such as ''Forget

about the price tag''. The fact that the intervention included a technological feature, in this case the robots also turned out to be an incentive for the children to participate.

Among participants, on the forms where they marked how they felt about five different periods of their day, there was a tendency to start the day slowly and portray this speed as accelerating till the end of the day, but the three speeds were relatively balanced for all stages. The speeds programmed into the TimeBots were admittedly too personal and subjective for others to connect to the behaviour of their owners in the final performance, and the owner of each robot was mostly recognised by its decoration. As the robots ran inside the pen, however, the children could observe the representation of their own rhythms, as well as the variety that composed the polyrhythms of the classroom. As affirmed by Adam (1998, p.10) it is through the intersection and accumulation of various rhythms that contextual temporal practices become tangible. The network of rhythms created by the TimeBots in the pen enabled a unique glimpse into the combined subjective experiences of time that did not and could not exist for an observer simply watching the routine of those students. In the pen the TimeBots interacted with each other on a different level, revealing the subjective timescape of the group.

The variety of speeds again pointed to the richness of temporal experiences within the group. While the utilisation of dominant narratives around speed and slowness as a way of expressing feelings of pleasure or displeasure demonstrates the difficulty of breaking with a pervasive culture of time, overall the children did not experience their 21st century lives solely as accelerated. Instead they explored the occurrence of multiple rhythms. The recognition of this multiplicity challenges the assumption that social life is monopolised by a single temporal expression, and the association of slowness with familiarity and tranquillity challenges the idealisation of always doing more. Acceleration may have become a normative model embedded in our language, but speed is experienced in multiple variations.

6.2.5 Discussion

Although each of the interventions carried out in the schools have focused on exploring one of the principles of Temporal Design, they revealed how these principles are intrinsically interconnected and may presuppose each other. As seen in the responses to the Family Clock intervention, the dominance of certain paradigms of time shift the focus from the collective to the individual and lead people to treat time as a personal concern instead of a social construct.

Looking for alternative expressions of time will, therefore, invariably point to a network of times, where activities, perceptions and natural rhythms intertwine to create a more complex timescape of the context in which we live. This way, if the starting point is is the second or third principle of Temporal Design, the principles are likely to hint at each other in the final designs.

By exposing students to the variety of temporal expressions that are part of their contexts, these interventions allowed for a sense of temporal empathy to emerge. When they reflected on slow and fast moments, the students did not place value on their routines, but instead considered how time was expressed to them in their specific contexts.

It is also important to note how a negative critique, as is the common practice in projects identified with the Critical Design (Dunne and Raby, 2001) movement, would be problematic in both of the interventions described above. As identified by Birth (2012), criticising clock-time does not make it go away. Its presence is so pervasive that it continues to influence its critics and those around them. The problem is not the existence of clock-time, but the fact that its dominance pushes other forms of time into oblivion; it is this dominance that needs to be challenged, which can be achieved by affirming alternative expressions and diversifying perceptions. Acceleration has also become taken for granted, embedded in Western societies as a positive attribute. Instead of denouncing the high value placed on acceleration, which is impossible to negate completely, it is necessary to detach speed from issues of value, interpreting it instead as a dynamic component that, in this changeable form, contributes to create the complexity of time in the world.

6.3   Summary of Chapter 6

This chapter has introduced and discussed the three Design Interventions that were developed in the context of this research and explored the three principles of Temporal Design. The first intervention, the Family Clock, investigated the way participants reflect on temporality and the way these reflections relate to higher-level socially constructed values of time. It demonstrated how families rehearse their conceptions of time so as to reach common understandings and smooth conflicts created by different perspectives. It also demonstrated how individuals regard problematic issues of time as a personal concern instead of a social issue, which hinders

discussion and legitimises dominant narratives. Finally, it argued for the necessity of drawing attention to alternative temporal expressions and consequently expanding the repertoireof time.

This expansion of temporal notions was approached in the second and third interventions, which were carried out in schools. The second, the Printer Clock, focused on drawing attention to the embodied and situated nature of time, while the third, the TimeBots, approached the variance of speeds that come together to create the rhythms of the classroom. By adopting the *critical affirmative approach* outlined in the previous chapter, these interventions invited students to reflect on the way time is expressed in their lives and how they are interconnected with the times of other classmates. Both interventions encouraged students to think about expressions that challenge dominant accounts of what time ''is'', and both presented aspects of the network of times that compose the timescape of the classroom.

The three interventions suggest specific ways of understanding temporality and influencing participants' perceptions in order to promote a more varied repertoire of time in Western societies. Designers could play a key role in opening up new ways of making, living and thinking about time. These interventions and the principles they represent may serve as a starting point in this long term challenge.

Part V

Closing reflections

Chapter 7

Discussion, conclusion and future directions

7.1   Thesis summary

Although issues of time play a central role in our lives, we seldom stop to consider them directly. Time is rehearsed and assimilated in the everyday so naturally that it disappears from consciousness to the point of being considered a fact of nature. Our conceptions of time, as presented in this thesis, are not neutral. Within this invisibility, time sustains social and cultural values that deeply influence our lives. In Western industrialised societies, these values are dominated by narratives of ''clock'' and ''network'' time. As explained in Part II of this thesis, these narratives have been extensively criticised in the social sciences and humanities for prioritising particular forms of time and consequently endorsing notions of universalised acceleration. These forms are depicted in terms of technological progression, and disregard the plurality of ways in which time is expressed in the world. This condition of temporal acceleration not only contributes to escalating levels of stress, but also reinforces social inequalities and renders impacts on the natural world invisible.

As shown in Part III, these temporal narratives have strongly influenced design practice for decades. The emphasis on time discipline, optimisation, compression, constant connectivity, flexibility and, above all, acceleration of time have narrowed ways of thinking about it. This has inhibited design practice, preventing the consideration of more nuanced, situated and complex temporalities and rhythms. As with narratives of ''clock'' and ''network'' time, artefacts and systems are often considered to define time, rather than provoking multidimensional practices that construct varied temporal expressions. Such narratives can also affect critical approaches. Movements such as Slow Technology and Slow Design, which have provided genuine proposals for a diversification of rhythms, have been appropriated into mainstream discourses as anti-technology. They have been interpreted as calling for a return to pre-industrial practices and manually operated artefacts; the complexity of these proposals is thereby simplified into a dichotomy of fast and slow, or of forward and backward thinking, sustaining a narrative that assumes that different forms of time replace one another.

Overall, the analysis of current approaches to time in design concludes that dominant narratives of time have restricted design practice in three main ways:

1. by monopolising designers' understandings of time and precluding further exploration in the field;
2. by locating temporality within technological artefacts and systems and ignoring the breadth of expressions beyond and around these technologies; and finally
3. by simplifying proposals that would otherwise contribute to including more varied perceptions of rhythms.

In order to unlock the hegemony of dominant narratives and expand ways of considering time, Part IV suggests a new approach, of *Temporal Design*, which proposes three general guiding principles considered in two steps. *First*, it calls for the identification of dominant narratives so as to recognise more nuanced temporal expressions, considering methods to disturb time-as-usual, and to reveal how taken-for-granted structures of time operate, as in Garfinkel's notion of ''breaching experiments''. *Second*, it suggests a *critical affirmative attitude* toward alternative expressions of time, which can function in two different ways: *(i)* by drawing attention to a specific alternative form of time or *(ii)* by exposing multiple temporaries simultaneously so as to illustrate variety.

Three Design interventions that explore this approach have been developed. The first intervention, the Family Clock, adopted a more disruptive attitude in order to investigate issues

of time in the context of the home. Hosted by three different families, the clock exposed not only the way schedules are easily linked with concepts of morality, hierarchy, and comfort, but also how family members connect to one another and create dependable relationships of time through their regular encounters. The intervention also revealed how each family created a temporal microcosm through the negotiation and performance of activities through time. The other two interventions, the Printer Clock and the TimeBots, were introduced in schools and adopted a more affirmative approach. While the Printer Clock focused on emphasising the embodied and situated nature of time, pointing to the mesh of activities and characters that combine to create time, the TimeBots drew attention to personal rhythms and their interplay within the context of the classroom. Although both interventions invited students to reconsider time outside already-learned temporal assumptions, they also demonstrated how pervasive narratives provide a filter through which participants interpret time, and how they influence the way participants refer to others and search for identification. The interventions nonetheless demonstrated that there is a multiplicity of temporalities latent in the world. Designers can help to create artefacts and systems that, instead of masking or filtering out perceptions that do not fit dominant temporal paradigms, would disclose alternative notions, revealing the intricacies of temporal relationships between individuals and groups.

7.2   Discussion

7.2.1   Temporal Design principles

As mentioned above this research defined three guiding Temporal Design principles:

1. identification of dominant narratives and attempts to challenge them, thus revealing more nuanced expressions of time;
2. drawing attention to specific alternative temporalities; and
3. exposing networks of temporalities, so as to illustrate multiplicity and variety.

As suggested, each of the interventions described in this research focused on one of the principles above. Based on the first principle, the Family Clock aimed to reveal dominant narratives

by attempting to disrupt time-as-usual and inviting participants to step out of the taken-for-granted temporality of their everyday and reflect on its intricacies. The influence of these narratives was exemplified by a reported commitment to productivity and acceleration as well as by frequent references to efficiency and busyness. Each family, however, shaped these issues differently; as such, each of them constructed a particular personality of time. This coherence emerged by carrying out practices, demonstrating the way everyday practices come together to construct expressions of time, even when these expressions are masked by dominant narratives.

The Printer Clock focused on the second principle, of looking at alternative expressions of time and affirming them as part of a temporal context. In the intervention, clock-time readings were replaced by the activities of the schoolchildren in order to emphasise the embodied and situated nature of time. By exposing students to this multiplicity of activities, which were inter-related with different exercises, a new sense of temporal empathy emerged. The TimeBots, in turn, focused on the third principle, exposing the networks of temporalities so as to illustrate multiplicity and variety. The bots aimed to investigate students' feelings of speed during different periods of the day, exposing these feelings to the classroom in the form of small, personalised bots. When describing their perceptions, the students considered similar activities, places, people and objects as fast, medium and slow, or even as having multiple speeds simultaneously, which demonstrates the richness of perceptions. Although in some cases, ''fast'' and ''slow'' were associated with pleasure and displeasure, their answers were detached from issues of value, and contrasted with current accounts of time in design that tend to place value on acceleration or slowness.

Although each intervention was designed according to one of the principles defined above, each incorporated elements of all three principles. By following the two steps that defined principle (1) as a requisite to principles (2) and (3), they all attempted to challenge dominant narratives. Interestingly, however, they all directly or indirectly manifested alternative temporal expressions and exposed temporal networks. It is important to note that these principles were not anticipated to propose parameters for evaluating how strongly a project fits into the concept of Temporal Design. Instead, they were simply intended to serve as a starting point for considering time in more pluralistic terms, thereby helping to define the kinds of methods, attitudes and more specific subjects to be approached.

It is also important to note that these principles are multifaceted and their implications are likely to alter over time. The first principle, for instance, involved identifying dominant narratives,

and currently responds to the relatively established paradigm of time, although this may eventually change as discussion evolves and different narratives are recognised. The second and third principles, respectively drawing attention to specific alternative temporalities and exposing several expressions at once, have been explored within social time, but should also be expanded to rhythms, times of nature and other forms of life; this may even require new methods in order to foster extended comprehension and interspecies empathy. The possibilities for exploring time are innumerable and continuously changing.

7.2.2   Temporal Design in practice

The aim of Temporal Design is to inspire the exploration of more complex expressions of time in design. As mentioned, the first principle of mapping dominant narratives is paramount to promoting a more critical view, which is necessary for the support of alternative notions. Such explorations, however, are by no means simple or safe from being incorporated into dominant narratives, especially if the principles are approached independently.

Slow Technology projects, as described in Subsection 4.3.1, effectively exemplify this difficulty. Although one can consider the proposal to challeng dominant narratives of acceleration intrinsically, the resulting projects eventually feed back into these narratives by considering acceleration as a universalised condition, as in the example of the *Social Jammers* (2011) project undertaken by Hugo Eccles and Afshin Mehin. When not quickly dismissed as nostalgic, anti-technology or obsolete, these projects may however have succeeded in influencing perceptions regarding slower expressions. A long term study of the *PhotoBox* (Odom et al., 2014), which expressed reactions of participants' assimilation of dominant narratives, was discussed in the same subsection. The study identified that, participants initially expressed experiences of frustration and confusion, and attempted to work out what the technology was *really* trying to accomplish. However, after a number of months they eventually came to accept the slowness of the *PhotoBox*. The lack of identification was overcome by the persistence with the long term study.

Regarding the exploration of alternatives, there is a risk that projects simply translate the alternative temporality into a technological expression that again presents time in its ''clock'' or ''network'' expressions. One project, which did not aim to explore time, but can be used as an example in this case, is Rachel Jacobs and colleague's installation *Conversation Between*

Trees (2013). The proposal of their project was to visualise communication between trees across continents, covering the topic of *Temporal Design* in terms of the investigation of rhythms in the natural world. The installation, however, was based on aesthetic visualisations of data gathered at trees, and lacked a critical perspective on socially constructed paradigms. On the other hand, the disregard for social narratives, did not compromise Wallace's series of lockets, referred to in Subsection 4.2.1, which invited people to reflect on pause, memory and duration, and unwittingly also invited them to step out of the narrative, providing a critical view even where unintended. Although exposing alternative notions or multiple perspectives of time while avoiding feeding back within a dominant system might be challenging, the examples above demonstrate that it is possible, especially when focusing on reflection.

There also remains the question of the extent to which these principles can be applied to the design of commercial or mainstream products, outside dedicated art spaces or academic and controlled environments. Section 4.4 presents some examples of commercial clocks, such as *The Present* (2013) by Scott Thrift, but naturally the Temporal Design perspective is not restricted to clocks. One project that exemplifies this approach in a different format is the *20-Day Stranger* (2014) project, designed and developed by the Dalai Lama Center for Ethics and MIT Media Lab. It consists of a mobile app that allows individuals to exchange their experiences anonymously, 24 hours a day for 20 days. The application brings participants into different temporal contexts, expanding their perceptions of rhythms. In addition to being applied to other contexts and formats, principles of temporal design can also influence different levels of the design process. As shown in Part III, attitudes toward time can be expressed in a myriad of ways, and assuming a pluralistic position in regard to time can have unexpected effects on areas that might not intuitively be associated with time. Challenging the modern paradigm of efficiency and acceleration allows designers to explore alternative temporalities, not only in conceptual but also in more immediate terms; perhaps this can even effect a reconsideration of traditional studies of time-response in interactive systems.

7.3   Conclusions

7.3.1   Research questions revisited

The initial questions defined for this research were:

Main question:

How can design contribute to an expansion of perceptions of time and rhythms?

Subquestions:

1. What are the current theories that can contribute to a better understanding of time in design?
2. How do artefacts and systems shape perceptions of time?
3. What is design's role in shaping these perceptions?
4. How can alternative notions of time be explored through design?

To answer Research Question (1), this work provided a thorough overview of current theories of time in the social sciences and humanities, admittedly focusing on current critiques of the influence and impact of dominant narratives on perceptions of time. This thesis is particularly influenced by the works of theorists such as Barbara Adam (1995; 1998; 2002), Michelle Bastian (2012), Kevin Birth (1999; 2012), Paul Glennie and Nigel Thrift (2009), Tim Ingold (1995), Helga Nowotny (1996) and Sarah Sharma (2013; 2014). The discussion however is on-going and remains extremely relevant to design.

Research Questions (2) and (3) were addressed by extensive discussion of the role of time in design as presented in Part III. Regarding Research Question (2), it was argued that artefacts and systems do play a role in shaping individuals' perceptions of time, but that the relationship between perception and practice is not straightforward; see section 3.1. Although individuals might be ''locked into'' their material and technological contexts, they continue to control these contexts to suit their lifestyles, and calibrate them to their own rhythms. Problems however

emerge when socially-constructed narratives become so prevalent that they leave no space for such calibration.

Regarding Research Question (3), it was argued that designers not only help to define the material context within which individuals are situated, and which may influence their temporal relationships, but also, on a higher level, to sustain or create different levels of temporal narratives. For example, they may unwittingly or intentionally support efficiency and time-saving and therefore fit their designs into narratives of clock time, or they may draw attention to alternative rhythms (e.g. natural, social, embodied rhythms) and attempt to expand the repertoire and challenge dominant narrative trends. Both perception and critical thinking are important in this case. It is necessary to first realise the multiplicity of rhythms in the world and the effect of dominant narratives to then strategically reaffirm disregarded temporalities without legitimising the dominance of particular expressions, as often happens in the slow movement. The traditional role of designers as problem-solvers has already been questioned by movements within Speculative Design (Kerridge, 2009), particularly in the form of Critical Design (Dunne and Raby, 2001), which attempt to reveal the negative impacts of developments that feedback into an on-going technological narrative. The question proposed by this research is what kind of narratives designers *want* to construct.

Research Question (4) was addressed by the proposal of *Temporal Design*, and by its principles, which reinforced the necessity of first recognising the norm, then the alternatives. Several factors affect our understanding of time within the dominant paradigm, and present a range of difficulties. These narratives, however, are intrinsic to our lives, rendering these difficulties a natural conflict between temporal expressions. The clash, however, as suggested by Gell (1992, p.53) is not between temporal expressions but between socially constructed norms of what time is supposed to be. Given the taken-for-granted nature of time, it might be necessary to disturb its sense of normality in order to reveal participants' relationships with it. Following the *Temporal Design* principles, once norms and the alternatives have been mapped, it becomes necessary to affirm the alternatives either by drawing attention to this specific temporality or by exposing the way in which the networks of temporalities intersect.

The overall question, of how design can contribute to an expansion of perceptions of time and rhythms, has been approached on different levels:

1. The initial analysis pointed to the way time has been analysed in the social sciences and the humanities, indicating the importance of enhancing dialogue between design and

other disciplines. This theoretical analysis was key to the realisation that the biggest challenge for designers is not only the *way* they address issues of temporality, but the *kind* of issues they approach, as the latter is strongly influenced by the former.

2. On another level, the research framed *Temporal Design* according to the principles discussed above; it took this as a starting point from which to explore perceptions of time, and its rhythms beyond the hegemony of current paradigms of time.

3. The thesis also pointed to different methods of analysis in relation to these principles. Garfinkel's breaching experiments, for instance, indicated the importance of disturbing the everyday in order to analyse it. A critical position was essential for challenging such narratives, but, in contrast to approaches associated with the concept of Critical Design (Dunne and Raby, 2001), this research essentially proposed the adoption of an affirmative attitude toward new expressions.

4. In terms of practical methods, preference has been given to open-ended approaches that may lead individuals to ''complete'' the meaning of artefacts and systems.

5. Finally, the research has provided different examples of interventions that have explored the principles and methods above.

7.3.2   Objectives and thesis structure

The objectives initially defined in this research were:

1. to identify critical trends in theories of time;
2. to map current design attitudes towards time;
3. to bring current critiques of dominant narratives of time, available in other areas of study, into the design context;
4. to investigate design opportunities for exploring perceptions of time;
5. to seek out models that might help an exploration of alternative perspectives of time in design; and
6. to produce a series of practical design examples that exemplify these alternative perspectives.

These objectives have been addressed throughout this thesis, and formed the basis of its structure. Objective (1) helped to define Part II (*Understanding time*), while Objectives (2) and (3) were addressed in the analysis presented in both Chapters 3 and 4 in Part III (*Time in design*),

which critically analysed the role of design attitudes towards time. The analysis conducted in these chapters presented several design examples, some of which, especially in Chapter 4 (*Reflective attitudes to time in design*), responded to Objective (4), which also addressed the three *Design Exercises* developed in the context of this research contained within the same chapter, and by the three *Design Interventions* described in Chapter 6 (*Temporal Design in practice*).

Part IV (Temporal Design) approached the final two Objectives, (5) and (6). Objective (5) was expressed by the Temporal Design proposal, and (6) was expressed by the artefacts designed for the three *Design Interventions*, namely the Family Clock, the Printer Clock and the TimeBots.

7.3.3   Contributions revisited

As defined in the introduction of this thesis, the four key contributions of this research are:

1) **Design perspective: problematising narratives of time.** The analysis carried out in this research revealed the social character of narratives of time, and questioned the taken-for-granted character of dominant narratives. Their status as ''common sense'' ensures the importance of critical and reflexive approaches in drawing attention to the range of alternative expressions of time, and countering the negative impacts and neglect produced by the dominant paradigms. Most importantly, this discussion drew attention to the danger of universalised social narratives in general, often hindering exploration and discussion and even perpetuating discriminatory social structures. Therefore, the research invites designers to reflect more broadly on the types of narratives they may be unwittingly supporting, and those they might choose to construct.

2) **Design subject: definition of temporality as a renewed subject of study.** The research extends the subject of *temporality* within design so as to consider more pluralistic accounts. As discussed, designers and society more generally are still very much influenced by dominant narratives of time. Design practice is particularly restricted in three ways: 1) through the monopolisation of understanding how we came to have the time we do; 2) through the tendency to read temporality in terms of technologies instead of practices; and 3) through the narrowing of alternative proposals. Looking at alternative conceptions of time, away from the filter of these narratives, would therefore support a renewed exploration of the subject of time within the design discipline.

3) **Design approach: proposed in the form of Temporal Design.** To support the call for a plurality of rhythms, this research proposes a new approach to time in design, referred to as Temporal Design, which aims to re-associate "temporality" with "time". This approach encourages a broadening of methods in relation to time including disrupting narratives, affirming alternative perceptions and exposing multiplicity.

4) **Design examples: providing practical explorations of Temporal Design.** Finally the work presented three design interventions in order to explore the *Temporal Design* approach. The respective interventions aimed to investigate taken-for-granted notions of time, to promote greater temporal empathy by presenting time as embodied and social and to promote a discussion of speed that avoids the binaries located within dominant narratives and alternative proposals of Slow Technology and Slow Design.

7.4   Future directions

This research has attempted to provoke designers to expand the way they think about time. The hope is that Temporal Design will influence a new range of practical design explorations, not only in the arts and in academic settings but also in mainstream approaches to design and commercial settings. The interventions described in this research focus on particular subjects related to social aspects of time, and to the specific contexts of the home and the school. There are however a myriad of other time-related subjects that can be explored, such as the intersections between social and natural time, the nuances of perceptions within considered work practices and the networks of time that involve intersections of personal and global affairs, as in the case of food production and consumption. The intricacies of these temporal expressions are important and hopefully thought-provoking for designers. Further additional supports should also be explored. The interventions presented in this research have focused on clocks, as did some of the experiments described in Section 4.4. Temporal Design, however, should be applied to further artefacts and systems, such as extending domestic appliances or taking advantage of situated opportunities created by mobile applications.

It is also interesting to think about the way narratives of time may change in the future. In the social sciences and the humanities, the discussion is on-going and is likely to increase

in complexity. Ideally, by challenging dominant expressions, designers, practitioners and theorists will contribute to creating a more plural scape of temporal narratives, to be regarded as of equal value.

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Appendix I: Family Clock interviews - transcriptions

The Clarkes: Rob (12), Emily (16), Sally (35-45) and Al (35-45)

Sally: I just realised that I did my homework in a funny way because, because I was thinking when you said when you like someone to do something sooner I often think that it was ME doing something sooner, does that count as someone? #00:03:07.3#

LP: that definitely counts as someone #00:03:07.3#

Sally: I wasn't thinking about controlling somebody else #00:03:14.6#

Rob: I was a bit confused about the one where you would like someone to do something later, would you put time forwards so that what they are doing now they would do it later, or would you put time backwards so that they would look at it and would think oh, I will have to do it later and then do it later. I mean, would you put time forwards or backwards? #00:03:35.6#

LP: I think it is up to you actually #00:03:41.9#

Rob: then it is forwards, no, I think I put time backwards, yeah. #00:03:45.7#

Sally: If you want to make it sooner you would make time go faster, wouldn't you? So I think it must be that #00:03:57.5#

LP: Maybe we can talk a bit about the experience of having the clock first and then we talk about the homework? #00:04:20.2#

LP: If someone comes here and asks what the clock is, how would you explain it? Does it have a name? #00:04:30.4#

Sally: I think I just said Family Clock because that is what we were calling it when we were e-mailing. #00:05:09.6#

Rob: I think like a thing that everyone in the family is connected to and you can speed up or slow down depending on when you want things to happen. #00:05:23.3#

Sally: I think I did explain it to somebody, when I talked it was sort of a more imaginative thing, that helped you imagine like if you could, you know, change time, and you know there is a funny thing that I did feel slightly connected to you at school without having to actually text you or talk to you because sometimes it was acting in a funny way and I thought a-ha, I knew it was some of you two doing something with the clock. #00:05:58.4#

Emily: I explained it quite badly. Something that made you think about time. #00:06:18.0#

LP: If that were to be a product, what would you do with that? #00:06:56.9#

Rob: I like the way you could see when you had stuff and when other people had stuff, like if you could see everyday what you were doing everyday #00:07:09.3#

Emily: I probably wouldn't buy it myself but I could imagine it a sort of thing that someone gave to me, I would think hum this is an interesting idea. #00:07:19.2#

LP: if you would give it to someone who would this person be? #00:07:43.3#

Emily: Mum? #00:07:46.7#

Sally: Would you give it to me? #00:07:51.0#

Emily: Yeah, this is the sort of thing you would be interested in. #00:07:54.7#

Sally: Yeah, I think there is something quite interesting about the whole thing that you could do something on your phone that is affecting something without you actually having to put a message about what you are doing. I do like that it joins all up in a funny, quite abstract sort of way. Because everyday is a little bit different, there was something about being only be wednesdays, I think I would have to somehow have all the different days on it #00:08:33.6#

Emily: you could have lots of different papers [referring to the one where the times are written down] and you could just change it

Sally: or if you could put things that you are doing on your phone and it would somehow appear. It would have a little LED display [laughs] #00:08:56.3#

LP: And would you give it to someone? #00:09:11.0#

Sally: I think I would give to? I can't think of how it would work if you had younger children. I think it would have to be someone with at least sort of 10 year old and up ones children. so that everybody would be interacting with it. so yeah, friends with older children. and yeah, someone with you know busy life, that are kind of juggling different things, trying to do what everybody is. #00:09:59.0#

LP: Do you know anyone living in this way? #00:10:01.0#

Sally: I don't know if I do actually. No, most of my friends have much younger children. #00:10:08.4#

LP: One thing that you liked about the clock? #00:10:17.2#

Rob: the way that it connected us all and that, and that we could change things for other people. #00:10:26.4#

Emily: I liked thinking about it. Normally you wouldn't think about when you would like to speed up time and when you would like to go back to what was good. It made me think about the day, what happened, and what you would like to change. #00:10:48.2#

Sally: I quite like the kind of ''Doctor Who'' thing. Am I just speeding up for the people who are attached to that clock or am I speeding up for everybody? Then if I sped up? the thing about doing something that would be funny, I've tried, I wanted to speed up Rob's class to see if he could do things really fast. But then I imagined that it would only be funny if it was just him, it wouldn't work if the whole class was moving really fast. #00:11:24.7#

LP: Something that you didn't like? #00:11:39.7#

Emily: I sometimes couldn't quite tell if I was making it going forwards or backwards. If there was a big gap between two points I couldn't tell which way is which I couldn't remember. #00:11:59.2#

Rob: If there were like a sort of beep when it was each thing a kind of alarm for each one. I guess then, like, if mum was in here and it was only 11:30, and she wants to do some yoga and for some reason we can put it forwards [...] and it would make bip! but she would think "oh, I'm not going to my yoga yet, it is not yet 12 o'clock. [laughts] or if I need to go and get my train I know because the thing went off #00:12:29.7#

Emily: It would remind us to do our things #00:12:56.4#

Sally: Sometimes the ticking. Sometimes, if I was in here a lot. But it was quite odd, kind of the way you notice and you don't notice it. Every now and then it would be... #00:13:10.2#

Rob: I haven't noticed it until now, like I have been here quite a lot and haven't noticed it at all. But now that you are talking about #00:13:15.2#

LP: now the homework, the first one was about pressure, and? #00:14:21.3#

Rob: I did, I thought I would miss my train on Tuesday. So I put time back 10 minutes #00:14:25.1#

Emily: When I thought I would miss the bus #00:14:43.2#

Sally: On the day when we were going to London I slowed time down because I suddenly thought, oh, there are quite a lot of things I need to do before, but in fact, later on in the day, there was a real panic, because there was something wrong in the traffic on the bridge, someone was giving me a lift to the station and the traffic just stopped and I thought oh, we are just gonna miss the train. And then, when was real pressure, I didn't think at all about the clock, I didn't think oh, I wish I could make time go backward, I just thought I need to run, or I will miss the train. The whole motorway was stopped. So afterwards I thought, oh, that was a time when time was really pressured, there was only a big pressure before. But when was real panic I didn't think at all I wish I could put time back. #00:16:00.9# #00:16:04.3#

LP: the second one was faster #00:16:11.3#

Sally: That was I wanted to get Rob get maths done quickly. So that was another one of this ones where I suppose you could have controlled #00:16:22.1#

Rob: Then I would just sneak out my phone and ti-ti-ti #00:16:24.8# [laughts] #00:16:24.8#

Sally: but also you could just speed up your math teacher #00:16:33.7#

Rob: I was thinking about it 'cause obviously I would like to skip maths, but if I skip that, will I still have that lesson? So if it was in the future would I have learned everything? I did do it but would I have skipped it forwards to where I know I've done it, or would I just go through it in a faster speed? #00:17:16.2#

LP: How was class when you wanted it to go faster? #00:17:16.6#

Rob: I don't know. It was actually just a lot of things that I have already done. #00:17:29.7#

Sally: I quite like that thing which, I don't know exactly but? like birds heart beats go really really fast and they reckon have a certain number of heart beats to live, and if your heart beats go fast, you have a short life, but maybe your experience is much faster than normal. Birds seem to be reacting to things in far more faster speeds. #00:18:10.0#

Rob: but would do exercise make our lives shorter then? #00:18:27.0#

Sally: Hum, I think if your fit then your heart beat is slower #00:18:45.9#

Sally: but that really made me think if I were speeding up time for you, if your whole class were going dzzzzz through the math class, would you even notice? Because you would all be doing at the same time, and you would have nothing reactive to compare. You have to move all the time at same speed. #00:19:28.6#

LP: and what did you do when you were waiting? I mean when you wanted things to go faster, in your math class? #00:19:30.7#

Rob: I day dream or do other work, count the minutes #00:19:36.9#

Emily: and sometimes you look up and only 2 minutes have past, I hate it. #00:19:57.2#

Sally: I had the opposite thing, I remember going swimming with my school and everybody would get changed, they would be ready ten minutes before I was ready and I really didn't feel I was getting ready slowly but, obviously, I really was, compared to them, and I used to have to sit and you know have my wash and they would say "right: 20 seconds to get your socks on!" #00:20:47.5#

Rob: I wanted to speed up time because I was in rehearsal, and because it was an exam everyone has their own little piece that they have to do so there is a lot of waiting where it was you to […] so it is just sitting for hours watching everyone else's, because all of my classes, I mostly watched before, so I wanted to speed up time between, so that I could skip through theirs and could do mine. #00:21:27.3#

LP: So the third one was about somebody else, but could be you as well #00:21:42.2#

Rob: I wanted put time forward to have tea sooner. #00:21:57.0#

Emily: I wanted to hurry up and get Rob out of rugby, that took forever #00:22:00.7#

Sally: Yeah that was a long wait. I could have changed time then too #00:22:13.8#

LP: Is there any moment you enjoy waiting or waiting is always bad? #00:22:13.8#

Emily: Depends on what I'm waiting for #00:22:16.5#

Rob: When I go to Edinburgh and I sit on the train and listen to my music, I quite like it. #00:22:27.6#

Emily: Yeah, that is when waiting is alright, but I was sitting on a wall and people kept walking passed me and giving me funny looks, like, ''why are you still here? In your school uniform?'' Cause I went there after the school and I was told that Rob would finish at 4:30. #00:22:45.7#

Rob: But that was the time. What time did it actually finish? #00:22:46.2#

Emily: quarter past five #00:22:46.2#

Rob: hm #00:22:53.3#

Sally: I think it just when you don't know how much longer it will take #00:22:58.8#

Emily: Yeah, I didn't think it would be that long, I had no idea what he was hanging up #00:23:00.1#

Rob: You should have come up... to take some pictures. #00:23:06.4#

Emily: What? and meet your rugby team? #00:23:10.3#

Rob: Watched on the sideline, see if I was still there #00:23:10.3#

Emily: In general when I'm waiting there is always something I would rather be doing, something that I need to be doing #00:23:46.4#

Sally: I think it quite depends on the person, if it is somebody that you often have to wait for. It definitely depends on what the little story is in your head. And I think the thing of waiting has changed because of iPhones because there is always something thrurururu, you know, you never, you don't just sit and stare into space. I don't, at least, hardly ever anymore. I now think wuhuu, time for a little game, or something. #00:24:53.0#

Emily: I think it helps, but it does get a point, if you are uncomfortable... depends on your mood too. There was a while when everyday when I went to take the train, and, every time I thought, right, I'm gonna get there and I'm gonna get straight in the train and I will get home really early and then, every time, I had to wait 45 minutes for the train. So you are in a bad mood anyway, it is quite cold in the station and then waiting is not fun. #00:26:10.9#

LP: We talked about someone doing something fast, let's talk about someone doing something slower #00:26:10.5#

Rob: I was really stuck with this, I didn't know, like, the only thing I could think of was my teacher to give me homework later but that has to be a whole day and I thought putting it forward one day would be way too much, so I did in music, I put it back so that the bell would then ring later. #00:26:49.5#

Emily: I just let [done time] because I didn't want my teacher to collect the tests yet, because I hadn't finished #00:27:02.3#

Rob: You shouldn't have done that in the middle of the test #00:27:05.2#

Emily: No... eh... I waited until the end of the test and I imagined I did it in the test. Because if I had done in the middle of the test of course I would have less time to finish. #00:27:16.6#

Sally: I moved time backwards because I was sitting there having really nice tea break reading my book and having a cup of tea and I said to myself I would do that until twelve o'clock and then twelve came and I just thought I need to put time back. So that was [neurosis] affecting me really. I suppose if I've been, you know if somebody was coming at twelve o'clock, if the reason I said twelve o'clock is because I had an appointment, then I could have just made for somebody else. #00:28:12.2#

LP: I forgot your reason to speed up time, did you have one? #00:28:15.3#

Sally: Oh yeah, I would speed up so that I could go out because it was really sunny when I was doing the computer job that I had to do and, it was on Tuesday, the afternoon. So I really wanted to go outside while it was really sunny and not wait until whatever time, 6? But it was quite good thinking, even just thinking, that just made me think: maybe if I just type faster, I would get the job done faster. Maybe there is a way. #00:29:13.6#

Rob: Did you make it? #00:29:13.6#

Sally: I can't remember now. It was still sunny when I went out, so that is good. I did slightly well. I wonder whether because they do that in supermarkets they play particular sorts of music because they want people to keep moving along, I wonder if having a clock that ticks quicker when you need to have your job done, would make you go faster, so there is a thing like that about the birds... #00:30:17.2#

Emily: If you are walking somewhere and you got like a fast song in your headphones you start walk in that beat without even thinking about it. It does make you go faster. #00:30:22.3#

Rob: I think I try to make myself go to the beat #00:30:37.4#

Emily: I think it is an unconscious thing. #00:30:51.0#

Sally: That would be an interesting kind of clock. That just playing music to the tempo or speed everyone wants the time to go at. #00:31:09.3#

LP: And a situation that would make something funny to happen? #00:31:34.4#

Rob: In the early day, miss the train #00:31:34.5#

Sally: It was quite hard to think of ones which weren't a bit cruel. #00:31:38.4#

Emily: I made Rob miss the bus and having to run for it. #00:31:43.2#

Sally: It seems that everybody's first option was making someone miss the train. That is something a bit mean. I'm not sure about mine, mine was about Rob doing his class really fast, going up the ropes rurururu. Like a little speeded up film. #00:32:24.2#

LP: If you missed your bus, what would happen then? #00:32:24.2#

Rob: If I miss the bus... I probably would have to get a later train or I'd call mum. #00:32:33.4#

Emily: maybe you can miss the bus on the way to school because then I get to watch it #00:32:36.0#

Rob: I'd call mum #00:32:41.5#

Emily: Because mum'd give us a lift#00:32:48.6#

Rob: yeah [looking at mum] it is not a thing to be happy about #00:32:49.4#

Sally: [nods] #00:32:55.7#

Rob: Now you'll think it was on purpose #00:33:01.1#

Sally: I have sometimes given them a lift to school. #00:33:01.1#

Rob: yeah, twice #00:33:04.2#

Sally: I was hoping once a term #00:33:04.2#

Rob: and **Emily:** [laughs] #00:33:03.6#

LP: I think that was it, any other comments? #00:34:25.0#

Sally: In the harry potter thing, do they change time in that family thing? #00:34:25.5#

Rob: They only had a thing, a special alarm clock, which you would lift to have it twice until it doubles the classes. Yeah, but it is only yourself that you could change. You could go to one class, go back, and go to another class. #00:34:51.3#

LP: So if you would design your own tool to control the time, how would that be? #00:35:08.5#

Emily: you know when you do something or someone said something and you didn't say anything but some minutes later you are caught with something really clever you could have said. I wish we could rewind and say the really clever thing. #00:36:14.0#

The Millers: Lily (7), Alice (10), Paula (35-45), and Ethan (35-45)

LP: I'm going to ask some questions about the experience of hosting the clock and then we pass to the homework. The first question is if someone comes here, and asks what the clock is about, how would you explain it? #00:01:12.7#

Paula: I think I did try to explain it to someone at work, I'm trying to think what I said... I think, it was to make us think about time. #00:01:48.8#

Ethan: It is a control of time, I think, something through which you can control the time. #00:01:54.8#

Alice: Yeah, by using you phone. #00:01:59.4#

Lily: It is a clock of what we do as a family, stuff we do together. #00:02:25.1#

Alice: It says when it is TV time again. #00:02:32.9#

LP: Do you know what a clock do, Lily? #00:02:40.8#

Lily: I know it goes too fast. #00:02:43.1#

LP: Why does it go too fast? #00:02:43.3#

Lily: Because when I come back from school, the TV has changed.#00:02:46.0#

Ethan: If you could follow what it says on the clock... #00:02:55.2#

Lily: Aha. #00:03:05.6#

Ethan: What the clock tells you.

LP: Can you read the time? #00:03:06.0#

Lily: Oh yeah, yeah, I can read the time. I know when it becomes television's time. And sometimes I don't know until it gets in [the evening?] #00:03:18.0#

LP: Did the clock have a name #00:03:44.0#

Lily: I call it the clocks who tells time. #00:04:02.9#

Ethan: I don't think we had a name for it actually #00:04:12.7#

Paula: I think you [Ethan] played more with it then I did. I think I didn't want to play with it too much because the girls kept speeding it up and it freaked me out when it started going really really fast. I think I didn't like it at all. For me it was something from a horror movie you know it was just watching the time disappearing so I didn't sort of play with it much at all. #00:05:09.2#

Ethan: I think that was the kind of unusual thing when you drew the time back, the one of the hands go around still clockwise but faster, after the shorter hand has reversed, and I think that was kind of we took a bit to get used to it. You expect a clock to work on a certain way, you know clockwise. #00:05:31.6#

LP: If you could give it to someone... #00:05:46.4#

Lily: I would give it to my friend so that he would be annoyed too. #00:05:43.6# She would probably give it back and I would give it to Poppy #00:06:08.8#

Paula: I would give it to my friend Simone because she is always late for everything, and she always has the clocks in her house at different times and it is normally such as. it would be set faster than the actual time is, to kind of give her more time to do things, if that makes sense. And still would be late but I think, it is really disconcerting when you go to here house because you never really know what the real time is. So I think if she has one clock that would have her activities on it, you know such as like wake up, breakfast, or something that might hep her. I think I would give it to her just to see what happens and how she would take it #00:07:05.0#

LP: Alice, can you think of someone? #00:07:24.8#

Alice: I would give it to my friend Melissa, because she sometimes likes to juggle things together, like she tries to tidy her room while playing with her dogs. #00:07:46.9#

LP: So one thing you disliked about it? #00:08:15.6#

Lily: It was annoying. #00:08:20.3#

Paula: I think that sort of... it was just a feeling of the ticking that time is running away from you. I always feel I don't have time anyway. So I don't know why I don't like it. #00:08:36.3#

Ethan: I don't know if it was a dislike. I think it was kind of slightly enervating and doing this, you know the small hand going back while the long hand would spin faster and that kind of puts you a little bit off, off balance. So I don't know if it was a dislike but it's like getting used to something. It has quite a nice tick though. #00:09:27.3#

LP: Something you liked about it #00:09:34.9#

Paula: I think when it went slowly I found it quite soothing, when it went slowly, and once you get used to the ticking, you know, I quite like that, I think after have been, you know such a [...] when it went, because it seems to get much much much much slower when it did that so I quite liked that. #00:09:51.9#

[Interruption]

LP: your ideal clock? #00:09:57.1#

Paula:I think I would like one that you could just stop time, at least for everybody else, and you could just sit and think ok, what should I do now. Like a panic button you just go STOP! and everyone would then go thruuuuaaah. And I would think alright, what can I do here, and then start again.#00:09:59.1#

[Interruption]

Lily: I wanted to put if back and back and then mum and dad can't go to bed. #00:10:10.3#

Lily: Because I don't want you to go to bed from now on. #00:10:10.3#

Paula: But we will have to stay up forever #00:10:10.3#

Lily: yeah, and then when it is morning I put it back to its normal place, so you can go to sleep, and then you will be late for work. #00:10:38.5#

LP: When you would use it for slowing down #00:11:49.4#

Alice: I would like to slow down in the evening. #00:12:22.7# and go fast at school #00:12:51.1#

Alice: Bed time. #00:12:55.1#

Lily: Now I know what to do. I would, when we go to bed at night, change it to morning, and then when we wake up it'd still be night time so I can have extra time of bed time and I don't have to go to school. #00:13:15.4#

Lily: And then I could just get to sleep all day and all night... #00:13:21.0#

Alice: I would like time to go faster when I'm at school. #00:13:33.5#

Lily: ... then after bed time, I'd check up my clock and sneakily change it to bed time #00:13:40.6#

Paula: I think in the morning is definitely, that is when I could do with just an extra few hours, just to try and get everything done. Because Lily is fine in the morning, she is a morning person, but I think the rest of us is not. #00:14:06.1#

Lily: It's like when you see the clock at bed time, I change it to TV time, so I can keep on watching tele. #00:14:24.0#

Alice: And you would be quiet #00:14:30.2#

Lily: You! Be quiet! Now! #00:14:30.3#

Ethan: There are not enough hours in the day to watch TV...#00:14:40.4#

LP: And when would you like time to pass faster? #00:14:59.8#

Alice: School #00:14:59.8#

LP: Any time in the school? or is there a specific time in the school? #00:15:03.1#

Alice: In the morning, because it is really boring. #00:15:16.7#

Paula: Is it that at certain classes, or is it just cause you don't really feel awake yet? #00:15:19.2#

Alice: I'm not really properly awake yet, so I feel tired. #00:15:30.0#

LP: Paula, when would you like time to pass faster? #00:15:52.8# #00:16:36.9#

Lily: I would like it to go faster now

Paula: At work. Not always, but just sometimes, if it is slow you know and sometimes, when you have like slow days and it feels that the day is lasting twice as long as a normal day, you

know and if you start looking at the clock, and then you just think oh, you do find yourself wanting home time to come a bit sooner. #00:16:25.0#

LP: Someone to do something sooner... #00:16:32.6#

Ethan: I think getting them ready for bed and ready for school sooner. #00:16:45.4#

Lily: Nooo! #00:16:45.4#

Alice: I would like mum and dad to go to bed sooner #00:16:58.0#

Lily: Yeah mum and dad going to bed sooner #00:16:58.0#

Paula: I see you want us to go to bed first #00:16:59.1#

Alice and Lily: yes! #00:17:00.8#

Lily: And I can watch tele #00:16:59.9# Mum would go to bed first, and then daddy and then Alice. #00:17:09.6#

Alice: Because mum is older. #00:17:09.6#

Lily: Who cares? She is the youngest now. #00:17:13.0#

Ethan: If you could compress the time this pair take to get ready? just do the same thing but in a much shorter space of time. #00:17:35.0#

LP: Someone to do something later? #00:17:49.0#

Paula: I would prefer Lily to watch TV later in the day and not first thing in the morning. Because she wakes up fast... because she wakes up really early and she will either be in the? well, since she's got the iPad it's being the iPad, but you know she would switch, no matter how many times she was told not to, she will have the TV on and it is the sort of thing that I think it's fine, you can watch a little bit but after school, not first thing in the morning. #00:18:34.1#

LP: And then it is the funny situation #00:19:02.8#

Alice: When mum is doing her dancing #00:19:04.8#

Paula: My dancing? #00:19:04.8#

Alice: Yeah I would like time to go faster just to see how you would be doing it #00:19:11.3#

Lily: I want time to go faster at school, it gets really bored, and I fall asleep #00:19:33.0#

Alice: History is boring #00:19:39.4#

Paula: I suppose if you change the clock so that it was, you know, not the time, people thought it was, because it happens sometimes when the clock is going back or forwards you know if you get caught out then you know people can end up being late for work or, whatever and things like that. #00:20:26.7#

LP: Which situations are flexible #00:20:33.4#

Paula: I suppose for me it is just Sunday, because I think the rest of the time I might go to work or locked into school-and-after-school activities so Sunday is the one day where it is up to us what we do, what time you get up, what time you go to bed, and then in the rest of the time everything is sort of programmed and yeah I think Sunday is the on only flexible day. #00:21:13.9#

Alice: Every second Saturday #00:21:36.7#

Paula: For you? #00:21:36.7#

LP: And in this programmed schedule, do you think you have any flexibility? #00:21:50.8#

Paula: I supposed because so many of the activities, you know, they have fixed times so, always things have a start and finish time. I suppose this flexibility we have in what time we eat and what time we go to bed, but other than that... hm, there is probably more flexibility then I think there is, but it certainly feels that, during the week, there is not much flexibility there. #00:22:53.1#

Ethan: I must admit that time is a very flexible concept for me. I'm not a punctual person, not at all, and I've always been struggled with time and I'm sure Paula would testify. I mean, my whole family is always late for everything, and I struggle with appointments. #00:23:25.3#

LP: You think time is flexible? #00:23:25.3#

Ethan: No, it is not, but I like to think it is, or I kind of treat it as if it were. #00:23:41.7#

Alice: On a Saturday and a Sunday, time is flexible. I don't have work #00:24:00.1#

LP: When time is not flexible? #00:24:39.8#

Alice: School. #00:24:37.9#

LP: Do you think it is good or bad? #00:24:49.7#

Alice: It is bad #00:24:51.7#

LP: Why? #00:24:51.7#

Alice: Because I don't have enough time to do things I want to #00:24:52.4#

Ethan: What sort of things? #00:24:58.0#

Alice: Like... when I'm doing homework I don't have enough time to go play with my friends, and that is because I have to come back to the house quickly, like, at half past six #00:25:21.0#

LP: If you were not in the school where would you be? #00:25:24.6#

Alice: On holiday #00:25:24.6#

LP: If the school didn't have any schedule, how would that be? #00:25:39.2#

Alice: It would be great. #00:25:55.9#

Ethan: Is it Steiner school or Montessori school where they do this kind of, I can't remember which one it is that, where there is no fixed lessons and the kids can choose to attend the classes or not #00:26:13.1#

Ethan: I wonder how that works, I suppose they just don't turn up at all #00:26:40.6#

Paula: That has probably to do with personality as well, because I tend to be more organised and like to have an internal schedule in my head, sort of what needs doing. Probably there is more flexibility but because I always organise things in my head so that I know what I'm meant to be doing. So I think my perception is like that and then on Sunday everything goes yeah. #00:27:56.1#

LP: Do you structure Sundays as well? #00:27:57.4#

Paula: No, we just see whatever the weather is doing and we just decide what we are going to do and we get up quite late and it is just really nice. #00:28:18.3#

LP: Do you think it should be more like that? #00:28:18.3#

Paula: Yeah, it would be brilliant. I mean, I probably would never get anything done, but I think it would be nice. I think there are some companies that lean toward a whole kind of flexiwor,k and working from home, and all that sort of stuff, but I don't work for one of those companies, yeah, it would be nice to have a bit of freedom. #00:28:54.8#

LP: Wouldn't that be stressful too? #00:28:59.4#

Paula: I think you have to work really hard to make it work if you are going to do flexible time. I have done it in, but you do have to be more organised. #00:29:30.0#

LP: Lily, when time is not flexible for you? #00:29:54.5#

Lily: When I cannot just go and watch tele #00:29:54.5#

Ethan: You are getting a theme in here. It is not quite as bad as it sounds. #00:30:49.2#

LP: I know you are leaving on holiday tomorrow, so is there any time that is fast in the holiday? #00:31:04.1#

Paula: At the end of the holiday. Because it is like, whenever you know you have a holiday coming up it seems to take forever for the holiday to come so time goes really really slowly but then when it is your holiday and specially the last day it always just go really really fast. So it would be nice if in the last day it could last a bit longer. #00:31:41.7#

Ethan: I think cause I suppose I don't have quite the same thing at work, because I work from home and work flexibly, there is a bit of [leading] between the two, I'm not so definite on time so... #00:32:08.3#

LP: When time is not flexible for you? #00:32:15.4#

Ethan: [laughs] I don't know hummm, [more laughs] I mean, I don't know, well, yeah, I do have appointments, no I think I do have to do, and I try to stick to it, I'm just not very good at it. I think it's perhaps I'm saying yeah, you know things are flexible. They are not. I'm just kind of I'm not good at sticking to the time so I think it's perhaps more my perception of time.

The Wilsons: Charlie (13), Tom (45-55), and Mary (45-55)

Tom: with the clock I guess because it doesn't really have an effect in the schedule, so there is a real question of what is its function. If it was maybe multifunctional... if it was reading clocks at the same time, somehow the clock face told different times at the same time, maybe using colours or colour dials and disks or something, so you would have three people's time at the same time going around the clock and maybe there are three different transparent colour disks

at the same time so the colours would mix, so you would have Charlie's Mary's and Tom's disks mixed and then you could actually tell how the times interrelate to each other visually. That would be somehow interesting but as the clock is at the moment... it wasn't really useful to interact with it... but the questions you asked are interesting questions. # 00:01:37.2#

LP: it is more a starting point for conversation # 00:01:44.1#

Tom: what are you trying to do with the clock? what is the function of the clock? # 00:01:46.4#

LP: it is really just a starting point for conversation # 00:01:51.8#

Tom: what do you think Charlie:? # 00:02:10.6#

Charlie: I don't know I didn't really know when to use it or not because I didn't really know what it was for exactly, apart from being able to move the time quicker or slower with the clock. But it didn't actually changed the time, so I didn't really know when to use it. # 00:02:29.0#

Tom: That is the same to me # 00:02:30.2#

LP: do you have any other comments? I mean the thing that the clock is not interfering in the real world. # 00:07:50.7#

Tom: Yeah it is not like a real clock where you look to tell the time. So it is not really? its agency is not equivalent and because it is different in some ways it is not a real clock and in another ways? it's different, because it is not a real clock, but it is not different in a way that effects how you behave. So again it doesn't have that agency. I think if the clock had agency it would be something we would engage more and you'd think more about the effect it has on time or on the perception of time. But the questions were interesting and it gives you reasons to consider the questions. # 00:08:43.2#

LP: Charlie, do you have any other comments? # 00:08:54.2#

Charlie: I have pretty much the same thoughts. # 00:08:54.2#

Tom: I mean I have a PhD student [advice on another line of research] # 00:11:16.9#

LP: so yes, maybe we should move to the questions... if you would explain the clock to somebody else that comes here, how would you explain it? # 00:12:20.4#

Charlie: I would explain as... # 00:12:28.8#

Tom: Didn't you have friend here asking what it was # 00:12:28.9#

Charlie: yeah, yeah, yeah # 00:12:28.9#

Tom: and what did you tell them? # 00:12:27.7#

Charlie: I told them it was something where you could change the speed of time, and then there is the time of the clock, yeah, that is actually a way of speeding up and slowing down time of the clock using this clock. # 00:12:54.4#

Tom: that was it? ok, that is more or less what I would have said too. I can use my phone to go a bit faster and make tic tic tic tic or make it go slow and it goes toc toc toc. # 00:13:17.1#

Charlie: and sometimes it goes toc toc like five minutes later! # 00:13:20.6#

Tom: I played with it a few times, but like I said I didn't understand why I was doing it because it has no effect and I'm not one for toys. If it was maybe multifunctional. # 00:13:52.4#

LP: do you have clocks in your house? # 00:13:52.4#

Tom: no. # 00:13:56.5#

LP: none? # 00:13:58.8#

Tom: No. I don't wear a watch, no clocks in the house # 00:13:58.8#

Charlie: I have a watch. # 00:14:00.2#

Tom: yeah, you've got a watch, but you don't wear it. # 00:14:06.8# # 00:14:06.9#

Tom: there is a clock in the cooker # 00:14:04.6#

Charlie: I do wear my watch. I broke it accidentally. I set an alarm on it and now the alarm goes off every hour, and I wonder if it can go off # 00:14:17.3#

Tom: why you don't turn it off? # 00:14:18.5#

Charlie: No, it didn't turn off though, it didn't work to turn it off. I didn't touch it. So the watch is sort of a bit broken, so I'm not allowed to bring it to school because the teacher thinks I'm texting. And then it is really annoying to wear it, but I would wear it. # 00:14:33.6#

Tom: Bring me the watch and the manual and I will fix it # 00:14:36.5#

Charlie: I will do it # 00:14:38.9#

LP: So how do you guys keep up with the time?# 00:14:41.8#

Charlie: with that clock in there [pointing to the cooker] and with my phone. I mainly just use my phone. # 00:14:48.0#

Tom: I just use my phone, or my computer # 00:14:50.4# I haven't worn a watch since I was twelve, and I don't like wearing things that let you [??] of any kind. and Mary doesn't wear a watch. # 00:15:14.8#

Charlie: She wore mine # 00:15:14.8#

Tom: She borrowed yours once or twice, just to see how it feels like, but she didn't wear it. And again she uses her phone. # 00:15:18.8#

Charlie: I would wear a watch but I always forget to put it on. # 00:15:21.1#

Tom: There is always time somewhere around and if there isn't there is a way you can find. But in the house we don't. Just that one, that is for cooking. # 00:15:28.8#

Charlie: I've got one in my room, which I was using # 00:15:30.5#

Tom: you've got an alarm clock. Yeah, we've got an alarm clock by the bed. But it doesn't glow so you cannot see the time unless you press a button, because it is dark and the phones have time, so you can always just look at the phone, that tells you the time. # 00:15:49.7#

Charlie: I always have the time in my room. # 00:15:56.1#

LP: Imagine this could be a possible situation that you could change the time in all clocks. Would you like to have that? # 00:16:34.4#

Tom: laughts # 00:16:34.4#

Charlie: It would be very cool because what I would do is to slow down the time when I have homework so that I can get through the homework really fast and speed time back up again and it would be almost like no time has past. So I wouldn't be wasting any time doing my homework. # 00:16:44.9#

LP: And do you also have someone also changing your time? # 00:16:50.3#

Tom: [making negative sounds with the mound] no # 00:16:50.3#

Charlie: I guess. These guys wouldn't use it. I would be the only one using it. So you know. What so you think Tom? # 00:17:10.2#

Tom: The only time I feel like dealing with time in respect to you [Charlie] is when you say you would come at home at 6 and you come home at 7. This is not really about changing time. # 00:17:19.7#

Charlie: I never actually say I will come home at 6. I say I'm leaving and then I never say when I'm back. It's different. # 00:17:30.1#

Tom: But yeah, changing the time would never have any effect on that, it is more about you keeping the time. # 00:17:40.1#

Charlie: It's not me. # 00:17:45.1#

Tom: I mean right now, Mary is on her way back from Portugal and I really wished she would be home now, but she won't. She will be home at midnight. So, this is the nature of the airplanes they take as long as they take and if there was a way she could be home sooner... but again this is not about time this is about being somewhere else. You could say it is about making time go faster but then the time is gone. # 00:18:35.7#

LP: so lets start with the homework, so situations in which you feel time is not flexible... # 00:19:19.2#

Charlie: ideally it is not flexible in the school, because I have to be mature about school and not immature speeding up time to get through the lesson but mature to get to learn something. # 00:19:31.5#

LP: but there aren't times in the school that?# 00:19:37.7#

Charlie: yeah, I feel there are lessons I could speed up and it wouldn't really matter. # 00:19:37.8#

Tom: you don't like [P] # 00:19:40.7#

Charlie: yeah I feel I could speed up [P]. Yeah, that wouldn't matter, but all the other lessons, I'm sort of learning so I couldn't speed that. # 00:19:53.8#

Tom: You like most of your lessons # 00:19:53.5#

Charlie: Hum, 50-50. I like half of my lessons and the other half I feel like I'm running so slowly. # 00:20:09.8#

Tom: So with maths, would you prefer to speed it up or slow it down? # 00:20:03.6#

Charlie: Neither # 00:20:09.3#

Tom: What about physics? # 00:20:11.5#

Charlie: None of the science I would speed up or slow down. # 00:20:12.3#

Tom: English? # 00:20:13.1#

Charlie: No. # 00:20:12.4#

Tom: So what would you speed up? Sport? # 00:20:15.5#

Charlie: I would speed up [P]. # 00:20:18.3#

Tom: Because you don't like it # 00:20:21.1#

Charlie: I'm just not learning anything # 00:20:22.9#

Tom: And what would you slow down? # 00:20:23.8#

Charlie: Music # 00:20:25.9#

Tom: you love that # 00:20:29.1#

Charlie: hum, hum # 00:20:29.1#

LP: Is there anything that is flexible in the school? # 00:20:29.1#

Charlie: Not in the school, but my time in the weekend is flexible, because, well, at least on Sundays it is. Because sometimes when I'm with friends sometimes I can just sort of play around. So my time on Sundays is flexible. # 00:20:49.5#

Tom: On Sundays? # 00:20:49.5#

Charlie: Yeah, well I've got music lessons # 00:20:56.1#

Tom: But you wanted to # 00:20:56.1#

Charlie: Yeah # 00:20:53.4#

Tom: But they structure your time # 00:20:55.3#

Charlie: Hum # 00:20:57.6#

Tom: So would you rather that piano lesson went slow so that you could do more piano lesson? # 00:21:00.4#

Charlie: Yeah # 00:21:00.4#

LP: and for you, Tom? is there any time that is not flexible in your... # 00:21:13.3#

Tom: Yeah, in meetings. Meetings are rarely flexible. Because it is about people having to be in the same place at the same time. So if you have a meeting to discuss an application to the research council or to discuss strategic decisions in the college, or something like that, it is important that you are there at the right time. You can't be late. Everyone is sitting and waiting. You can't do that. And it's important that you stay there until the end of the meeting to make the decision. You can't just leave before the decision. So that meeting time is inflexible. # 00:22:03.5#

Tom: And then teaching is the same thing. Students will show up at a particular time and you have to teach them you can't leave until the time you were told you have to teach them, and again it is inflexible time. # 00:22:12.1#

Tom: And.. other inflexible time? deadlines. My day is full of deadlines. Whether it is getting a review in on time for, I don't know, maybe a career review for one of the staff members, or getting a grant application in on time. Because deadlines are absolutely? if you miss a deadline it's it, you've lost it. And it might be three months of work for 10 people to prepare that document and it's not there, so, gone, wasted, wasted people's time so, hundreds of hours of work, gone # 00:23:01.8#

Tom: So those things are completely inflexible, no matter what else you wanna be doing what else other demands are upon you. It's inflexible. Often you've got multiple deadlines, all coming around the same time. And that's pretty normal, everyday. And they all are inflexible, and they will collide in a chaos and then you got a problem of how can I do that if I also have to do that. So you have to do both, at the same time, so you have to multitask. You do multiple things at the same time, and you might be doing a meeting, finishing a grant application and writing up a staff career review or something. All at the same time. Because you got the same deadline for everyone. # 00:23:45.2#

LP: And you think there are no meetings or deadlines that are flexible? # 00:23:49.5#

Tom: Usually the most important the problem or issue, the less flexible it is. And when I was younger and I was just a lecturer, or junior professor, then things were more flexible but as you move over, you are senior, the things you are deciding or doing are mission critical to something. If they don't happen, something will go wrong and it will affect many people, then, no, there is no flexibility, at least in relation to deadlines. And you can't just call someone up and say move the deadline, because they will say, nope, can't do it. # 00:24:31.0#

LP: and meetings? are there some that can be flexible? # 00:24:32.4#

Tom: Oh yes, some meetings can be flexible. Often tutorials with students, you can email the student or text them and say ''can we move the meeting?'' And I do it all the time. But you got to be very careful that the things that are absolutely important not call the other things out of the way, and then they end up in danger of not getting done or not getting done well, or you start treating people as second class citizens, you got to respect them too, and so you got to be really careful on what you do there with your time and how you do it. # 00:25:22.6#

Tom: So those things are sort of flexible but they are not really flexible, they still have to happen. # 00:25:59.0# And the flexible things... well, are things like walking # 00:25:59.0#

Tom: we love going walking, although Charlie doesn't like walking. We love walking but Charlie is not so keen on it. So he has written on his bedside: when is time to go faster? When we are going walking. # 00:26:28.5#

Charlie: I didn't say that. I said I wanted time to go faster.... eh when did I say I wanted to do that? Ah, when doing homework # 00:26:39.3#

Tom: Ah, maybe was work not walking. Anyway we love walking and it's often that we don't have enough time to go walking because walking takes a long time, takes a whole day if you are going for 10 or 20 kilometres # 00:26:52.4#

LP: Oh you mean hiking # 00:26:50.9#

Tom: yeah, across the hills, but I wouldn't call it climbing or mountaineering. English call it rambling, but it is just walking through the landscape, taking lunch on the back. Cooking, I love cooking. # 00:27:30.4#

LP: Is that flexible? # 00:27:30.4#

Tom: Well it is and it isn't like the cooking times are not flexible so once you start cooking you are inflexible. You know exactly when the meal will be ready otherwise it is bad food. So it is gonna be cooked perfectly, the pasta has to be al-dente the [...] running, the skin of the duck has to be perfectly crisp, while the inside has to be perfectly pink, and you have the exact timings to get that right. And temperatures, and things like that, but it is flexible in the sense, it is flexible more or less when you start and when you finish and you do around the meal time so, and it is a period of time you are enjoying yourself so, and then listen to music, that's flexible time, but again music is not flexible, music has a beginning, a middle, and an end it has fixed time, unless you do like Charlie does, he does music at home, so he has to improvise it, and he makes a start

point whenever he wants and finishes whenever he wants, if you listen to music it is on a DVD or record or something, it is fixed, so it is not flexible, but listening to it is flexible. # 00:28:40.5#

Charlie: You can always rewind # 00:28:40.5#

Tom: yes, yes # 00:28:40.5#

Charlie: and fast forward # 00:28:42.8#

Tom: And there is of course music applications for iPads where people listen to music but it is generative so it can go on forever, it doesn't have an end # 00:29:00.9#

Tom: And shopping can be sort of flexible. But it depends on if you like shopping. I like shopping for food in like markets and things, but I hate shopping for clothes and supermarkets I hate. And socialising, that is flexible, there again you usually have to [say if you are late?], at 7:30 or something and don't be late because dinner will be ruined. So it is not that flexible # 00:29:23.8#

Charlie: School socialising is flexible. # 00:29:27.5#

Tom: By lunch time # 00:29:27.5#

Charlie: You just talk in the lessons as well. # 00:29:30.4#

Tom: Do you? # 00:29:30.4#

Charlie: [Something like in past before the teacher stop it] yeah, before the lesson starts, at the end of the lesson, in the past we were working in groups # 00:29:43.4#

Tom: But then you are talking about your work # 00:29:45.2#

Charlie: Usually our group finishes it early, so you just talk # 00:29:47.2#

Tom: When I was at school you weren't allowed to talk. Unless you were asked to talk. The teacher had a big [...]. # 00:29:58.5#

Charlie: did your teacher call you [Wilson]? # 00:29:58.5#

Tom: Yes # 00:30:05.8#

Charlie: My teacher just call me [Charlie] # 00:30:05.8#

Tom: Yeah it is much more informal these days # 00:30:06.8#

Charlie: Aaahh. My teachers have to refrain from swearing # 00:30:12.0#

Tom: And then reading, just reading, that is flexible time, and you are the big reader in the house. How many hours a day do you read? # 00:30:28.3#

Charlie: One, two. # 00:30:34.2#

Tom: Four! # 00:30:39.5#

Charlie: Depends which day, some days. # 00:30:39.5#

Tom: In average week now, you come home from school you read and then you do music you have dinner, you read, you don't watch much TV, you read when you go to bed for one hour, half an hour. You know, so you do loads of reading. # 00:30:51.1#

Charlie: can be yeah # 00:30:51.1#

Tom: How many books a week do you read? # 00:30:52.8#

Charlie: Five, depends on the size of the book, sometimes I read one book, if it is a massive one. # 00:31:07.4#

LP: And do you feel it is a flexible time too? # 00:31:07.4#

Charlie: A book has a beginning a middle and an end. Just like music, but the difference is that music... # 00:31:16.9#

Tom: music goes at a fixed speed # 00:31:16.9#

Charlie: yeah it changes. Music has a fixed speed, music has got a linear view to it, while reading you can choose to read the book in different ways, than you can choose to... yeah you can choose to listen to music in different ways but it is always gonna keep on happening here, keep on rolling, while reading you can just skip or go back to a chapter. # 00:31:43.2#

Tom: Or you can just sit and think for a minute about something you have read. # 00:31:42.5# You can read slowly, or you can read fast, depending on how challenging the text is. Reading is extremely flexible, it is one of the most flexible of all activities. # 00:31:55.2#

Charlie: Yep. # 00:33:07.2#

Tom: And then the other thing is, I mean, for me, working, I do lots of different jobs, and with the job I do at the college it's usually not flexible, but then again I do a lot of writing of my books and chapters and things, that's sort of flexible. But then on the other hand it is inflexible, because you still have deadlines, and then I do a lot of work on my studio, and that's flexible

time, it is creative time, and the best time, almost doing nothing, you are thinking, waiting, waiting to think. # 00:33:44.0#

LP: you manage to find time to do this? # 00:33:48.1#

Tom: yeah, not enough though, you need to do things like going to a trip for six weeks to find the time to do it. # 00:33:47.3#

Charlie: yeah, he is leaving for six weeks # 00:33:49.2#

Tom: I need to go to the other side of the planet # 00:33:50.9# Yeah, I'm going next month # 00:33:56.2# So we just go there and we have a studio, we are in the forest and we just don't do anything, nobody bothers you and you've got no deadlines and... # 00:34:11.6#

Charlie: well you have # 00:34:11.6#

Tom: well we got to make the work, but how you structure your time to get to it... # 00:34:21.7#

Charlie: you have to structure in a specific way otherwise you will never get to the deadline # 00:34:21.7#

Tom: but the most important part of the work is not instrumental. It is not about doing or making the work it is about getting ideas and that really requires that you don't have pressure. # 00:34:50.3#

LP: It is seems that pressure, with deadlines for example is not comfortable, while flexible time is more comfortable, is there anything comfortable about inflexible time? # 00:34:58.0#

Charlie: You know what you are doing. You know where you are heading, what is behind you. You know what to do and when you gotta do it for # 00:35:07.3#

LP: So you think it is nice to have all these schedules at school or you would prefer to have a free schedule so that you could set up your own time # 00:35:15.5#

Charlie: I think it is nice that it is set up like this because you can sort of, you don't really have to think much about this. You sort of know you are meant to be there at that time, you don't have to decide to be there at that time, you just are there at that time, so it is easy thinking. I don't know if it's good, but it is easier. # 00:35:43.7#

LP: would you change it if you could? # 00:35:43.7#

Charlie: probably not. # 00:35:43.7#

Charlie: I'd probably change the length of the school day, I probably make it from, instead of 8:30 every week I would make at 9:30 to 4:30, instead of 8:30 to 3:30. # 00:35:58.7#

Tom: Same time, just later # 00:35:58.7#

Charlie: Same time, but just later, yeah # 00:35:58.7# Then I can wake up later. I have to wake up at 7 o'clock. # 00:36:06.2#

Tom: Well my time is a bit more flexible in that way because I control most of my routines and things, even classes, nobody else is writing my schedule for me. I mean, sometimes meetings are called and I just have to be there. Sometimes early. Other times I have to arrange a few meetings but I have to arrange them rely because there isn't enough time in the day, unless I make them early. So sometimes meetings are really early like 8 o'clock, and simply because you need to do four hours or something before lunch.

LP: Is there anything good about all these deadlines? # 00:37:06.3#

Tom: It is all about working with other people that is what deadlines are about and getting things done. # 00:37:15.9#

LP: Couldn't you just deliver a project whenever it is finished? # 00:37:17.4#

Tom: No. That is ok if you are working on your own, but if you are doing things that other people need you to do, so that they can do something, then it is really bad not to get it delivered early, so you need deadlines for that, that is what the purpose of the deadline is.

[chat about doctor who]

LP: Ok, so when you would use the clock for time to pass slower? # 00:39:28.4#

Charlie: As I said before, when I'm doing my homework # 00:39:27.6# when you say time to pass slower # 00:39:38.2#

Tom: she means things you enjoy, you want time to pass slower # 00:39:40.5#

Charlie: do you mean that the clock is going slower but you are still perceiving things at the same speed or everything is just going slower, including your perception? # 00:39:56.1#

LP: I think it is up to you the way you interpret it. # 00:39:57.6#

Charlie: I interpret it as the clock going slower but you are still perceiving things at the same speed because that would be a good thing, because that means you can get the homework out of the way and not much time will pass # 00:40:10.7#

Tom: I would understand that as faster time, that is what I've understood as faster the time

Charlie: No, faster time is when the clock goes faster # 00:40:15.8#

Tom: Hm, we should be careful about what we mean here. # 00:40:18.2# For me slower time is where I want to spend most time doing something so it would be nice if time went slow, so that would be like when mum is here, which is not too many days, it is only two days in the week, so it would be great if that felt longer, but then faster time is this time when I don't really wanna be worried about, so like when I'm doing the dishes or going shopping or walking home from college, I don't really wanna be spending time walking home from college, I just wanna be there. # 00:41:04.5#

Charlie: It is a nice walk # 00:41:04.5#

Tom: It is not a bad walk but if I'm leaving college at 5 and I wanna be home asap I would rather be home at one minute past five not at quarter past five # 00:41:05.6#

Charlie: What you with is, you could teleport # 00:41:06.5#

Tom: Yes. # 00:41:17.1#

Charlie: In this case you could teleport to a bank hall and steal money # 00:41:11.2#

Tom: This is about time not money # 00:41:17.1#

Charlie: Time is money # 00:41:16.4#

LP: Charlie, when would you like time to pass faster?

Charlie: when I go to sleep because I get to sleep really slowly so I would like time to pass faster so all at sudden I would be asleep, and you know, I have to wait for ages lying and not falling asleep. # 00:42:00.0#

Tom: But then waking up is the other way around # 00:42:00.3#

Charlie: Yeah, so? # 00:42:00.3#

LP: Ok when would use the clock for someone to do something sooner? # 00:42:21.9#

Tom: Charlie sometimes doesn't get going to school quick enough # 00:42:29.8#

Charlie: I would like dinner to get cooked faster because we have dinner quite late, and I get hungry quite early # 00:42:41.6#

Tom: Sorry, I haven't started cooking yet # 00:42:40.9# takes about an hour from now # 00:42:42.2#

Charlie: Yeah, so I would like dinner to be earlier, you know # 00:42:45.1# Yeah I would like time to go faster then, but when I want someone to go faster at cooking, but you can't go too fast because then you raw food. # 00:43:03.0#

LP: And then something later? # 00:43:13.9#

Tom: Getting up in the morning. It is nice to stay in the bed, but usually you just have to jump out of the bed and do things # 00:43:16.1#

Charlie: Something I want somebody to do later or something that I want to do later? # 00:43:18.6#

Charlie: Something I want to do later? Bed time. # 00:43:36.4#

LP: And someone else? # 00:43:44.8#

Charlie: Hm. # 00:43:52.6#

Tom: I can't think of anything # 00:43:59.7#

Charlie: Neither can I. Usually I want people to do things sooner, so that they are done. # 00:44:17.7#

Tom: I guess if you ... Maybe mum leaving, to go to work. # 00:44:22.7#

Charlie: Yeah, I guess one thing is if you realise that you forgot a [new picket] # 00:44:29.9# and the teachers get to give you a detention if you get [any picket] you want the teachers to realise it later. # 00:44:37.7#

Tom: Like after you are gone # 00:44:37.7#

Charlie: Yeah, because I tend to forget my [picket]. Yeah, quite a bit. # 00:44:43.7#

LP: Now we just have the funny situation... # 00:45:07.0#

Charlie: I definitely would do it when somebody isn't expecting it, and you'd speed up time and all the voices go squeaky, like when you speed up the TV or speed up a recording like beberebereberedede, as in a music and you have some sort of weird jazzy, I would do that # 00:45:30.5#

Tom: I guess in something like a meeting when you are talking about something and you realise nobody can understand what you are talking about, I would either make the time going really fast so that it is gone, past, and everyone has just forgotten about it, or get more time to explain what you mean. One or the other but definitely not the status quo. # 00:46:02.6#

Appendix II: Printer Clock interviews - overview of chosen times

Printer clock: times chosen and why

	Explain the clock	Time	Why	Person	Past	Future	Person in the picture
M1	*A photo comes out*	*Quarter to seven*	See past	*I'm not sure*	*8 o'clock* *Today, yesterday? Today* *Why did you choose it? Because I always got [breakfast cup] at eight o'clock* *Is it a nice moment? Yes*	*Any time in the future: Half twelve* *That soon? Yes*	*The picture: can you tell me what they are doing? Playing games* *Is that something that you usually do? Do you do something similar at this time, like quarter to seven? I get ready* *Can you imagine what they would you be doing after that? No*
E1							
H1	*It gives you the time and it prints off a picture with that time.*	*Half past three*	*I don't know*	*Probably my sister [Do you know what she is doing now? She is probably in class or walking to class]*	*Probably some time when I was in Florida When I was with the dolphins, about 1 o'clock*	*When I get home today*	*That is B., do you know what he is doing there? He probably just came back from a football match or something*
D1	*I remember a thing about the pictures... I went to, my brother had this practice gliding so I just went outside and there was a rugby game going on so I just stayed there and watched...*	*1:40*	*This is the time I have lunch sometimes*		*Probably when I was doing karate, that would be around half past twelve to quarter past three*	*Probably on Sunday*	*Hannah She is holding a rabbit.* *Is it a normal activity? [Silence]* *What do you think she is going to do after that? Probably feed her rabbit... no half past one, she will still be at school*
R1 Absent							

R2	*It's a robot-clock. You pull this one and after a while a picture will start printing.* *If you could give it to someone who would this person be* *My older brother B.* *Why is that* *Because he is quite good at fixing clocks*	*Half past six*		*B.*	*The classroom start D.*	*O.*	*Do you want to take the picture now?* *It's D. he is lying in a couch.* *What do you think he was doing before that?* *He probably has been in here, in the class*
A1		*12 o'clock*	*I don't know*	*I'm not sure, probably, K.*	*Probably when my brother was a baby*		Ollie is in the picture He is just outside his tennis [club] What he has done before that? Probably have lunch
C1	*You put a time then you pull it and a picture will come out*	*Half past six*	*Because this is a time in which I would be sitting in the house, watching tele comfortable*	*God* *Is God a person?* *He is*	*One o'clock* *Yesterday?* *I'm not sure*	*[Silence] I don't know*	*Who is in there D.* *What is D. doing in the picture?* *Holding the clock on the sofa* *Is that something you would do as well at half past six?* *[...] On his sofa.* *Can you imagine what he was doing before that* *Playing or something* *And after that?* *Still sitting in the sofa*
C2	*When you pulled the cord you would have the time*	*9 o'clock*	*Because this is when school starts and I want to see what people do at that time.*	*I'm not sure*	*Probably last month at 12o'clock* *Why* *Because normally 12 o'clock is when you are supposed to have lunch but I just wanted to see if people do activities or there are insights of having lunch or something*	*Probably.... I'm not sure*	*This is Rachel and she is having breakfast.* *What time do you usually have breakfast?* *Just have breakfast when everyone is out of bed. This is usually half past nine.*

A2	*You need to pull, like that, and it would tell you the time and then it would take out a picture of what time is, of someone with like the time on it.*	*4 o'clock or quarter past four*			*Last week Why? It was a holiday*	*Not sure, in one hour*	*S.* *What is she doing? She is having a happy meal at mc' Donald's* *Can you imagine what she did afterwards? Probably go back home* *And before that? She probably wen in her car to McDonalds*
C3	*Well it has a computer in the back and it has all the photos we took and then we pull the handle and one of the photos at that time would come out.*	*Probably 7 past 9*	*Because it is kind of my birthday.* *The day is my birthday the day 7 and the month 9.*	*Maybe my best friend, who isn't in this class.*	*If you could print anytime in the past, what time would that be? 3 o'clock* *Yesterday? No, Tuesday.* *Last Tuesday? Any Tuesday.*		*Its printed do you want to have a look? It is in the classroom I think it is Marion.* *What you were doing there I think we were talking about the cameras that we had* *And what do you think you were doing afterwards? Writing* *And before that? Maths*
B1	*When you pull that rope it prints a photo.*	*3 o'clock*	*End of school*	*Rory Anderson -* *It is just the first person that came to my mind*	*9 o'clock* *Why? School start*	*8 o'clock in the morning on this Saturday* *Why is going to happen on Saturday? Football*	*It is a school task* *What he'll do after that: Go home* *Before that Working*
S1	*When you pull the string it shows us the time and then prints out a picture of what happened at that time*	*I would pick 23 minutes past 7*	*It is my favourite time in the day because I watch TV before I go to bed*	*I would choose Nicholas [sherzi...?]* *He is my favourite celebrity*	*I would choose William Shakespeare*	*[...too noisy]*	*It is A.; he is at [calton leigh] leisure centre I think he just got out of the pool.* *What he has done after that I would say he probably went to bed*
E2	*It printed photos* *Photos about what? Your day*	*2 o'clock*			*My birthday, or Christmas*	*Future: Not sure*	*M1* *I think she is on the running thing Is that something you do as well? No* *What is she doing before that? Not sure, maybe eating lunch* *And after that? Maybe going somewhere*

L1		6:52	I don't really know	My sister's friend sister, because she is a photographer		11:30 Today? Yes	That's A1. She is playing with her phone Do you think it is a normal activity for this time? I don't know, maybe, every time is time
S2	It's a picture clock so it will make a sound and a picture will come out	I pick quarter past eight. In the morning or in the evening? Evening		The queen	I'm not sure, [during the accidents] in London, stopping that from happening. Stop the world disasters that like I know how they happened but in the past no one else would	Probably of some world disaster in the future	**E2** he is going to bed Can you imagine what he was doing before that? No idea Do you usually go to bed at this same time? I'm supposed to go to bed at 8:30 but I fall asleep at 9 o'clock
O1	Wasn't that you would pull the liver or like the rope and the clock would light up and then the photo that was closest to the time, like taken of from, it would print out?	Half past seven	It's breakfast time	Lionel Messi He is my favourite football player What time would you choose for him 12 o'clock in the day	French revolution	31st century Just would like to see how life is will be like, see how it will be different to then What do you think will be different Better technology What kind of technology Like this clock	It is E1 in bed Is it the time you usually wake up as well? No I wake up at six in the morning
J1	It collects this time and then it would print a picture of one of the pictures taken at that time.	I can just [set up the clock hands at 6:30]	I really don't know	Don't know	Don't know	Don't know	What is happening in there It seems they are having dinner or something What do you think they were doing before that? I don't know. Maybe it looks like Christmas. Do you usually have the dinner at a similar time? I don't know it varies
L2	Absent						

Appendix III: TimeBots interviews - overview of speeds

Speed of activities

[All names omitted]

	Slow	Medium	Fast
M1	Writing	School	Running
E1	Baking	Swimming	Horse Riding
H1	Breakfast	Scottish country dancing	Judo
D1	Comprehension	Football	Karate
R1	Getting up in the morning	Going to school	Athletics
R2	Eating breakfast	Going to school *I sometimes need to bring my brother up and it goes a bit slow sometimes we got to go separated and it goes faster so it is kind of medium*	Football
A1	Trying to sleep	Homework *Because time doesn't go really slow during homework but it also don't go really fast.* *Do you like to do your homework? Sometimes*	Running
C1	Swimming *It is slow because you have to do it quite long, and it feels really slow when you are doing it.*	Getting out of school *Because getting out of the school is a bit fast because you don't like school that much.* *You just want to get home*	Football
C2	Maths	Going to school	Climbing
A2	Homework *Because I don't like it*	Lunch	Eating and computer games *Eating: it just sort of feels fast is quite hard to explain, probably because I'm always hungry* *Computer games: because I like playing them, once I have done like something it doesn't feel that long but it is half an hour or something*
C3	Sleeping, Maths	Tennis, Football	Cycling, piano *Why is piano fast?* *Because I practice it and then I do it very quickly.*
B1	Sleeping	Football	Extreme karting
S1	Cubs *It goes fast at the start because you are playing a game but then it gets really slow because you learn about things you've already learned, for people who just moved up from [beavers].*	School, Homework, TV *It's medium because when it is 54:11 [all] it sort of goes a bit quicker than you think it would but then the adverts are sort of not fast but not slow.*	Running
E2	Maths, cubs, getting to sleep	Cubs, going to school, karate grading	Blaring, karate, skiing
L1	Writing	Homework	Talking *Because I talk a lot and sometimes I talk really fast, so that's why* *People say you talk fast* *Yeah, and I talk a lot*

S2	Sleeping, Maths, Shopping, Homework	Eating, drawing, watching TV, school sometimes	Swimming, dancing, talking
	Why is shopping slowly? When I go shopping with my mum she takes forever to buy all the stuff I just get dragged around, whatever, she was doing the job	*Watching TV: it's fast and slow but I put it in medium because watching TV you think it is going really slowly but then when you get out like watching it its like much later in the day* *School: whenever I'm doing art at school. I love art so it doesn't go too fast but it doesn't go too slow. And other times like I'm drawing or when we are doing drama, because I like drama as well.* *And what is fast in the school then? Probably... drama goes really fast, I like drama.*	
O1	Homework	Tennis	Eating, swimming *Eating: normally breakfast because I go to a child minders and I go there about eight so I have to eat pretty fast. Swimming: Because I do swimming competitions and I have to try to swim pretty fast.*
J1	Homework	Karate *Is fast when you are doing some moves that are in too fast but when you are doing slow things. There are places in which you do slow thing and fast things so it is sort of in the middle, balanced.*	Video games
L2	Homework	Football	Playing Wii

Speed of people

	Slow	Medium	Fast
M1	Baby J.	D.	M. - *She is really fast, she is our sheep dog and she got me and my sister up around, just [like...]*
E1	Mum	Mrs D.	Miss S.
H1	M	Dad	M.
D1	P. Our brother *Takes too much time*	Mum and Dad *They just take their time, they don't really rush*	A.
R1	T., my brother	Mum	M.

R2	J. My brother *He is mostly so [busy] he keeps sleeps in, he kind of can't really bother getting to work to get paid and he lives at home and doesn't pay the bills and he is not technically that much finished studying but cannot do work and cannot do much [...]* *How old is he?* *20*	Me *Sometimes I sleep in sometimes I don't and I might take a while to take my breakfast but I'm quite fast again [later]*	Dad *Because he gets right off the bed and is already... he already had his breakfast, brushed his teeth and is ready to go to work*
A1	My Granny	Miss S.	Me *Why are you fast?* *Most things are fast for me*
C1	Grandma	Mum *Because she is really slow sometimes*	B., Usain Bolt
C2	A.	Granny	Mum *Because she is always in a rush to get to work and she always wants the house tidy, she doesn't like us watching TV when there is still stuff to do.*
A2	Grandma *I like that she is slow*	Dad	Me
C3	Animation actors, **me**, S. *Yeah because when you are making an animation and it is of people you got to move very slowly.* *Why are you slow?* *I don't know*	A. R.	J.
B1	Mum	S. – Brother *One is three years old like he's [?] is very* *The other is fast because he is always quite late for things so he is always in a hurry.*	C. – Brother *Do you know why others think you are fast? Because I run really fast*
S1	C. *I would say because she is sort of very relaxed out and not like [dumping] about and all it is set to the right things.*	A. *And what would you say about you, would you be fast or slow?* *I would say I'm medium.*	R. *Because she is like energetic a lot. She likes to run around and being in all. When you are around Rachel everything is fast and when you are not around her everything feels like relaxed and calmed down*
E2	M., J., S. *Because she is not a very fast runner and she likes to write.*	E., O. *D. is quite fast and me and O. are quite in the middle.*	R., D. *Why are they fast? They go to running clubs.* *Do you think it is cool being fast? Sort of*
L1	A.	Mum	J.
S2	C., K., A. (mum), Miss S. *C. is really peaceful she never shout or anything, my mum she sometimes, I put her as fast as well, because sometimes she is rushing around the house and sometimes she takes forever [at the rooms?]*	Miss S. *She is slow and sometimes in the class she is fast, she is medium*	Miss S., A. and R.

O1	P. *That is my eldest sister, she is slow at eating, slow at getting dressed, slow at getting out of bed, slow*	D.	B. *B.: he is the fastest person I know personally, that I met, fast in running* *And D.?* *He is fast but not as fast as B. and then yeah, he is pretty fast*
J1	My dad *He just spends most of his time on the computer and it does go slowly. Once he is on it he doesn't go out for a while, he can be a bit slow*	D. *David sometimes is fast sometimes is slow*	F. *Fraser can be a bit slow sometimes but most of the times he is all over the place.*
L2	J.	A.	B.

Speed of laces

	Slow	Medium	Fast
M1	North Queensferry *Because of the traffic. The traffic is like slow when you reach the bridge*	Climbing *Because you take your time to climb you don't want to flow like that so*	Edinburgh train station *Because the trains are really fast*
E1	Home	School	The runaway train at Alton towers
H1	School	Home	High Street
D1	North Queensferry home village	Home	Krispy Kreme
R1	School	My house	Athletics
R2	School	My house *My brother can sleep [soon] I can get up early and my dad kinds of get up early and my mum can sleep in a bit. You have all different times, don't you?*	The gillie
A1	Athletics *It feels quite slow because one minute it's 6:01 and then you come back in and it's about 5 past 6. It is really slow*	School	Krispy Kreme
C1	High Street *Because there is so many people then I just I can't... I walk towards them and I just try to get through them.*	Egypt town *Because you always get people to show the town and say come here and you are just trying to walk*	Airport
C2	Home at the weekends	Granny's home	High street in London
A2	School	Cubs	Swimming club

	Slow	Medium	Fast
C3	School, Safari, Piano lesson *Because when you are in a safari they explain quite a lot about it and it is really slow.* *Is it good or bad?* *Don't know*	Towns walks *T can be slow and it can be fast so it is probably medium*	Theme park, Train station *Because lots of [roids] and things*
B1	Zoo *Why is the zoo slow?* *You need to take your time to visit, see all the animals* *Is it good or bad?* *Middle.*	Shops *Sometimes you are in a hurry and you just pick something, other times I'm just like dying to get home and I find it quite boring but mum takes her time looking at the shop windows and so.*	Theme parks, Bush Gardens - Florida *Theme park:* *Because it has rollercoasters*
S1	School *Is just all the lesson you get really bored half through a minute it is like slow and you are like: when is it ending?*	Restaurants	Theme Park
E2	Maths test plain school	Karate dojo	Video games, rollercoaster
L1	Driving down to S.'s house. *Driving to S.'s house because it's sort of slow driving to my mum's friend's house from where we live because she lives in Linlithgow. Which is only a few minutes away but it feels really slow at night. Because if we go there and come back it is always like 8 o'clock and it feels really slow because it is really dark.*	My bedroom	Ice rink
S2	School, my bed	My house, restaurants, dancing classes, swimming	Rollercoaster TV theme park train station
O1	My bed	Café *Because sometimes people really are like be rushing to get food to places and sometimes everything feels on time, all on schedule, so slow.*	Theme parks
J1	School	My house	High street
L2	Home	School, car	Caravan park

Speed of things

	Slow	Medium	Fast
M1	Eating *Because you don't want to choke*	Dancing	Cars *Because when you go in it some people drive really fast if they want to get passed to you, and it will be like fast*
E1	My Talkbox Computer	Blaze the pony I ride – when she is being good	Blaze – when she misbehaves
H1	Coffee maker *Because it takes forever to brew a cup*	Fish *Because it is just kind of nice, swimming, I'm not actually sure*	Motor way

D1	Stick insect	Maths	Time *Well it feels that it is going really really fast*
R1	Sloth	Cat	Rollercoaster
R2	Snail	Mocontrol cars	TV *Because when I'm really enjoying a program and like my mum says something but until it is finished I cannot. It goes on quite fast*
A1	My computer	My cat	A clock
C1	Clocks	Car *Because it is fast but not faster than a bike.* *Are cars slower than bikes?* *Yes cars are slower than bikes.*	Bikes
C2	Clock *Because whenever I'm doing something that is really boring and I look at the clock and something like five minutes seems like one hour.*	Car *Because whenever I go on a long journey it always seems to take so long, but when I go on a short journey it doesn't seem to take so long it seems to get early and quickly.*	Hamster *When I go to pick him up he is always really fast and I let him go in the hamster pool and she is really fast and she really tries to run into everything.*
A2	Bed	Clock *It just goes like medium time.*	Computer
C3	Clock, Snails *Because if you look at the hour hand if you try to spot the difference between eleven and twelve it takes really an awful lot of time*	Car Wheels	Metal springs, Guns *Springs: because if you drop it, it immediately goes back up again* Guns: *because when you click the [button] immediately a bullet go so tchhhhh*
B1	Elephant	Frog *Because it can bounce really quickly while normally it will stay in the river all the time*	Bugatti Veyron
S1	Clock *Because when I'm waiting for a time to happen it never happens and it seems that it get slower and slower the more I want that time to come.*	Car *Because time doesn't go quickly in there, if we are going somewhere it is not so fast. If we are going somewhere and it takes a long time to get there it is not so fast*	My rabbit *It is very energetic and when she sees a cat she will run away from it*
E2	Clock brain snail turtle *Why is the clock slow? Because when you are doing something that you like to do time goes really quick when you are doing something you hate, the time goes really slow.*	Fred (cat) moomin (cat)	Bike scooter car
L1	My fish	Hot chocolate *Because it takes me a while to drink it. But it also finishes fast so it is medium.*	My cat
S2	Bed	Homework *I find it slow sometimes, if it is maths homework but I get through my spelling homework really quickly but it is fast when you get through it but while you are doing it is quite medium.*	Race cars rollercoaster, TV

O1	Cat	Clock	My server
	She is pretty lazy, most cats I know will like run around, she will just lye in the corner for the whole day.	*A clock is medium because it tells time and it is not like going really slow, it sometimes can but it sometimes can go really fast so put it in medium because it can go slow and can go fast.*	*Do you think fast is good or bad? I think fast can be good and can be bad, because when you rush stuff, they aren't in your high standard, when you do it too slow you take ages to do them, and they can be high standard but they took ages to do which is not good.*
J1	My stick insect	Time	Lego
	It most of the times he is not moving he is just staying still but when it does move, he moves like that [making a slow movement]	*Time can be fast but can also be slow it just depends on what we are doing really.*	*I spend ages doing it and it feels it is not time at all*
L2	Milk shake	Mocontrol car	Football

Speed in five periods of the day

	1st	2nd	3rd	4th	5th
J1	S - Wake up	M - Karate	S - Lunch	M - Lego	F - Videogames S - Dinner
H1	S - Get up	M - Scottish Count Dancing	M - Lunch	F - Play with friends	F - Watch Movies
E2	S - Karate	F - Lunch	S - Edinburgh	M - Train back	M - Dinner
S2	M - Breakfast	S - Go to school	F - Go home	M - Swimming	M - Go home start to make dinner
C3	XF – Get out bed	S - Maths	F - Lunch	M - Snack	F - Gymnastic
B1	F – Up for football	F – Leave for football	M – Football game	M – back from football	S – chillax till tea
R1	S – Have Breakfast	M - Go outside	S – Lunch	F – Go to friend house	M – Have dinner
R2	F – Football	F – Rugby training	S – Lunch	M – watching TV	M – Skiing
C1	M – Bed	F – football	F – Karate	M – Ipad	F – Trampoline
O1	S – Wake up	F – Tennis	F – Lunch	F – TV	F – Dinner
S1	F – Watch TV	M – Lunch	F – Swimming	F – Run	M – Cook dinner
L2	S – Sleep	F – Play in bed	M – Eat breakfast	F – Play	F – Auntie
C2	F – Climbing	M – Watch TV	M – have lunch	S – Go to my Aunties	F – Dinner
E1	S – Get up	S – Painting	S – Get dressed	M – Cooking	S – TV
M1	S – School every week	M – Drama Wednesday	F – Gym Monday	S – Art Thursday	M – Shopping Tuesday
D1	S – Sleeping	M – Breakfast	S and calm – Go for a walk	M – Dinner	M – Ice cream
A2	F – Karate	M – Lunch	S – Cousins	S – Mindcraft	M – Dinner
--	S – Maths	S – Writing	M – Lunch	F – Art	F – Go home
--	S – Bed	F – Breakfast	F – Rugby	F – Lunch	F – Swimming
MS	F – Up and get to school	M – Math lessons	M – Language lessons	F – Art project lessons	S – Marking / preparing for next day

List of figures

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Workshop organisation: *Temporal Design Workshop*, 28-29th May 2015, at Design Informatics Forum, University of Edinburgh. Organised together with Michelle Bastian and Chris Speed.

Figure 1: Leaflet Temporal Design Workshop