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Designing A Tangible Device for Re-Framing Unproductivity

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Abstract. We report on the design of a tangible device for encouraging the acceptance of unproductive time on office workers. We first conducted interviews for a better understanding of the subjective experience of productivity. We found that while the idea of being productive can evoke positive feelings of satisfaction, dealing with unproductive time can be a struggle, negatively affecting people’s moods and self-esteem. These findings guided the design and implementation of RU, a tangible device for reflecting on self-care time. Our prototype offers a physical representation of the mainstream productivity mindset and plays with the idea of connecting and charging energy to encourage the user to experience the time considered unproductive as self-care. In a second study, participants used the device for 5 days and our results suggest that the device motivates reflection on activities beyond work and increases awareness of the importance of taking time for self-care.

Keywords: Tangible User Interface · TUI · Research Through Design · Productivity · Self-care · Self-Awareness · Interaction Design · Tools

1 Introduction

In an era of hyper-productivity where time is capital, one can identify a deep-seated mindset that constantly pushes people to be more productive. As society subscribes increasingly more to this mindset, even children are taught to think in terms of the productive use of their time [11], and by the time they reach adulthood, they believe that they should strive to optimise for productivity [26]. Productivity is broadly related to a work-context, and as a consequence, people struggle with the tension of balancing work and leisure, as what is considered “unproductive” is de-prioritised [2]. The obsession about avoiding unproductivity results in built-up pressure, leading to stress and anxiety, and potentially culminating in stress fatigue [32].

Productivity evokes feelings of accomplishment and can work in a positive reinforcement loop but, if taken to an extreme, it can have damaging health consequences. Setting aside time to breathe and recharge can be deeply beneficial.

Taking care of one’s mental, physical, and emotional health increases wellbeing, and, in turn, contributes to productivity [29,17]. Because productivity and self-care are two concepts that go hand-in-hand, helping users strike a balance between both attitudes is an important challenge for interaction designers [34].

While there is a wealth of available tools to support users in self-tracking for improved productivity [40], we found little research on dealing with the other side of this coin. Most available solutions consist of tools that track users’ work-related activities at a device or application level, disregarding activities performed beyond computing devices [38,43,16]. These technologies are characterized by quantification [46], thus reducing the complexity of life to a numeric representation and ignoring the inherent subjectivity of the lived experience [27]. Instead, in this work, we depart from quantifiable measures, and we tackle the concept from a subjective experience angle.

The main goal in this work was to explore the potential for re-framing the negative understanding of unproductivity as an opportunity for self-care through the design of tangible technology. We consider three different research questions: (1) around the understanding of the concepts of productivity, unproductivity and self-care from a subjective experience using qualitative methods; (2) around the design of tangible technologies, stepping away from digital screen-based devices and using design as a medium to encourage the acceptance of overlooked aspects of life, often considered wrong, embarrassing, or taboo, rather than focusing on aiming to right what is wrong or lacking [14,4]; and (3) around the positive outcomes of making tangible the invisible concepts, and the influence on increasing awareness on self-care time and acceptance of unproductivity.

We believe that re-framing the concept of unproductivity is the first step for a better and more positive understanding. Therefore, in this project, we refer as *self-care* to all activities that fall outside the banner of productivity, but have a positive potential for wellbeing. This intentional re-naming is to avoid the dichotomous understanding of one being good and the other being bad.

This paper reports on the design process of RU (see Figure 1), a device that motivates users to reflect upon their productivity time, and encourage them to take time for self-care activities. We named the system RU after the old Swedish word *ro*, which is pronounced *ru* and means peace and calm. This work consists of two studies. The first study explores the design space of productivity and its inherent subjectivity. From the 12 interviews we conducted, we gained a better understanding of the experience of productivity, and we uncovered problematic perceptions of unproductivity. Such findings led to the design and implementation of RU, which was deployed in a second study and evaluated in a real-world setting. Our findings support our design intentions of engaging in self-care mindset and demonstrate that the device enhances awareness in the benefits and importance of dedicating time to self-care activities.

We want to state the limitations of this project to research purposes. This work does not aim for the design of a commercial product nor to implement an ultimate and definitive device for behavior change. Instead, we use design practices and qualitative methods to explore the space of productivity, unpro-



Fig. 1. The first working prototype of RU

ductivity, and self-care with the aim of creating new knowledge about these concepts. With this project we want to motivate and inspire other researchers to challenge productivity thinking and insist on the importance of striking an optimal work-life balance. This work also intends to start a discussion around the current hyper-productive era, and offer the reader the opportunity to reflect on their productivity, and self-care time.

2 Related Work

2.1 Productivity trackers

Tracking productivity has long been an object of interest to researchers and product developers. The key idea behind it is that by improving self-awareness, one can enhance productivity [29]. When tracking their productivity, the user is given the opportunity to reflect on their behavior, learn from it, and maximise the amount of work they can achieve [28,8,12]. As a result, a variety of self-tracking applications and devices have been developed to support users in boosting their productivity by improving their time management (e.g. Rescue-Time [38], Toggl [43]) or blocking distracting applications (e.g. Focus [16]). Academic researchers have also proposed frameworks that use computing technologies and data analytics as guidelines for users to track, analyze, and improve their productivity [46,9].

The most common solutions are systems designed for the digital space in the form of screen-based applications that track the activities the user does. The principle behind current systems is that productivity can be quantifiable and time can be classified as productive or unproductive based on data captured as users carry out their activities. While semi-automated approaches minimise user effort [33], the system may define a task as unproductive when, in the eyes of

the user, it is perceived as productive. For example, whereas reading the news might be unproductive for an engineer, it is a critical aspect of a journalist’s work. This disambiguation is often done a priori, with users labelling different applications and websites as productive or unproductive use of their time. Such automation also misses a valuable opportunity for reflection—solutions that aim to quantify human behavior suppress the user with their option to decide upon their actions and discard the values of personal experience and emotion [36].

2.2 The subjectivity of productivity

Most research studies focus on productivity in the workplace through a quantitative approach [25], and little is known about personal productivity as a subjective experience that occurs beyond typical office work [27].

Tracking productivity can boost productivity. However, ongoing pressure to be productive leads to stress and anxiety, thereby negatively affecting health outcomes [42,7]. This creates a delicate relationship between wellbeing and productivity — while wellbeing positively contributes to productivity, excessive demands on productivity might hinder wellbeing [23,17]. Therefore, it is crucial to strike an optimal work-life balance [34]: *A state of equilibrium in which the demands of both a person’s job and personal life are equal* [47].

The excessive focus on productivity thinking gives birth to a new lifestyle trend that opposes it. *Anti-productivity* challenges productivity thinking, encouraging people to do things that do not yield measurable results, or to do something for the sake of doing it. It also proposes measuring productivity in terms of feelings and emotions rather than on concrete outcomes [13].

In line with this philosophy, the “Anti-ToDo list” [3] method consists of only listing the achievements of the day rather than writing tasks and crossing them out. The user ends their day with a list of all of the things they accomplished rather than a list of things still left to do. As far as we are aware, there is no literature on the concept, yet research suggests that positive feedback induces rewarding feelings, whereas capturing negative behaviors might increase stress levels on the user [28].

At the opposite end of the productivity mindset lies the Chinese concept of *Wu-Wei* [1]. The principle stems from the philosophy of Taoism, which emphasizes living in harmony with the Tao (“The Way”). *Wu Wei* is the balance of the elements both within and outside the body. Although the term translates from Chinese as “do nothing” the actual meaning of the concept is more akin to “effortless action”. The mindset embraces the ups and downs of life, accepting them instead of fighting against them. Flow days refer to high-energy days, whereas ebb days refer to low-energy days. Applied in productivity thinking, the Wu-Wei ideal encourages acknowledging the time of not being productive, rather than enforcing productivity at all times.

2.3 Designing for the physical space

While we found a great number of productivity-related digital tools, few technologies consider tangible interactions within the physical space to design for productivity [10,22,35,24] and self-care.

Physical technologies focused on self-care have resulted in devices that encourage reflection on negative behaviors or situations to gain self-awareness [5]. For example, Nidra [37] targets sleep routines that have been hindered by stress and erratic schedules. The author challenges productivity thinking by encouraging the user to pay more attention to their sleep patterns.

In line with the topic of stress, the Stressball project [39] is a conceptual prototype that explores the emotion of stress from a qualitative perspective. The project not only targets stress but challenges the reductionist nature of self-tracking technologies that quantify the human body down to numbers and diagrams.

So far, we discussed a variety of systems and tools that focus on improving productivity through the design of digital tools that quantify human behavior. While these solutions are mostly based on productivity in a work context, we found literature that suggests productivity to happen anywhere, anytime [27]. These studies use qualitative methods for understanding the inherent subjectivity of productivity. In this research, we also approach productivity from a different perspective. We ground our work on alternatives that explore the design space in the periphery of productivity prioritizing individual values and emotions rather than quantifiable measures. We are also inspired by studies that focus on designing tangible devices that portray abstract concepts, and explore the interactivity and positive outcomes of it. Last, we support all technologies that encourage the acceptance of a rejected attitude. We explore through design the concepts productivity, unproductivity and self-care by making them tangible and interactive. Our research also adds to the knowledge about personal productivity, unproductivity, and self-care, from a subjective perspective.

3 Study 1: Understanding subjective experiences of productivity

We began our design process by exploring participants' subjective understanding of productivity, aiming to identify opportunities within the design space of productivity for grounding the design and implementation of prototype.

3.1 Study design

This study consisted of semi-structured interviews about the subjective experience of productivity³. Through these conversations, we aimed to learn about

³ We conducted all interviews online via Zoom in either Spanish, Catalan or English as they preferred. All Non-English quotes we report from this study are a translation from the original language.

perceptions and practices in relation to productivity. We covered the following main aspects: conceptualisation of productivity, feelings and emotions of productivity and unproductivity, and tools and methods for boosting productivity.

We recruited 12 participants (7 men and 5 women) for this first study. Our sample was comprised of participants from different backgrounds, nationalities, and ages (23–69) to include a wide range of perspectives. All participants were knowledge workers, either being students or office workers. In this paper, we kept participants’ identities anonymous and we refer to them by a numerical identifier (e.g. P9).

We used affinity mapping for synthesizing and concluding the relevant information. We first transcribed all interviews⁴ for codification. We identified a collection of different codes that were clustered into more broad themes that portrayed the core findings. Examples of these codes were: mood, motherhood, state of flow, feelings, skills in productivity, productivity standards, acceptance, reward, motivation, locations of productivity, culture, and tools. Some of these codes (e.g. influence of culture, and motherhood, skills in productivity) were rejected as they did not align with our research topic of acceptance of unproductivity. We present the result of the analysis in four main concepts: *the conceptualisation of productivity*, *the experience of unproductivity*, and *tools and methods*.

3.2 Results

Conceptualisation of productivity Our analysis revealed different conceptualisations of productivity. We derived three themes from participants’ responses: *goal achievement*, *time efficiency*, *perception of progress*.

The goal achievement approach consisted of defining a set of objectives to accomplish, normally constrained by a time-frame.

“So for me productivity is achieving whatever goals I set out to do, or achieving small milestones in a project” (P1)

While this theme is task-driven, participants who focused on using time efficiently were time-driven—meaning participants aimed to seize their time and pursue as much as possible within a given time-frame. Setting the right timing required self-awareness of their own capabilities.

“It also requires to know what I’m capable of doing in the given time. Of course, my timing has nothing to do with other people’s time” (P2)

On the other hand, participants reported to feel productive when they felt progress in their goals.

“A productive day is when I set certain goals for the day, and I might not have achieved them, but I feel I made some progress on it.” (P5)

To assess their productivity, the most common parameters were time, tasks, and quality of the outcome. While time and tasks are quantifiable parameters, quality is a more subjective criterion.

⁴ All interviews were audio-recorded under the participants’ consent.

The experience of unproductivity All participants used positive adjectives to describe the feeling of productivity, identifying it with success, satisfaction, fulfillment, and relief. These emotions are positive reinforcing and motivating to keep being productive. Participants called this experience as “be in the flow”:

“The feeling of having finished tasks is what motivates me the most to do more. Once it starts the flow, it’s very smooth. [...] Sounds like positive feedback.” (P1)

We found the concept to appear in several interviews. Participants also mentioned to be a state of high concentration in which time flows:

“...I’m really in the flow, and I forget the time, and that’s very nice” (P7)

But productivity does not always flow. In these situations, participants felt dejected and struggled with the surge of negative emotions. Unproductivity evoked from guilt to frustration, to uselessness. These feelings might reach a point that negatively impacts mood and, in extreme situations, lowers self-esteem.

“When I’m not productive, I’m not in the mood for doing anything. Days I’m unproductive, my self-esteem lowers. I might associate it with my image and things like this. It all builds up, and I start feeling I don’t know anything. I feel useless” (P9)

We collected a wide range of different solutions for fighting unproductivity and getting back on track. Some of these include avoiding distractions, taking breaks, switching to other activities, or changing the environment. In any case, participants who instead accepted being unproductive were able to minimise negative feelings and bring calm and relief.

“It can be a very relieving feeling to just put it [the task] aside, for trying out again later. If it doesn’t work, then do it another day that you feel with more energy. So it can be good to accept not to be productive.” (P7)

Three interviewees started a discussion about the role of society in personal productivity. All three participants blamed society for imposing high productivity standards, building up pressure and stress. According to them, there is the habit of comparing yourself to others, an attitude that has been amplified by social media. In most cases, such comparison results in negative feelings.

“You might feel useless if you’re not doing 100 different activities” (P3)

We found that productivity increases in productive environments. Participants felt more productive when surrounded by other people that seem to be productive. This phenomenon is what we refer to as social influence.

“I like the library or any place where other people study. [...] I don’t get distracted because I see other people working. Being surrounded by productive people helps me to stay focus.” (P6)

Aside from social influence, we encountered a variety of factors—external and internal—that affect, both positively and negatively, productivity. External factors include weather, and culture, whereas internal factors are intrinsic to the person, such as mood and amount/quality of sleep.

Tools, methods and techniques We listed up to 15 different tools and techniques—digital and physical—used by participants in a context of productivity. Participants were interested in tools that induce reflection on their time, and support on mistakes and shortcomings. In one case, the participant was motivated to use systems that enhance their work-life balance, claiming the difficulty of finding the right balance:

“I would like a system able to monitor all my activities, and determined my productivity in each of my personal areas. I would like to see if I’m in work-life balance.” (P4)

3.3 Discussion

Our study with 12 participants confirmed the inherent subjectivity of productivity. Although participants shared similar notions of what productivity is—the experience of getting things done within a time-frame—their specific perspectives somewhat differed. In line with previous research [27], productivity was generally related to office work, yet participants included other types of activities (e.g. sports) as well. We identified a pattern among these other activities—they tended to be driven by outcomes, a deadline, or a sense of duty (e.g. cleaning, grocery shopping). Passive activities that required little or no interaction, or lack of a clear purpose (e.g. be on social media, taking a nap) were commonly categorized as “unproductive”.

Our findings suggest a need for an improved conceptualisation of productivity, which leads to negative feelings when out of control. Productivity is a dynamic phenomenon, adapting to new situations and environments [27]. Participants also commented on the role of society in the evaluation of productivity. Assessing productivity was, in most cases, also influenced by mainstream productivity thinking. Society setting high standards of productivity and comparing oneself to others results in built-up pressure and stress [42].

All these circumstances might generate frustration in moments of low productivity. Being in a state of flow—highly focused and productive—evokes positive feelings of success, satisfaction, and pride. It works as positive reinforcement and motivation to stay on track. On the contrary, unproductivity can have the opposite effect. The negative feelings might reach a point of impacting mood and even self-esteem. While most participants acknowledged fighting against these situations, those who went through a process of accepting their circumstances were better equipped to cope with negative emotions.

In this first study, we uncovered the need to design for the struggle of dealing with the counter effects of productivity, and enhance the positive consequences

of accepting unproductivity. In the current era of hyper-connectivity where digital devices are an extension of the self [6], it is very easy to get carried away in productivity and be deprived from self-care time [19,30]. We consider this an opportunity to create positive impact on people’s wellbeing, and to bring knowledge and inspiration to the research community for further research in the topic. The results of this study and previous literature also motivated us to (1) reject the quantification of productivity and use qualitative methods for exploring the experience; (2) challenge mainstream productivity thinking; and (3) explore the potential of designing Tangible User Interfaces (TUIs).

4 RU: Design and Implementation

RU is a device for reflecting upon and accepting the time and energy spent on activities that might be considered unproductive, but are essential for maintaining the user’s wellbeing. The design of RU is the result of an iterative design process of exploration, sketching, lo-fi prototyping, and role playing. The device is the portrayal of different ideas and themes that departed from symbols of productivity, unproductivity, and self-care (e.g. balance, time, energy) which evolved throughout the design process into the final prototype.

The metaphor that guided the design of RU was that self-care is the energy that allows us to carry the weight of our work life. We designed the system as a device that makes these concepts tangible while giving continuous feedback as an ambient display [45]. As a symbol for the weight of the productivity mindset, the device has an arm that carries a weight. Throughout the day the arm becomes “tired”, slowly and almost imperceptibly lowering the weight up to a point where it is dropped.

To prevent the weight from dropping, the user must “charge” the device. This can be achieved by plugging it into one of the sockets in a set of blocks provided to the user (see Figure 2). Each block represents a self-care activity defined by the user. The user can also set a strength for that activity by turning a knob in the corresponding block, depending on how they conceptualise their contribution to their own self-care. For example, the user might have one socket for the activity “play tennis” set to maximum importance because they feel that is a crucial activity for their wellbeing. Then, every time the user practices the sport, they would connect RU to the socket for charging it.

RU continuously discharges over time. Every 25 minutes, the arm rotates two degrees clockwise. The movement is small and smooth, making the change only perceptible after a long time. It takes around 16 hours for the arm to travel from one end to the other. These are the total of waking hours in a day ($24h - 8h = 16h$), taking into account that 8 hours of sleep is an often recommended amount of sleep time [20].

RU charges when connecting it into a socket. Then, the arm rotates anticlockwise as much as the value given to the socket. This value is proportional to the charge capacity—the bigger the value, the more the charge capacity and the longer is the arm ticking anticlockwise. When charging, the user must push



Fig. 2. The interaction for charging RU to the socket with the activity “Netfix” assigned to it. Yellow light (left) indicates that is charging. Green light (right) means fully charged

down the plug until fully charged, which can take up to 5 seconds. Otherwise, the charge is interrupted at half load. This way, we ensure the user does not leave connected the plug with the intention of continuously charging. When connected, RU’s face lights up, increasing its brightness as it charges. The light color switches from yellow to green, indicating full charge.

The arm only reaches its highest position when the user has plugged several sockets in a relatively short time. Nevertheless, if the user does not connect RU to any activity for a long time, the arm keeps ticking clockwise to the point of reaching the lower position. This increases the chance that the hanging object drops and fall out the arm. Through this subtle interaction, we notify the user of the need for self-care activities.

RU’s aesthetics resembles a scale, thus reflecting the importance of work-life balance. By charging and discharging RU, the user is automatically committing to their self-care. RU demands little effort but continuous use, reminding the user to be consistent with their self-care activities.

4.1 Hardware

RU has two different parts: the **main station**, and three **sockets**.

The main station (see Figure 3, left) consists of the base, at the bottom, and the face, at the top. The stem joins both parts. From the base, a yellow plug comes out from the front. We also added an on/off switch and reset button at the back of the base. The face has a built-in light system and a arm coming out from the right side. From the arm, there is a hanging cube that represents weight. Both the arm and the weight rotate clock- and anticlockwise up to 20 degrees from the balanced position—when the arm is neither tilted upwards nor downwards. When resetting RU, or turning it on for the first time, the arm resets to the balanced position.

The sockets (see Figure 3, right) are wooden blocks that represent the different self-care activities assigned by the user. Each socket has a whiteboard at the front face for writing down the activities’ name. In the back, we added



Fig. 3. RU. On the left, the main station. On the right, the three sockets

a knob for the user to indicate the importance of that corresponding box—a higher value means more importance of the activity which translates to more charging capacity.

From a technical perspective, the device consists of four main components: the light, the arm, the plug, and the socket. All of them connect to an Arduino MKR1000 WIFI that controls all the logic of the system. The micro-controller is held in the base of the main station. For the lighting, we used a 24 LEDs NeoPixel Ring that supports different colors and brightness. The arm is attached to a mini servo that rotates clock- and anticlockwise. The servo is limited, with software, to rotate up to an angle of 40 degrees from one end to the other. Last, the plug does not have a standard regulated design, but specific to the device, meaning that only fits to the outlet in the sockets. We recycled the cable and the pins of regular plugs to implement a customized plug with three pins: one for power, the other for ground, and the third is data. The shell was 3D modeled for 3D printing. When plugged to the socket, each pin of the plug connects to the corresponding pin of the potentiometer inside the socket. The potentiometer allows the user to change the value of the socket. The sockets are powerless blocks and when RU is plugged into one, the electronic circuit is powered, and the micro-controller reads the value of the potentiometer resistance. To ensure this connection, we implemented a system made of springs for a better current conduction from the main station to the potentiometer.

Last, the device is powered using a power bank that connects to the black USB port sticking out from the back of the base.

5 Study 2: Deployment and evaluation of RU

The second study focused on the deployment and evaluation of RU in a real-world setting. The objectives were (1) test our design for re-framing unproductivity; (2) get insights on the different interactions with RU; (3) learn about the concept of self-care; and (4) test the device from a technical perspective.

5.1 Study design

We decided for an *in-the-wild* deployment of our research product like a technology probe [21] where participants take the device home and use it without the supervision of a researcher. Each deployment lasted five days. We considered this time-frame to be appropriate for the user to explore RU, and for the research team to identify any changes in the user’s experience of unproductivity.

We provided each participant with a complete kit for the use of the system (see Figure 4). The kit included RU, three sockets, a diary, the instructions of use, one power bank, a whiteboard marker and eraser. We asked participants to complete the diary throughout the study. The diary had four parts: the location, the sockets, the daily report, notes and comments. In the first section, the participant described where they placed RU in their environment. In the second section, we asked the participant to keep track of all the changes regarding sockets and knobs, and the activity assignation process. In the third section, we asked the participant to summarize their feelings of that day, and log in the daily activities used for charging RU.



Fig. 4. The evaluation kit and diary: (1) RU, (2) three sockets, (3) weight, (4) instructions of use, (5) diary, (6) whiteboard marker and power bank

We recruited five participants (P13—P17) from different backgrounds, ages (25—59), and gender (4 women/1 man) for testing and evaluating RU. Following the same criteria than study 1, we limited the study to knowledge workers.

At the start of the study, we gave participants the details of this research and specific instructions on how the deployment would proceed. We introduced the device and carefully explained how it worked. We also provided the instructions in written form. We emphasized the free nature of certain parts of the study, such as designating activities to the sockets, and the importance given to them, which were left open for participants to assign whichever way they wanted. We explained how to complete the diary, which also contained a written description of each section. Last, we provided them with the contact information of the principal researcher for any problems that might arise during the study. After

the evaluation period, we conducted the final interview about their experience using the device.

For data analysis, we followed the same procedure as the first study, using affinity mapping, for synthesizing and structuring all collected data.

5.2 Results

A tool for reflection Participants described the experience of using RU as positive, helpful, motivating, and innovative. RU helped them to reflect upon activities that fall outside the work environment and contribute to self-care, increasing awareness on the importance of taking time off productive work:

“It’s been a very positive experience. [...] it turned out to be a tool that helped me to take more time for myself.” (P15)

All participants reported the device to be very intuitive and easy to use, and to not feel overwhelmed by the tasks and interactions with RU. They interacted with RU mostly at the end of the day, as it was only possible if they were at home where RU was. Participants opted for a place of high visibility to them, where it could work as a reminder:

“I chose to put it in my nightstand because it’s my ‘non-working spot’, my place for reflection. Besides, it gives me privacy, and it [RU] won’t be exposed to the rest of the family.” (P15)

Not being able to connect RU at any time yield to the opportunity for reflecting on all the activities of the day. One participant elaborated on the idea of productivity is time you invested in others, whereas self-care time is for oneself. Participants translated the interaction of connecting and charging RU to themselves, feeling as if charging their wellbeing:

“It was like I was doing it to me, as if I was connecting and charging myself.” (P13)

Another participant insisted on how productivity thinking blinds them from self-care activities. The participant used the concept of “generalization” to describe situations of little awareness of good experiences because these are masked in a negative feeling produced by productivity thinking:

“It helped me to be more aware that I have to take time for myself. Sometimes you feel you only work, but if you stop, you see that there are moments in which we do nothing, and it’s good because we need them. Still, we don’t stop. [...]” (P16)

The interpretation of connecting and charging RU Our participants interacted with RU both during weekdays and weekends. In the weekend, participants registered more activities, so RU’s arm tended to be tilted upwards and the weight not to fall. One participant mentioned that they managed to keep the device charged at maximum, making the weight fell in the opposite direction. The participant reported this as a very positive experience, rewarding them for spending time on self-care:

“The day I spent all day with my daughter, [...] and charged to the highest position. That was amazing. It was very positive feedback, and I thought: I achieved it, I reached the top. It was motivating and super satisfying.”
(P16)

On the other hand, during work days, most of the participants spent a long time without interacting with RU and reported to have less time for self-care activities. For a few participants, not to charge RU in a long period turned out to be inconvenient and frustrating. Yet, all participants were, at different levels, triggered by it and motivated to engage in self-care:

“I was expecting it [to see the cube on the floor] because I would spend all day at the office. Anyway, it was like a representation that I should spend more time in self-care activities. It was a bit sad [to find it that way], but then I would charge all the activities and think the day wasn’t that bad.” (P13)

To overcome this situation, participants recommended complementing the system with an app or additional device that allowed them to charge RU anywhere at anytime, allowing interaction with RU throughout the day rather than connecting all the activities at once.

Assigning activities to the sockets We found two methods for the use of the sockets: the flexible and fixed approach. The former consists of assigning an activity per socket, having three simultaneously. In case the participant wanted to add a new activity, they would erase the socket’s whiteboard and write down the new activity’s name. In the fixed approach, the participants gave each socket an importance value—low, medium, or high—and assigned multiple activities to one same socket, based on the level of importance.

For all participants, the importance of the socket was given based on the feeling resulting from the activity. The higher the contribution to self-care, the higher the value of the socket. Participants illustrated the process of giving value with examples:

“To the activity music, I updated the importance. Maybe at one time, it is of medium importance, and at another moment, I spend the afternoon listening to music, dancing, and singing. Then I’m super happy, so I give it [the socket] a higher value.” (P15)

One participant made a distinction between activities and in-activities, requiring the former an active involvement whereas in-activities lack of action. They also reported to be confusing the assignment process, choosing to only register deliberate activities:

“I didn’t add the times I was working and I would check twitter. This was not intentional, I didn’t need a break.” (P17)

Participants registered up to 50 entries in the activity registration section of the diary. From all of them, we identified a total of 32 different activities, which we grouped into six categories based on the reasoning for choosing the activity. In some cases, one same activity was experienced differently, thus falling into two different categories. Below, we list the different categories with a short description and examples:

Relax: This category covers a wide range of different activities that help the user relax. Participants gave medium and high importance to them. Examples: reading, listening to music, watching TV, playing games, etc.

Disconnection: This category covers activities that induced a mental break from productivity thinking and their routines. Hence, most of them had high importance. Examples: reading, going to the beach, hanging out with friends, etc.

Rest: This category includes all activities with a passive interaction—the participant’s interaction was little or none, and lacked of intended goal. We divided them into two subgroups: sleeping and do-nothing. The former is the time spent sleeping or similar (e.g. taking a nap, snoozing the alarm). The latter includes activities with no clear purpose (e.g. scrolling on the phone). These activities were given medium-low importance.

Positive energy: This category covers activities performed just for the sake of having fun and enjoying the activity. These activities result in a positive change of mood, a feeling described as *“recharging your batteries”* (P13). Hence, participants assigned medium-high importance to all activities. Examples: going out for dinner, watching Netflix, or walking.

Care: All activities in this category are related to actions of taking care of themselves or another object/ living being. Participants considered these activities of medium-high importance. Examples: petting your dog, face cleaning, gardening, sport, etc.

Strengthen relationships: This group comprises activities in which what mattered to participants was the social component rather than the activity itself. For these activities, the socket was set to the maximum value. Examples: playing board games, going to the beach with friends, etc.

6 Discussion

The use of RU resulted in a novel and positive experience for participants and its design was successful in terms of aesthetics, functionality, and meaning. The device presented a clean, minimal, and creative design that pleased participants.

6.1 Using design for engaging in reflection

In our studies we found that RU gave space for reflecting on productive, unproductive, and self-care time, and enhances awareness on the benefits of self-care and the importance of it. The opportunity to focus on the experience of self-care guided participants through an inspiring and positive experience of reflection and self-knowledge. They reflected upon activities commonly understood as unproductive, and instead registered them as self-care activities.

“Trouble” Design focuses on designing for acceptance of neglected attitudes and is claimed to create a broader space as a straightforward problem/solution approach [14]. This work took inspiration from trouble design, and rejected all opportunities that aim to make productive the unproductive time. Instead, we used the design of a tangible technology to shift the negative conceptualization of unproductivity towards an opportunity for self-care. Such findings uncover the opportunity for designers of engaging with rejected behaviors, and use alternative design practices that work beyond the design space of fixing problems.

In this research, we used design to create a physical and interactive representation of the concept of productivity. Embodiment of invisible information through tangible forms gives the concepts giving the space and opportunity for the user to interact with them. For example, The Dangling String [45] gives to the invisible computer network a tangible form, providing the users with the opportunity to grasp the idea and reflect on the amount of network traffic of the room. From our findings, we conclude that the physical presence of RU acted as a *Tangible Well-being Reminder* to take time aside from productivity thinking and invest in on self-care activities. The device plays with the idea of “recharging batteries” through the interactions of connecting and charging the device with self-care energy. Participants associated the movement of the arm with personal satisfaction, and triggered a change when the weight fell. RU demands of effortless but daily use, engaging with the user to find motivation for staying active in their self-care time. The device was designed to embody mainstream productivity thinking, and motivate the user to challenge it.

Our work highlights the valuable of tangible technologies in the context of productivity and self-care. In an era of hyper-productivity where digital technologies fuel productivity [6], we found the need to disconnect from it and find time to focus on oneself, like a “digital detox” [41]. The manual and tangible interaction that RU requires forces the user to create a time and a physical space off productivity for self-care reflection. We open a design space for exploration of different interactions and designs that challenge productivity thinking and encourage a more balanced lifestyle where productivity is not the dominant force.

6.2 Productivity, unproductivity and self-care

From our findings, we make a clear distinction among the three experiences. Productivity is the state of getting things done. Unproductivity occurs when there

is a desire or need to be productive but no success. Our findings revealed several factors that can influence productivity and led to unproductivity. Self-care, however, is strongly related with the contribution to one’s wellbeing. However, our results show that a same activity might feel unproductive or self-care based on the interest in being productive. For example, checking out social media is perceived as self-care or distraction according to the productivity goals.

Productivity evokes very contrary feelings, resulting in an imbalanced state of mind. You can be at the top, feeling successful and satisfied, or at the bottom wrapped in negative emotions. Instead, self-care activities always evoke positive emotions. Productivity thinking craves for more production and a busy lifestyle [32], whereas a self-care mindset surrounds people in a calmer and peaceful state of mind. Self-care slows down the high-speed lifestyle. We highlight the importance of finding a balance between the two attitudes to avoid stress fatigue [29,17].

From our studies we conclude that self-care is an abstract concept where feelings prevail. Participants might consider self-care all activities falling off the work environment, or just the time invested in themselves. The conflict aroused when considering active (e.g. sport) and passive activities—or in-active (e.g. lay on the sofa, be on social media). Participants clearly identified the former to self-care, because of the clear contribution to wellbeing, but in some cases, they found it confusing to consider the latter as well. Literature confirms that wellbeing and self-care is a dynamic state that can happen anywhere at anytime [31,18], the same as productivity [27].

These findings emphasize the inherent subjective nature of the three concepts. Our work points out the positive value of offering participants the opportunity to engage in reflection on the concepts and the use of their time. Our approach was to accept this subjectivity and focus on designing a tool to support users in making sense of their behavior [36]. Our findings suggest that this approach was successful, and is something others conducting similar work may be able to learn from.

6.3 Further work

We identified new directions for further research together with design feedback for next iterations of RU. We engage in new research questions with the aim of inspire other researchers to explore this design space. This paper introduces the idea of re-framing unproductivity in knowledge office workers. As a result, we uncovered new opportunities to expand this exploration into other scenarios, like the workplace. We are interested in how design can support in embracing unproductivity in a space where productivity is demanded at its best. Similar approaches of bringing acceptance and self-compassion in situations of high levels of stress given in the workplace have been explored in other studies [15]. We also engage in the idea of adding a social component into re-framing unproductivity, as research supports the social influence among people [44], a behavior that we observed in our studies. The same way we found the social component to boost productivity, we are interested in designing and exploring how it can engage

in acceptance of unproductivity and self-care. We also encourage practitioners in critical design to align with this work and use design as a medium to critic the mainstream productivity mindset and bring up questions that challenge the current hyper-productive lifestyle and strike for an more balanced solution where self-care is as important as productivity.

7 Conclusion

The main goal in this work was to explore the potential for re-framing the negative understanding of unproductivity as an opportunity for self-care through the design of a tangible technology. Our first research question aimed to gain understanding in the subjective perception of personal productivity. Our findings from 12 interviews with office workers confirm the subjective nature of productivity and reveal insights about the experience. We report on the counter effects of productivity, which are neglected by society. The feeling of being productive is commonly associated with success and satisfaction, whereas unproductivity is considered a failure. However, participants who learned to accept the unproductive time brought relief and calm to their wellbeing. Our second research question focused on the exploration of tangible design for re-framing unproductivity—meaning the acceptance and change of perception from negative to a positive experience. We presented RU, a device that embodies mainstream productivity thinking and plays with the idea of connecting and charging to motivate reflection on unproductive and self-care time. We held a second study with 5 participants for validating our design and evaluating the device in a real-world setting. This leads to the third research question that explored the use of the tangible technology. Our second study confirmed that RU motivated and encouraged reflection on self-care activities, enhanced awareness of the benefits and importance of self-care, and challenged our participants to add the new habit of dedicating time for self-care everyday. In addition, the outcomes of giving a tangible form to these abstract concepts resulted in a enlightening experience that challenges mainstream productivity thinking. This research demonstrates the great potential for using tangible design in shifting the negative conceptualisation of unproductivity towards a positive experience of self-care. Our work is an opportunity for the research community to engage in design explorations of topics that are commonly disregarded and ignored by society. This research also challenges the approaches taken in self-tracking solutions, which reduce human emotions to numeric values, and motivates to integrate qualitative methods for tracking subjective experiences. We also encourage designers to delve into other forms of design, as we explored tangible user interfaces for abstract concepts. In our paper, we tackle an everyday challenge by opening a new design space for productivity, and starting a discussion for raising awareness on the importance of self-care in everyday life.

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