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How Design Enhance the Situation Switching Process in Individual Teleworking

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Master of Arts thesis abstract

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Abstract

Teleworking is gradually being applied on a large scale in organizations in China because of the epidemic. At the same time, it is changing from an urgent need to a new normalized office scenario as organizations collaborate more across geographies, reduce staffing costs and improve support related to teleworking. In teleworking, individuals communicate with the organization through multiple electronic devices in a private, non-fixed location to complete work tasks. Compared with office work, teleworking makes personal life and work more closely connected in time and space dimensions. On the one hand, this means that teleworkers can be flexible and fully engaged in their work and leisure activities. However, on the other hand, it also leads to considerable negative effects, such as constant stress due to the confusion between work and non-work time, easy distractions due to the interruption of personal matters, and feelings of overwhelm due to reduced direct social interaction. Undoubtedly, how to help people establish a positive teleworking state to better facilitate good personal work-life interaction is an issue worth investigating.

This thesis takes the perspective of "situation switching" in individual tele- working, aiming to explore the possibility of helping teleworkers to better transition between different categories of situations in the multi-activity scenario in individual teleworking and thus help them establishing a better personal state.

The research in this thesis is divided into two phases. The first phase is the study of the categories of situations in teleworking, which is developed from the perspective of situations defined by the subjective psychological characteristics of teleworkers in this thesis. By coding and analyzing the raw data, the situations in teleworking are classified into eight sub-situations under three different level of concentration requirements. Further, situation switching process in telework is discussed in two categories: entering and leaving formal working states, and situation switching that occurred during formal work hours with concentration switching as the main feature.

The second phase of the study is an examination of the cues that support, represent, and influence teleworkers to switch between situations. By examining the behavioral motivations of teleworkers and the objective stimuli in the work environment that constitute the situations, this study summarizes the cues at both task and environment levels.

Based on the study of situation switching in teleworking and the cues that influence the process, a situational adaptive design strategy is proposed in this thesis. Its main advantage is to determine the situation by recognizing the individual's tasks and activities in teleworking, and thus create and switch various cues in the work environment to positively influence the individual's concentration and personal state. Three ambient cues - sound, light and smell - are used in the design strategy. By dynamically adjusting the three cues, the design strategy is able to flexibly and proactively respond to the switching process between different situations, thus helping teleworkers to meet the different requirements of personal state regulation.

The thesis concludes with a discussion of the practical implications, limitations, further research and personal reflections to declare the value of the research and the possibility of future development.

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Keywords teleworking, situation switching, concentration, personal state, distraction, psychological characteristics

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01

INTRODUCTION

The first chapter introduces the theme and background of this thesis, including the development of teleworking in China and the necessity of forming positive personal state in teleworking. The thesis is positioned by exploring the formation of positive personal state from the perspective of situation switching, and propose a design strategy to help individuals easily switch their personal state in teleworking. This chapter introduces the research questions and objectives to show the direction of the work. Finally, the structure of the thesis is demonstrated.

1.1 Relevance of the topic

The outbreak of the epidemic has affected people's normal lives, while also brewing new opportunities. Ever since the COVID-19 outbreak in 2020, a large number of office workers have been restricted from working offline and need to work and collaborate online. This condition forced organizations worldwide to rapidly embrace teleworking practices, though many were ill-prepared for this sudden transition.

This research is carried out in the context of the current development of teleworking in China. Teleworking is a relatively new concept in China. For most organizations, they do not take large-scale and long-term teleworking as the normal. The vast majority of teleworkers are experiencing intermittent teleworking due to epidemic isolation.

However, it is undeniable that teleworking, significantly popularized by the epidemic, is changing from an emergency need to a new normalized office scene. On the one hand, international cooperation in more organizations has been strengthened, which means remote collaboration office between local teams and overseas talents is becoming increasingly common. On the other hand, for the purpose of reducing office costs and providing office workers with greater freedom, more and more companies are choosing to allow their employees to work remotely. Even after the pandemic, teleworking is likely to be a permanent fixture in the future of work.

The popularization of teleworking not only brings new challenges to the operation and management of organizations, but also has a significant impact on the individuals. This new and flexible work mode will change people's office behavior and attitudes to some extent.

Firstly, teleworking turns people's living places into spaces for work purposes, which means that the office and life of teleworkers are highly integrated in time and space, allowing multiple personal states occur in the

same scene.

In addition, teleworking makes the workspaces more digital and portable，which in turn means that it has lost many of the features that help people build their working state in traditional office spaces. At work, people have different physical and psychological states depending on their main goals and activities over a certain period of time, such as independent work, interpersonal communication, in-team collaboration, relaxation activities, etc. In the teleworking scenario, these activities are almost completely online.

Thus, here comes a question that, when entering the working state becomes a simple software launch and the switching between tasks is just opening and closing different online office tools, can people still be able to easily and quickly adapt to new tasks, stay focused, communicate effectively, or return to their leisure life? If we just provide people with a very efficient office tool to achieve the purpose of the work and ignore their subjective feelings and experience in the dynamic process of teleworking, it is likely that teleworkers will become more like machines which will inevitably lead to negative individual states. Therefore, there is little doubt that how to help people build a positive and fluid telework state to better facilitate the development of new work experience is a worthwhile research question.

Current design research on individual teleworking has mainly focused on home office workspaces, efficient collaborative tools, and healthy office furniture, but little has been done to explore how user behavior between situations can be examined to enhance the personal experience. This research will take the perspective of “situation switching” in individual teleworking and aims to identify how design can facilitate this process to help teleworkers better transform between different situations in this multi-activity scenario, thus exploring the possibilities of building better personal state in this new office norm.

1.2 Research Questions and Objectives

The research explores the switching of personal states in teleworking from the perspective of situation switching. The first phase of the research situationizes teleworking by examining teleworkers' psychological and behavioral motivations as well as their subjective perceptions of situations in different tasks and activities. The second phase of the research identifies cues that have an impact on the process of situation switching in individual teleworking by examining objectively quantifiable situational information. The goal of these two phases of research is to propose a situation-based design strategy that helps individuals easily switch personal states during teleworking by creating or switching different cues. Thus, help them to achieve desired goals and enhance positive experiences during "situation switching".

The research is organized to answer the following Research Questions (RQ) and Sub-questions (SQs):

RQ: How design enhance the situation switching process in individual teleworking?

• SQ1: What kind of “situation switching” exist in individual teleworking?

• SQ2: What are the main psychological factors that affect the individuals’ perception of the situation?

• SQ3: What are the most different characteristics between the situations?

• SQ4: What motivates people's behavior during situation switching in individual teleworking?

• SQ5: Which cues can have influence on the transition of personal state between different situations?

• SQ6: How can these cues be integrated into design strategy to enhance the situation switching process in individual working?

The Research Objectives of this thesis are to:

• Identify how different types of activities and tasks in teleworking can be classified into several typical situations, what are the main characteristics of these typical situations and how does the process of situation switching occur between these typical situations

• An exploration process oriented towards psychological characteristics and behavioral motivations in order to understand the individual's subjective perception of the situation and the switching of individual states between different situations

• Gain insight into the cues that have an impact on the switching of personal states between situations

• Propose a situation-based design strategy to influence teleworkers' psychological states and behaviors through cues, thus offering new possibilities for positive personal states for teleworking from the situation switching perspective.

As shown in Figure 1, these research questions and objectives were addressed in the research through a four-stage process of understanding and development. Firstly, I investigated and generalized the different types of activities and tasks in teleworking and people's subjective perceptions of the characteristics of tasks and activities in teleworking through desktop research and questionnaires. The aim was to identify the characteristics that have the most significant impact on personal state. I initially defined that situations in teleworking could be categorized and discussed according to how one enters and leaves the working state, and how one switches between situations during formal working hours. I also constructed a profile of typical teleworkers based on the results of the questionnaire.

Next, I conducted user research through Diary Study and retrospective in-depth interviews to understand people's psychological characteristics, behavior and motivations during different tasks and activities. Psychological characteristics-related data was analyzed using two levels of academic coding and resulted in the situationization of teleworking. Psychological and behavioral motivation-related data were summarized together with the results of the examination of objective stimuli in the environment as cues that influence individuals' situation switching in teleworking.

Finally, I proposed a design strategy to support the process of situation switching based on a combined analysis of the situationization of teleworking and the findings of research on cues

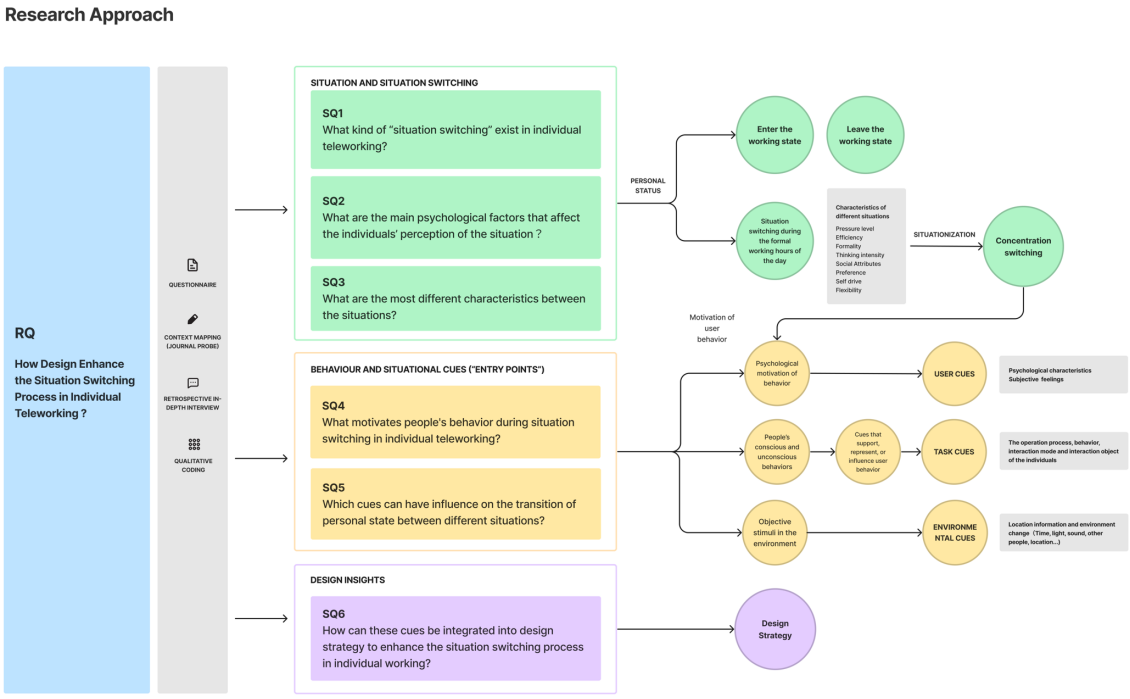

Figure 1: Research Approach

1.3 Thesis Structure

The thesis includes seven chapters. The introduction chapter starts by explaining the research value of the topic. It also outlined the research questions and objectives.

The second chapter introduces the literature background which includes the review of current research on teleworking, situation awareness， situation and situation switching, entry point and context information. This literature review gives a more rational explanation for the focus of of studying situation switching and helps me to structure my research framework.

Chapter three presents the methods used for conducting the research, from questionnaires, Diary Study, retrospective semi-structured interviews to thematic coding.

Chapter four describes the detailed research process. The insights of the questionnaire research, the construction of the typical user's profile, the hypothesis based on the questionnaire research results, and the specific data coding process are included.

Chapter five describes the key findings based on data analysis, including psychological characteristics of individuals in tasks and activities， the categories of situations and typical situation switching in teleworking, cues that influence the process of situation switching in individual teleworking.

The sixth chapter proposed a design strategy based on the research result. Design suggestions are presented to provide the users with a more positive personal state during situation switching in individual teleworking. Finally, the thesis concludes the limitations of the research, the practical implementation, the suggestions for the future research and personal reflection in chapter seven.

02
LITERATURE BACKGROUND

This chapter introduces the literature background which includes the review of current research on teleworking, situation awareness，situation and situation switching, entry point and context information. A framework for the research of situations and situation switching in individual teleworking is constructed in terms of both the psychological situation as subjectively perceived by the individuals and the objective situation as constituted by objective stimuli (cues).

2.1 Teleworking

The focus of the definition of teleworking, which is also called telecommuting, has gone through a number of stages of development. Nilles (1975) was the first scholar who proposed the concept of "telecommuting", which he regarded as work completed by employees outside the workplace. More specifically, Olson and Primps (1984) emphasized teleworking as employees working outside the traditional workplace and communicating with the business through telecommunications or computer technology. The interaction of telecommunication was then added into the definition by Gajendran and Harrison (2007). They defined teleworking as a work arrangement that allows employees to use electronic media to interact with others inside and outside the organization in a location other than their primary or central workplace.

Further, Messenger (2019) divided the concept of teleworking into three generations, based on Craipeau's (2010) evolutionary perspective: home working, mobile working, and virtual working. The home working concept focuses on the activities of the office workers in the home environment. Mobile working, on the other hand, makes the work become place-independent, which breaks down the two-tier structure of home office and traditional office. The virtual office emphasizes the accessibility of information anytime, anywhere. Office workers only need a smart device to access information stored in the cloud and on the web.

In addition to the definition of teleworking given by academics, some business sector actors have contributed their understanding of teleworking. According to Tang Peng, the founder of Digital Flag, teleworking can be understood as a three-stage process (“Can telecommuting break down urban spatial boundaries?”, 2020) . The first is SOHO (Small Office, Home Office), where the idea of teleworking came from writers, designers, and other freelance groups. These groups use teleworking because of the nature of their work. The second stage is SOMO (Small Office, Mobile Office), which is

characterized by the popularity of mobile internet and smart devices. This stage of teleworking does not only occur in a fixed or a closed space, but may be a home, a personal studio, or a mobile space such as a car. In this phase, the range of occupational types for teleworkers is slowly expanding, with freelance and fixed professions co-existing. The third stage is SOSO (Small Office, Smart Office), which is accompanied by the emergence of audiovisual collaboration tools such as Virtual Reality (VR) and Artificial Intelligence (AI). These smart technologies open up more possibilities for teleworking. Based on this, there is little doubt that more new professions will gradually emerge to provide the services required for teleworking in both digital and physical spaces.

Considering all the definitions and understanding of teleworking that were described above, this research will focus on teleworkers who work in personal environments (homes, personal studios and other non- traditional office areas) with the help of personal computers and collaborate with other people online. The different situations in the teleworking environment and the personal status of the teleworkers are the main focus of the research, rather than the content of the office. Therefore, the research has no obvious restrictions on the type of occupation of the teleworker.

2.2 The impact of teleworking on individuals

Current research on the state of the individuals in teleworking mainly concentrated under the fields such as management, social science, and psychology. A number of studies have shown that teleworking, as a non-traditional way of working, affect individuals both positively and negatively, which are of value in guiding my initial exploration of the potential physiological and psychological state of the teleworkers. The effects can be divided into the following four main aspects:

First, teleworking allows individuals to work in a more flexible pattern, which presents a dual impact on individual productivity. On the positive side, teleworking has been shown to be associated with a greater sense of control and flexibility (Huws et al., 1990; Maruyama & Tietze, 2012; Tremblay, 2003) which is linked to mental health well-being (Thompson & Prottas, 2006). In addition, teleworkers experience fewer distractions (Bailey & Kurland, 2002; Haddad et al., 2009), thus leading to more progress towards goals, a frequently recognized source of positive emotions. However, from the other point of view, teleworkers are likely to face special disruptions such as from their home activities. Avoiding distractions is important to promote their working effectiveness (Grant et al., 2013). Another factor that may cause negative impact on productivity is procrastination, which has been shown to be associated with a failure of self-regulation in teleworking. The key causes of greater procrastination were found to be greater online laziness and lower self-perceived performance (O'Neill et al., 2014) .

In terms of schedule management, teleworking allows the personal activities and work of individuals to occur in the same scenario, thus facilitating both to influence with each other in the time dimension. On the one hand, flexible schedules in teleworking have been shown to encourage workers more easily and fully engage in both their personal lives or work (Pedersen & Jeppesen, 2012). However, on the other hand, it has been demonstrated that online teleworking causes confusion between work and non-work time, leaving employees unable to psychologically disengage even during their personal time outside of work, which has serious implications for their physical and mental health (Dettmers et al., 2016).

When it comes to the relationship between work and family life in teleworking, these two spheres can permeate each other, which brings both integration and conflict. The positive aspect of this relationship is that online teleworking strengthens work-life connectivity and widens the boundaries of the family, making them more permeable and resilient (Leung, 2011). However,

the interpenetration of the two can also produce negative conflicts in time, space and personal activities. In these issues, boundary management strategies that encourage employees to separate work and family was considered to be helpful in reducing home-work conflicts for teleworkers (Kossek et al., 2006).

Change in social connections is also an unavoidable issue that teleworkers face. As traditional face-to-face communication is replaced by online communication, teleworking can easily lead to a lack of belonging among employees due to too little direct group contact. Research has identified work as a primary source of connection to others and a way for individuals to satisfy their sense of belonging (Baumeister & Leary, 1995). However, special effort may be required for teleworkers to maintain an social identity in the their working contacts, especially for those who telecommute frequently (Thatcher & Zhu, 2006). In order to improve this situation, individual teleworking participants may construct other social connections outside the working context to build their sense of belonging (Ammons & Markham, 2004).

2.3 Relevant research on situation

2.3.1 Situation Awareness

The research on situation awareness of human beings comes from cognitive psychology and is represented by Endsley's three-layer model of situation awareness.

Endsley examines situation awareness from the perspective of information processing: “the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future.” (Endsley, 1988) This concept is the basis of the theoretical model of human situation awareness. The three-

layer model divides the process of situation awareness into three stages: perception, comprehension and projection.

Based on the three-level model, Endsley presents a theoretical model of human situation awareness through a systematic study of situation awareness theory, information processing and situation awareness evaluation. The model suggests that situation awareness is a prerequisite for people's decision-making and implementation stages. Based on the situation, the subject can decide how to process and perform certain necessary actions.

Endsley's model of information processing for situation awareness suggests that situation awareness relates to dynamic, evolving situations and that the content of situation awareness differs from static knowledge in long term memory. Therefore, a true measure of situation awareness should emphasize only the dynamic and changing elements of the environment. Thus, Smith and Hancock build on Endsley's interpretation of situation awareness as a constant of the 'person-environment' system that generates the momentary knowledge behaviors of operators in the environment in order to achieve goals (Smith & Hancock, 1995).

The above research suggests that all human awareness activities have a situation-dependent process of adaptation and interpretative construction. People's awareness is dependent on the situation. The surrounding environment actively participates in people's awareness and has an impact on their behavior. Studying users' situation awareness is a process of studying the interrelationship between the user, the task and the environment at the core of the user and how they fit together. Thus the situationization of awareness is of universal significance.

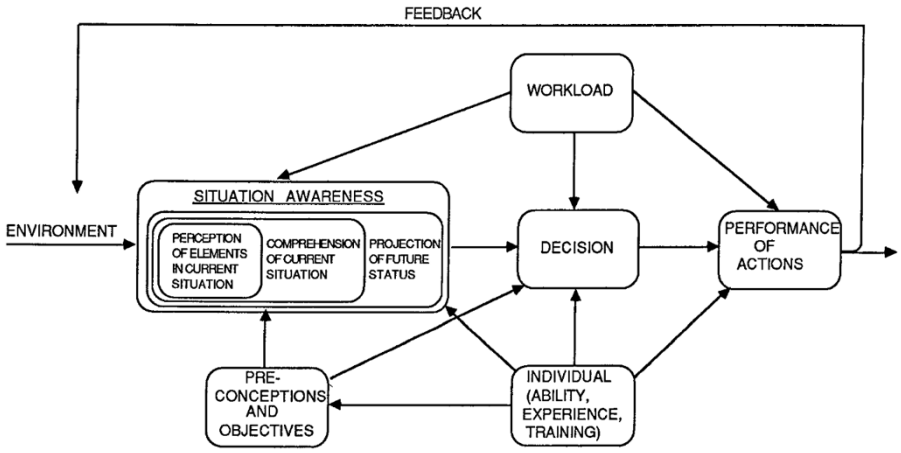

Figure 2: The three-level model of situation awareness (Endsley, 1988).

2.3.2 Situation and Situation Switching

In situation-related research, many definitions of situation have been proposed. In social psychology and other fields, defining what exactly is a situation has always been a tricky issue (Huws et al., 1990; Maruyama & Tietze, 2012; Tremblay, 2003). It has been concluded that "the conceptual status of "situations" is a mess, . . . there is little agreement about how to define situations, there is no widely accepted taxonomy of situations" (Hogan, 2009, p. 249). A coherent way of conceptualizing situations is to identify the different kinds of information they provide (Rauthmann et al., 2015). From this angle, situations can be seen as fleeting, dynamic, and momentary set of circumstances which are neither a person's own mental processes nor behaviors, but in their surroundings (Rauthmann & Sherman, 2020). Three levels of situational information are identified:

> "The situation consists of objectively quantifiable stimuli called cues (e.g., illumination, temperature, noise, persons in a room, trees, animals, books) that may be perceived and interpreted by a person, yielding psychological situation characteristics (e.g., whether work needs to be done, how intellectually stimulating a

> situation is). Different situations may be grouped together into classes (e.g., medical situations, travel situations, happy situations) on the basis of the similarities among their cues and characteristics. Thus, different kinds of situational information—cues, characteristics, and classes—provide a lens to define situations."(Rauthmann & Sherman, 2020， p.1).

As the situation itself can be defined and studied, the switching between different situations has also been given considerable attention. Rauthmann & Sherman (2016) has declared the importance of focusing on the process of situation switching. For the purpose of predicting people behavior, how situations change should be considered as an essential aspect, as a certain amount of information about the state of people can be explored by examining the types of situation change. Based on the three kinds of situational information that been presented, "situation change may be studied according to whether (or to what extent), when, how, and why cues, characteristics, and/or classes change" (Rauthmann & Sherman, 2016, p.4).

Situation switching can also be explained in terms of the change of motivation and goals. "Situations may change, in part, because people change their momentary goals, intentions, and strategies" (Rauthmann & Sherman, 2016, p.15). According to Yang et al. (2009), situations can be understood in terms of the content of people's goals and the process of reaching the goals. People's goals may not only shape the way they perceive situations, but also how they respond to them. Thus, the motivational processes (such as goals, needs, and motives) play a key role in the underlying processes of situation change. It has also been demonstrated that focusing on people's persistent and momentary goals is valuable for studying situation change because they can shed light on the reasons why people try to maintain or change a situation in the first place, such as expectations of the outcome (Rauthmann & Sherman, 2016).

Furthermore, studies show that people can actively respond to situation change and shape it to certain degrees. While situations can change independently of one's subjective state, people can also navigate, influence, and shape situations to some extent ,not just passively or randomly "in front of" them (Rauthmann & Sherman, 2016). For example, in order to adapt to their needs and personalities, people are able to cumulatively optimize their environment during habitual or typical situational changes. Thus, in the long run, short-term situation changes may serve long-term developmental-psychological adjustment (Haase et al., 2013).

From the above literature studies, it is clear that situation can be defined from two perspectives as shown in Figure 3. On the one hand, people form situational awareness, develop a certain psychological state, and thus subjectively recognize the situation because they perceive and comprehensively understand certain elements of the environment within a temporal and spatial range.

On the other hand, objective quantifiable stimuli in the environment constitute the objectively existing situation. My research aims to define the categories of situations from the perspective of individuals' subjective perceptions, and then to investigate the switching between these different categories of situations. Therefore, the research of situation switching in this thesis can be divided into two stages.

In the first stage people's motivational processes (e.g., goals, needs, and motives), etc., are studied to discover for what psychological motivation people make subjective judgments about situations. The first phase of the research hopes to discover which situations exist in individual teleworking based on psychological characteristics.

Objectively quantifiable stimuli change in the different situations of people's subjective judgement. Therefore, the second phase of this research hopes to identify changes in these stimuli (referred to as cues in this thesis) by

examining in terms of if (or to what extent), when, how and why people's behavior and perceivable information in the teleworking environment change, in order to find which cues influence the process of switching between different categories of situations. Finally, these cues are integrated into a design strategy to enhance the process of situation switching in individual teleworking.

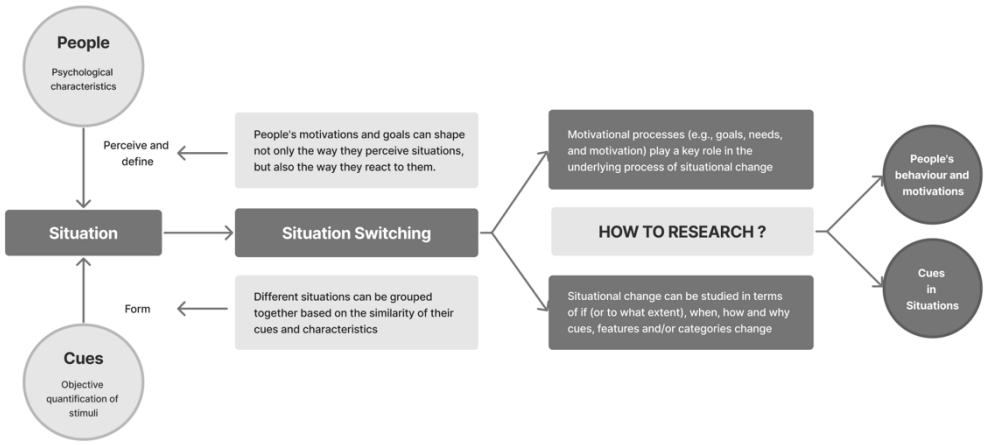

Figure 3: Situation switching process can be researched based on two aspects: the psychological and behavioral motivations of people, and the cues in the situations

In my research, the "situation switching" refers to switching in personal state and their surroundings due to inconsistencies in people's motivations, goals and main tasks over a fixed period of time. Individuals need to construct different personal states in different situations, and as a result, physical and psychological requirements arise. How to help users better realize the switching process is the focus of the research. Based on desktop research and personal experience, Figure 4 initially describe the different situations and possible switching process that exist in teleworking. In follow-up research, I conducted research to further define the typical situation switching process in individual teleworking.

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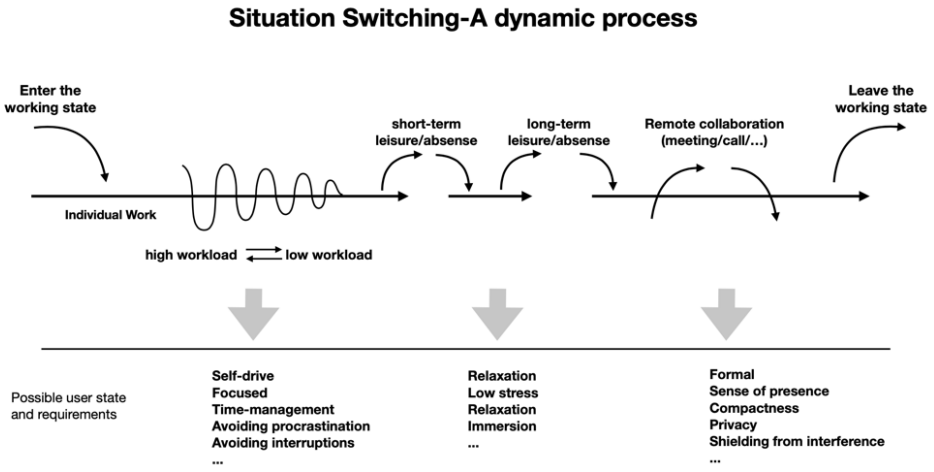

Figure 4: Preliminary defined situation switching in individual teleworking

2.4 Entry point

How to characterize the work environment, especially during situation switching, is a key issue in the research. In cognitive science and human-computer interaction research, a concept of "entry point" have been introduced by an emerging theoretical work of David Kirsh, which was aiming at understanding and improving the representations of work contexts from the theoretical perspective of distributed cognition. According to this approach, people often disperse some of the cognitive effort in performing the task into the environment and rely on them to better follow a certain path to complete the task (Hollan et al., 2000).

An entry point is defined as "a structure or cue that represents an invitation to enter an information space or office task" (Kirsh, 2001,p.311). As Kirsh

(2001) points out, entry points are much like affordances, that is, they invite us to do something, "typically information or communication related things" (p. 311). An entry point acts as a set of information that can encourage or prevent user engagement with a system, interface or environment, prompting them to take action based on the current states. The concept have been used to refer to the ways the structure of the environment or an interface can mediate interaction (Hornecker, 2005; Kirsh, 2001; Ryall et al., 2004).

Entry points has also been declared that should provide a teaser that is forewarned by the user, in other words, they must provide enough time and space for users to judge the choices they are about to make and fit reasonably into the context. In interactive tabletop environments, entry points can be environmental, physical, social, or digital structures (Hamdan et al., 2013).

"Users, in the course of working in their offices, create a collection of entry points and invitations to revisit work threads" (Kirsh, 2001,p.311) .The entry points present in the office scene have different characteristics that have impact on the way people perceive and react to them. The study declares that the first step in analyzing entry points is to start with the six key dimensions of entry point diversity, four of which are "objective" or irrelevant to the user and two of which are "subjective" or relevant to the user (Kirsh, 2001):

- Intrusiveness: How much attention can the cues at the entry point attract visually or sensorially? For example, special colors, unique shapes and tactile sensations of objects, sound messages and light all attract varying degrees of attention. Intrusiveness can help determine the probability of a user approaching that entry point.
- Metadata rich: how much information about the upcoming situation the entry point describe. Tags, titles, images, covers, etc. are all physical information that an entry point can contain. The more metadata

available at the entry point, the less memory the user needs to recall in order to start the next phase of activity.

- Visibility: how easy are the entry points visually accessible to the user to identify. For example, from the perspective of the physical office environment, a calendar or post note on a desk will be more visible to the user than a file in a cabinet. The more visible an entrance is, the greater its chances of being used.
- Freshness: how long ago was the entry point created or last perceived? Recency influences recall, thus makes the recently touched things such as papers, notes, etc., more likely to be retrieved for use in current activity.
- Importance: how pressing the activity or information, associated with the entry point, is. A due date or higher level of importance on the user's to-do list increases the probability of the use of the entry point.
- Relevance: how useful are the action paths suggested by the entry points for the current activity. The more relevant the entry point is to the activity, the more likely it is to be accessed.

These entry point characteristics build a better representation of the work context at a certain level, which allows us to better predict user behavior while providing guidance on identifying which cues play a role in influencing user behavior (Kirsh, 2001). Further, the concept of entry point is considered to show guiding value in design applications:

> "This reconceptualization potentially has more utility as a design concept insofar as it gives more clues as to what to do with it: encouraging designers to think about the coordination and sequencing of actions and the kind of feedback to provide, in relation to how objects are positioned and structured at an interface – rather than simply whether objects perse afford what to do with them"(Rogers, n.d.,p.11).

The concept was originally proposed in traditional offline office contexts and has been extended to understand shareability, facilitating the integration of people in collaborative systems (Marshall, Hornecker, et al., n.d.; Marshall, Rogers, et al., n.d.).

Entry point provides my research with a way of thinking about the cues that influence and draw people into a workspace. Quantifiable stimuli that people subjectively perceive in their environment can influence people's entry into a workspace, thus helping them to enter working state in an easy way. Previous research on the entry point in work context has also demonstrated the value of the research of cues in the work environment in my research.

However, in this research I am concerned with the process of situation switching which includes not only entry into the workspace but also situation switching during formal working hours. I would like to transfer the "entry point" conceptualized by Kirsh to the examination and analysis of the teleworkers' perception process during situation switching. So this research is based on the concept of entry point and extends this concept further from the perspective of drawing people into the next situation with different characteristics.

In the context of my research, entry points refers to the state of various digital and physical resources that influence the user's perception and prompt them to change their situation in teleworking, such as the layout of the physical working environment and the interactions between the teleworkers and the digital devices. By analyzing the digital and physical resources in the situations, the 'cues' in this research, it is possible to understand what objective factors influence people to switch between situations.

2.5 Context Information

Kirsh(2001) explored that how work environments are conceived and represented from a theoretical perspective of distributed cognition.

> "Offices are niches we inhabit and construct. Owing to our interactions over time we build up a system of supports, scaffolds, at-hand resources, reminders, and interactive strategies that help us to perform our tasks, cope with overload, and recover from interruption. When people enter our office we have a collection of physical and symbolic resources, such as whiteboards, corkboards, schedules, e-mail, Post-it® notes, day planners, speakerphones, video-teleconference units, desks, sheet paper, and of course computers, to facilitate discussion, coordinate our activity, and record outcomes. At any moment, the state of these resources sets the arena for the next round of activities. Their physical layout and their state partly constitutes the current context of work" (Kirsh, 2001).

The research abstracts the work environment and defines the invariant structures shared by variable office environments at three levels: entry points, action landscapes and coordination mechanisms, and constructs 'contexts of work'. A thesis about the office environment is stated: well-used workspaces have a deep structure. Any place that adapts to the ongoing workflow needs of the user will support those specific task needs by providing an underlying structure or context for the work.

'Context' is proposed from a computer science perspective to describe any information that arises during the execution of people's activities and operations and that affects the characteristics of entities and the process of interaction. A commonly used definition of context is the one proposed by Dey: "Context is any information that can be used to characterize the situation of an entity. An entity is a person, place, or object that is considered

relevant to the interaction between a user and an application, including the user and applications themselves."

While context is a concept proposed from the perspective of computer perception, it can be identified as a description of the various kinds of information in a given situation. The classification of contextual information in previous studies has greatly inspired my study from two aspects: identifying the differences between situations in individual teleworking, and dimensions of examination of cues that have influence on the situation switching of individual teleworkers.

For the classification of contexts, Schmidt et al. (1999)model contextual information from a human factors or user perspective as human-related contexts and physical environment-related contexts. Human-related contexts include: user information, social environment and user tasks. Physical environment-related contexts include: location, infrastructure and physical conditions. Jacek Gwizdka(2000) argues that the most basic way of classifying contexts is internal context, which describes the state of the user, and external context, which describes the state of the environment.

As shown in Figure 5, my research combines the above classifications and focuses on the collection and analysis of situational information based on an understanding of people's situation awareness process. The information that influence peoples' perception of situation and their situation switching processes in teleworking will be collected along three dimensions: user, task and environment.

A detailed description of the classification of examined situational cues is presented in Figure 6. There is little doubt that this concept is worthy of being adapted and extended in a non-traditional office work context, helping to create a framework for analyzing and understanding which cues influence people's transition between different situations (cues that support,

represent, or influence user behavior) and what factors can facilitate this process.

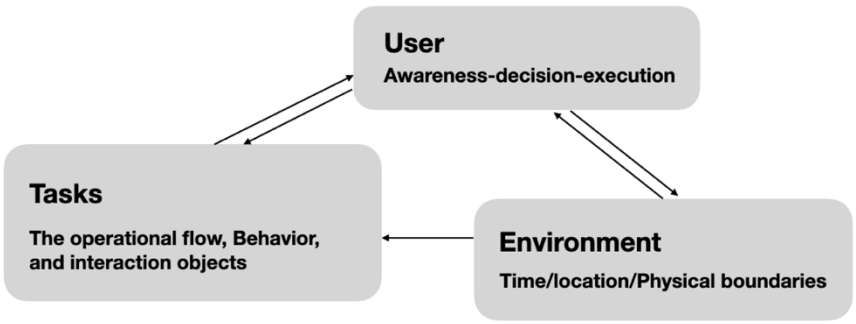

Figure 5: Dimensions of collecting situational information in different situations: user, task and environment

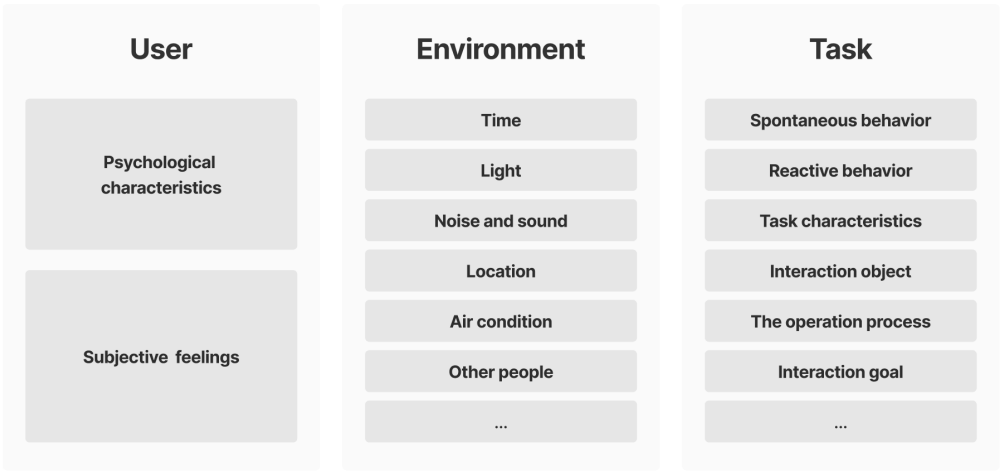

Figure 6: Examination of the cues in situations

03
METHODS

This chapter demonstrates a description of the research methods utilized in the thesis and the research materials. Questionnaire research, Diary Study, and retrospective in-depth interviews are used for user research. Thematic coding was used for analysis of the raw data. A total of 15 respondents participated in the Diary Study and in-depth interviews, and the data was analyzed through open coding and axial coding to reveal further insights.

3.1 Questionnaire

In the first phase of the research, I designed an online questionnaire that combined the results of desktop study and preliminary interviews with several respondents who had a significant period of experience working remotely. The questionnaire was used to discover several typical and high-frequency task and activity situations within the remote workday that people were concerned about, and to provide an initial understanding of the different situations that people may identify when working remotely.

In the questionnaire I collected extensive information about the situations and situation switching processes they experienced in their teleworking scenarios, as well as their main behaviors, feelings, perceptions and attitudes. The questionnaire played an important role in helping me to better capture some of the common activities in telework and the potential connection of these behaviors to people's attitudes toward telework. These facts are based on a certain amount of people's perceptions and attitudes about the issues involved in the research.

As shown in Figure 7, the questionnaire was mainly distributed to potential users who have teleworking experience. I collected information on six aspects around the working mode of teleworking through questionnaires:

1. Basic personal information: including the type of industry, as well as job and teleworking experience

2. Basic information about the repondents' teleworking day: including working hours, company requirements, and the main types of their work and leisure activities

3. Respondents' attitudes towards teleworking: including the difficulties they encounter, the positive and negative impacts of teleworking they can identify

on themselves, and the typical characteristics of work and activities in teleworking that they are concerned about.

4. The measures that respondents have taken to help themselves adjust to the 24/7 remote workday: including what basic strategies they have used to help themselves improve their individual experience while working remotely, which is different from going to the office to work, and what measures they have taken to help themselves better enter and leave the work state.

5. The respondents' tendency towards perceived physical conditions in the environment while work remotely: including the state of equipment they use, sound and light atmosphere, olfactory atmosphere, somatosensory atmosphere, etc.

6. The respondents' own personality traits: the recognition and judgment of the situation and the personality traits of the person have a certain correlation. At the end of the questionnaire, respondents were invited to self-evaluate their own personality traits according to the personality-work adaptation theory proposed by the American psychologist Hollander, as an auxiliary data to study the motivation of their behavior, their perceptions of different situations in teleworking, and their identification of the characteristics of the situations.

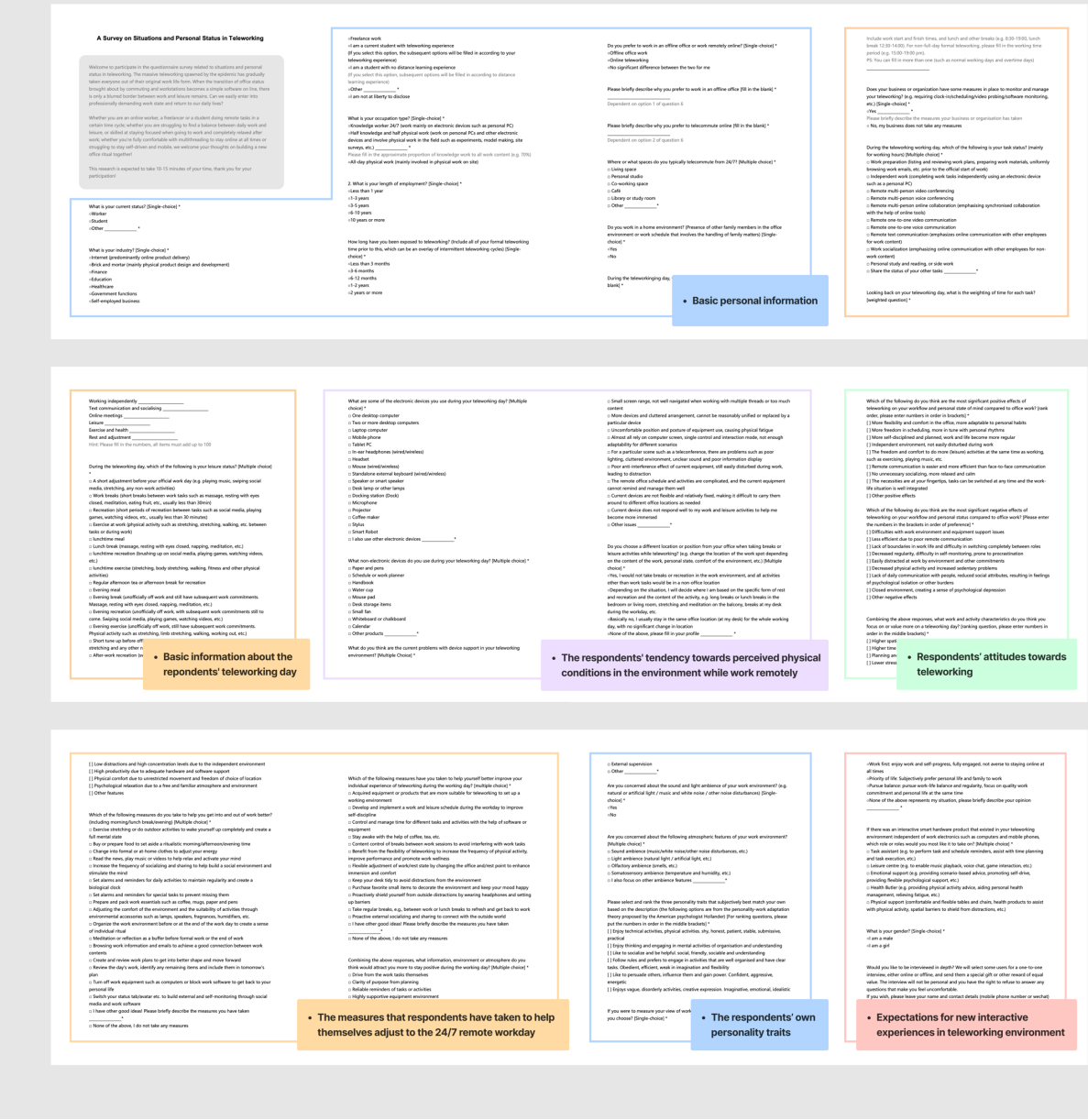

Figure 7: Themes covered in the questionnaire research

In total, I received 40 valid responses that met expectations. The responses collected verified the validity of the options for the objective questions in the questionnaire.The results related to the research as reflected in the questionnaire will be analyzed in detail in Chapter 4.1.

Another purpose of the questionnaire research was to construct a situation-based profile of typical users of individual teleworking and to screen interviewees for participation in the follow-up phases of my research.

Based on the results of the questionnaire, I selected 15 interviewees to participate in the follow-up research. From the comprehensive answers to the questionnaire, it can be seen that they meet the five screening criteria mentioned above and were willing to participate in the research.

The interviewees selected came from a variety of industries and positions such as UX designer, internet product manager, game platform developer, brand manager, financial property manager and user researcher, etc. They all had a considerable period of teleworking experience (more than 3 months) and were teleworking in China, which meant that I could conduct follow-up Diary Study with them. The interviewees were divided into four groups based on their work experience and teleworking experience, as shown in Figure 8.

The four groups of interviewees were those who were conducting distance learning and internships, had 0-1 years of work experience, 1-3 years of work experience, and people with more than 6 years of work experience. Correspondingly their time spent working remotely also differed.

Although my research is not specific to the content of the work tasks, I would like to explore what commonalities and characteristics the groups with different levels of familiarity with the work tasks have in relation to the switching between situations and personal states in the teleworking environment. Such a distribution of interviewees characteristics allowed me to better examine some generalizable and differentiated information in the research. And validity of this consideration was confirmed by the results of the follow-up research.

NUMBER	INTERVIEWEE	WORKING EXPERIENCE	TELEWORKING EXPERIENCE	OCCUPATION	TELEWORKING SPACE	RESEARCH BACKGROUND INTRODUCTION	DAIRY STUDY	RETROSPECTIVE IN-DEPTH INTERVIEW
1	INTERVIEWEE A	Student Distance internship 3 month	3 month	AI Research	Home Personal Studio	✅	✅	✅
2	INTERVIEWEE B	Remote Learning 6 month	6-12 month	Product Design	Home	✅	✅	✅
3	INTERVIEWEE C	Remote Learning 6 month Distance internship 6 month	12-24 month	Product Design Product Manager	Studio Dormitory	✅	✅	✅
4	INTERVIEWEE D	Student Distance internship 4 month	< 6 month	History and Theory of Design User Researcher	Home Co-working space Studio	✅	✅	✅
5	INTERVIEWEE E	Work for 0-1 year	<3 month	UX Designer	Home	✅	✅	✅
6	INTERVIEWEE F	Work for 0-1 year	3-6 month	Finance and Insurance Staff	Home	✅	✅	✅
7	INTERVIEWEE G	Work for 0-1 year	3-6 month	Game Planner	Home	✅	/ Dictation	✅
8	INTERVIEWEE H	Work for 0-1 year	3-6 month	Internet Platform Developer	Home	✅	/ Dictation	✅
9	INTERVIEWEE I	Work for 3 years	3-6 month	Brand Manager	Home	✅	✅	✅
10	INTERVIEWEE J	Work for 3 years	<3 month	Battery Tester and Project Manager	Home	✅	✅	✅
11	INTERVIEWEE K	Work for 3-5 years	3-6 month	UX Designer	Home Café	✅	✅	✅
12	INTERVIEWEE L	Work for 6-10 years	>2 year	Post doctor of Sinopec Safety Institute	Home	✅	/ Dictation	✅
13	INTERVIEWEE M	Work for 10 years+	>6 year	Sales Manager (Sweden)	Home Café	✅	✅	✅
14	INTERVIEWEE N	Work for 10 years+	12-24 month	Industry Manager (China)	Home	✅	✅	✅
15	INTERVIEWEE O	Work for 10 years+	>6 year	Spare Parts Manager	Personal Studio	✅	/ Dictation	✅

Figure 8: Basic information of screened interviewees

The follow-up phase of the research with the 15 interviewees followed a three-step sequence: introduction to the research background and the Diary Study, Diary Study and retrospective in-depth interviews. With the exception of four of the interviewees who, for special reasons, used multiple dictations to review and collect the data required in the Diary, all the interviewees successfully completed the self-recording and reporting as planned, helping me to gather detailed and realistic information about their activities in the teleworking scenario. The data obtained from the research and the results of the data analysis will be summarized in Chapter 4.4 and Chapter 5.

3.2 Diary Study and Context Mapping

Diary Study is a qualitative research method for collecting user behavior, activities and experiences. A diary study requires participants in the study to self-report over an extended period of time (several days, a month or even longer). During this time, research participants are asked to keep a diary and record specific information about the activities being studied. Diaries has been described as tools used repeatedly to examine ongoing experiences, providing opportunities to investigate social, psychological, and physiological processes in everyday situations(Hampton, 1944).

One fundamental benefit of diary study is that they allow reported events and experiences to be examined in their natural, spontaneous context, providing information that is complementary to that available by more traditional designs. Another is the significant reduction in the likelihood of retrospection by minimizing the time between the experience and the description of that experience(Reis, 1994). When conducting research with users, the longer the time between the event and the description, the more external factors (factors unrelated to the event itself) can influence their description of what has happened. Diary Study has been found to be more suitable for in-depth situationtual research around users than simple event descriptions(Nezlek, 2012).

The validity of a diary study design depends on detailed consideration of the questions sought to be answered. Three broad categories of research objectives can be achieved using diary designs: “(a) obtaining reliable person-level information; (b) obtaining estimates of within-person change over time, as well as individual differences in such change; and (c) conducting a causal analysis of within-person changes and individual differences in these changes”(Bolger et al., 2003).

The respondent's work environment is not easily interrupted or disturbed. I wish to avoid, as far as possible, that the presence of the researcher interferes

with the real activities of the teleworker under investigation. So my research uses Diary Study as the main user research tool. On the one hand, it avoids interfering with and disrupting the respondents' real lives, while delving into the real situation of their activities. On the other hand, it provides a way for the respondents to record the deeper details of their experiences and to reflect on their feelings. It helps me to understand the personal state transitions between different teleworking situations that occur in a real environment, as well as the perception process of the individuals. The rich information obtained by this method will, together with the results of the retrospective in-depth interviews, help me to clarify the user's current state and their expectation.

I designed a 13-page user diary for this study, inviting each respondent to record their activities and thoughts during a week of teleworking based on the prompts in the diary, focusing on details that are easily overlooked in order to gather richer and more convincing information. I guided the respondents through a structured process of recording and reflecting on their teleworking schedules and personal state switching process.

As shown in Figure 9, the diary was designed to allow me to build perceptions and generate ideas with the respondents together in the following areas: behavioral variables, characteristics of tasks and activities, typical situations, desktop and environmental feature, subjective feelings and reflections. The detailed content of the diary is included in the appendix.

Figure 9: Dairy Study as the main user research tool

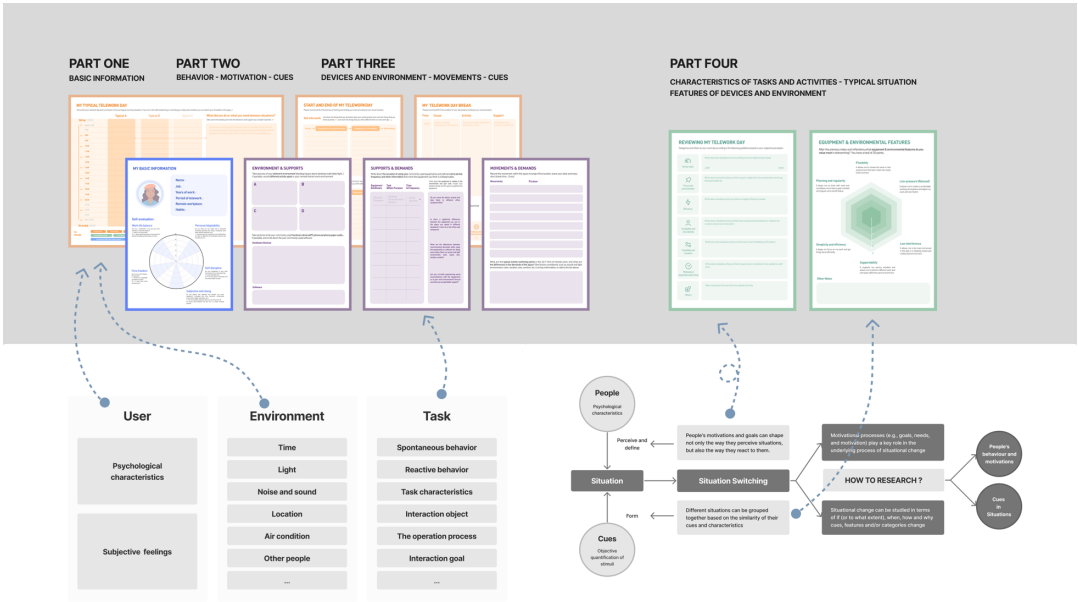

Figure 10: Design of diary structures based on theoretical research

As shown in Figures 9 and 10, in terms of structuring the diary, I divided the data to be collected into a total of five main sections and arranged the sections to be filled in the diary according to different levels from representations to reflections. I used different color to distinguish the different themes in the diary so that the respondents were aware of the differences between the various data collection dimensions.

In the first part of the diary (in blue), I wanted to collect basic information about the respondents' teleworking, such as the time period and workplace. I also invited the respondents to self-evaluate their teleworking on five dimensions (life and work balance, personal adaptability, time flexibility, self-discipline, and subjective well-being) using a scale. These self-assessments were discussed with the respondents in the in-depth interview to understand their overall attitudes and feelings towards their teleworking.

In the second section of the diary (in orange), respondents were guided to record specific actions and activities during their teleworking day in time order, summarized as their typical teleworking day. If respondents were in the

habit of planning or recording their daily work schedule, I also invited them to attach their schedule to their diary.

In this section, I particularly prompted them to focus on two parts: their emotional and psychological state, and on what they did between each two tasks or activities to help themselves better adjust and switch their personal state. They were also requested to mark the behaviors, equipment or environmental support they found necessary. This section helped me to obtain detailed data from a behavioral perspective, to understand the respondents' self-judgement of their state and situation switching, and to gain some insight into their goals and motivations for each activity. With this data, I was able to make some initial judgements about typical psychological situations.

In addition to the daily recording of schedules, I collected separate data on the details of the activities in which the respondents entered and left work, as well as on the breaks between tasks, as identifiable points of situation switching. I guided the respondents to record the process of starting and ending their daily teleworking, as appropriate, including a list of what they did to prepare for their personal state and to prepare for the work task before starting the work schedule and before ending the work schedule, as well as marking the processes that they considered essential and different from going to the office. For the breaks during the working day, I asked the respondents to record when and why it happened, what activities they did in the break and what they did when they returned to work from the break. The respondents were also asked to reflect on which benefits of the break they were most concerned about.

In the third section of the diary (in purple), I wanted the users to record what they perceived to be the feature of the equipment and environment in the teleworking space. First, I invited the respondents to collect their work environment by taking photographs of their desktops and the surrounding space as well as recording the specific environmental conditions at different points of their activities in the remote (home) working environment. In addition, I

asked them to highlight their commonly used hardware devices and products (computers, phones, headphones, paper, stereos, aromatherapy, humidifiers, etc.) in the form of text or pictures (shown in Figure 11).

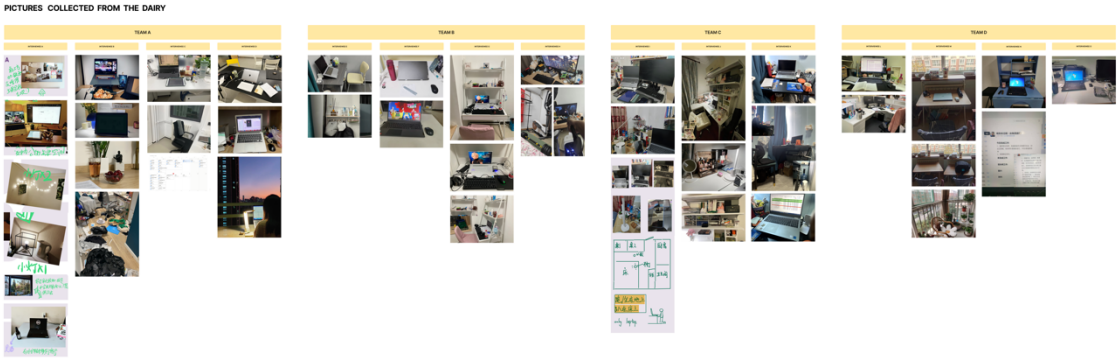

Figure 11: Pictures collected from the Diary

Respondents were also invited to reflect on the relationship of the equipment to the environment and their activities, and were asked four questions.

• Do you move equipment around and take it to different office locations? Why?
• Is there a clear difference in the equipment or space you use in different scenarios? (e.g. when in the office and when at leisure?)
• What are the differences in environmental requirements (e.g. sound and light environment, colors, size of space, location, comfort) when using equipment or software for certain specific tasks?
• Are you currently experiencing any inconveniences with your equipment or work environment? How do you think you could be better supported?

These answers were discussed with the respondents in subsequent in-depth interviews, which were used to uncover cues on the device and environment level that influence the situation switching that occurs in individual teleworking.

In the fourth section of the diary (in green), I guided the respondents to review and summarize their teleworking activities from different aspects of psychological characteristics and environmental features in terms of what they have recorded. According to the research approach of situation switching outlined in Chapter 2.3.2, situations can be identified and constituted on two levels. Firstly, the situations people perceive and how they will react to them are based on their motivations and goals, and motivational processes (e.g., goals, needs, and motivation) play a key role in the underlying process of situation switching. This allows people to define situations at a psychological level. So in this section of the diary, I first guided users to categorize and rank their activities and tasks in teleworking according to five dimensions: concentration and relaxation, stress state, social attributes, self-drive, and efficiency. I aimed to sort through the different situations they identified, and to group activities and tasks with similar psychological attributes into the same category. Secondly, situation is constituted of objective quantifiable stimuli (i.e. cues), whether task-related, environment-related or related, which are perceived to be real and tangible in the situation. So I also guided the respondents to rate the overall characteristics of the equipment and environment they paid attention to in terms of flexibility, rhythm (concentration and relaxation), planning and regularity, simplicity and efficiency, immersion, and support. Thus understanding the personal state they would most like the perceived cues in their teleworking environment to help them develop, and what overall features of the equipment and environment they would most expect.

The happiness and frustration wall were included in the last part of the diary. I wanted a relaxed and more flexible way for respondents to record anything that made them feel unhappy or troubled, as well as anything that made them feel happy and joyful, at any time during the teleworking day. The hope was to collect data on pain points and emotional peaks in teleworking. I also guided the respondents to imagine their expected teleworking day and wrote down or draw any ideas they have. The data collected during this session of

understanding user expectations and co-creating inspiration was also discussed in depth with the respondents during the interview.

Before conducting the diary study with each respondent, I individually arranged a time with them to introduce the diary via online one-to-one session, including the main structure of the diary, how to fill it in and the main goal of the diary study (see Figure 12). Through this session I clarified my research topic and highlighted what needed to be paid more attention to in the diary to ensure as much as possible that the respondents completed the diary in the way they were expected to. And I also reached an agreement with them to ensure that the data filled in the diary is recorded at any time while working remotely so that it is true and effective. During the one week diary research process, I monitored the progress of the respondents in a two-day cycle to remind them to keep recording at any time during the workday.

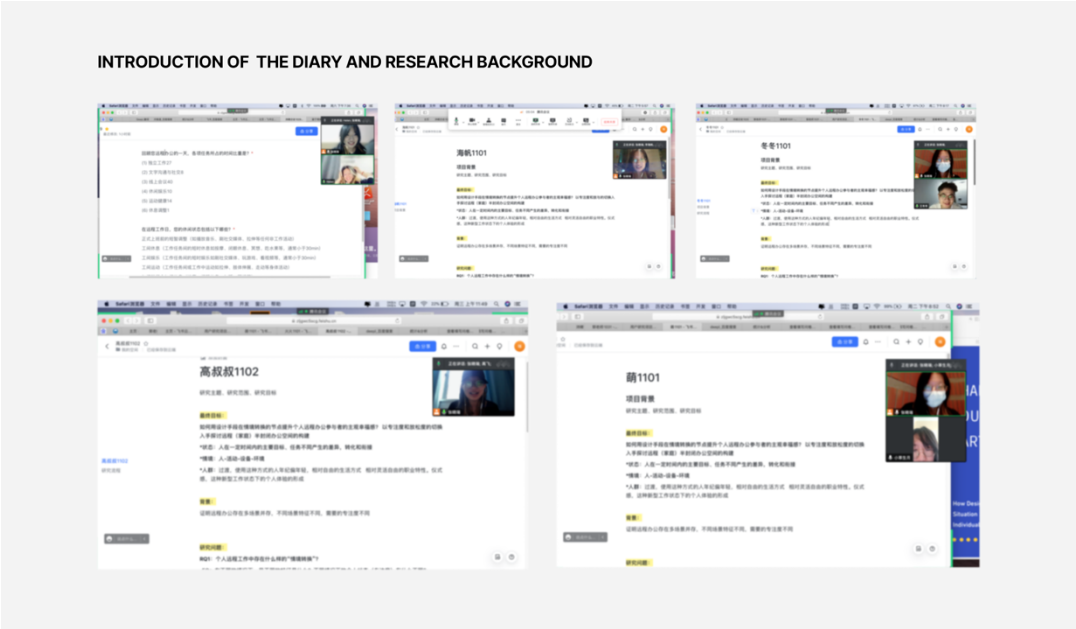

Figure 12: Introduction of the Diary and the research background through online meetings

Figure 13 shows an example of a diary filled in by a respondent during five days of work. The specific content displayed on these pages is included in the appendix. According to the inspection of the contents filled in the diary, I

think the data collected by the diary is basically in line with expectations. In the follow-up interview, I modified the outline of the semi-structured interview according to the specific condition of the diary filled in by each interviewee, hoping to achieve the maximum richness and depth of information collection.

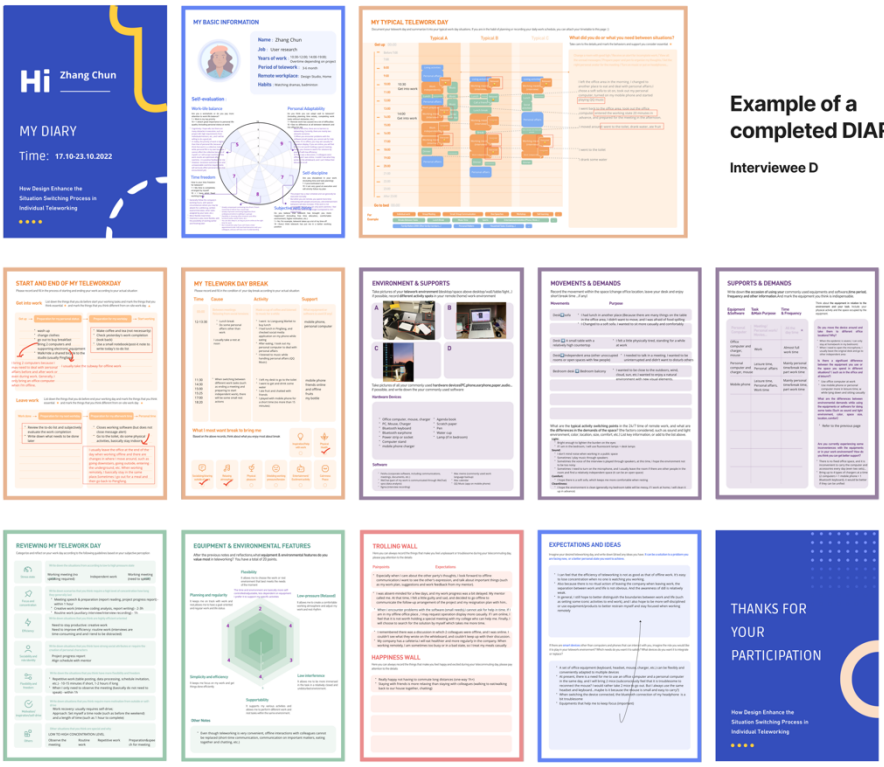

Figure 13: Example of a completed Diary

3.3 Semi-structured interview

Semi-structured interview is a type of interview in which the interview questions are prepared in a coherent, systematic and progressive manner targeted by identified themes, gradually eliciting more detailed and in-depth responses. It is a flexible and effective method for researchers to obtain a more complete picture from the interviewees, including not only superficially

visible behaviors and attitudes, but also necessary and often hidden motivations of human and organizational behavior(Qu & Dumay, 2011).

The semi-structured interview I conducted in the research was a retrospective in-depth interview based on the qualitative data in the diaries filled in by the interviewees (see Figure 14). The one-on-one interview with each interviewee last for 1-1.5 hours. The interview process was mainly divided into two parts. The first part was about their answers in the questionnaire. Questioning mainly focused on the objective question options they chose to understand the reasons that affect their choices and more detailed information behind the options. In the second part I asked questions around the data they had self-recorded in their diaries and explored with them the possibilities for idea generation. Before each interviewee's in-depth interview, I reviewed the content of the online questionnaires and diaries they had completed, and constructed connections between the information from the different research sources. I paid more attention to the data showed to be strongly relevant to the research questions, as well as information that was found to be very interesting.

In the interviews, the order of my questions is roughly consistent with the structure in the diary, mainly inviting interviewees to share more details about the content they have filled in from the four perspectives of equipment, space, activities & tasks and personal state. The data I focused on were users' psychological perception of the characteristics of tasks and activities, as well as cues that affect their behavior presented in space and devices. Compared with the intuitive record of activities in the diary, I would like to further explore the interviewees' "why they do this" and "what factors support, represent or influence their behavior" through interviews

First-hand qualitative data from the interviewees helped me to understand people's subjective perceptions of teleworking situations and the cues that influence individual state transitions, which was the main goal of the two research phase.

The data collected from the interviews will be analyzed in Chapter 4.3 along with the data collected in the diaries.

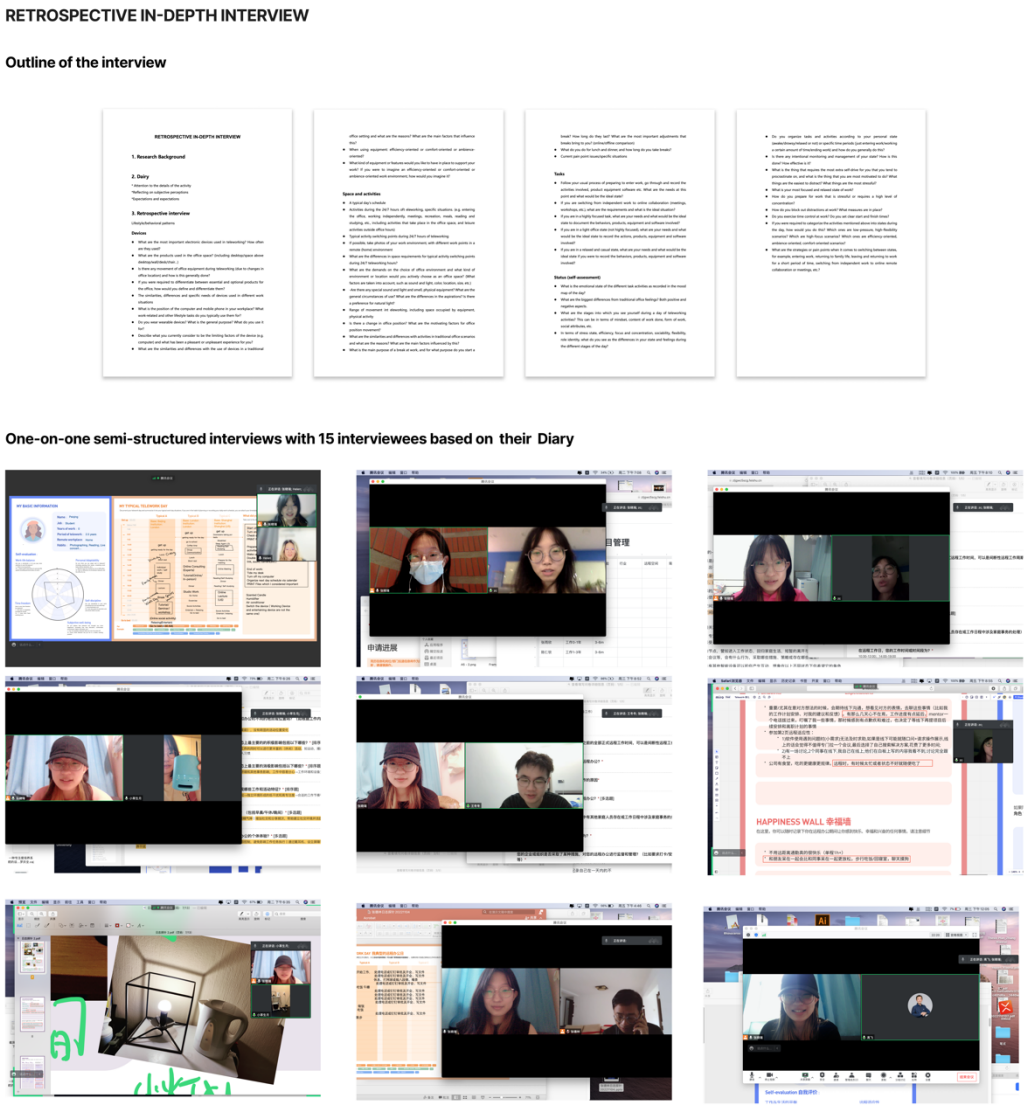

Figure 14: Retrospective in-depth interview with 15 interviewees

3.4 Thematic coding

Thematic coding is a method of qualitative research. Coding is a way of defining the data being analyzed as well as a method of indexing or classifying text with the aim of establishing a framework of thematic ideas about it. It involves identifying and recording one or more paragraphs of text or other data items. When using this method, multiple passages are usually identified and then associated with the name (code) of the idea(Gibbs, 2007).

In this research, open coding and axial coding were used as methods in the data analysis phase，drawing on the first two levels of coding in Grounded Theory.

Grounded Theory (GT) is an approach to qualitative research under the field of social sciences(Strauss, 1987). Its main goal is to build a theory from real empirical data, i.e. to find the core concepts that reflect the essence of a phenomenon based on a systematic collection of data. The researcher generally begins the study without assumptions about expected theoretical output, but starts directly with actual observations, draws empirical generalizations from the primary sources and then summarizes the systematic theory.

In Open Coding, the researcher requires an open mind and tries to remain as objective as possible. The researcher breaks up and assigns concepts to the information collected and then puts it back together in a new way. The aim is to discover conceptual classes from the data, to identify the attributes and dimensions of the classes, and then to name and categorize the phenomena under study. The process is similar to a funnel, starting with a wide range of data collected and the range of genera found, and then continually narrowing this range(Strauss, 1987).

In Axial Coding, however, the researcher's main task is to discover and establish links between conceptual genera in order to discover and explore the connections between the various parts of the data. In Axial Coding, the

researcher analyses one category at a time in depth, looking for correlations between the data around that one category, hence the term 'axial'. As the data is analyzed in depth, the links between the various categories become more and more concrete and describable. In addition, when coding and analyzing the axes of conceptual categories, the researcher must not only consider the connections between the categories themselves, but also explore the intentions and motivations of the people who express them, placing their words in their context and the socio-cultural background in which they are embedded(Strauss, 1987).

This research aimed to identify the situation categorization and situation switching process in teleworking based on typical psychological characteristics by open coding and axial coding of raw data from 15 respondents.

Through open coding, the research found that concentration is a characteristic that allows for a general overview and classification of the respondents' personal state. Therefore, the research of situation switching in individual teleworking can take concentration switching as the main perspective. Through axial coding, the research situationized teleworking tasks and activities using concentration as a lens. The situations based on the psychological characteristics of the tasks and activities was classified into three categories of eight: the concentration level of the situation and whether the teleworker could be distracted or actively distracted. The specific process of coding the raw data will be shown in Chapter 4.3.2 and 4.3.3.

04

RESEARCH PROCESS

This chapter describes the detailed research process. The important hypothesis of this research was constructed from the results of the questionnaire: concentration can be seen as a psychological characteristic that generalizes almost all tasks and activities in teleworking. Thus it is feasible to categorize situations in individual teleworking in terms of concentration levels. This hypothesis was further validated by a two-stage coding process. The results of the coding present conclusions for the situationization of individual teleworking. At the same time, the typical psychological characteristics of the tasks and activities associated with concentration were identified.

4.1 Insights from the questionnaire research

As described in Chapter 3.1, in the first phase of the research, the questionnaire was used to identify several typical and high-frequency task and activity situations within the teleworking day that people were concerned about, and to provide an initial understanding of the different situations in teleworking that people could identify. At the same time, some of the obvious activity and task switching, both of potential situation switching, can be identified based on the strategies that people have already adopted to improve their personal state in teleworking collected by the questionnaire. Based on the length of time the questionnaire was completed and the quality of the data collected by the questionnaire, 38 valid questionnaires were collected from teleworkers who met the expectations. They were all knowledge workers with certain (no less than 1 month) experience of working remotely 24/7. And they work independently in a fixed space. In the subsequent description of the insights, the research tends to divide the behaviors performed by teleworkers during the working day into work oriented "tasks" and non-work oriented "activities".

4.1.1 Main types of tasks and activities in individual teleworking

According to the results of the questionnaire, the type of task that takes up the most time of the working day for teleworkers is independent work (37.21% in total). This was followed by online meetings and other online communication related to work tasks (15.97% and 17.42% respectively). The main types of activities during the teleworking day included entertainment activities, sports & exercise, and rest. (see Figure 15)

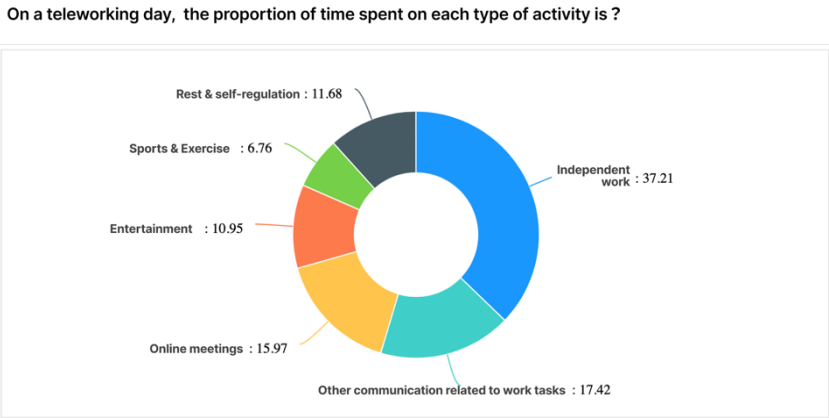

Figure 15: The proportion of time spent on a teleworking day

Specifically in terms of the type of work task, the majority of respondents (more than 55%) responded that they would carry out (see Figure 16):

- Work independently (use PC and other electronic devices to complete work tasks independently)
- Work preparation (list and review the work plan, prepare work materials, check the work email, etc.)
- Multi-person audio meeting
- Text communication (emphasis on online communication with other employees on work content)
- One-to-one voice communication

Multi-person video meeting， networking (online communication with other employees for non-work content) and multi-person online collaboration (synchronous collaboration with online tools) were also found to exist in the daily work of some teleworkers (more than 35%).

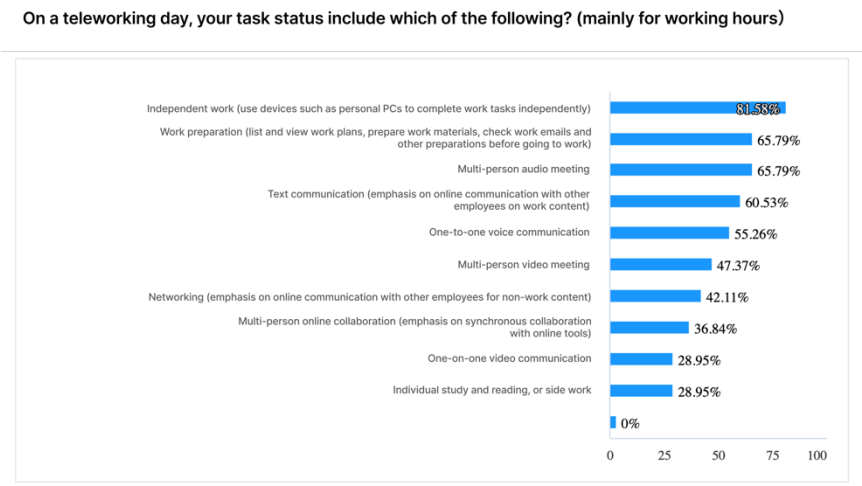

Figure 16: Types of work tasks

Specifically in terms of the types of activities for non-work content in the workday, the objective options in the questionnaire research were split according to the time of the activity (morning/afternoon/evening) and the main purpose of the activity (rest/entertainment/sports), so as to better understand the relationship between different goals of the activity and the time of the activity.

The most frequent activity types among teleworkers (more than 60%) are (see Figure 17):

• Lunch break (massage, rest with eyes closed, nap, meditation, etc.)
• Work breaks (short breaks between work tasks such as rest with eyes closed, meditation, eating fruit, etc., usually less than 30 minutes)
• Prepare and have lunch
• Short adjustments before going to work (such as playing music, checking social media, stretching, etc. any non-work activities)
• Work-time entertainment (short-term entertainment between work tasks, such as checking social media, playing games, watching videos, etc., usually less than 30 minutes)

Some of the teleworkers (more than 30%) carry out other activities during the working day that have commonalities, such as：

• Leisure activities and entertainment after get off work (checking social media, playing games, watching videos, etc.)
• Work-time exercises (physical activities such as short-term sports, walking, etc. between work tasks or on the job)
• Evening break (not formally off work, there are still work tasks to do. Massage, rest with eyes closed, nap, meditation, etc.)

In addition to the above activities, which more commonly occur during the teleworker's working day, evening entertainment, short adjustments before the formal end of get off work, afternoon tea or afternoon break were also found to be the types of activities that could take place during a teleworker's working day.

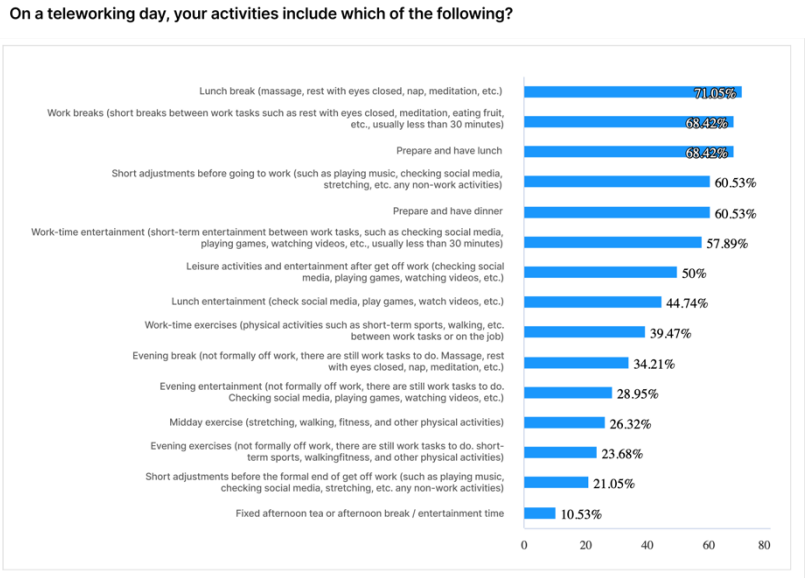

Figure 17: Types of activities

As can be seen from the above result, teleworkers place more importance on taking breaks during the working day than on entertainment or exercise, both in the form of lunch break that is relatively independent in time and in the form of breaks between work tasks that have no fixed duration. Except for lunch break and night break in special circumstances (such as before overtime), people rarely set more formal rest periods in other time during the formal working hours of the day. They usually take a short break to help

them adjust their state. It is also common for people to use entertainment activities, such as checking social media, to help them relax. This kind of behavior more often occurs between work tasks in a short time cycle, or even occurs simultaneously with work tasks. Compared with the above two, exercises are not the more common type of leisure activities carried out by teleworkers.

In addition, compared with leaving the working state, people will reserve more time for self-adjustment to enter the working state.

4.1.2 Positive and negative impact of teleworking on personal state

4.1.2.1 Characteristics of teleworking that have positive impact on personal state

As shown in Figure 18, In response to the question "On a teleworking day, do you choose a different location for different tasks or activities?", the results of the questionnaire show that the majority of respondents indicated that they would change their location in the environment, i.e. move within the environment, depending on the current situation at work, or the type of task or activity they are doing. For example, they will take a long break or lunch break in the bedroom or living room, stretching and meditation will be on the balcony, and work breaks will be at the desk, etc. This reflects a clear characteristic of teleworking compared to office working: the flexibility of location. Teleworking offers workers the possibility to choose the location that best suits the task and activity at hand, depending on objective conditions (e.g. time of day, lighting conditions, comfort level, etc.) and subjective tendencies (mood, desired physical posture, etc.). This flexibility of location provides a means for teleworkers to make personal state adjustments. It is found to be a common individual strategy for teleworkers to adjust their physiological and psychological state by changing their location and environment.

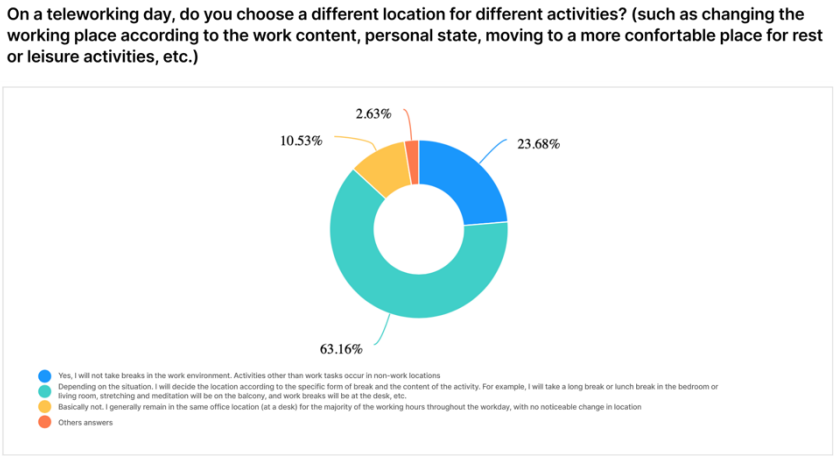

Figure 18: Location flexibility in teleworking

In addition to the flexibility of location, according to the positive features of teleworking selected and ranked by the respondents, the four most commonly identified characteristics of teleworking that have positive impact on personal state include (see Figure 19):

• Free time arrangement, which is more in line with personal rhythm
• Independent environment, less likely to be disturbed by unnecessary social interactions at work
• Richer (leisure) activities can be carried out freely and comfortably while working, such as sports, playing music, etc.
• More alone time, which brings a more comfortable and peaceful mood

It can be seen from the results that the respondents attach great importance to the time arrangement that conforms to the personal work and relaxation rhythm in teleworking. The freedom of switching between tasks and activities was found to be the best way to help them maintain good personal status. Based on this insight, I focused on the characteristics in the follow-up research, and hoped to explore the specific mechanism of this positive impact through research. It is further analyzed from the perspective of concentration in Chapter 5.1.2 to discover which psychological characteristics

underlie the switching between tasks and activities and how these switching between tasks and activities can be situationized.

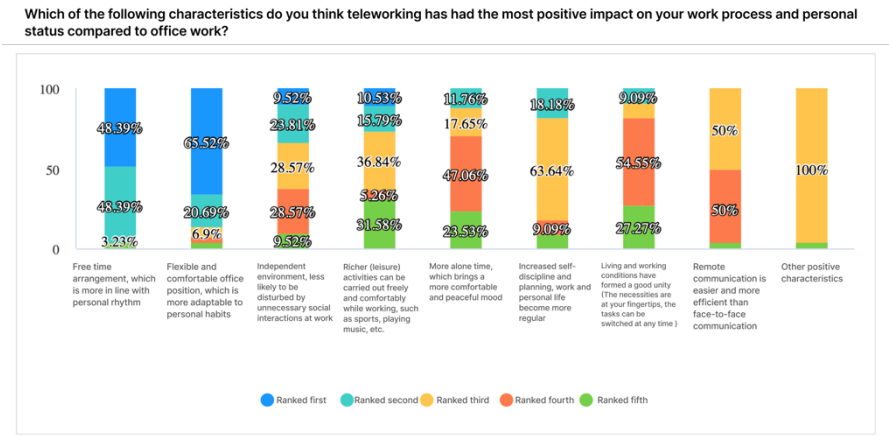

Figure 19：Characteristics of teleworking that have positive impact on personal state

4.1.2.2 Characteristics of teleworking that have negative impact on personal state

Conversely, teleworking also had negative impact on the personal state of the respondents. Based on the negative characteristics brought about by teleworking as selected and ranked by the respondents, the five most commonly identified characteristics of teleworking that have positive impact on personal state include:

- Inconvenient and low efficiency remote communication
- Difficulties brought by work environment and equipment support issues
- Decreased regularity, difficult self-monitoring, prone to procrastination
- The lack of boundaries between work and life makes it difficult to fully switch to different roles
- Impact of the environment and other matters easily distracted at work

The first two of these negative effects are mainly due to restricted communication and equipment support that is not adapted to the requirements of teleworking. They are more dependent on the coordination between teleworkers and other roles, and the functional requirements of the equipment,

which were not considered as a major part of the research of personal state. The remaining three findings indicate that teleworking has negative effects on individuals in terms of low self-motivation, high procrastination, easily distracted, and blurred life-work boundaries. These effects are closely related to the individual states of teleworkers that I wish to explore in this research, because they focus more on the subjective feelings of individuals.

Among them, the blurring of the life-work boundary is more due to the fact that the teleworker's life and work occur in the same environment. This leads to an easier entry and exit from work than in the office. There will be no "signal" behaviors that are reflected in physical activities such as commuting and arriving or leaving the office which help people complete state switching. From the results of the questionnaire research, it is clear that this blurring of the work-life boundary has a negative impact on the personal state of teleworkers. Therefore, the switching between the life state and the formal working state in teleworking was identified as a typical situation switching process in this research for further research.

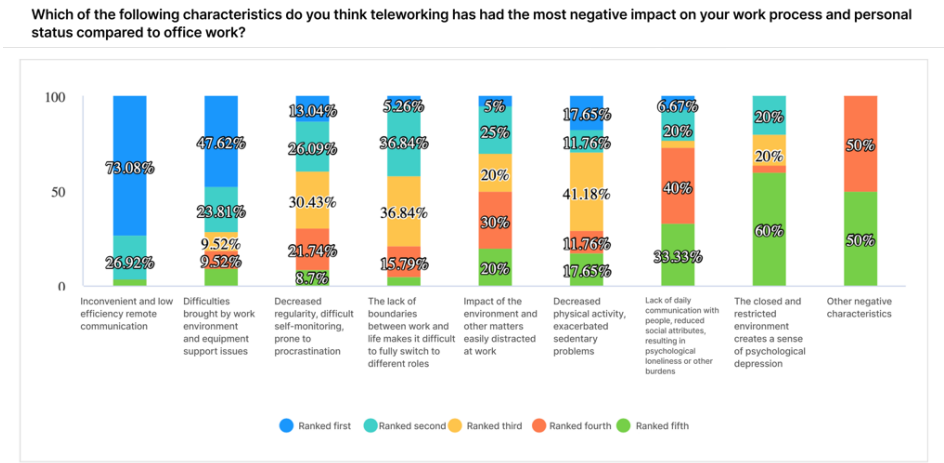

Figure 20: Characteristics of teleworking that have negative impact on personal state

And as reflected in the findings, the negative personal states of low self-drive, high procrastination, and being easily distracted would occur more

often during the formal working hours of the day than during the transition between life and formal work. In Chapter 2.2, these effects are summarized from previous research on teleworking. In Chapter 4.3, the specific performance of these effects extracted from the data of the interviewees is coded as the tasks and activities related psychological characteristics, and the psychological characteristics related to concentration. This helped me to situationize the tasks and activities in the formal working hours from the perspective of concentration.

Based on the above insight into the positive and negative effects of teleworking on individuals, I tentatively divided the research of situation switching in teleworking into two categories: situation switching when entering and leaving formal work state, and situation switching during formal working hours in the day.

4.1.3 Individual strategies adopted by teleworkers to improve their personal state

Through the questionnaire, I also gained a preliminary understanding of the strategies that teleworkers adopt to improve their personal state. This data was also collected in two categories: the behavior of the respondents to help themselves better enter and leave the formal working state, and the behavior of the respondents during the formal working hours.

From the perspective of entering the working state, the results show that teleworkers are more likely to prepare themselves mentally by setting aside ritual meal times, exercising to help clear their minds, changing into formal clothing, adjusting the comfort level of the work environment with accessories, and reading news or listening to music to help activate their minds. At the same time, they will help themselves connect with the upcoming formal working state and have a preliminary understanding of the specific content of the work tasks by checking email and work information, formulating and

reviewing work plans, adjusting the fitness of the work environment to the work tasks, and setting alarm clocks for important tasks.

From the perspective of leaving the working state, the results show that teleworkers took fewer measures. This can be explained by the fact that it is easier for teleworkers to leave the working state than to enter it. They generally review their work and plan for the next day, turn off their work equipment and block work messages, clean up their desks and work environment to end the day of teleworking and prepare for personal life.

From the perspective of the individual strategy to improve personal state during formal working hours, respondents were more likely to adjust their efficiency, energy, and physical feelings by adjusting the timing, content, and pace of their various tasks and activities in teleworking to help themselves stay in good individual shape. This echoes the insights in Chapter 4.2.2.1. In addition, they were also concerned about factors in the teleworking environment that help them focus or may cause distractions for them, such as objects on their desks, physical barriers, sound distractions from the outside world, non-work social activities, etc. These characteristics in the environment are exactly the "cues" that this research wants to explore to affect users' situation switching.

In the follow-up diary study and retrospective in-depth interview, I continued to collect more specific behaviors and motivations of the respondents based on the preliminary understanding of the strategies taken by teleworkers. The data was clustered and analyzed with the goal of situationize teleworking and exploring the cues that affect users' situation switching

In addition, based on the results, I also found common characteristics among teleworkers. As shown in Figure 21, more than 68% of the respondents said they were very concerned about the sound, light and physical atmosphere in the teleworking environment, and 50% of the respondents said they were concerned about the smell in the teleworking environment. And

most of the respondents who showed concern about the different ambience expressed that they would create a comfortable and positive working environment for themselves with the help of some accessory equipment or by switching the space where tasks or activities occurred. This result, on the one hand, proves that the information in the environment that affects the senses have a very important impact on the positive experience of teleworkers. On the other hand, it also verifies that it is feasible to help teleworkers improve their personal state by adjusting and changing the cues that affect their perception.

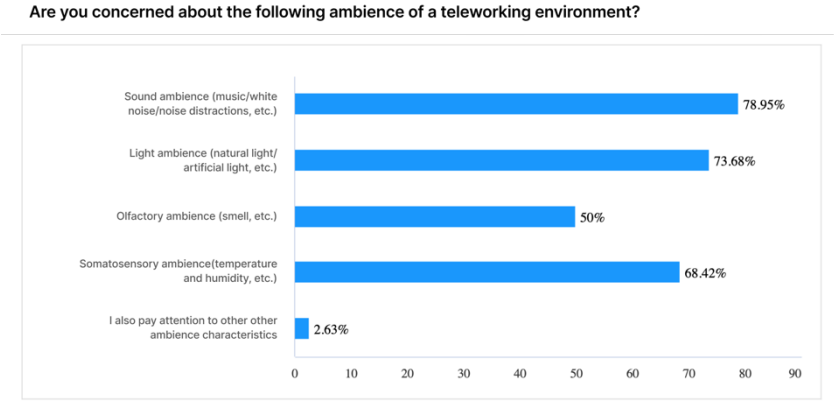

Figure 21: Concern for the ambience in teleworking environment

4.2 Profile of typical users

As stated in Chapter 3.1, another purpose of the questionnaire research was to construct a situation-based profile of typical users of individual teleworking and to screen interviewees for participation in the follow-up phases of my research.

Based on the insights gained from the questionnaire results in Chapter 4.1 and the questionnaire responses from the respondents, I screened 15 teleworking individuals based on the questionnaire responses who meet the following requirements（as shown in Figure 22）:

1.Knowledge teleworkers

2.Their teleworking locations are relatively static rather than mobile, with office environments concentrated in homes, individual studios or co-working spaces
3.They make much active efforts to adjust to their state while working remotely
4.They are sensitive to the characteristics of tasks and activities that come with telework that are different from offline work
5.They are sensitive to the impact of environmental and equipment features on their personal status when working remotely

Teleworkers who meet these criteria are the core group of my research, and also the main user group of the design strategy I proposed. Based on the results of the questionnaire research, I believe that teleworkers with these characteristics can be considered as typical in my research. Their sensitivity to negative and positive characteristics come with teleworking that are different from office work dictates that they can easily identify the impact of telework on their own state. This also means, in part, that they show more differentiated behaviors in teleworking than in office work because of this influence. Their sensitivity to the impact of environmental and equipment features on their personal state determines that they can perceive stronger cues that affect their state. This means, on the one hand, that making changes to these cues in a teleworking environment could more significantly affect their positive experience and, on the other hand, that it is easier for me to obtain valuable research data from them.

Finally, the fact that they make much active efforts to adjust to their state while working remotely defines them as a group that is more concerned about their physical and psychological condition. This means that they are more willing to create a positive individual state for themselves through some methods, even with the help of external factors, rather than being unconcerned. This is in line with the main goal of my research. These five requirements were therefore used as criteria for screening the respondents who participated in the follow-up study, and as a description of the profile of the typical user among the teleworkers in my research.

Figure 22:Interviewees screening criteria

4.3 Data coding process for the situationization of teleworking

As shown in Figure 23, after the questionnaire research, I conducted a three-step research process with each of the selected typical teleworkers. After collecting the data filled in by the respondents in the diary and the data dictated by the respondents in the interviews, I clustered and coded all the data in order to analyze them. The data analysis process was divided into three stages: primary data clustering, open coding to discover common patterns and axial coding to construct a situationized framework for teleworking.

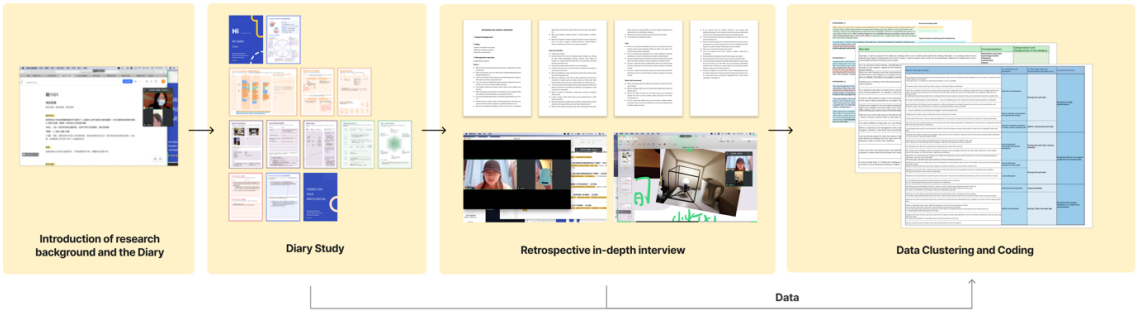

Figure 23：Research process of each respondent

4.3.1 Stage one: Primary data clustering

In the first stage of data analysis, I performed initial clustering of the large amount of raw data based on the dimensions of information that I wished to link in the subsequent analysis. The raw data from the respondents were grouped into two categories summarized in Chapter 4.1.2.2 (entering and leaving formal work status, and during formal work hours of the day) and labeled from the following key dimensions.

1.Enter the working state

- Emotion of entering the working state
- The behavior and motivation
- Equipment and environmental cues

2.Leave the working state

- Emotion of leaving the working state
- The behavior and motivation
- Equipment and environmental cues

3.Typical situation switching within formal working hours

- Behavior and motivation of obvious task and activity switching
- Psychological characteristics associated with tasks and activities
- Psychological characteristics related to concentration
- The relationship between concentration and situations
- Equipment and environmental cues that affect concentration switching

Because the processes of entering and leaving working state can be identified as typical situation switching in individual teleworking, the data were clustered directly based on the emotional states, behaviors and motivations exhibited by the respondents as well as the equipment and environmental cues they identified, and then were summarized directly in the subsequent analysis phase using affinity diagrams.

The tasks and activities performed by the teleworkers during the formal working hours of the day were so complex that they may even appear distinctly different due to individual differences. So the first step in the research of situation switching should be to categorize the situations. Then it would be possible to study how teleworkers switch between different categories of situations. This meant that I needed to abstract from a large amount of complex data to create a model that could cover as much of the tasks and activities as possible.

Based on my perception of the feedback after the interviews, I found that the most frequently mentioned descriptions of personal state in teleworking were related to concentration. Many respondents shared in the interviews whether they needed to focus on the task, whether it was difficult to

maintain constant focus, and whether they could do other activities while completing the task. In addition, when talking about tasks with different levels of stress, time constraints, or different levels of social interaction, respondents also invariably mentioned their level of concentration during these tasks and whether they could not be distracted by other matters. Based on a review of the interview results and initial reflections, I can almost describe it as follows: concentration is found to be the most important characteristic that interviewees pay attention to in teleworking situations.

It can be easily understood because people use their professional abilities to deal with problems while working. The user's attention needs to be highly focused on the input and output of professional information, i.e., the mental stress is relatively high. And when engaging in leisure activities, people tend to choose those that help them relax. This was also reflected in the respondents' expectations of the benefits of break time in teleworking. Almost all respondents (13) expressed a desire for breaks and recreational activities to help them relax their minds and to relieve the fatigue caused by work. And they want rest and recreation activities to help them shield themselves from work stress and tension. The number of respondents who chose these two reasons exceeded those who said that rest and recreation activities were for physical and mental stimulation. Therefore, in the initial clustering of the data from users during formal work hours of the day, a hypothesis was made: concentration could be a characteristics in classifying different situations in teleworking. Based on this hypothesis, I wanted to investigate how tasks and activities with different characteristics (mainly psychological characteristics) in telework are related to concentration, and how these tasks and activities can be situationalized from a focus perspective.

So I also defined the labels that helped me cluster the data:

• Psychological characteristics associated with tasks and activities: the psychological feelings that different tasks and activities bring to teleworkers, as

well as the emotional and psychological triggers that teleworkers experience while performing different tasks and activities

• Psychological characteristics related to concentration: the relationship between the different psychological characteristics and the concentration level of teleworkers as evident in the respondents' data

• The relationship between concentration and situations: the apparent difference of the teleworkers between the tasks and activities with different levels of concentration (i.e., they responded to situations with different concentration requirements, and these responses could be judged as switching between situations)

I wanted to find connections between the information under these three labels and use them to categorize the situations in individual teleworking from a concentration perspective. This hypothesis was validated from the results of the data analysis in Chapter 5.1.2.2.

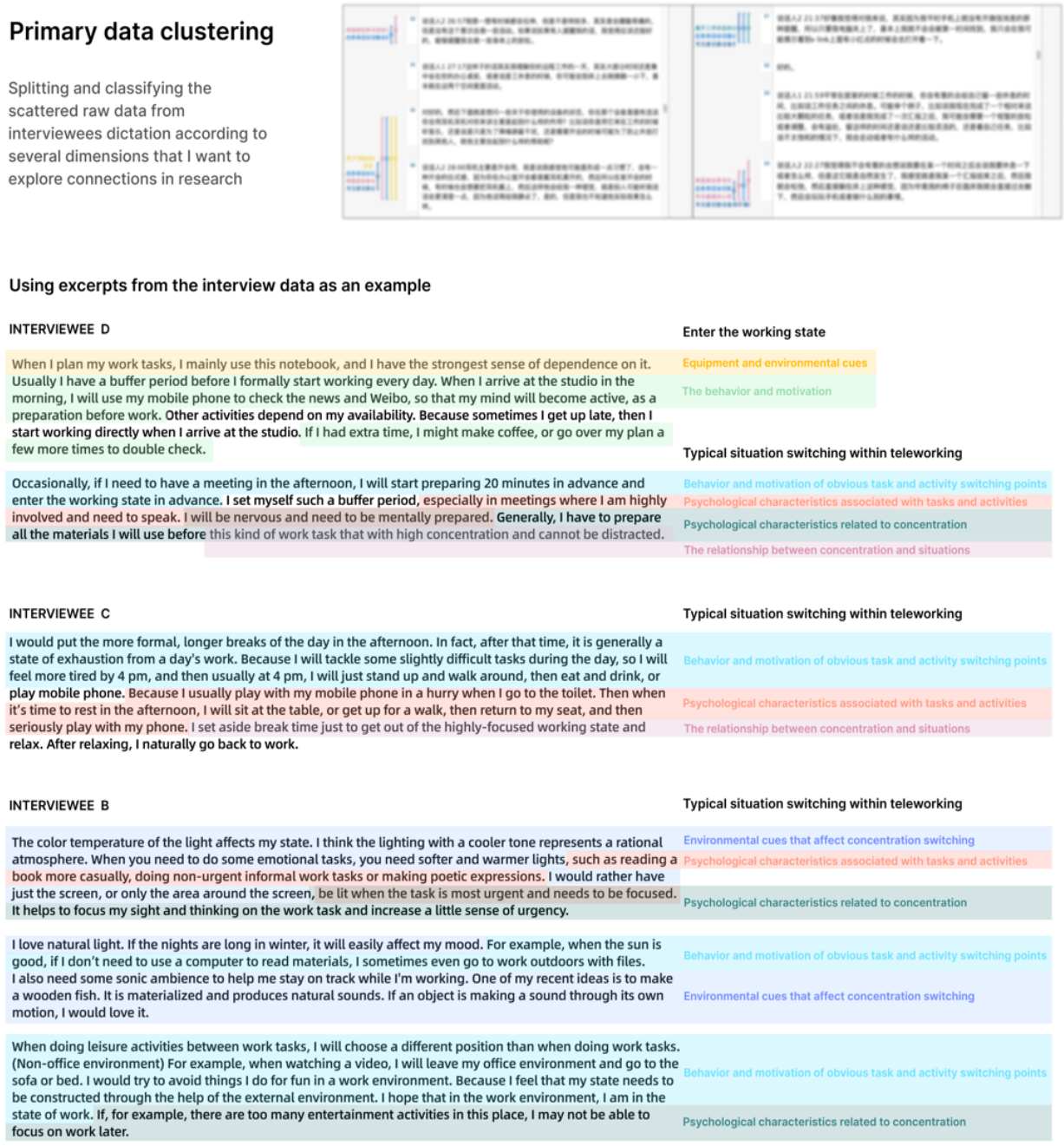

Figure 24: Primary data clustering

4.3.2 Stage two: Open Coding

The main purpose of open coding as the second stage of data analysis in this was to identify and frame the relationship between concentration and

situation in teleworking. By identifying data on both the impact of different tasks on the user's psychological state and which psychological characteristics affect the user's concentration, it is possible to define how the concentration required for tasks with different characteristics varies.

The raw text data from the respondents under the three clustering labels were transformed together through open coding into a summary description that could be used to identify common patterns. So that these common characteristics could be further constructed in axial coding as multiple situations in telework.

As show in Figure 25, I have taken snippets from the coding process as examples to better explain how I analyzed the data and drew conclusions through coding. Take the example of an online social task that requires active output of opinions in remote work. Conclusions obtained through open coding include:

• Different types of tasks and activities in common psychological states: online social tasks that require active opinion output and are evaluated by others

• Psychological characteristics that affect the concentration of teleworkers: When performing online social tasks that require active opinion output and are evaluated by others, teleworkers are more nervous, stressed, and have a higher degree of concentration.

• The distinctly different strategies adopted by the teleworkers in these tasks and activities: a psychological buffer period is required before or after the task takes place. Stressful and draining communication tasks require longer periods of rest and relaxation. In this type of task, it is necessary to avoid being distracted as much as possible.

These findings can be considered as characteristics of the categories of this type of task (online social tasks that require active opinion output and are evaluated by others). Before obtaining the characteristics of these categories, there was another step of conceptualization. I summarized the keywords from the original texts of the respondents and further turn these keywords into characteristics of these categories. These keywords included: presentations and reports, psychological buffer, preparation, concentration, tension, output-oriented tasks, avoiding disturbance, stress, energy consumption, social tasks, resistance, tasks evaluated by others, relaxation, seriousness, high efficiency. Through conceptualization, the multiple ways of describing the same problem in the raw data were made common and concrete. It was also easier to abstract out regular descriptions with common features. These keywords helped me to derive the "characteristics of the categories" as a stage for open coding.

At the same time, in the conceptualization stage, teleworkers' psychological states or motivations that were found to be closely related to concentration, such as tension, immersion in the task, stress and worry, independence, and other keywords, were further summarized as psychological traits. These psychological characteristics vary, but they can be generalized in terms of concentration levels to construct situations with different concentration requirements. The findings of this analysis phase will be presented in Chapter 5.1.2.1.

Open Coding

Identifying and framing the relationship between concentration and situation in teleworking. By identifying data on both **the impact of different tasks on the user's psychological state** and **which psychological characteristics affect the user's concentration**, it is possible to define how the concentration required for tasks with different characteristics varies. As well as exploring how to situationize teleworking tasks and activities using concentration as a lens.

Use excerpts of the coding process as an example

Raw data	Conceptualization	Categorization and Characteristics of the category
Generally, if I want to prepare for the afternoon meeting, there is such a buffer period before the meeting. Generally, it is a meeting where I have a relatively high degree of participation and I want to speak. I need to prepare some content for the presentation. Because the meeting will be more concentrated and tense, thinking may be chaotic.	**Presentations and report** **Psychological buffer** **Preparation** **Concentration** **Tension**	When performing online social tasks that require active opinion output and are evaluated by others, teleworkers are more **nervous, stressed, and have a higher degree of concentration** **A psychological buffer** period is required before or after the task takes place Stressful and draining communication tasks require **longer periods of rest and relaxation** In this type of task, it is necessary to **avoid being distracted** as much as possible
If it is an important review meeting, I will definitely set aside a certain amount of time to make myself fully psychologically prepared. I'm definitely going through my own material. I reserve 20-30 minutes of this free time for myself. But if it is my own personal work, it is more casual and there is no such sense of tension.	**Psychological buffer** **Preparation** **Tension**	
What I am most focused on and the most stressful about is the formal task of being evaluated, which needs to be expressed and reported to others, and then there is the meeting. It's not exactly a formal report, it will include all the tasks that I feel need to introduce my work to others. Usually when I am in a meeting, if the status of my avatar is not switched to busy, I will manually switch it to prevent someone from disturbing me.	**Presentations and report** **Output-oriented tasks** **Avoiding disturbance**	
Presiding over a meeting is the most tiring and the most stressful. Because it is necessary to listen to everyone's opinion, and then react quickly to make a decision.	**Output-oriented tasks** **Concentration** **Stress** **Energy consumption**	
If it is said that a task does not require me to use too much brain, I do not need to make psychological preparations. But for Presenting, I need to make some mental preparations. For example, I need to publish intermittently or I need to participate in the output of opinions.	**Presentations and report** **Output-oriented tasks** **Psychological buffer**	
It may be a little stressful to report on the evaluation, or to argue with my colleagues about something. Or hold some more important meetings, such as the review meeting specifically for my design, which has a high degree of concentration.	**Social tasks** **Output-oriented tasks** **Stress** **Concentration**	
I will be more resistant to my work being reviewed by people who are completely unfamiliar, because I need to accept other people's opinions and admit some mistakes I may have made. I don't want to face it. The most typical manifestation is, for example, I have a meeting with my boss, and I am 100% unwilling, and I have to wait until the last second before I walk into the meeting room, okay.	**Resistance** **Tasks evaluated by others** **Psychological buffer**	
What are some of the tasks that you find painful that make you want to distract yourself with music? -I think it's natural to want to listen to music when I've just finished a presentation and I'm stressed or tired.	**Presentations and report** **Stress** **Energy consumption** **Relaxation**	
If I've done a difficult or heavy task, or if I just finished a report to someone else, I might take a little bit more of a break.	**Presentations and report** **Break**	
When I'm reporting to the management of the company, or when I'm communicating with a client, especially a client's manager, I'll organize my thoughts in advance. I think about how I should describe the matter more clearly in advance, and there is a process of preparation.	**Social tasks** **Output-oriented tasks** **Preparation**	
I will consciously prepare for tasks that require a high level of concentration, such as communicating with the leader. For example, I would turn off all other devices and software and only open work-related content on my computer. Then I prepare all the materials in advance. I would sit there attentively, ready to answer some questions.	**Social tasks** **Output-oriented tasks** **Concentration** **Avoiding disturbance** **Preparation**	
I think one of the most stressful tasks is the debriefing at meetings, where I give a presentation to other people. I would adjust the light around the computer to make myself more focused.I don't want anyone to disturb me at this time.	**Presentations and report** **Tasks evaluated by others** **Stress** **Energy consumption** **Concentration** **Avoiding disturbance**	
I'm very focused when I'm meeting with colleagues online to discuss some of the important aspects of my work. I take the task more seriously. I make sure that it is done efficiently and without mistakes.	**Social tasks** **Output-oriented tasks** **Seriousness** **High efficiency**	

Figure 25: Open Coding

4.3.3 Stage three: Axial Coding

The main purpose of open coding, as the third stage of data analysis was to categorize teleworking situations using concentration as a lens. The results obtained by open coding were clustered in this stage to find common features among the categories.

As shown in Figure 26, the findings from the open coding, different types of tasks and activities in common psychological states, were first divided into eight categories based on whether they were distractible and whether respondents would actively help themselves to be distracted. For example, a summary of the situations that were best characterized as not being distracting comes from these insights in the open coding:

When performing online social tasks that require active opinion output and are evaluated by others, teleworkers are more nervous, stressed, and have a higher degree of concentration. In this type of task, it is necessary to avoid being distracted as much as possible

• The rigorous data and text work brings higher pressure, and requires higher concentration with no distraction

• Tasks that are important and continuous require intense concentration. Teleworkers show a tendency to adjust their time to complete important and energy-consuming tasks according to their mental and physical state. And they do not want to be distracted when completing independent and continuous tasks.

• By deliberately fragmenting complete tasks or setting relatively long task cycles can reduce the stress and concentration required to complete them.

• While tight and fixed deadlines increase teleworkers' focus on completing tasks, with a high level of need to avoid interruptions or distractions.

• Newly started tasks with relatively unclear outcomes are difficult and require more thought, teleworkers are more prone to procrastination and distraction, require more concentration and need to avoid being distracted as much as possible.

These are the types of work tasks in which teleworkers tend to or need to maintain a high level of concentration. On the one hand, they react instinctively because of the high level of stress, tension, and other characteristics of the task itself. On the other hand, they are also better able to cope with the complex thinking and high efficiency required by the task with high level of concentration. These types of tasks and activities were collectively categorized as situations where the level of concentration is high and where teleworkers preferable not to be distracted.
Similarly, the other seven categories of situations were summarized by means of axial coding. The process of axial encoding, and the specific information being encoded is shown in Figure 27.

In this regard, the situations based on the psychological characteristics of the tasks and activities was classified into three categories of eight based on the concentration level of the situation and whether the teleworker could be distracted or actively distracted. In this way the situationization with teleworking using concentration as a lens is accomplished. The results of this study also validate the hypothesis presented in Chapter 4.4.1 that concentration can be seen as a key characteristics to classify different situations in teleworking. And concentration is a characteristic that allows for a general overview and classification of the individual's personal state.

Also, the distinctly different strategies adopted by the teleworkers in these tasks and activities, which were summarized in the open coding, became the basis for identifying at which stage of the task or activity the concentration switched. For example, during the task, before the task, after the task, or during leisure activities. These insights also correspond to eight different categories of situations. These insights helped me to generate value for the process of concentration switching by further thinking about the temporal dimension in which changes in cues are more appropriate to occur when proposing design strategies. It showed the possibility of a design strategy that makes it specific to the stage of time in which it is to have an effect, not

just how the situational cues should change with varying degrees of focus required.

These are the conclusions of the research on the different situations that constitute the subjective perception of the teleworker from the perspective of concentration. These situations clearly represent and influence the different personal states of teleworkers. The freedom to switch between tasks and activities, as mentioned in chapter 4.1.2.1, is the feature that has the most significant positive impact on the personal state of the teleworker. The question of the specific mechanism of this apparently positive influence is also answered from the perspective of concentration switching. In chapter 5, I will present these findings and insights.

Axial Coding

The results obtained by open coding were clustered to find common features between the categories. The situations based on the psychological characteristics of the tasks and activities was classified into three categories of eight: **the concentration level of the situation and whether the teleworker could be distracted or actively distracted.** In this way the situationization with teleworking is completed.

Results from open coding	Is it possible to be distracted	At what stage does the concentration switching occur	Concentration level
When performing online social tasks that require active opinion output and are evaluated by others, teleworkers are more nervous, stressed, and have a higher degree of concentration In this type of task, it is necessary to avoid being distracted as much as possible	Best not to be distracted	During the work task	Situations of high concentration
The rigorous data and text work brings higher pressure, and requires higher concentration			
Tasks that are important and continuous require intense concentration. Teleworkers show a tendency to adjust their time to complete important and energy-consuming tasks according to their mental and physical state. And they do not want to be distracted when completing independent and continuous tasks. By deliberately fragmenting complete tasks or setting relatively long task cycles can reduce the stress and concentration required to complete them.			
While tight and fixed deadlines increase teleworkers' focus on completing tasks, with a high level of need to avoid interruptions or distractions.			
Newly started tasks with relatively unclear outcomes are difficult and require more thought, teleworkers are more prone to procrastination and distraction, require more concentration and need to avoid being distracted as much as possible			
It' s easy for teleworkers to stay focused and engaged in work that interests them.	Easy to maintain concentration, no external help needed		
Challenging work makes it easy for teleworkers to focus and stay self-motivated			
In group tasks where there is external supervision,teleworkers will consciously increase their self-involvement, leading to increased concentration.			
Tasks that do not rely on office equipment, such as phone calls, require high concentration, but teleworkers can walk around or change their posture to adjust their state (help relax or concentrate)	Need for moderate distraction to relieve tension and help relax	Before / During the work task	
A psychological buffer period is required before or after the online social tasks that require active opinion output and are evaluated by others take place			
Teleworkers do not feel the need to stay focused on tasks that are not very involved or relevant to them and are prone to actively distract themselves with other activities to alleviate boredom.B29:B30	Can be distracted Proactively help distract themselves	During the work task / Leisure activities	Situations that do not require a high level of concentration
Teleworkers tend to stay relaxed during optional tasks or personal tasks that are not related to other roles. When necessary, they will also adopt certain strategies to help them stay focused and improve efficiency.			
The fragmented work tasks can be distracted by interspersing some other leisure activities.			
With relatively clear knowledge of what to do (already in process) or clear knowledge of tasks that are within ability, teleworkers are less stressful, consume less energy, are more self-driven, require less concentration.			
Teleworkers in an overtime state are relatively more relaxed and independent, and the overall concentration of work is less demanding except for urgent tasks, which can even be distracted. They tend to stay motivated through leisure activities in the form of listening to songs, etc.			
Teleworkers can, and to some extent do, want to be distracted from boring repetitive tasks and want to be helped to stay active by some interesting or fresh external factor. Repetitive and boring tasks can easily lead to fatigue and resistance, resulting in low concentration and self-drive.	Can be distracted Hoping to be distracted	During the work task	
Teleworkers are less self-driven in tasks that are not time-critical and where there are expectations of personal competence and completion. This type of task requires a lower level of concentration.	Can be distracted		
Teleworkers can be distracted when performing tasks that are less involved or less professionally demanding in terms of communication or output.			
It is more difficult to stay focused on tasks that they have to do but have no interest in. They can be distracted while doing tasks of interest but not importance.			
Teleworking brings time flexibility and delays in replies and tasks, creating large fragmented periods of free time. Such intermittent relaxation activities tend to keep users entertained while making it difficult to stay on task. The rhythm of concentration and relaxation needs to be appropriately adjusted.	Avoid excessive distraction	Leisure activities	Situations that require relaxation or a break from concentration
Teleworkers are more likely to perceive their physical and mental states at work and respond to them positively. For example, actively distracting themselves from work to relax and take breaks to help clear their minds and relieve mental and physical fatigue.	Need to be distracted	During / After the work task	
Teleworkers are better at using some leisure time or break time to help keep them entertained during or between work tasks that don't require intense focus.			
Difficult or problematic tasks make it difficult for teleworkers to fully relax even during short breaks. At this time they need ways to relax their mood and body more easily and immersively. Or even they need a way to help them jump out for a short while or to temporarily block out the things that are stressing them out. Or a psychological buffer before going into the task.			
Divergent work tasks with pure input and no clear form of output can easily cause teleworkers to be too immersed and difficult to jump out, which may affect other tasks.. They need to be distracted in some similar tasks to avoid consuming too much time.			
Stressful and draining communication tasks require longer periods of rest and relaxation			

Figure 26: Axial Coding

05

FINDINGS AND INSIGHTS

In this chapter, the findings and insights from the research are discussed. They explain how situation switching in individual teleworking occurs. Situation switching in individual teleworking is discussed in two categories. The first is entering and leaving formal working states. The second is situation switching during formal working hours based on concentration switching. Situation switching within formal working hours are classified into eight categories based on concentration and whether teleworkers can be distracted. This chapter also summarizes the cues that influence the process of situation switching in individual teleworking. Thus, the situations are mapped to objectively quantifiable stimuli in the situation. The aim is to create design opportunities for changing these cues to facilitate the situation switching process and thus enhance the personal state of the teleworkers.

5.1 Typical situation switching process in individual teleworking

As discussed in Chapter 4.1.2, situation switching in teleworking can be discussed in two categories: Entering and leaving formal working state, and situation switching within formal working hours. So in summarizing the findings and insights, I also discuss them in these two categories.

5.1.1 Entering and leaving formal working state

5.1.1.1 Psychological characteristics of entering formal working state

Entering formal working state was identified in this research as a typical situation switching process in individual teleworking. I wanted to explore teleworkers' subjective perceptions of this situation switching and their personal states under this situation switching to more accurately describe the process. I collated data of the 15 typical teleworkers, and clustered it from both mindset and motivation perspectives (see Figure 27). Six psychological characteristics and motivations of this situation switching was summarized.

1.Tough first step with low motivation and procrastination: The boundary between life and work is more blurred in telework. Because of weaker external feedback (often unemotional text words), lower social attributes, lower sense of work accomplishment and more distractions from the home environment, teleworkers tend to maintain a relaxed life and thus find it more difficult to take the first step towards work. They will draw themselves into relatively difficult work by taking a number of measures.

• Setting small, easy goals for themselves in stages
• Setting aside a small period of independent thinking before formal work
• Replacing a strict time schedule with a more flexible one to reduce stress
• Starting with low-stress tasks and gradually transition to high-stress tasks as a buffer to avoid emotional procrastination

• Self-suggestion with positive feedback from work, such as money, sense of accomplishment, etc.
• Allowing themselves to relax completely, relying on the guilt from the break to boost their motivation to entering the working state

2.Higher demand for pleasure: Similarly, people in teleworking have a higher need for external elements that bring them pleasure due to weaker external feedback, lower social attributes and lower work accomplishment. For example their favorite small ornaments, natural light, some green plants, etc. These elements can help them form positive psychological suggestions and attract them to actively engage in their work. In some cases, a relaxed social interaction with friends before work can help them reduce their psychological depression and thus improve their motivation to enter the working state.

3.Fresh mental and physical state: Entering working state requires a clear mind. The easy switch between life and working states that comes with teleworking can save the energy people expend on activities like commuting to some extent. But it also means that teleworkers may lack the external factors that help them wake up on a physical level. A fresh personal image on a physical level, or a fresh personal state on a psychological level can start work more easily and help them reconstruct their motivation to enter the work environment. For example, they will get a new set of formal clothes, take a shower, do some exercise, etc.

4.Calmness: Entering working state requires a calm mood. Overly stimulating and exciting activities can reduce a teleworker's willingness to work. Moderate leisure activities that are non-stimulating and of interest to teleworkers can help them relax and calm down before entering the formal state of work. For example, they will check stock information, do some light reading books, etc.

5.Sense of tension and order: The perception of sense of tension and order can help teleworkers switch from life to a focused work state more easily. On the one hand, they adopt behaviors that facilitate both psychological characteristics, such as planning the day's work clearly and constructing external supervision by exposing their state to their friends, family, or colleagues. On the other hand, when working remotely, people have a greater need to rely on the external environment to make themselves perceive that they are in a working state or about to maintain a working state continuously. Some cues that represent the work environment play an important role, such as urgent messages or emails from leaders, Timely responses from colleagues, a calendar or planner, a desktop with only work devices, etc.

6.Insecurity and uncertainty: Teleworking results in less direct contact between people and the outside world than office work. The execution of tasks relies almost entirely on self-referral in teleworking. Some remote workers were found to have a sense of insecurity and uncertainty about whether they accurately remembered important work schedules when they entered the workplace. So they tend to help themselves increase mental confirmation by checking their work schedule and setting reminders for important work arrangements, etc.

Figure 27: Psychological characteristics of entering formal working state

5.1.1.2 Psychological characteristics of leaving formal working state

Similarly, leaving formal working state was also identified as a typical situation switching process in personal telework in this study. Compared with entering the formal working state, leaving the formal working state was found to be easier for teleworkers. In the same way, I summarized five kinds of psychological characteristics and motivations in the process (see Figure 28).

1.Excitement and pleasure (weaker than in office work): It is clear that leaving the working state is exciting and pleasant for teleworkers. The excitement of returning to life can lead to higher motivation during the off-hours, but the blurring of life and work boundaries in teleworking leads to a lower level of excitement compared to office work. This can also lead to procrastination and lower productivity to some extent. And teleworkers may alternate between work and life activities behaviorally until they are close to the formal end of their working state.

2.Sense of confirmation and accomplishment: People want to have a sense of confirmation that important tasks have been completed for the day to ensure that they finish what they need to do in a timely manner and that they have not missed anything. At the same time, they also want to feel a sense of accomplishment and satisfaction in their work by confirming that they have completed their tasks. This is also true for teleworkers. For example, they will do a work review before the end of the formal work, check their work output again, or check their schedule.

3.Work anxiety in personal life: Work completion and satisfaction affect the people's attention and anxiety to work in their personal life. This is even more evident in teleworking. Anxiety makes teleworkers more likely to have a hard time fully leaving work in the early stage of getting back to their personal life. This leads to work-life psychological encroachment.

4.Relief from frustration and exhaustion: In some cases, people leave the working state because of frustration and difficulties in their work, resulting in their escape psychology. They hope to stay away from these negative emotions for the time being and put the problem behind. In addition, in remote work, it is easier for people to leave their work state and push the remaining work to the next day when they are tired physically or psychologically.

5.A sense of shielding from work: The blurring of life-work boundaries in teleworking and the absence of ritualistic behavior while leaving work often makes it difficult for people to switch to personal life. Teleworkers hope to enter their personal life completely relaxed after finishing their work. They will take some measures to help them shield themselves from the pressure of work. For example, they will block work messages, remove work equipment from their living environment, or switch their state through a short period of complete relaxation (such as lying down, playing mobile games, etc.).

The above are the psychological characteristics of teleworkers of entering and leaving the formal working state. In Chapter 5.2.1, I will further discuss

Figure 28: Psychological characteristics of entering formal working state

how to influence these psychological characteristics with cues, so as to promote the two kinds of situation switching processes in individual teleworking.

5.1.2 Situation switching during formal working hours based on concentration switching

5.1.2.1 Psychological characteristics associated with concentration switching in individual teleworking

The concentration-related situations perceived by users in teleworking are associated with a number of psychological characteristics. These psychological characteristics are closely related to the type of tasks and activities. As described in chapter 4.4.2, this research first identified some tasks or activities with these psychological characteristics, and found that they were also closely associated to the concentration level of teleworkers. Through data analysis,12 psychological characteristics were found to highly relate to the concentration level in a certain period of time, as shown in Figure 29 (when the word "more" is used to indicate a comparison, the comparison is made with the office work)

1.Sense of control： Whether a task can be interrupted by other tasks or activities comes more from the subjective judgment and inclination of individuals who want more control when working remotely.

2.Choice: Individuals want more choice over tasks and activities and expect to have more options to determine the priority of tasks and the amount of effort spent while working remotely. It also means that they have greater freedom to self-adjust their concentration.

3.Freshness： Individuals in teleworking environments have a higher demand for sensory stimulation elements in the environment and are more

inclined to rely on the positive emotions that the environment brings to them, thus promoting motivation and concentration.

4.Sense of tension and orderliness： Individuals prefer to help themselves create a tense and organized environment to help them stay focused while working remotely, such as establishing external supervision and organizing their desks for work use.

5.Self-drive： During teleworking, self-control decreases due to the reduced level of tension. There is a tendency for teleworkers to revert to a low-consumption, non-focused state. There is a stronger demand from them to remain self-driven or dependent on the external help.

6.Accomplishment： Individuals perceive less work feedback. Boring and repetitive work consumes energy and hardly brings a sense of work accomplishment when working remotely. It is even more difficult for these tasks to interest the teleworkers. Their annoyance level increases, making it more difficult to maintain concentration.

7.Interest level： Individuals perceive less work feedback when working remotely. They are more likely to prioritize tasks or activities that they enjoy and that bring them positive emotions.

8.Pressure and worry: Individuals are more likely to procrastinate on tasks that are stressful or that they are worried about when working remotely. But in such tasks, they are more focused. However, they tend to give themselves a buffer period before or after the task.

9.Certainty and familiarity: Individuals are more inclined to avoid uncertainty while working remotely. They prefer to perform tasks that are certain, that they believe they are competent enough to perform, or that they are familiar with. This reduces the feeling of insecurity. Such tasks or activities will keep them focused and productive in a relaxed mood.

10.Self-attention: The flexibility of tasks and activities in teleworking makes it easier for individuals to notice their physiological state and needs. They are more likely to interrupt their current concentration because of these demands and go to meet them. It's a way for them to help adjust their personal state.

11.Immersion: Presence enhances the people's concentration. It is always easier to stay focused on tasks in an office environment rather than working remotely. So in teleworking, individuals also tend to create some sort of immersive atmosphere for themselves to help them stay focused.

12.Independence: There are many factors that cause distraction in a teleworking environment. In situations that require a high level of concentration, individuals often help themselves create a relatively independent work environment while working remotely by blocking useless information and unhelpful social interactions. For example, closing non-task related software, wearing headphones, or even setting up barriers.

These are psychological characteristics that can be considered as influential factors that cause changes in concentration levels to occur in teleworking. They determine, to some extent, whether teleworkers are able to maintain focus easily, whether they need to but have difficulty maintaining high levels of concentration and whether they do so in a way that maintains low levels of concentration, or actively help themselves to lower their concentration levels in order to achieve a more positive personal state.

The results of this part of the research, answer the second research sub-question: What are the main psychological factors that affect the user's perception of the situation?

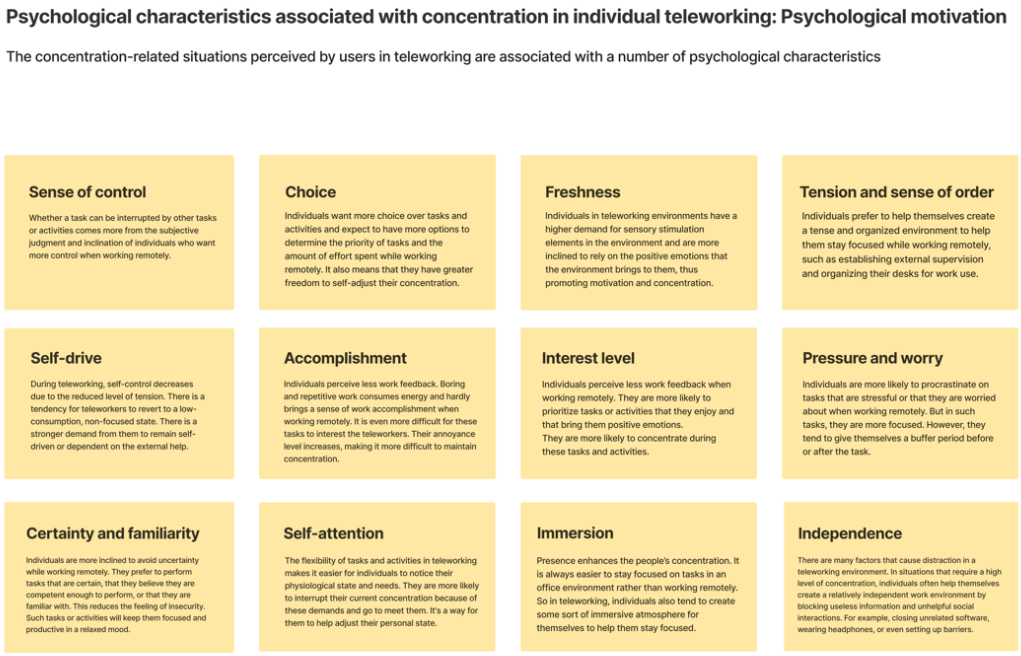

Figure 29: Psychological characteristics associated with concentration

5.1.2.2 Situation switching with concentration as a key characteristic

This research categorizes situations in personal teleworking from a concentration perspective. The process of situation switching in individual teleworking can be interpreted as the process of teleworkers switching between these categories of situations. This allows the complex tasks and activities occur in teleworking to be abstracted into a model that can be studied.

Based on the hypothesis of "Concentration is a characteristic that allows for a general overview and classification of the teleworking situations", tasks and activities associated with different psychological characteristics are successfully classified into eight categories of situations.

As shown in Figure 30, these eight categories of situations fall under three levels of concentration, which are.

1.Situations of high concentration
2.Situations that do not require a high level of concentration
3.Situations that require relaxation or a break from concentration

Depending on whether there is possibility for teleworker to be distracted with different levels of concentration, different sub-situations are subdivided under each of the three categories.

In situation of high concentration, there are three sub situations:

1. Teleworkers are best not to be distracted

"When I need to report to my superiors, my mobile phone will be muted, and only the relevant content of the report will be shown on the computer."

-Interviewee F

"When I concentrate on thinking about a work problem, I will replace the background sound in the environment with pure music without lyrics to prevent my thoughts from being taken away by them."

- Interviewee K

"Generally, if my status tag on the social software is not ' busy' when I attend an online meeting, I will manually modify it to prevent colleagues from disturbing me."

- Interviewee I

2. Teleworkers can easily maintain a high level of concentration without external help

"Dealing with project problems requires not only complex thinking, but also frequent communication. At this time, I will not deal with anything other issues than this task. I must deal with this matter until it is finished."

-Interviewee J

"If I have more tasks one day than usual, I will be more naturally nervous and concentrated in each task. Because I'm worried that I can't finish the work plan."

- Interviewee D

"When I do desktop research, I will try to output the research into a result, rather than just working on it aimlessly. When I do output-oriented tasks, my attention naturally increases."

- Interviewee A

3. Teleworkers need to focus while moderately distracted to relieve tension or help relax

"In some cases, if I am too nervous, I am more likely to make mistakes, such as in important communication with customers. At this time, I will imply to myself to be properly relaxed and clear my mind before making comments. Sometimes I'll spray a little perfume that calms me down."

- Interviewee K

"Although I need to pay more attention to remote communication, I prefer to walk on the balcony and make phone calls when I do not need to check the materials on the computer. Walking helps me relax properly and help me think."

- Interviewee M

In situation that do not require a high level of concentration, there are three sub-situations:

1.Teleworkers can be distracted

"It is acceptable to be invited to an online meeting or asked about something related to work by a colleague in a task that does not require intensive thinking, although this may affect my mood."

- Interviewee E

"Except for online meetings, I don't mind being interrupted by unexpected news or events at other times. This is bound to happen in my telework. But I will spend more time returning to my previous work task."

- Interviewee H

2. Teleworkers hope to be distracted for pleasure and relaxation

"Some tasks are very boring, and I don't want to deal with a boring thing wholeheartedly. This is why I hope that some friends will come to me online. I can chat with them while working. Or I sometimes hope my favorite blogger publish videos on their channel, so that I can work while watching the videos I am interested in."

- Interviewee I

3. Teleworkers proactively help themselves to distract

"Some online meetings have nothing to do with me, but I have to attend them. At this time, I will use another computer to play some of my favorite videos, or just get lost. At least, I will be relaxed and happy."

- Interviewee G

"When doing familiar work tasks, such as approving someone's work report, I'll wear headphones and listen to music or podcasts. Music at this time won't have any bad impact on my work."

- Interviewee N

"During teleworking, sometimes when I feel bored doing some personal tasks, I will take my mobile phone and go to the living room for a short time to stay with

my family. Or I will go to the kitchen to wash some fruit before returning back to work."

- Interviewee O

In situation that **require relaxation or a break from concentration**, there are two sub-situations:

1.Teleworkers need to be distracted to restore their personal state

"When I encounter difficulties in an important task, I have some negative emotions, such as anxiety and worry. I think one of the advantages of teleworking is that I am able to choose to take a bath or make a phone call with my friends to relieve this emotion at almost any time. It helps me a lot."

- Interviewee C

"I sometimes take unnecessary pains to problems in my work. It's also easy to get overly immersed in some work, such as gathering inspirations. I would accidentally spend too much time and not be able to get out of it. There are situations where it would be helpful if I were interrupted in a timely manner."

- Interviewee K

2.Teleworkers need to avoid excessive distraction to avoid difficulty to regain focus

"I usually don't play mobile games during my break during work time. It makes me too excited. Once I become excited, I won't want to return to the painful work again."

- Interviewee H

"I will watch the news during my break time at work. Because the news does not occupy my body or thinking space. In addition, I may play with my children for a short time. This matter is not sticky. If you want to finish it, you can finish it and go back to work immediately."

- Interviewee M

In addition, the types and characteristics of the tasks or activities that correspond specifically in each sub-situations summarized can be viewed in the first column of Figure 30.

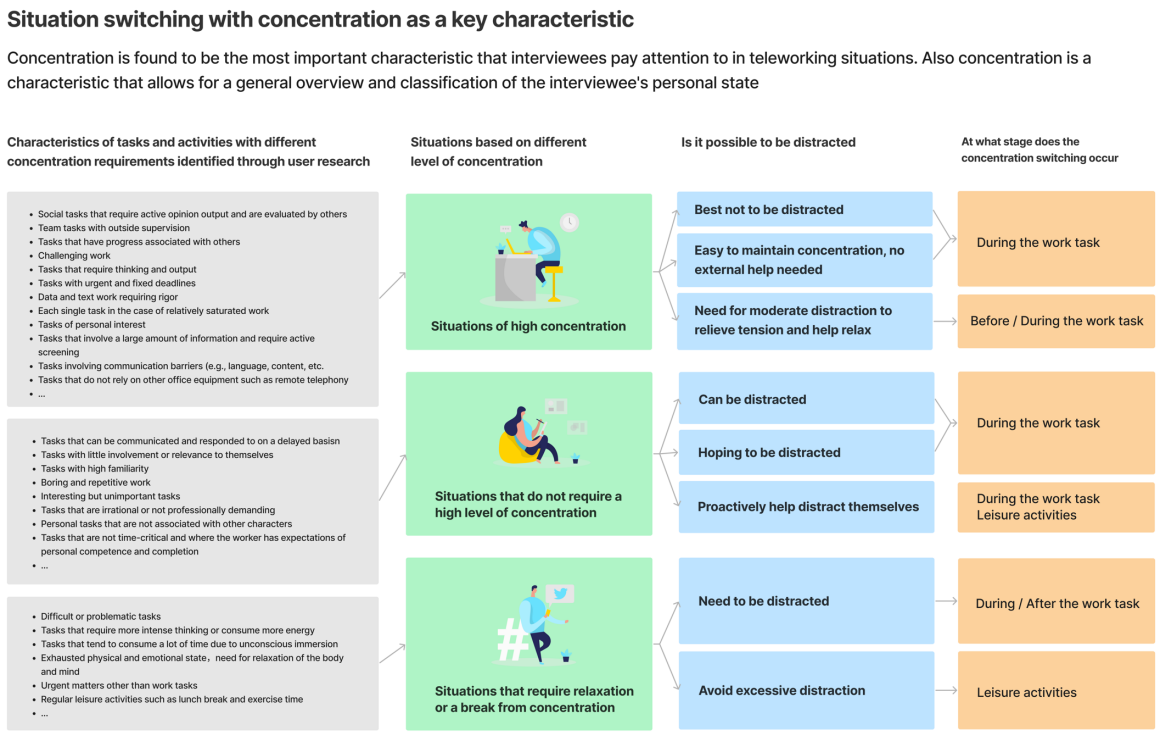

Figure 30: Situation switching with concentration as a key characteristic

In different sub-situations, I found that the nodes where concentration level switches differed. For example, in the situations of high concentration, such as those in which a high concentration level is accompanied by a moderate distraction, concentration switching generally occurs before or during the task. This is because situations of high concentration require the individuals to remain focused on the task, but allow for appropriate distractions to improve personal state.

This conclusion comes from the discovery that teleworkers tend to set a buffer for themselves before the task with a preconception of their state during the task. Or when they feel the tension or stress caused by the high

concentration during the task, they choose to help themselves relax to relieve this bad personal state and thus help themselves to complete the task better. For example, adjusting the environmental ambiences (sounds, smells, etc.) or walking around in the work environment. These two behaviors constitute a switch between a higher and appropriate level of concentration.

And in situations that do not require a high level of concentration, the concentration switching occurred more often during work tasks or leisure activities.

This insight is based on the finding that teleworkers in situations that do not require a high level of concentration, such as tasks that do not involve them as much or are repetitive and unnecessary, actively engage in leisure activities such as viewing social media, browsing interesting web pages, or eating fruit while working on the task. These activities make them more comfortable and enjoyable, and also help them build up energy for subsequent work tasks. But at the end of this phase, they need to return to their formal focused working state to complete other tasks. Therefore, in situations that do not require a high level of concentration and where teleworkers actively help themselves to distract themselves, they need to complete the switching between low concentration and appropriate or high concentration while the work task is in progress, or while the leisure activity is in progress.

Finally, in situations that require relaxation or a break from concentration, concentration switching occurred more often during work tasks, after work tasks, or during leisure activities.

This conclusion comes from these two findings. First, teleworkers exhibit negative physical and psychological states during or after some work tasks, such as fatigue, anxiety, and disappointment due to difficult problems or stressful interpersonal communication. At this point, it is necessary for

them to step away from the task temporarily. They need or consciously help themselves to improve their personal state and gain positive emotions by some relaxation and rest. They complete the switching between high and low concentration levels in time while some work tasks are in progress, or after the tasks. Second, during formal working hours, teleworkers' rest sessions are generally interspersed between work tasks, which means that they need to re-enter the more concentration-demanding work state after a break. Teleworking allows people to more easily engage in diverse recreational activities, such as playing games. But overly stimulating emotional and physical experiences have been found to cause their consciousness to be overly engaged, making it difficult to return to work or stay focused in subsequent tasks. So when teleworkers engage in leisure activities, they need to be careful to avoid being overly distracted.

The above is the conclusion of situationazition of individual teleworking, and my insights into the process of situation switching based on concentration switching. The results of this part of the study answer the third and fourth research sub-questions.:

What are the most different characteristics between the situations?
What is the motivations for user behavior in the situation switching process?

5.2 Cues that affect situation switching in individual teleworking

According to the research background in Chapter 2, this research also summarizes the cues that affect the situation switching process in individual teleworking from users, tasks and environments levels to find out which objective stimuli affect the process. At the end of this study, I found design opportunities through these cues and put forward design strategies to help remote office individuals promote the process of situation switching, thus promote the transition of personal state.

5.2.1 Cues that affect entering and leaving formal working state

5.2.1.1 Cues that affect teleworkers to enter formal working state

Cues from the user level have been summarized in Chapter 5.1.1.1, from the perspective of psychological characteristics. In this section, I focus on summarizing the task and environment level cues that influence the teleworker's entry into formal working state..

As demonstrated in Chapters 2.4, 2.5, and 2.6, the task-level cues include mainly the user's spontaneous behavior, the object with which the interaction occurs, the operational process, and the interaction goal. It represents the strategies adopted by the user to help him/her get into the working state. The "task" here needs to be distinguished from the "task" that describes the "work task", which is used to refer to the behavior of the teleworker.

The environment-level cues represent the state of the device and the physical space (an extension of the concept of entry point). It includes objective environmental conditions such as objects in the space, light, sound, location, air environment, and the presence of other people. Together, they constitute this physical environment. Individuals perceive the cues in the environment, thus undergo a change in their mental state and adjust their personal state. Based on the results of the research, I summarize below the common cues at both task and environment levels that influence teleworkers to enter the formal working state.

Task-level cues
Preparation for personal orientation
• Enhancing the natural light in the room to give oneself psychological hints • Intentionally keeping the original commute time and use it to clear one's mind by handling personal affairs • Gathering external appearance, such as changing clothes and makeup • Activating one's body and mind through sports • Using some habitual actions such as making coffee, making tea, turning on the desk lamp and music to signal the beginning of the working day • Active thinking through some easy activities, such as viewing social media, playing mini games, reading news, etc., as a buffer period • Turning on the working equipment and then return to the living state again, for the interpenetrating work transition • Setting aside a period of light office time that can be distracted, such as starting to do work tasks while having breakfast or leisure activities
Preparation for the work content
• Planning the day's tasks • Printing important documents for the day and place them in a prominent place • Checking one's device or paper work plan to confirm the tasks to be completed • Checking for new work messages or emails to get one's brain going • Chatting online with familiar colleagues about work tasks to offer advice and inspiration to each other, starting the day on a social note • Leaving unfinished task the night before and transition to formal work the next day by completing easier remaining tasks • Living up your one's with the easiest and low-stress work-related tasks to provide inspiration for follow-up work • Following up and confirm progress on a small task point with colleagues
Construction of an appropriate work environment

• Organizing a clean and simple desk space and remove non-work items • Building a supportive workspace by having everything one need ready to go • Turning on the work equipment at regular times to signal that it is ready to start working • Sitting at the desk and build your body posture in a formal work environment • Setting up a physical barrier to build independence, suggesting to oneself and others that he or she should not be disturbed • Showing the status tags in the office software to build self-monitoring with his or her organization

Table 1: Task-level cues that affect teleworkers to enter formal working state

Environment-level cues
Atmospheric conditions
• Fresh and positive air conditions that enhance the spirit • A space with a soothing smell that you like • Music that creates a lively atmosphere
Desktop and work space
• A simple desktop environment • Interesting small items that make people feel happy • Physical items that are unique to the working environment, such as calendars, planners, cups, etc. • Visual reminders of work tasks in the space • Fully prepared items for work • Barrier to the outside environment
Equipment condition
• Open work equipment • Reminder of work tasks on equipment • New work message • Time reminder • External supervision from his or her organization

Table 2: Environment-level cues that affect teleworkers to enter formal working state

5.2.1.2 Cues that affect teleworkers to leave formal working state

Similarly, I summarize the cues that influence teleworkers to leave formal working state at both task and environment levels.

Task-level cues
Preparation for personal orientation
• Habitual activities such as putting away the water glasses used for work and turning off the lamp • Playing games or doing other leisure activities that require thinking as a buffer before complete mental relaxation • Taking a short break by lying down and other completely relaxing methods • Going to a family member or friend with whom one can interact, socialize with non-staff members to get into a state of living and get emotional support • Changing into home clothes to isolate from work at the physical state level • Having dinner as a signature work-to-life transition activity • Performing appropriate physical activities, such as walking, exercising, etc., to get out of the working state
Preparation for finishing work tasks
• Checking off the tasks in work plan to complete that day which enhance one's sense of accomplishment • Summarizing the day's work and plan the next day's work, and record the unfinished work to the next day • Communicating work progress with colleagues to confirm the completion of tasks • Checking mailbox or notebook to confirm the work to be completed to make sure all urgent matters are handled • Completing simple and easy tasks that do not require a high degree of concentration, as a transition back to personal life • Closing work software, organizing documents and cleaning the desktop of office equipment • Placing materials for the next day's work on the desktop to attract oneself to the work space the next day
Construction of an appropriate living environment

• Blocking work messages • Turning off PC and other office equipment • Organize your desktop and put clutter in its place • Put away items related to the office environment and avoid their existing in the living environment • Tidy up the desk and put the messy items back • Switching the working equipment to the entertainment equipment to create the space attribute of entertainment and leisure • Switching the space for a short period of time, for example, from the desk to the living room

Table 3: Task-level cues that affect teleworkers to leave formal working state

Environment-level cues
Atmospheric conditions
• Softer or turned off light • Energetic and immersive music
Desktop and work space
• Organized desk surface • Physical exposure of one's current state
Equipment condition
• Completed work plans • Closed Office software • Closed devices

Table 4: Environment-level cues that affect teleworkers to leave formal working state

5.2.2 Cues that affect situation switching during formal working hours

For the cues that affect the teleworkers' situation switching during formal work time based on concentration switching, I also categorized them at both task and environment levels. The cues were compared according to the

respondents' concentration levels, i.e., what differences the cues reflect when they were at a higher or lower concentration level.

<table>
<tr><th colspan="3">Task-level cues</th></tr>
<tr><td>High concentration</td><td>Relatively
low concentration</td><td>Leisure activity</td></tr>
<tr><td colspan="3">Equipment and body posture</td></tr>
<tr><td>The body is subconsciously closer to the screen, allowing the field of view to be more focused</td><td>The body is at a certain distance from the screen</td><td>Using the phone more often and don't necessarily sit in front of a screen</td></tr>
<tr><td>Maintaining a tense body posture

• For example, pulling the chair close to the table so that the body has the feeling of being restrained. Or sitting cross-legged in a chair, or even covering the body with a small blanket and tighten it.</td><td colspan="2">Maintaining a stretched and relaxed body posture

• For example, lying in bed or on the sofa to listen to a meeting, and slumping in a chair while sitting at a table.</td></tr>
<tr><td>Maintaining the same device usage habits as in the office

• For example, put on headphones and keep phone muted during meetings.</td><td>More free and flexible device usage habits

• For example, use the computer to play songs while working independently. Or using iPad to play movies.</td><td>No restrictions on the use of equipment.
Richer choice for recreational and exercise equipment</td></tr>
<tr><td>Shortening the path of physical activity to complete a task.

• For example, using the laptop keyboard instead of a separate Bluetooth keyboard to avoid interference with coherent thinking due to the long path of fingers between the touch pad and the Bluetooth keyboard.</td><td colspan="2">The path length of physical activities to complete tasks is not concerned. Relatively rich working equipment will be used. Because there is enough time to switch between devices without interrupting thinking.</td></tr>
<tr><td>Turning off or staying away from information devices that are likely to cause interference or attraction, such as mobile phones or other entertainment devices.</td><td colspan="2">Even using phones or other entertainment devices more often to help distract themselves.</td></tr>
</table>

Using more flexible physical media, such as pen and paper, to quickly record ideas and thoughts to help focus on thinking	/	/
Time management		
Arranging tasks that require more concentration at times with high energy according to the personal biological clock • For example, arrange continuous work tasks in the morning	Arranging simple and easy tasks at times the mind is prone to lethargy • For example, do some repetitive tasks in the first hour after a nap.	Arranging appropriate rest or leisure activities to relieve fatigue
By means of intentional time management (such as tomato clock) to make oneself focus intermittently	/	By means of intentional time management to make oneself regularly rest to relax and relieve fatigue
Allowing oneself a buffer period of mental or physical state before going into a highly focused task. • For example, set aside 20 minutes of preparation time for work debriefing and have some tea or water.	/	/
Location & Activities		
Trying to avoid being distracted by other activities while working.	Doing appropriate leisure activities to relieve fatigue and maintain a happy mood.	Getting away from work for leisure activities
Working in a specific area with little change of work location	A reasonable change of location • For example, moving to a more comfortable and home-like environment, such as on the sofa, on the balcony, or even on the bed in the bedroom	Frequent changes in location • For example, going to the living room to interact with the family, to the kitchen to wash fruit, to the bedroom to lie down for a short while or to go outside to get some sun
Social Attributes		
Self-exposing the state of concentration, and inform or	Self-exposing the possibility of being distracted	

remind others who may distract themselves. • For example, set a "busy" status tag in the work software, or communicate the work schedule with your family in advance.	• For example, open the door or actively respond to family members and interact with them.	
Avoid extra unnecessary work social interaction as much as possible	Taking the initiative to socialize with colleagues to relax and get more inspiration for work	
Self-suggestion & Motivation		
Asking oneself to have output while inputting knowledge and keep thinking • For example, summarizing the content of the web pages viewed into a report.	Avoiding excessive distraction by consciously engaging in leisure activities that are low viscosity and do not lead to an experience of extreme excitement • For example, browsing social media rather than playing games.	
Rewarding oneself before or after staying focused for a longer period of time • For example, ordering a delicious take-out meal or watching an episode of your favorite TV show.	/	/

Table 5: Task-level cues that affect situation switching during formal working hours

<table>
<tr><th colspan="3">Environment-level cues</th></tr>
<tr><td>High concentration</td><td>Relatively
low concentration</td><td>Leisure activity</td></tr>
<tr><td colspan="3">Atmospheric condition</td></tr>
<tr><td colspan="3">Sound</td></tr>
<tr><td>Quiet environment

"I don't want to listen to music when I'm very focused."
-Interviewee F</td><td colspan="2">An environment with sound

"Listening to some audio books while working makes it easier for me to focus."
-Interviewee J</td></tr>
<tr><td>Soothing rhythmic white noise and pure music

"I would listen to more soothing music like white noise and pure music. If I listen to songs, my thoughts will be completely taken away and I will be easy to get distracted at work."
-Interviewee E

Other audio that doesn't cause distractions

"In fact, sometimes the environment is too quiet and not very easy to help people focus. I'll put on Guo Degang's comedy. I do not actually listen to what he's saying. I just need some sound in the environment."
-Interviewee M</td><td>Both left and right, depending on the situation

Music with cheerful rhythm

"Fun music keeps me from just being confined inside my own work."
-Interviewee J</td><td>Music with relatively strong rhythm

"I will switch the music from a slow rhythm one to a stronger rhythm one."
-Interviewee I

"I listen to my favorite song list instead of pure music when I rest."
-Interviewee K</td></tr>
<tr><td>Music with relatively low volume

"I will turn down the voice of the music when doing long period and focused personal task, avoiding it interfering with my work. "
-Interviewee K</td><td colspan="2">/</td></tr>
</table>

<table>
<tr><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">Light intensity/color/range</td></tr>
<tr><td>Bright Light

"Brighter lights will make me more focused. "
-Interviewee O

"My desk lamp only needs to be turned on at work. I usually turn its light to the brightest. "
-Interviewee H</td><td>Light of appropriate brightness

"When I want to concentrate on my work, such as making a contract or business quotation, I will use the strong light of the desk lamp. I don't need such a good light when I am not doing very important tasks, such as looking at files. It is also harmful to the eyes. Also, my computer screen will not be very bright. "
-Interviewee N</td><td>Soft light

"I don't like too many lights in the environment when I'm taking a break. Darker environment makes it easier for me to relax. "
-Interviewee C

"When I relax, I will use a small lamp with soft light to replace the lamp used for work. "
-Interviewee D</td></tr>
<tr><td>Strong light that focuses on the work desktop

" It is better to have light only in the view area of my office, but not elsewhere. "
-Interviewee B

" After the lamp is turned on, the space around the computer with enhanced light makes my eyes more focused. "
-Interviewee I</td><td colspan="2">/</td></tr>
<tr><td>Light with cool color (White light)

" For important work I like to use cool light, not warm light. I want to keep myself rational. "
-Interviewee K</td><td colspan="2">Light with warm color (Warm light)

" Warm light is more likely to make me want to sleep. Warm light brings a positive mood, giving me a very warm and comfortable feeling. "
-Interviewee A</td></tr>
</table>

" I'm looking forward to the light being a very bright white one when I'm working, which will make me more focused. " -Interviewee A	*"When I am not working, I want to have a lamp with a warmer and soft light. "* -Interviewee F
Artificial light *" When doing rigorous work and concentrated work, I will choose to turn on an artificial light instead of relying on natural light. "* -Interviewee M	**Natural light** *" If my work tasks do not require me to sit in front of the computer nervously, I will even take documents to the outdoors to enjoy the sun. "* -Interviewee B *" Sometimes I work on the balcony, because the windows are large and there is plenty of sunshine. "* -Interviewee o
Smell	
Environment with no special smell *"I usually use scented candles when I am relaxed. Because the smell distracts me from my work "* -Interviewee A	**A scented environment** *"Scents help me build an immersive atmosphere which helps me maintain a pleasant and relaxing mood. "* -Interviewee E
Favorite smells *" I spray my favorite perfume before I'm ready to start intense work. "* -Interviewee K **Cool smell** *" I open the windows in the morning and the smell of cold air in the room makes it easier for me to stay awake."*	**Favorite smells** *" I always put a fragrance in my room, it's a lavender smell that I really like. I feel very comfortable after smelling it in my leisure time. "* -Interviewee G **Calmful smells** *" I will use aromatherapy to relieve the pressure of work. I prefer oranges and lemons. They make me calm. "* -Interviewee F

-Interviewee E **Nature smell** *" Smell brings me an association. I work remotely in my own little room. My personal space is limited. If an ambient atmosphere is created, it will free me from the confines of that space and put my mind in a very expansive state. This will make it easier to get into a focused state of work. "* -Interviewee E	
Equipment condition	
Only Equipment and software for work use *"I will put my phone far away or leave it on my bed to avoid it interfering with my work. "* -Interviewee J *"I only keep work-related content and materials open during important work. "* -Interviewee K *"When I take a break from work, I will take out my iPad for entertainment and watch some short videos. I not put it on my desk at work. "* -Interviewee F	**Equipment and software for work and leisure use** *"I may be browsing other non-work related content on the secondary screen when I'm in a meeting that doesn't require my participation. "* -Interviewee G *"I will use my phone to chat with friends while working on easy tasks. "* -Interviewee F
Prompts to help think and express continuously	/

"I'll make an outline first. In this way, I can think continuously and attentively in the task and control the time reasonably. " -Interviewee D *"Before doing such a stressful task as reporting, I will write some ideas in the memo in advance to give myself some hints in the presentation. "* -Interviewee H		
Important information alerts *"I don't have time to read other news. I just want to finish my work. Therefore, I will actively block the news of some friends or colleagues. I only watch the important messages. "* -Interviewee C	**Attractive information** *"If my friends send me messages or the messages from some applications attract me, I will check the messages first before continuing to work. "* -Interviewee B	/
/	**Works Schedules or task progress reminder** *"It's important for me to occasionally check my work schedule on my computer desktop. Certainly when work is relatively free. "* -Interviewee B	/
Desktop and environment		
A clean desktop with few items	/	

"If I am to stay focused now, the environment in my view must be very clean and tidy." -Interviewee L *"When I'm in my leisure time, I have more devices on my desktop. When I'm working intensely, I want to have as few things as possible. Because there are fewer distractions. "* -Interviewee A	
/	**Exciting and pleasing visual elements in the environment** *"When I sit in front of the window to work, I can see the occasionally passing beautiful car outside the window. This makes me happier at work. It makes me feel like I'm enjoying a good living while working"* -Interviewee K *"I usually play with the small toys on my desk when I am at leisure. I feel very decompressed. They help me escape from the pressure of work temporarily. "* -Interviewee I *"When I was working in the living room, I saw that the leaves outside had turned yellow, which was very beautiful. "* -Interviewee A
Physical barriers *"I prefer a separate room. Or there is a barrier between me and the outside world in the working environment. This will allow me to work more immersively."*	/

-Interviewee C *"For example, there is a curtain behind me. This sense of isolation makes me feel that I am alone in the working environment."* -Interviewee G		
Space with working properties *"I try to avoid doing recreational activities in the work environment."* -Interviewee B *"I don't work at the dining room table or on the living room couch. I don't think that's good for me to stay focused on my work "* -Interviewee o *"I hope there can be a way to help me visually isolate space. The items in the home environment and the items in the work space together will affect the work concentration. "* -Interviewee E	**Space with working and leisure properties** *"I go to other non-work environments when I'm listening to a meeting that doesn't require me highly participate."* -Interviewee L *"I change office locations when I'm working on less important tasks. This helps me to change my mood."* -Interviewee D *" I prefer to go to the balcony to make work calls, the atmosphere helps me relax. "* -Interviewee M	**Space with working and leisure properties** *"If I just finished the important things, I would go to the bedroom to lie on the bed for a while."* -Interviewee J
Social Attributes		
Low probability of non-work social interaction *"I go to the studio because I have a roommate who is a bit noisy. I could easily be accosted by him if I was at home.*	**Relatively high probability of non-work social interaction**	/

But at the studio everyone's purpose is to study, so no one will come and make small talk with me. It's easier for me to focus on my own work." -Interviewee C *"When I work in the office, I can't avoid making small talk or interacting with my colleagues or whatever, but at home that doesn't happen at all. It helps me to focus."* -Interviewee H *"I usually ask my husband to take the kids to a relative's house on weekends when I have to work. This way, I don't have the kids interrupting my work."* -Interviewee L	*"If it is in a less urgent task, I think it is a good thing to stop working and talk to friends for a while "* -Interviewee F *"I can be disturbed under some working conditions. I even wish someone could come and talk to me. Even if we don't talk about work issues, we can talk about some things in life."* -Interviewee J *"I can't leave this online meeting, but it really doesn't help me very much. I think I will chat with friends on my mobile phone."* -Interviewee G	
Simple and independent information space in special time period *"Most of the people I work with are late sleepers and late risers. So, for me, morning is a relatively undisturbed time. I will do more focused tasks during this period."* -Interviewee C *"I put tasks that require high concentration in a relatively independent period of time late in the day. At this time, I am not easily disturbed by news and other affairs."* -Interviewee M	/	
Temporal shareability with others	/	

Online supervision *"If possible, I hope to supervise each other online with a working partner. For example, we can check each other's attention status through the video call. This can stimulate my enthusiasm for work."* -Interviewee E *"The online supervision of the boss or colleagues should be very effective. "* -Interviewee I	

Table 6: Environment-level cues that affect situation switching during formal working hours

The findings and insights in Chapter 5 answer the fifth sub-question of the research: Which cues have influence on the switching of personal state between different situations?

06

DESIGN STRATEGY

In this chapter, a design strategy based on the research findings is presented to support the process of situation switching in individual teleworking. It takes into account the multiple situations that exist in teleworking as reflected in the research findings as well as part of the cues that influence people's situation switching process. The design strategy facilitates personal state switching between situations by altering, where possible, common cues that can influence the situation switching process of teleworkers, thereby enhancing the user experience in the dynamic activity of teleworking from an overall perspective.

6.1 Overview of design strategy

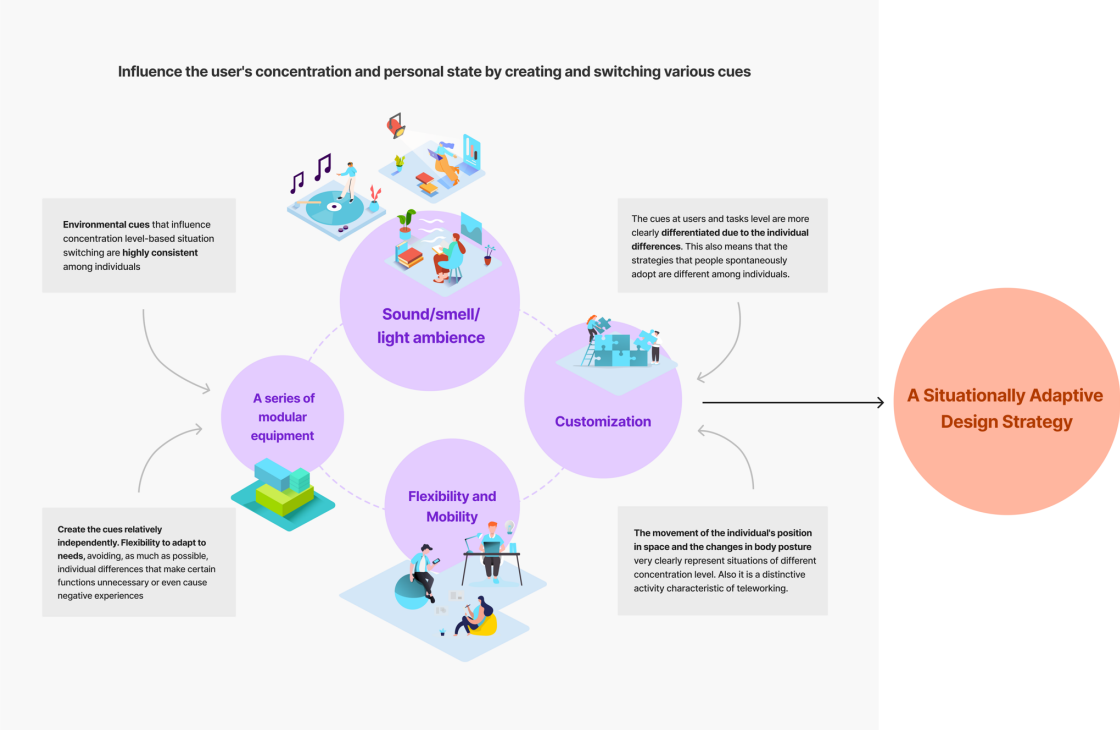

Figure 31: Overview of the design strategy

This thesis proposes a situational adaptive design strategy based on the results of the research. Its main advantage is to determine the current situational properties by identifying the tasks and activities of individuals in teleworking and actively influencing the individual's concentration and personal state by creating and switching various cues in teleworking environment. Through this situationally adaptive working mechanism, this design strategy can flexibly and proactively cope with the process of switching between different situations, thus help teleworkers with the different requirements of personal state regulation.

There are two questions here. First, how should we identify the tasks and activities of individual teleworking, and identify them as different situations? Second, what cues should we provide to individuals in dynamic change, and how can we provide these cues to better enable this design

strategy to help people adjust their personal state? I will answer these two questions in turn.

1. How should we identify the tasks and activities of individual teleworking and identify them as different situations?

The findings of two aspects of this research help in this regard. On the one hand, we need to define the context category of tasks and activities according to their specific types. As shown in the open coding in Section 4.3.2, different tasks and activities of teleworking (e.g., presenting, rigorous text work, less involved online meetings, etc.) can be categorized according to different psychological characteristics related to concentration. Therefore, from an individual perspective, different types of tasks and activities can be associated with different levels of concentration in a situation. For example, we can get a preliminary idea of what tasks a teleworker performs during a day of teleworking based on his or her work schedule. This means that we have the opportunity to initially determine which situations with different levels of concentration may exist during his or her teleworking day. Of course, if combined with a certain subjective description of how he or she feels about the work tasks, we can make a more accurate identification of these situations.

On the other hand, we need to determine which of the eight types of situations defined in this research they are currently in based on the identification and analysis of the teleworkers' spontaneous behaviors. The task cues that influence the teleworkers' situation switching process, summarized in Chapters 5.2.1.1, 5.2.1.2, and 5.2.2, are the spontaneous behaviors that can be identified and analyzed. They can typically represent the individual's current level of concentration in teleworking. Therefore, by perceiving these task cues, the individual's current situation can be identified and determined. Design strategies can then respond proactively to the situation by providing cues that fit the situational demands and help the individual to switch between situations.

2. What cues should we provide to individuals in dynamic change, and how can we provide these cues to better enable this design strategy to help people adjust their personal state?

This design strategy answers this question through four key features (see Figure 31).

1.The objects of the design strategy are the sound, light, and smell ambiences of the environment

2.These ambiences are suitable for construction by a series of modular devices rather than an integrated multifunctional device

3.The design strategy is customized or retains user-defined freedom to create and switch of the three environmental cues of sound, smell, and light

4.The carrier of the design strategy should be flexible and mobile

Each of these features is explained in turn below:

Sound/smell/light ambience: The design strategy is intended to help teleworkers switch between situations, either passively or actively, by building a dynamic ambience in their work environment. This ambience includes sound, light, and smell. In Chapters 5.2.1.1, 5.2.1.2, and 5.2.2, the cues that influence situation switching in individual teleworking were summarized at the task and environmental levels, from entering and leaving formal work states, to switching between situations based on concentration levels during formal work hours.

First, in the summary of cues that influence concentration level-based situation switching among teleworkers during formal work hours, I found that environmental cues that influence concentration level-based situation switching are highly consistent among individuals. This was particularly evident for three different types of environmental ambient cues: sound, light,

and smell. For example, 13 of the 15 respondents indicated that in situations requiring high levels of concentration, they would supplement their work environment (or desk) with stronger and more focused light to make it easier to immerse themselves in the task. Twelve respondents said they use music or their favorite scent to help them regulate their mood and personal state while working remotely. According to the results of the research on the cues that influence individuals' situation switching in teleworking, the three ambiences preferred by individuals in different concentration levels differ. Adjusting the environmental ambiences to help one develop a positive office experience can be seen as a common individual strategy. In the current situation, this adjustment is more often done by teleworkers actively with the help of devices such as cell phones, lamps, and scented candles. In some cases, they do it only when they are aware of their poor state. And there is a regularity in these strategies, in a particular individual who works remotely. That is, in similar scenarios (or tasks and activities), an individual tends to adopt the same adjustment strategy. This means that the designer has the opportunity to intervene in this process by providing the individual with a set of strategies that follow a pattern of modulating the three environmental ambiences of sound, light, and smell, thus helping the individual to create a more positive situation switching process.

In addition, by comparing the results of studies on the cues that influence individuals to enter and leave formal working states and the environmental cues that influence the switching in concentration levels during formal working hours, a clear common feature can be identified. Sound, light, and smell appear as three ambient features of the environment in all the cues that were summarized under the types of situation switching defined in this research. This means that if one wishes to enhance the individual experience from the overall perspective of teleworking (i.e., the complete remote workday) through a set of design strategies, it is most effective to take these three environmental ambiences into account. Therefore, the design strategy chose to focus on sound, light and smell in the environment as the objects.

A series of modular equipment: Although the process of perceiving the three cues of sound, light, and smell in the environment and generating psychological characteristics at different levels of concentration is common across individuals. However, the present study found that these demands were not entirely consistent across individuals who worked remotely. For example, certain respondents focused on and adjusted only two ambiences, sound and smell, in the teleworking environment, while certain respondents were sensitive to all three atmospheric features. This means that the behavioral tendency to regulate state with the help of environmental ambience cues is consistent for different individuals, but the specific type of ambience needed is different. In some cases, even providing individuals with ambience that they do not need can interfere with their focus on the task. Therefore, the design strategy hopes to create the cues relatively independently through a series of modular devices. In this way, it can adapt to different individuals, avoiding, as much as possible, individual differences that make certain functions unnecessary or even cause negative experiences.

Customization: The starting point for this feature of customization is that the design strategy is expected to better accommodate each individual's more differentiated cue perception process. In addition to individual differences in sensitivity to the types of sound, light, and smell cues, there are also individual differences in the perception of a particular type of environmental cue. For example, for the ambience of light, although there was a common tendency among respondents to use stronger cooler light in concentration-demanding situations and softer warmer light in casual situations. But for each individual, their specific requirements for the color and intensity of light are more dependent on their personal preferences. The analysis of the respondents' raw data provided suggestions for creating and switching between the three ambient features for different types of situations. However, in the design strategy, the creation and switching of sound, smell, and light cues should be customized based on individual preferences

or provide the user with the freedom of customization. Users can benefit from the ambience suggested by the design strategy, or they can fine-tune the original settings to their specific needs.

Flexibility and Mobility: The different categories of situations in teleworking do not occur in the same "place". According to the results of the research, the movement of the individual's position in their teleworking environment and the changes in their body posture very clearly represent situations of different concentration level. Also it is a distinctive activity characteristic of teleworking. The spatial and activity flexibility of teleworking requires that the design strategy corresponding to it should have the characteristics of flexibility and mobility to maximize its value in the whole scene. In particular, when creating the ambience, the design strategy needs to take into account the spatial location of the individual in different situations and the original characteristics of the space. And where possible, continuity of experience across spaces is maintained by providing devices with a high degree of mobility or by creating flexible interconnections between devices. Some respondents expressed in their diary their expectation of this continuity experience. In the case of music playing, the current teleworking groups meet the requirements of continuous listening experience in different spaces by switching between playback devices in different locations. For example, in the bedroom they will use a speaker, while in the living room they will choose to wear headphones and play music on the phone. The two are sometimes not well connected. The existence of a strategy that flexibly creates a continuous spatial atmosphere based on the teleworker's movement through the space can have a significant effect on enhancing the positive experience of the individual.

The situational adaptive design strategy that incorporates the four features above answers the last research sub-question: How can the cues be integrated into design strategy to enhance the situation switching process in individual working?

6.2 Design strategy to enhance situation switching process in individual teleworking based on three types of ambiences

The following table shows a specific application of the design strategy to enhance switching of personal state in individual teleworking based on three types of ambiences in each type of situation switching process.

Situations （Situation switching）	Sound ambience	Light ambience	Smell ambience	At what stage does the cues switch
Situations switching between personal life and formal working state				
1.Entering formal working state	• More energetic music or sound to help create an active atmosphere and improve the degree of pleasure • Moderate sound volume that should not interfere with the work	• Enhanced cool-colored light, especially in areas within the field of view of teleworkers at work • If possible, it is good to simulate daytime sunlight	• Fresh smelling atmosphere. • Allow user to choose the scent that pleases them according to their preferences	Half an hour before entering formal work
2.Leaving formal working state	• Users' favorite songs	• Soft light • Automatic light shut-off	• No special effects except for the teleworker's preferred smell	A short period of time before leaving the formal work (it is better to be customized by the user)
Situations in formal working hours based on concentration level and distraction possibilities				

Situations of high concentration	3.Best not to be distracted (High concentration)	• No sound • Soothing rhythmic white noise, pure music or video • Moderate sound volume • Sound with as little change in category or intensity as possible	• Cool artificial light that is sufficiently bright and focused within the user's field of view • Light as unchanging as possible	• No smell • User's favorite and pleasant smell • Fresh smell that keeps people awake. • Natural smell • Not too strong smell intensity • Smell as unchanging as possible	During the work task
	4.Easy to maintain concentration, no external help needed (High concentration)	• No special effects except for the user's preferred sound • Sound with as little change in category or intensity as possible	• Cool artificial light that is sufficiently bright and focused within the user's field of view • Light as unchanging as possible	• No special effects except for the user's preferred smell • Not too strong smell intensity • Smell as unchanging as possible	
	5.Need for moderate distraction to relieve tension and help relax（High concentration to appropriate concentration）	• Actively recommendation of white noise, pure music or video background sounds with a soothing rhythm • Moderate sound volume	• Light with reduced intensity • Actively switch to a warmer light if necessary. • If possible, it is good to simulate daytime sunlight	• Enhanced Smell • Actively recommendation of their favorite and pleasant smell, fresh smell or a calming smell	Before / During the work task

Situations that do not require a high level of concentration	6.Can be distracted （Switching between appropriate concentration	• No special effects except for the user's preferred sound	• Bright light • No special effect	• No special effects except for the user's preferred smell	During the work task
	7.Hoping to be distracted （appropriate concentration to low concentration）	• Actively recommendation of user's favorite songs or other suitable sound	• Bright light • Actively adjust to warmer light or other colors of interesting light if necessary • If possible, it is good to simulate daytime sunlight	• Enhanced Smell • Actively recommendation of their favorite and pleasant smell	
	8.Proactively help distract themselves （appropriate concentration to low concentration）	• Rely more on the active adjustment of the user • Actively recommendation of user's favorite songs or other suitable sound	• Rely more on the active adjustment of the user • Actively adjust to warmer light or other colors of interesting light if necessary	• Enhanced Smell • Actively recommendation of their favorite and pleasant smell	During the work task Leisure activities
Situations that require relaxation or a break	9.Need to be distracted (high or appropriate concentration to low concentration）	• Enhanced sound	• Actively adjust to warmer light or other colors of interesting light if necessary • If possible, it is good to simulate daytime sunlight	• Enhanced Smell • Actively recommendation of new smell	During / After the work task

from concentration					
	10.Avoid excessive distraction（switching between low concentration）	• Sound not too intense • Actively recommendation of user's favorite songs or other suitable sound	• Open light • Actively adjust to cooler stronger light to attract users back to work	• Smell not too intense • Actively create different smell ambience for work and leisure, and help users switch personal state by switching between the two.	Leisure activities

Table 7: Situational adaptive design strategy based on dynamic switching of three environmental ambiences

The table above lists ten specific types of situation switching, which fall under the categories of entering and leaving formal work states, and three situations with different concentration requirements. The design strategies are described below according to the different categories of situation switching.

The first two types of situation switching in the table are those where the teleworker switches between life and formal work situations. The design strategy is intended to help the user construct a different state constructing an ambient space with the properties of the new situation for a short period of time before entering it. For example, when the user is ready to start working, the design strategy provides the user with more energetic music at a moderate volume to help create a lively atmosphere and increase the level of enjoyment while avoiding disruption to work. Enhanced cool-colored light, especially in areas within the field of view at work, should also be provided to attract teleworkers to a professional state of work. In terms of the scent environment, providing a smell that keeps the users awake and providing their preferred smell ambience through smart devices are also helpful in helping them to enter formal work in a positive and pleasant mood.

Similarly, before the user is ready to finish work, the design strategy plays the user's favorite song list and turns off or dims the lighting, either at a time set by the user or based on a determination of the user's spontaneous behavior, as a transition from the stressful work situation and back to their personal life.

In the high concentration requirement situations, the first two sub-situations (type 3 and 4 in the table) are situations in which teleworkers are best not to be distracted and in which they can easily maintain high concentration with no external help. In these situations, the user needs to remain highly focused on the task for a certain period of time with little noticeable change of activity or position. During these times, the design strategy is to consistently provide users with sounds, lights and smells that help them to maintain a high level of concentration. For example, soothing rhythmic white noise and pure music, cool artificial light that is sufficiently bright and focused within the user's field of view, user-friendly or fresh smells with moderate intense. It is also important to keep these cues as constant as possible during the time the user needs to maintain a high level of concentration so that changes in ambience do not interfere with the user's attention.

In the high concentration requirement situations, the third sub-situation (type 5 in the table) is situation in which the user needs moderate distraction to relieve tension and help relax. The user still needs to stay focused on the task to achieve the task goal, but they need to relax moderately to keep themselves in good shape and avoid the negative effects of overstress. For example, keeping a brisk pace during online communication with important clients or regulating emotions during time-critical document writing to avoid increased errors due to irritability. In this case, the point at which the user switches their concentration often comes from their subjective judgement of the state of the task and their own feelings. The main objective of the design strategy is to help users switch from a high level of concentration to an appropriate level of concentration by suggesting an ambience that is acceptable in terms of distractions and helps them to relax when they are identified as staying focused for long periods of time. For example, actively recommending white noise and pure music, and actively recommending the user's favorite smell, fresh smell or a calming smell. In terms of lighting, actively reducing the light intensity according to the user's needs, and helping the user to switch to a warmer light if necessary or simulating natural light can guide the user's concentration and thus help them to relieve the emotions caused by constant stressful work. The ambiences can also be adjusted manually to create a moderately relaxed environment to help build up a

mental buffer before a highly focused task is about to start. For example, when preparing for an upcoming public presentation, or before starting a rigorous audit that will last for a considerable period of time.

In situations that do not require a high level of concentration, the first sub-situation is that teleworkers can be distracted (type 6 in the table). In this sub-situation, users are focused on their work tasks and do not mind being interrupted by other affairs, and they can resume their work after being interrupted. Generally they are passively distracted by interruptions, and these are more important or more engaging than the task they are currently working on. This means that they switch between situations that are less demanding in terms of concentration and do not experience a significant change in concentration. This situation switching is more of a passive cause, in which the user is motivated to cope with the distracting task and is not significantly facilitated by the change in ambience.

In situations that do not require a high level of concentration, the second sub-situation is where teleworkers want to be distracted to increase their psychological pleasure and relaxation for reasons such as the repetitive nature of their current task and the low level of engagement required (type 7 in the table). In this type of situation, the user does not tend to disengage directly from the work task, but wants to use some exciting audiovisual elements or create the possibility of socializing with friends online to help them stay entertained while working. The main difference between this and the fifth situation switching type in the table is that the external elements can be more intrusive to the teleworkers with richer form. After the user gives a command, the design strategy will proactively recommend the user's favorite or other suitable song, adjust the lighting to warm or other colors of interesting light and recommend some pleasant scent. By creating an attractive and highly pleasurable environment, the design strategy hopes to help the user make the switch from appropriate concentration to low concentration.

In situations that do not require a high level of concentration, the third sub-situation is where users actively help themselves to distract themselves from tasks that require a low level of concentration, such as listening to a meeting they do not need to attend while doing some exercise, or responding to work messages while heading to the living room to interact with their family. It differs from type 7 in the table in that the user actively breaks away from work tasks to engage in intermittent leisure activities or to attend to other personal matters. The user has a strong desire to keep themselves relaxed through leisure activities or external factors and is more

willing to expend energy to achieve this goal. In this situation, the design strategy should allow the user to create for themselves the ambience that is most comfortable and appropriate to their current state of being, both in terms of what they are doing and where they are. The design strategy actively recommends an appealing and enjoyable atmosphere while leaving more freedom and possibility for the user to actively adapt the ambient cues.

In the third category, i.e. situations that require relaxation or a break from concentration, the user in the first sub-situation needs to be distracted from exhausting tasks (type 9 in the table). Users need to be distracted from work tasks for a while to adjust themselves after experiencing some negative emotions or stress that makes them feel uncomfortable. It is the one with the greatest span of concentration switching of all the situation switching types, i.e. the user needs to change from a high level of concentration to as complete relaxation as possible. This is where it is important to switch the ambience to the greatest extent by creating stronger environmental cues. The design strategy helps the user to block out negative feelings and develop new personal states by providing enhanced sound, actively adjusting to warmer light or other colors of interesting light if necessary, and providing enhanced smell or actively recommending new scent atmospheres.

In situations that require relaxation or a break from concentration, the second sub-situation is where the user needs to avoid excessive distraction for non-work leisure activities during formal working hours. In this case the design strategy takes more care that the intensity of the psychological stimulus provided by the ambience is not too high, such as overly intense music or overly stimulating smells. The design strategy also aims to attract users back to focused work by creating a serious and orderly atmosphere at appropriate times, for example by automatically turning the lights on the desktop into cooler color with brighter intensity. Also, by intentionally creating differentiated, relatively fixed atmospheres for work and leisure, and helping users to switch between personal states by switching between the two atmospheres, is an considerable way to entice users to switch between leisure and work states.

07

CONCLUSION

The final chapter concludes this thesis by summarizing how the findings of this thesis answer the research questions. In addition, this chapter presents the limitations of the study and identifies opportunities for further research. Finally, a personal reflection on the thesis is provided.

7.1 Answering research questions

The research question for this thesis was to determine how to enhance the process of situation switching in individual teleworking by answering six research sub-questions.

The first sub-question was the following:

•What kind of "situation switching" exists in individual teleworking?

In answering this question, this thesis constructs an approach to defining and studying situation from both subjective and objective aspects based on literature study. On the one hand, people's psychological states constitute their subjective perceptions of situation. On the other hand, objective and quantifiable stimuli in the environment constitute the objective situation. In the first phase, this research defines which categories of situations exist in telework and how situation switching occurs from the perspective of individuals' subjective perceptions.

Based on the results of the questionnaire research, the researcher first discussed the situation switching processes in teleworking in two categories: entering and leaving the formal working state, and switching between situations that occurs during the formal working hours. The two processes of entering and leaving the formal working state, as typical situation switching processes, are the switching between the casual life situation and the formal work situation. The situational categorization of teleworking during formal work time was examined through a three-step data clustering and thematic coding analysis process.

During interviews with teleworkers, based on extensive knowledge of the 15 respondents, the researcher found that concentration is a characteristic that significantly represents the personal states, as well as the psychological characteristics associated with tasks and activities. Concentration is found to be

the most important characteristic that interviewees pay attention to in teleworking situations. Therefore, based on the hypothesis that "concentration is a characteristic, which allows an overall overview and classification of the respondents' personal state", the researchers further carried out a situationalized process of teleworking tasks and activities that occurred during formal working hours.

First, the researcher found that the concentration-related situations perceived by individuals in teleworking are associated with a number of 12 psychological characteristics. These psychological characteristics are closely related to the type of tasks and activities. These psychological characteristics can be considered as influential factors that that lead to changes in the concentration level of teleworkers. The results of this part of the research answer ed the second research subquestion:

• what are the main psychological factors that affect the individuals' perception of the situation?

Also, the strong relationship between the psychological characteristics of different tasks and activities and the level of concentration proves that it is feasible to situationalize different tasks and activities of teleworking with concentration as a core concept.

The final situationazition results validated this. It was found that the situations in individual teleworking during formal working hours could be divided into eight categories based on two main characteristics: the level of concentration and to what extent the teleworker was easy to be distracted. Among the different situations, the switching process with concentration as the main characteristic occurred at different stages of the task or activity due to different requirements of the potential for distraction. In part, the key words "concentration" and "distracted" answer the third and fourth subquestions of this thesis:

• What are the most different characteristics between the situations?

• What motivates people's behavior during situation switching in individual teleworking?

The second phase of this thesis was to answer the fifth sub-question:

• Which cues can have influence on the transition of personal state between different situations?

The researcher clustered the raw data to find those cues that influence the process of switching between situations. The study of cues was still discussed in terms of entering and leaving formal working states, and switching between different concentration levels during formal work hours. The cues were summarized at the task and environment levels respectively. Task-level cues were mainly derived from behavioral strategies actively adopted by individuals, while environment-level cues were mainly derived from information that can be perceived in the physical environment.

Finally, this thesis supported the process of situation switching in individual teleworking by proposing a situational adaptive design strategy based on three cues: sound, light, and smell ambiences. It integrated the cues from the results of the second phase of the thesis, and extracted the parts in which there were commonalities that can be translated into design opportunities. The design strategy proposed in this thesis suggested a solution for each specific situation switching process to facilitate people's personal state switching between situations. It enhanced the positive experience of individuals in the dynamic activity process of teleworking from a overall perspective. Thus, it answers the last research sub-question:

• How can these cues be integrated into design strategy to enhance the situation switching process in individual working?

7.2 Practical implications

First, the findings of this thesis offer a new perspective on promoting positive individual experiences in teleworking with the study of situation switching processes. The situationazition of tasks and activities in teleworking as the findings of the first phase of this thesis can help people better understand how and why personal states change in teleworking. Teleworkers can refer to this finding to reflect on which phases of their teleworking fit the situation described in the conclusion. And they can proactively help themselves construct an individual strategy to positively respond to it and enhance their office experience.

In addition, the cues that influence the situation switching process of individual teleworking as the findings of the second phase of this study can be applied to a broader range of design activities that focus on teleworkers. Because the design strategy proposed in this thesis hopes to help individuals switch states from a overall perspective of teleworking (or from a complete remote workday), only some of the common findings of insights into the cues that influence individuals to switch between situations are included in the consideration of design ideas. However, other cues summarized in the research can still be seen as references when designing for particular tasks or activities in teleworking.

7.3 Limitations and Further research

A limiting aspect of this thesis is was that it is a qualitative study based on a limited number of participants. The researcher believes that it would be beneficial to conduct a more extensive qualitative and quantitative study of the process of situation switching in telework, following the research framework of this study. A larger base of respondents would bring richer data to the study, and these data samples would further enhance the reliability of the findings.

In addition, this thesis categorized the tasks and activities in teleworking from the perspective of one psychological characteristic, concentration, to obtain findings that are consistent with the hypothesis. However, because people's mental activities and psychological traits are very complex, there should exist other typical psychological characteristics that is able to categorize the situations in telework. Therefore, this thesis represented only one of the many possibilities.

At the same time, because the goal of this thesis was to explore strategies to help individuals switch states from a overall perspective of teleworking (or from a complete remote workday). Therefore, concentration, as a characteristic that can be integrated for almost all tasks and activities, was used as the main entry point for the study. In future studies, more attempts could be made to conduct research on some specific categories of tasks and activities in individual teleworking, so that conclusions that are more typical and adapted to some specific scenarios will be drawn.

Finally, the design strategy proposed in this thesis are intended to serve as a guidance for real design projects. In order to better validate the feasibility of the idea in a real remote work scenario, it can be further developed into a functional prototype and tested in practical use.

7.4 Personal reflection

Looking back on the process of writing my thesis, I have to say that I learned a lot. At the beginning, I wanted to choose this topic because of my own remote work experience. I experienced a bad teleworking experience in 2021. At that time, because of the epidemic, my design internship in China was done remotely. I had little teleworking experience before that. It was hard to feel in control of my life and work when I no longer had to go to the office every day and instead relied on a computer at my bedroom desk to communicate with my colleagues and mentor. I found many activities that could have helped me adjust my state naturally disappeared, such as commuting and

having lunch with familiar colleagues. I always sat at my desk and finished my work all day long. I had no way to adjust my mood except occasionally playing with my mobile phone. Moreover, I hardly felt my connection with the outside world. In the communication between people, those factors bearing rich emotions disappeared, which led to the reduction of my own vitality. These sad feelings brought me problems such as procrastination and low efficiency during my internship.

Because I personally experienced some negative effects, I wanted to explore how the positive individual state forms in teleworking in my master thesis. I think it is very valuable for tens of millions of people like me in China who are not familiar with teleworking, but are participating in teleworking for various reasons and are likely to work remotely for a long time in the future.

In completing the research of this paper, I think the biggest gain is the attempt to use a variety of research methods.

First of all, I tried to use academic coding to analyze the raw data from the respondents with the suggestion of my supervisor, so as to reveal the core insights. At the beginning of the research, I was confused about how to study the very complex tasks and activities in telework. I even thought that they could not be studied or abstracted into a model. But for now, I successfully categorized the tasks and activities in teleworking, and put forward my own opinions based on the results of the research. The method of coding has helped me a lot in this process.

In my previous studies, I had a certain understanding of the methods related to design theory research, including how to build abstract theories from complex data. In this research, I took the initiative to learn the specific operation of academic coding and applied them in practice. This process made me more deeply aware of how to structure complex human behaviors and make them researchable by refining core variables. I also hope to apply this research method and idea to my future research projects.

Another research method that has benefited me a lot was the Diary Study. It is also a method I tried to use for the first time. In previous design practices, I always conducted semi-structured interviews to obtain information about users' behaviors and attitudes. But in the research of this thesis, I found that only relying on semi-structured interviews cannot help me to get the data I need. Because the behaviors I want to collect has a strong correlation with the real situation. If respondents were only invited to answer what they have done in teleworking based on their memories, it is difficult to accurately recall the information related to the specific tasks and activities, as well as the behaviors between them. So after comparing the advantages and disadvantages of some user research methods, I finally chose Diary Study as a research method to go deep into the real working environment of users, so as to collect richer and more convincing data. I also experienced many firsts in the process of completing the diary study. For example, the first time I designed a diary, the first time I told respondents about my diary, and the first time I repeatedly urged my respondents to actively participate in the user research process. I think the final result is satisfactory. The detailed information from the diary provides a solid data base for me to conduct retrospective interviews with each interviewee. I also look forward to the opportunity to make better and more rigorous use of it in the future.

In a word, I gained obvious personal growth in the process of writing this thesis. I am very glad that I finally successfully completed it. The topic of positive personal state should always be the most basic expectation of people we care about. Because it will affect our attitude towards life and the quality of our life. Especially in today's rapidly evolving lifestyle, whether we can actively adapt to the new life and work patterns is a key issue. I hope that the research conclusions of this thesis can help people who encounter negative emotions in teleworking better adjust their personal state. During the interview, one interviewee's words touched me very much. He said: "I am very grateful for your research. This diary gives me the opportunity to reflect on how I work every day. In the process of completing it, I found that

I never seriously thought about how my work can make me better in life." Therefore, I also hope that this paper will play a role in a wider scope. For example, helping people re-examine their work and life, and think about the significance of work from a new perspective different from the past. This is also very meaningful to me.

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APPENDIX

Hi

Zhang Chun

MY DIARY

Time: 17.10-23.10.2022

How Design Enhance the Situation Switching Process in Individual Teleworking

MY BASIC INFORMATION

Name : Zhang Chun

Job : User research

Years of work : 10:30-12:00; 14:00-19:00; Overtime depending on project

Period of telework : 3-6 month

Remote workplace: Design Studio, Home

Habits : Watching dramas, badminton

Self-evaluation :

Work-life balance

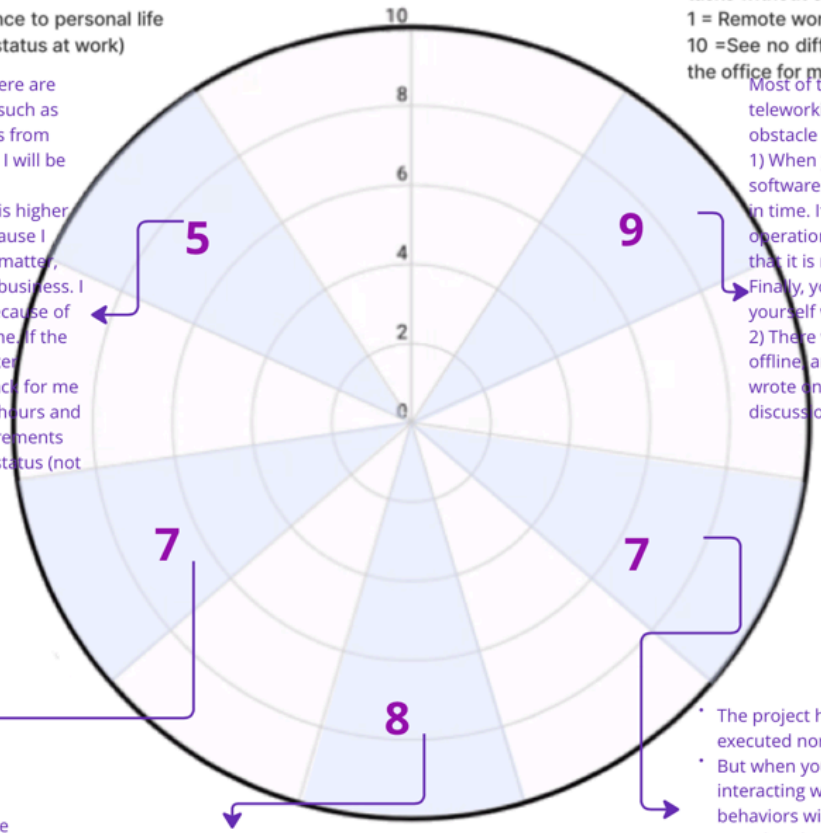
Are you a workaholic or do you pay more attention to work life balance?
1 = Work is my top priority
10 = I attach great importance to personal life quality (including personal status at work)

- Cognitively, I hope wlb, but there are many obstacles in execution, such as project ddl, high requirements from individuals/mentors, etc., and I will be willing to do a good job
- In reality, the priority of work is higher than that of personal life, because I think that work is a collective matter, while personal life is my own business. I cannot affect the collective because of myself, so I will accept overtime. If the work results are optimized after overtime , it is positive feedback for me
- However, excessive overtime hours and unreasonable overtime requirements will seriously affect personal status (not encountered yet)

Personal Adaptability

Do you think you can adapt well to telework? (including planning time wisely, completing work tasks without obstacles, etc.)
1 = Remote work has caused me a lot of difficulties
10 =See no difference at all between telework and the office for me

Most of the time, there are no barriers to teleworking. Currently, there are mainly two obstacle scenarios:
1) When you encounter problems with the software (small needs), you cannot ask for help in time. If it is offline, you may ask casually for operation display. If you are online, you will feel that it is not worth holding a special meeting. Finally, you choose to search for solutions by yourself with low efficiency;
2) There was a discussion, 2 colleagues were offline, and I was online, I couldn't see what they wrote on the whiteboard, and I can't follow their discussion at all



Time freedom

How is your time freedom for telework?
1 = My time is completely arranged by myself
10 = I have strict fixed working hours

- Generally follow the company's working hours, with special circumstances where you may be absent for a while (e.g. written exams/interviews, other tasks assigned by your tutor, etc.)
- More flexible meal times
- Overtime is also more flexible, with the possibility of starting earlier and finishing later

- Greatly compressed commuting time (from 2 hours round trip to half an hour round trip)
- Greatly improved commuting happiness (from underground alone to walking in a group)
- Flexibility in choosing office locations and office furniture (sofas, swivel chairs, etc.)
- You can also sleep in, as long as you're online at the right time for work
- But it would be a pity if you can't have a meal appointment/order milk tea/chat/interaction with your colleagues, and you will lose a lot of understanding

Self-discipline

Are you disciplined in your work (including time and task planning)
1 =I procrastinated a bit
10 =I am very good at execution and will strictly follow my plan

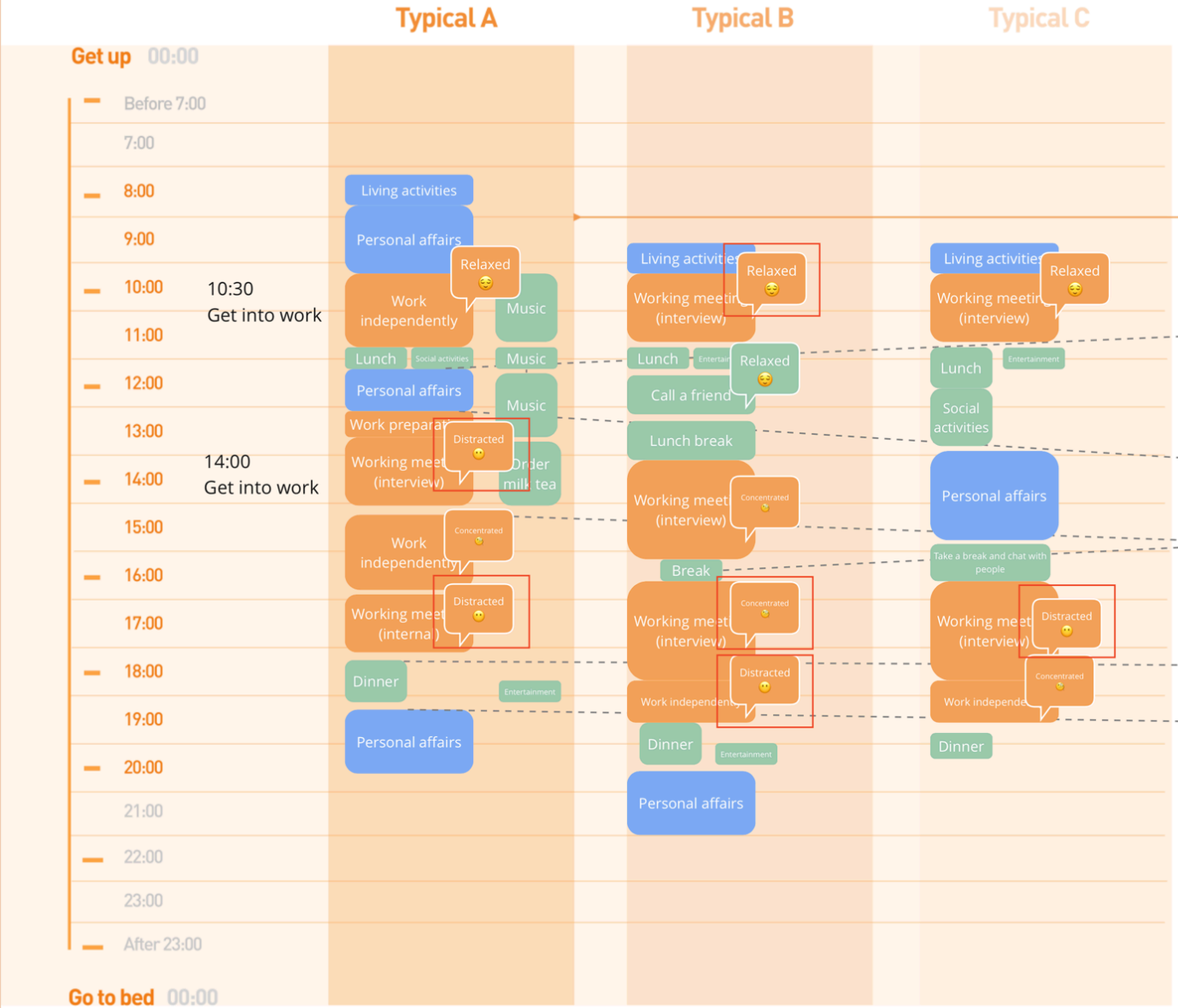
- The project has a clear schedule and can generally be executed normally
- But when you are remote, you spend more time interacting with people around you, and entertainment behaviors will also increase. If the work is not completed on time, you can only work overtime. I feel that the overtime time is longer (compared to non-teleworking)

Subjective well-being

Do you believe that telework has brought you more happiness? (including free time allocation, comfortable environment, higher motivation, etc.)
1 = No. For example, telework takes up a lot of my time off
10 =Sure,I think telework has put me in a better working position

MY TYPICAL TELEWORK DAY

Document your telework day and summarize it into your typical work day situations. If you are in the habit of planning or recording your daily work schedule, you can attach your timetable to this page :)



What did you do or what you need between situations?

Take care to the details,and mark the behaviors and support you consider essential ★

Change a room with good ligh / Receive an alert for incomplete work / View all the unread messages / Prepare paper and pen to organize my thoughts / Get the right personal avatar for the meeting / Turn on music or put on headphones...

I left the office area in the morning. I changed to another place to eat and deal with personal affairs.I chose a soft sofa to sit on, took out my personal computer, turned on my mobile phone and started playing QQ music

I went back to the office area, took out the office computer entered the working state 20 minutes in advance, and prepared for the meeting in the afternoon.

I moved around: went to the toilet, drank water, ate fruit

I went to the toilet

I drank some water

For Example

- Individual work
- Group Meeting
- Small Group Communication
- Give Speeches
- Workshop
- Self-learning
- ...
- Breaks Between Tasks
- Lunch Break
- Music Time
- Sports
- Entertainment Activities (Phone, Movie...)
- ...
- Family Matters (With Other family members...)
- Personal Matters
- Household Tasks (Cooking...)
- ...

START AND END OF MY TELEWORKDAY

Please record and fill in the process of starting and ending your work according to your actual situation

Get into work

List down the things that you do before start your working tasks and mark the things that you think essential ★ and mark the things that you think different from on-site work day ▲

Get up → Preparation for my personal status → Preparation for my workday → Start working

- wash up
- change clothes
- go out to buy breakfast
- Bring 2 computers and supporting electronic equipment
- Walk/ride a shared bicycle to the studio (usually Pingfang)

I bring 2 computers because I may need to deal with personal affairs before and after work or even during work. Generally, I only bring an office computer when I'm offline.

I usually take the subway for offline work

- Make coffee and tea (not necessarily)
- Check yesterday's work completion (look back)
- Use a small notebook/post-it note to write today's to-do list

Leave work

List down the things that you do before end your working day and mark the things that you think essential ★ and mark the things that you think different from on-site work day ▲

Work done → Preparation for my next workday → Preparation for my afterwork time → Personal time

- Review the to-do list and subjectively evaluate the work completion
- Write down what needs to be done later

- Closes working software (but does not close message alert)
- Go to the toilet, do some physical activities, basically stay indoors

I usually leave the office at the end of the day when working offline and there are changes in where I move around, such as going downstairs, going outside, entering the underground, etc. When working remotely, I basically stay in the same place.Sometimes I go out for a meal and then go back to Pengfang.

MY TELEWORK DAY BREAK

Please record and fill in the condition of your day break according to your actual situation

Time	Cause	Activity	Support
00:00	Between meetings Relaxing from social tensions	Made a cup of coffee and listened to music for a while	What equipment or software is used (if any)
12-13:30	• Lunch break • Do some personal affairs other than work I usually take a rest at noon	• I went to Lianguang Market to buy lunch • I had lunch in Pingfang, and checked social media application on my phone while eating • After eating, I took out my personal computer to deal with personal affairs • I listened to music while handling personal affairs (QQ Music)	mobile phone, personal computer
11:30 14:30 15:00 15:25 17:00 18:20	• When switching between different work tasks (such as ending a meeting and preparing to start independent work), there will be some small rest actions	• I left my desk to go to the toilet • I went to get and drink some water • I ate fruit and chatted with friends • I played with mobile phone for a short time (no more than 15 minutes)	mobile phone friends online and offline fruits my bottle

What I most want break to bring me

Based on the above records, think about what you enjoy most about break

- Inspiration/Help with work ○
- Physical Health ✓
- Socializing/sharing outside of work ✓
- Relaxing atmosphere ✓
- Physical pleasure ○
- Shielding working pressure/tension ○
- Entertainment/ Excitment activity ○
- Calmness Peace ○

REVIEWING MY TELEWORK DAY

Categorize and reflect on your work day according to the following guidelines based on your subjective perception

Stress state

Write down the situations from according to low to high pressure state

LOW

Working meeting (no speaking required)

Independent work

Working meeting (need to speak)

HIGH

Focus and concentration

Write down scenarios that you think require a high level of concentration how long they generally last

- Meeting speech & preparation (report reading, project progress report) - within 1 hour
- Creative work (interview coding analysis, report writing) - 2-3h
- Routine work (auxiliary interview/interview recording) - 1h

Efficiency

Write down situations that you think are highly efficient oriented

Need to stay productive: creative work
Need to improve efficiency: routine work (interviews are time-consuming and and I tend to be distracted)

Sociability and role identity

Write down situations that you think have strong social attributes or require the creation of personal characters

Project progress report
Align schedule with mentor

Flexibility and freedom

Write down the situations that you think have more flexibility and freedom

- Repetitive work (table posting, data processing, schedule invitation, etc.) - 10-15 minutes if short, 1-2 hours if long
- When I only need to observe the meeting (basically do not need to speak) - within 1h

Motivation/ inspiration/self-drive

Write down situations that you think require more motivation from outside or self-drive

Work recovery: usually requires self-drive;
Approach: Set myself a time node (such as before the weekend) and a length of time (such as 1 hour to complete)

Others

Other situations that you think are special and why

LOW TO HIGH CONCENTRATION LEVEL

Observe the meeting

Routine work

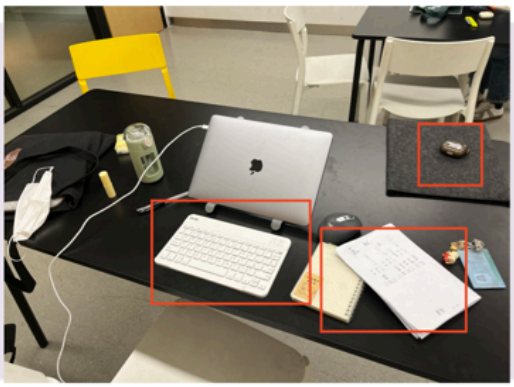
Repetitive work

Preparation&speech for meeting

ENVIRONMENT & SUPPORTS

Take pictures of your **telework environment** (desktop/space above desktop/wall/table/light...) if possible, record **different activity spots** in your remote (home) work environment

A



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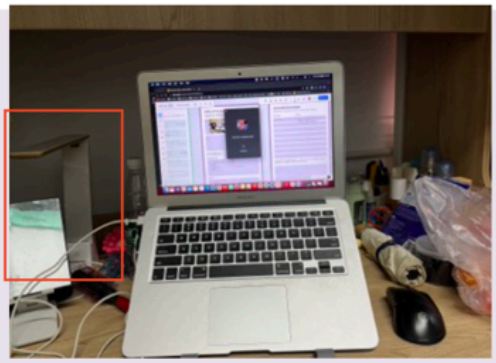

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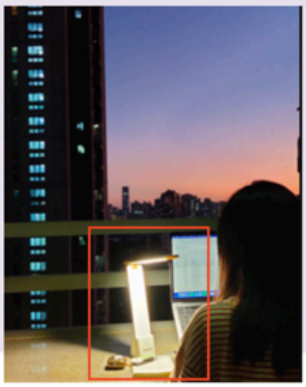


D

Take pictures of all your commonly used **hardware devices(PC,phone,earphone,paper,audio...** if possible, and write down the your commonly used software

Hardware Devices

- Office computer, mouse, charger
- PC, Mouse, Charger
- Bluetooth keyboard
- Bluetooth earphone
- Power strip or socket
- Computer stand
- mobile phone charger
- Agenda book
- Scratch paper
- Pen
- Water cup
- Lamp (if in bedroom)

Software

- Feishu (corporate software, including communications, meetings, documents, etc.)
- WeChat (part of my work is communicated through WeChat)
- spss (data analysis)
- figma (interview recording)
- Mac memo (commonly used work language backup)
- Mac calendar
- QQ Music (app on mobile phone)

MOVEMENTS & DEMANDS

Record the movement within the space (change office location, leave your desk and enjoy short break time ...if any)

Movements	Purpose
Desk➡️sofa	• I had lunch in another place (Because there are many things on the table in the office area, I didn't want to move, and I was afraid of food spilling • I Changed to a soft sofa. I wanted to sit more casually and comfortably
Desk ➡️ A small table with a relatively high countertop	• I felt a little physically tired, standing for a while at work
Desk➡️Independent area (other unoccupied rooms or open spaces with few people)	• I needed to talk in a meeting. I wanted to be uninterrupted and didn't want to disturb others
Bedroom desk ➡️ Bedroom balcony	• I wanted to be close to the outdoors, wind, cloud, sun, etc.I wanted to enjoy a natural environment with new visual elements.

What are the **typical activity switching points** in the 24/7 time of remote work, and what are **the differences in the demands of the space**? (the factors considered, such as sound and light environment, color, location, size, comfort, etc.) List key information, or add to the list above.

Light:

- Bright enough to lighten the burden on the eyes
- If I am in the bedroom, I will use fluorescent lamps + desk lamps

Sound:

- I don't mind noise when working in a public space
- Sometimes I play music through speakers
- Sometimes the voice of the interview is played through speakers, at this time, I hope the environment not to be too noisy
- Sometimes I need to turn on the microphone, and I usually leave the room if there are other people in the room and find a relatively independent space (it can be an open space)

Comfort:

- I hope there is a soft sofa, which keeps me more comfortable when resting

Cleanliness:

- I hope the environment is clean (generally my bedroom table will be messy, if I work at home, I will clean it up in advance)

SUPPORTS & DEMANDS

Write down **the occasion of using your** commonly used equipments and software,**time period, frequency and other information.**And mark the equipment you think is indispensable.

Equipment &Software	Task &Main Purpose	Time & Frequency
Personal Computer	Meeting/ Personal work/ Movies...	All the day time ★
Office computer and charger, mouse	Work	Almost full work time
Personal computer and charger, mouse	Leisure time, Personal affairs	Mainly personal time/break time, part work time
Mobile phone	Leisure time, Personal affairs, Work time	Mainly personal time/break time, part work time

Think about **the equipment in relation to the environment and your task**. Include your physical activity and the space occupied by the equipment.

Do you move the device around and take them to different office locations? Why?

- When the epidemic is severe, I can only stay at home(work in my bedroom)
- When I need to open the microphone, I usually leave the original desk and go to other independent area

Is there a significant difference between the equipment you use or the space you spend in different situations? (such as in the office and at leisure?)

- Use office computer at work
- Use mobile phone or personal computer more in leisure time, w while lying down and sitting casually

What are the differences between environmental demands while using the equipments or software for doing some tasks (Such as sound and light environment, color, space size, location, comfort)

- Refer to the previous page

Are you currently experiencing some inconveniences with the equipments or in your work environment? How do you think you can get better support?

- There is no fixed office space, and it is inconvenient to carry the computer and accessories every day (even two sets)...
- Bring up to 4 types of chargers at a time (2 computers + 1 mobile phone + 1 Bluetooth keyboard), it would be better if they can be unified

EQUIPMENT & ENVIRONMENTAL FEATURES

After the previous notes and reflections,what **equipment & environmental features do you value most** in teleworking? You have a total of 20 points.

Flexibility

It allows me to choose the work or rest environment that best meets the needs of the moment

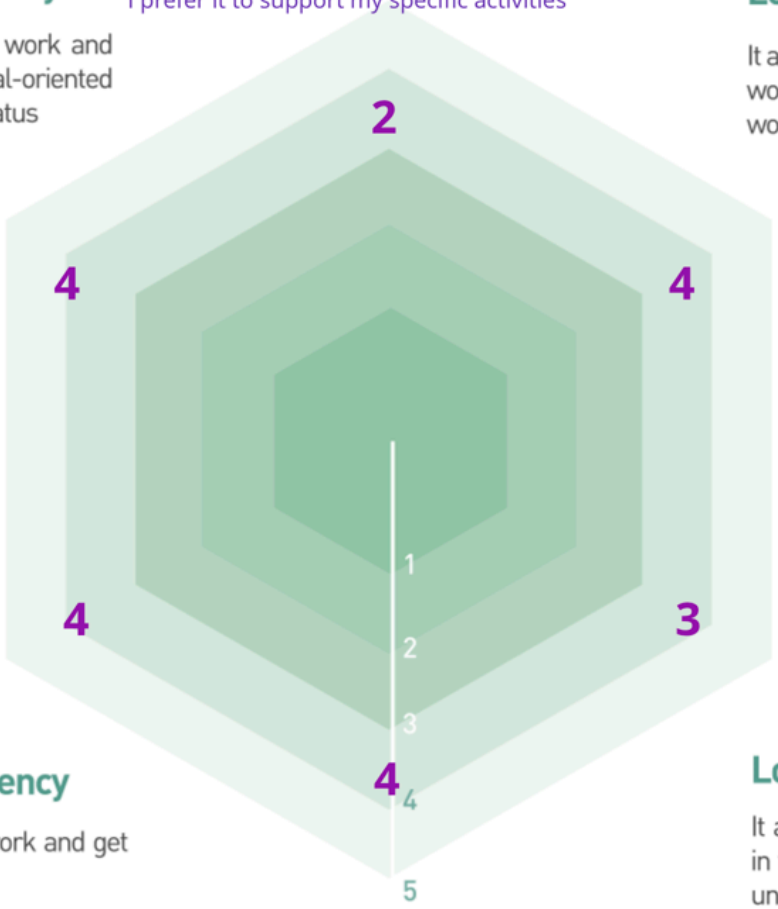
The time and environment are basically more self-controlled/adjustable, less dependent on equipment I prefer it to support my specific activities

Planning and regularity

It keeps me on track with work and rest,allows me to have a goal-oriented and regular work and life status

Low-pressure (Relaxed)

It allows me to create a comfortable working atmosphere and adjust my work and rest rhythm



Simplicity and efficiency

It keeps me focus on my work and get things done efficiently

Low interference

It allows me to be more immersed in the task in a relatively closed and undisturbed environment.

Supportability

It supports my various activities and allows me to perform different work and rest tasks within the same environment.

Other Notes

- Even though teleworking is very convenient, offline interactions with colleagues cannot be replaced (short-time communication, communication on important matters, eating together and chatting, etc.)

FRUSTRATION WALL

Here you can always record the things that make you feel unpleasant or troublesome during your telecommuting day, please pay attention to the details

Painpoints

Expectations

- Especially when I care about the other party's thoughts, I look forward to offline communication.I want to see the other's expression, and talk about important things (such as my work plan, suggestions and work feedback from my mentor).

- I was absent-minded for a few days, and my work progress was a bit delayed. My mentor called me. At that time, I felt a little guilty and sad, and decided to go offline to communicate the follow-up arrangement of the project and my resignation plan with him..

- When I encounter problems with the software (small needs),I cannot ask for help in time. If I am in my offline office place , I may request operation display more casually. If I am online, I feel that it is not worth holding a special meeting with my college who can help me. Finally, I will choose to search for the solution by myself which takes me more time.

- I remembered there was a discussion in which 2 colleagues were offline, and I was online. I couldn't see what they wrote on the whiteboard, and couldn't keep up with their discussion.
- My company has a cafeteria.I will eat healthier and more regularly in the company. When working remotely, I am sometimes too busy or in a bad state, so I treat my meals casually

HAPPINESS WALL

Here you can always record the things that make you feel happy and excited during your telecommuting day, please pay attention to the details

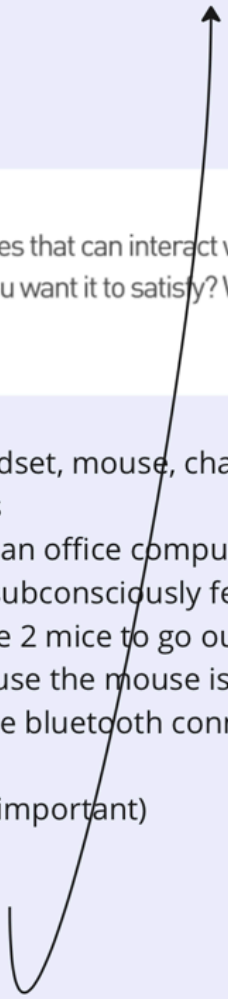
- Really happy not having to commute long distances (one-way 1h+)
- Staying with friends is more relaxing than staying with colleagues (walking to eat/walking back to our house together, chatting)

EXPECTATIONS AND IDEAS

Imagine your desired teleworking day, and write down (draw) any ideas you have. **It can be a solution to a problem you are facing now, or a better personal state you want to achieve.**

- I can feel that the efficiency of teleworking is not as good as that of offline work. It's easy to lose concentration when no one is watching you working.
- Also because there is no ritual action of leaving the company when leaving work, the separation between work and life is not obvious. And the awareness of ddl is relatively weak.
- In general, I still hope to better distinguish the boundaries between work and life (such as setting some iconic activities to end work), and I also hope to be more self-disciplined or use equipment/products to better restrain myself and stay focused when working remotely

If there are **smart devices** other than computers and phones that can interact with you, imagine the role you would like it to play in your telework environment? Which needs do you want it to satisfy? What devices do you want it to integrate or replace?



- A set of office equipment (keyboard, headset, mouse, charger, etc.) can be flexibly and conveniently adapted to multiple devices
- At present, there is a need for me to use an office computer and a personal computer in the same day, and I will bring 2 mice (subconsciously feel that it is troublesome to reconnect the mouse? I would rather take 2 mice to go out. But I always use the same headset and keyboard...maybe Is it because the mouse is small and easy to carry?)
- When switching the device connected, the bluetooth connection of my headphone is a bit troublesome
- Equipments that help me to keep focus (important)

THANKS FOR YOUR PARTICIPATION

How Design Enhance the Situation Switching Process in Individual Teleworking