Investigating Collective Stress

Behavioral Influences Amongst Office Workers by a Dynamic Painting

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ABSTRACT

Office workers face high working pressure, which could result in chronic stress. These conditions affect their vitality and can lead to health problems and burnout. VIT.IN is a dynamic painting that represents the collective stress level of employees. Based on the intensity and duration of stress, the dynamic painting will partially morph towards a more stressed or relaxed visualization. In an experiment with several fictive scenarios, behavioral influences were explored related to changes in collective stress. Social connections between colleagues, and general organizational and social values seemed important behavioral influences. Next to this, ethical boundaries were identified for real-life application. Further investigation of these behavioral influences can unveil new triggers, aimed at encouraging healthier behavior amongst the working community.

Keywords

Collective Stress; Data Visualization; Office Workers; Behavior Change; Social Factors.

INTRODUCTION

In 2019, 1.3 million Dutch employees faced burnout symptoms due to too high working pressure. This raised the absenteeism costs to approximately 3.1 billion euros, which makes the situation problematic for employers as well (TNO, 2020). Even though stress is a useful factor in completing tasks efficiently, a high workload often requires high performance, leading to increased stress levels. (American Psychological Association, 2018). Especially when stress levels are increased for a longer amount of time, chronic stress can be developed. This leads to serious health problems, such as headaches, insomnia, concentration issues, muscle tensions, and eventually burnout when not taken seriously (Maslach & Leiter, 2016). Therefore, chronic stress prevention is essential for a healthy working community.

Figure 1. VIT.IN presented in an animated context, demonstrating its social impact.

Awareness of the consequences of chronic stress and burnouts is raised by several campaigns of e.g. TNO and the Dutch government (Rijksoverheid, 2021). A small decrease of employees who experienced stress has been observed: from 17% in 2019 to 15,7% in 2020. Additionally, the number of employees who requested measurements against work-related stress decreased from 44% to 37%, and absenteeism due to work-related stress decreased from 37% to 34% (TNO, 2021). These numbers make it likely to assume that the government and TNO campaigns have an effect. It is however hard to determine in what way the COVID-19 pandemic has influenced this study. Even though these numbers look somewhat optimistic, the TNO (2021) emphasizes that a further decrease in the number of burnout symptoms amongst employees is necessary. Additionally, the European Union (EU) acknowledges the seriousness of work-related stress, demonstrated in the European Framework for Psychological Risk Management (PRIMA-EF). PRIMA-EF contains guidelines for EU companies defined by the Institute of Work, Health and Organizations (I-WHO) in 2008.

International recognition of work-related stress has created a well-studied research domain . Lansisalmi et al. (2000) emphasized the importance of investigating collective stress within organizations since it gives a holistic view. However, most current studies are focused on individual stress. Within design research, investigating collective stress allows for managing and reflecting upon stress by shared data visualizations (Xue et al., 2017; Xue et al., 2019). Nevertheless, behavioral influences in this direction, have not been investigated yet .

Thus, within this study we have tapped into behavioral influences of collective stress within the field of design research. Office workers were targeted since they often face stress due to high workloads and working pressure, e.g. because of deadlines and time restrictions (Maulik, 2017; Rajgopal, 2010). We have used multiple person perspectives, to create more value by combining intuitive, empirical and theoretical framing (Smeenk et al., 2016). The research artefact is a digital collective stress visualization, to elicit behavioral insights in a hypothetical setting. First, we have designed an initial visualization by a co-creation session. Based on the received critique on a design demonstration day, we have derived two new visualizations. By comparing these visuals in a small user-study, we have chosen the most empathic and artistic visual, which became the final research artefact: VIT.IN (Vitality Insight). The following question will be answered through VIT. IN: "*How does a dynamic painting, that represents data about collective stress, influence behavior amongst office workers in different fictive scenarios?*".

We have used a combination of hypothetical choice experiments with elicitation interviews to answer the research question, while evaluating personality traits and VIT.IN's aesthetic quality quantitatively. With this study, we aimed to contribute to the field of design research by gaining insight in the value of collective stress visualizations among office workers. Investigating this newer domain of collective stress can unveil new triggers for a healthier behavior change. These triggers could be applied in future investigations to create a healthier working community.

RELATED WORK AND BENCHMARK

First, studies about data visualizations related to vitality are discussed to sketch the state of the art. Second, radical differences in common organizational structures are explained since the working culture affects the perspective on health and stress management. Third, relevant behavior change theories were mentioned for a basis of investigating behavioral triggers. Fourth, other methodologies were demonstrated to strengthen the final method of this study.

Visualizing Vitality

The vitality of office workers is a common topic within design research. Elvitigala et al. (2021) designed StressShoe, a sensor for measuring work-related stress amongst office workers, which could be attached to their shoes. When stress levels changed, there was a contextual change (desktop background), a message to manage stress (take a break, stretch) or interruptions (change in music) (Figure 2). The measured stress was visualized in an app, which was perceived as most helpful for gaining insight in personal stressors. The value of these insights for individual stress management was also acknowledged from a psychological perspective by Michie (2002). Ren et al. (2021) investigated the value of coping with and reflecting upon stress by mock-up app Steadi (Figure 3). Steadi allows for scheduling tasks and recommendation of breaks and planning optimizations. In a small explorative study it was found that Steadi helped with decreasing high stress levels amongst intensive tasks. However, a field study was not conducted. Sharmin et al. (2015) found that personal data visualizations allow for the development of individual interventions by stress experts.

Stimulight, a physical data visualization, was developed by Brombacher et al. (2019) to investigate the stimulation of physical activity amongst office workers, whilst tested with students. It facilitated feedback for individual employees and the collective of them (Figure 6). Brombacher et al. (2019) found by a thematic analysis, that individual data should be accessible since it could otherwise lack meaning for the user. Recently, a thematic analysis was also used for investigating stress levels of aid workers (Young et al., 2018) and break-taking and accompanied social behaviors of office workers (Oliver et al., 2020). Xue et al. (2017) developed ClockViz, a physical data visualization of collective stress amongst office workers. ClockViz was perceived as a valuable information tool (Figure 4). Additionally, Xue et al. (2019) created AffectiveWall, an interactive wall which visualizes both individual stress levels and those of the collective (Figure 5). AffectiveWall was deployed in group meetings and helped participants to interpret their stress levels in a better way. Both Xue et al. (2017) and Xue et al. (2019) demonstrated abstract and creative data visualizations compared to other studies. However, behavioral influences by collective data visualizations were not studied by Xue et al. (2017) and Xue et al. (2019).

Organizational Culture

According to Peters and Weggeman (2013a), most European companies use a combination of the Rhineland Model (West-European capitalism) and Anglo-American capitalism. The Rhineland Model has a social-economic focus where political democracy is applied, in order to preserve job security, public education and public healthcare. The Rhineland model has increased in popularity since the economic crisis of 2008, because it is the most economically stable model. This model is in contrast with the Anglo-American Capitalism, which has a purely economic focus on making money; this is not guarded by the government. Another socio-economic model is the Government capitalism, which is meant to provide income for the government, without political democracy. (Peters & Weggeman, 2013b). The applied capitalism is reflected within the organizational culture. It determines the values and the ambiance of the work environment, also considering stress management and

personal health of employees.

Behavior Change

Behavioral change theories are often about changing and maintaining a healthier behavior. Examples are the Integrated Behavioral Model (IBM) theory and the Transtheoretical Model (TTM). IBM has been defined by Montaño and Kasprzyk (2008). It emphasizes that the intention a person has to perform a specific behavior is mainly dependent on their attitude, perceived norm, and personal agency. The attitude is influenced by their feelings (experiential attitude) and beliefs (instrumental attitude) associated with performing a behavior. The perceived norm is related to social factors: whether other people expect if an individual will perform a certain behavior (injunctive norm), and the tendency of others to perform the behavior themselves (descriptive norm). Personal agency consists of the perceived control one feels related to the specific behavior, as well as to what extent they believe they are competent to perform the behavior (self-efficacy). When using IBM, elicitation interviews are used which are thorough and open-ended. These interviews are critical for determining behavioral influences such as triggers, constraints, and social aspects (Montaño & Kasprzyk, 2008).

TTM defines stages accompanied with behavior change, define by Prochaska et al. (2008). In this theory, the processes from pre-contemplation (no intention to change behavior) to contemplation (intention to change behavior sometimes) to preparation (preparing oneself to change behavior) are of relevance. These processes can be influenced by several factors, including consciousness-raising, self-re-evaluation, and environmental re-evaluation. These stages are followed by action and maintenance, to successfully change and sustain the desired behavior.

When evaluating behavioral aspects and stress, more meaningful insights could be gained by including the Big Five Personality traits (Grant & Langan-Fox, 2006; Penley & Tomaka, 2002; Petasis & Economides, 2020; Vollrath, 2001). These traits can reflect how certain people experience stress, cope with stress and how they will behave in general. The Big Five Personality traits were mentioned within the Five Factor Model (FFM) which distinguish the following traits: 'Neuroticism', 'Extraversion', 'Openness', 'Agreeableness', and 'Conscientiousness' (McCrae & Costa, 1989). Seibt et al. (2005) demonstrated this importance of investigating the relation between personalities and stress amongst office workers and teachers. Additionally, Grant and Langan-Fox (2006) have found that combining the traits is valuable when investigating a stress-related topic, although this is fairly more complex.

Methodologies

The definition and importance of multiple person perspectives were framed by Smeenk et al. (2016). These design guidelines verify the validity of the designer's personal experiences, the first-person perspective. The second-person perspective is about experiences, knowledge and data collection of others, users and experts. The third-person perspective is most 'distant', namely theoretical frameworks and literature. In a preliminary study amongst design students, Smeenk et al. (2016) have found that the combination of the first-, second- and third-person perspective created the richest data and resulted in the most empathic design. The probable declaration was that the shared experience of designer and user lead to a better fitting design. Nevertheless, more research is necessary.

Stated choice experiments are often used in the field of marketing to determine the value of a new product and the willingness to buy it (Fifer et al., 2014). These experiments make use of scenarios in which the participant has to decide what they would do or has to decide what option they would choose from a predefined list. According to Fifer et al. (2014) hypothetical bias plays a role in these experiments. Especially in the field of marketing, since the participant can overestimate their willingness to pay, without engaging in paying for this product. This bias is less present in studies without financial commitments (Hensher, 2010).

Next to stated choice experiments, hypothetical choice experiments could illustrate a situation with images to clarify interpretation of the scenario (Haghani et al., 2016). Haghani et al. (2016) compared behavior of people in hypothetical emergency situations with realistic (simulated) situations. They found similarities between these experiments, but more research is necessary to generalize the relation between hypothetical experiments and real situations. Still, such experiments could give valuable results.

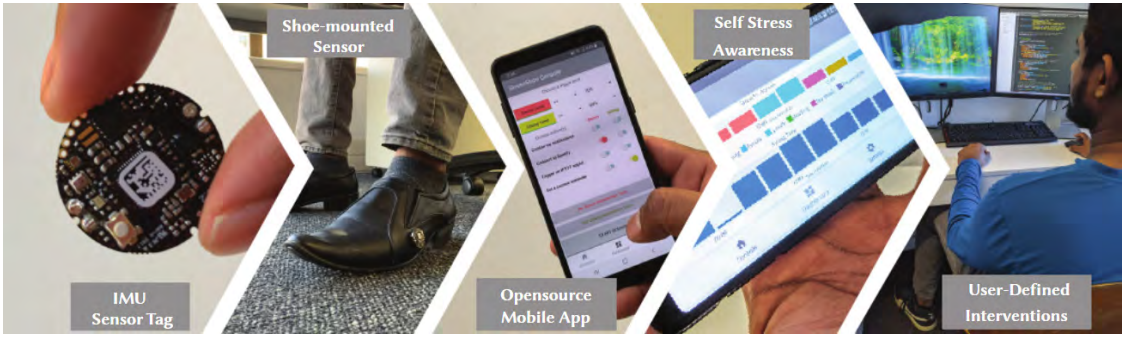


Figure 2. StressShoe by Elvitigala et al. (2021).

Figure 3. Steadi User Interface by Ren et al. (2021).

In summary, prevention of chronic stress is essential to protect the working community (TNO, 2021). Awareness is raised, but behavioral triggers have remained unexplored in current design research about collective stress. Visualizing collective stress allows for a holistic view of organizational stress, which is most valuable when individuals could retrieve personal data from the visual (Brombacher et al., 2019, Xue et al., 2017; Xue et al., 2019). Behavioral influences could be investigated by combining the open-ended characteristic of elicitation interviews (Montaño & Kasprzyk, 2008) with the use of hypothetical scenarios in stated choice experiments (Fifer et al., 2014; Haghani et al., 2016; Hensher, 2010). Furthermore, it is important to evaluate personalities amongst the Big Five Personality traits within this context (Seibt et al., 2005).

Figure 4. ClockViz by Xue et al. (2017).

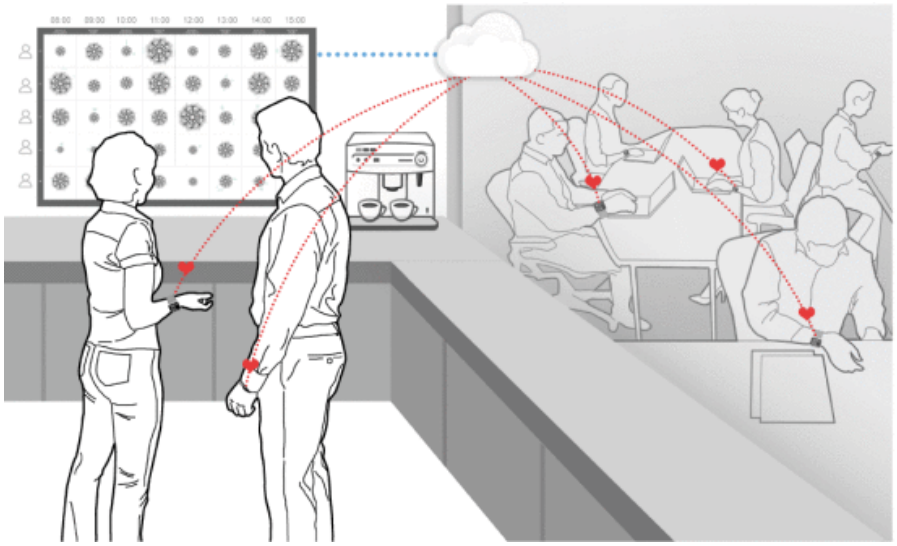


Figure 5. AffectiveWall by Xue et al. (2019).

Figure 6. Stimulight by Brombacher et al. (2019).

DESIGN PROCESS

Visualizing Ambiances

The value of data visualizations has been demonstrated in previous studies about individual and collective stress. Especially the visualizations aiming at collective stress, characterized abstractness and creativity instead of graphs and specific numerical data. We agreed upon the development of an abstract visual based on grounds for novelty. Furthermore, a data visualization hidden in an artwork seemed less ethically concerning, because it does not reveal specific health conditions. This manner of visualizing seemed less serious and therefore a better dialogue enabler, from a first-person perspective. We have executed a co-creation session with 4 participants to investigate individual differences and similarities about the ambiance of colors, shapes, artworks and data visualizations.

Beforehand, we have explained the study and the participants signed consent forms regarding ethical considerations (Appendix A.1). All elements were handed to the participants as visualization cards, each participant was facilitated with the same set of cards (Appendix C.1). First, the participants had to sort these elements from relaxed to stressed in about 10 minutes. This was followed by a group discussion, in which participants could indicate whether some visuals triggered an ambiance instead of only visualizing it. The participants had a similar opinion about using softer colors for expressing a relaxed ambiance, whereas stronger and brighter colors indicated stress. When stronger colors were combined with softer colors, stress was visualized, but not triggered. One participant envisioned animated effects based on colors and size of the elements within the visual. Bigger, brighter and multi-colored elements would transform and move around quicker than smaller, darker and single-colored elements. The slower movement would indicate relaxedness whilst the quick movement could trigger stress. Some participants argued organic shapes to indicate relaxedness because of their 'soft edges'. Other students argued static shapes to be relaxed, because they are 'clear and easy to grasp'. After this first round of sorting the cards, participants were engaged to create their own visualizations for a stressed and relaxed ambiance. Overall results demonstrated 'connectedness' for relaxedness, whereas disconnection was demonstrated for stress (Figure 8).

From a theoretical perspective, Aronoff et al. (1988) found in an intercultural study that sharp edges and diagonals were more likely to represent hazards. This third-person perspective enriches the empirical findings. Therefore, we have decided to express relaxedness with organic shapes and stress with increased straight lines and sharper angles. Furthermore, we have conducted knowledge about color combinations to express an ambiance, without triggering it. Additionally, animated effects should have minimized speed to prevent triggering stress. Consequently, we have gained the insight that relaxedness could be seen as a 'whole' in which individuals are connected (Figure 7 and 8). In contrast, an increased stress level would disturb this whole by disconnecting from the center.

A Morphing Artwork

Based on the take-aways from the co-creation session, we have created a dynamic artwork. We envisioned this artwork to be a dynamic painting, which could be attached to a wall in the office where most employees could see it. The artwork expresses a whole with pastel colors and organic shapes when the collective stress level is low (Figure 11.2). When the collective stress level increases, the artwork will morph slowly and express stress by disconnection, addition of bright and strong colors and sharper shapes. The visualized faces do not represent specific employees, but they represent the average collective stress level. The artwork itself was inspired on line art, which is abstract and often expresses humans. This way, we have used a style that generally represents faces, but also allows for empathizing when the deeper layer of collective stress is known. From a first-person perspective, it gives a feeling of safety that only people involved within the organization understand the deeper layer; whilst it will look like a general artwork for external people.

This morphing artwork was shown and explained to design students, coaches and professors on a demonstration day. Visitors often misinterpreted the faces as specific persons whilst they represented an average value. Feedback included that this neglection of individual data could cause demotivation to understand or act upon the visual. Therefore, we had decided to integrate elements that connected to specific employees in the next visual, to trigger individual involvement.

Figure 7. Created artwork with on the left a whole (relaxed ambiance) and on the right this gets disconnected (stressed ambiance).

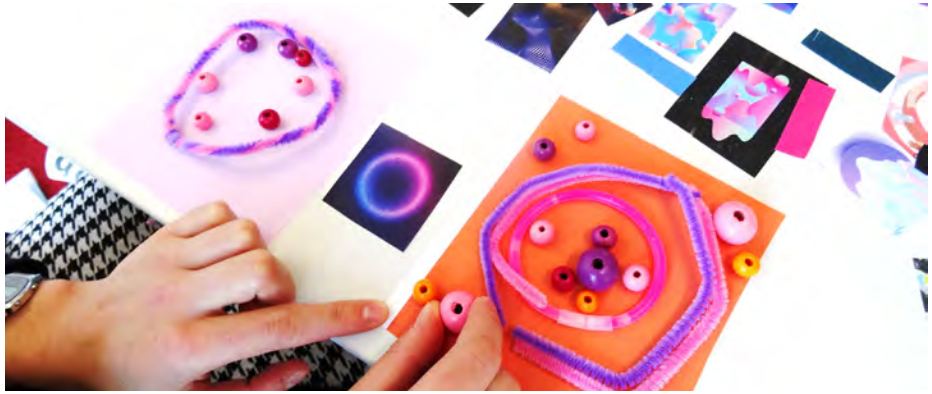


Figure 8. Created artwork with on the left a whole (relaxed ambiance) and on the right this gets disconnected and the beats float out of the center (stressed ambiance).

Furthermore, this empirical finding was theoretically supported by Brombacher et al. (2019).

Novelty

The feedback of this demonstration day inspired us to create a new visual, with improved individual involvement. The facial elements of the previous visual were based on a first-person perspective, that human characteristics could assist in empathizing with the design. However, this was not evaluated. Therefore, two different themes of visualizations were created. One theme was based on traditional data visualizations, using a circle as basis (Figure 11.3). The other theme had an artistic focus, inspired on the previous visual with faces (Figure 11.3). Both visuals were evaluated in an user-study with 5 participants at the same time. 4 out of 5 participants, participated in the previous study as well, all participants were familiar with the collective stress topic. All participants were master students Industrial Design.

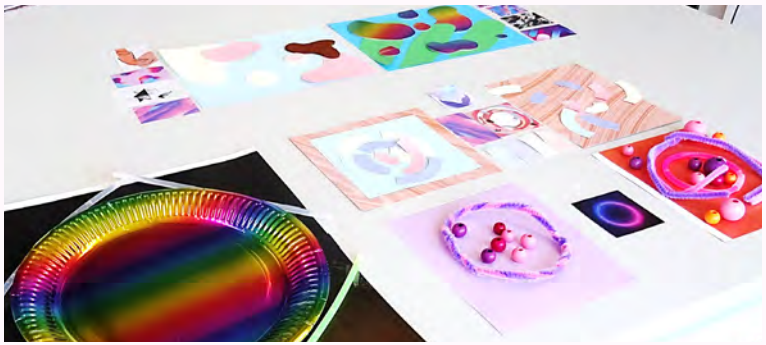
First, we had explained the study. Furthermore, the participants signed consent forms regarding ethical considerations (Appendix A.2). The participants received 4 cards of both visualization themes in a random order. In about 10 minutes, the participants had to sort the cards from relaxed to stressed per theme. A group discussion followed once all participants had sorted the cards. While all participants argued that the circle theme was easier to grasp, there were differences between participants' orders. In contrast, there were no differences in sorting order of the facial theme. 2 participants argued that the background of the first circle visualization was too light combined with a thick circle border, this 'emptiness' and 'contrast' triggered stress. The other 3 participants understood their opinion, but experienced multiple colors as more stressful. All participants argued that the background of the first visualization of the facial theme is most relaxed, because of its warm, convenient and comfortable ambiance; without much contrast. One participant held the opinion that the doodle lines of the circles were more stressful than the peaks. Other participants argued that the increased amount of peaks caused asymmetry, thus interpreted more peaks as stressful. After discussing the sorting experiment, we requested the participants to explain differences in interpretation per theme. All participants found the facial theme most personal and emphatic, one participant mentioned: 'It allows me to translate data to a person right away and therefore makes me more conscious of how my colleagues are doing, otherwise I would probably neglect it'. However, personalization was concerning according two participants, one of them stated: 'I would prefer the circles, because these are less personal. Otherwise I am afraid that I get identified and that others will gossip about my stress levels.'.

Both themes were quantitatively evaluated in a VisAWI survey, which is an approved survey for assessing aesthetic and user experience qualities (Moshagen & Thielsch, 2013). The circle theme was most positively evaluated, on grounds of simplicity, colorfulness and craftmanship. The facial theme was evaluated best on diversity, meaning it was original and inventive. Based on this mixed-method experiment, we decided to continue with the facial theme. This theme allowed for conducting knowledge through a novel data visualization, since we value originality within design research. Furthermore, we believed that the evaluation of this theme would be more interesting. Namely, when we evaluated it with fictional stress-related data, we were enabled to explore behavioral triggers and ethical concerns; without violating ethical regulations.

Figure 9. A result from the co-creation session, by which the participant has interpreted the speed of the animation as well.

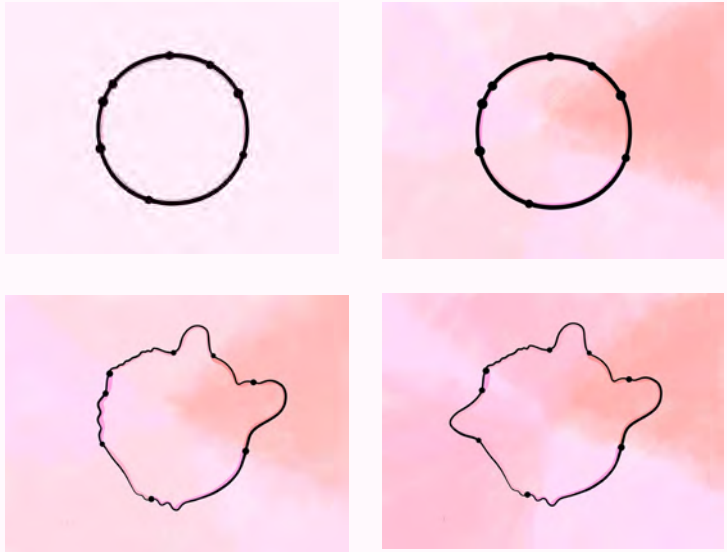
Figure 10. A result from the first part of the co-creation session, from one of the participants.

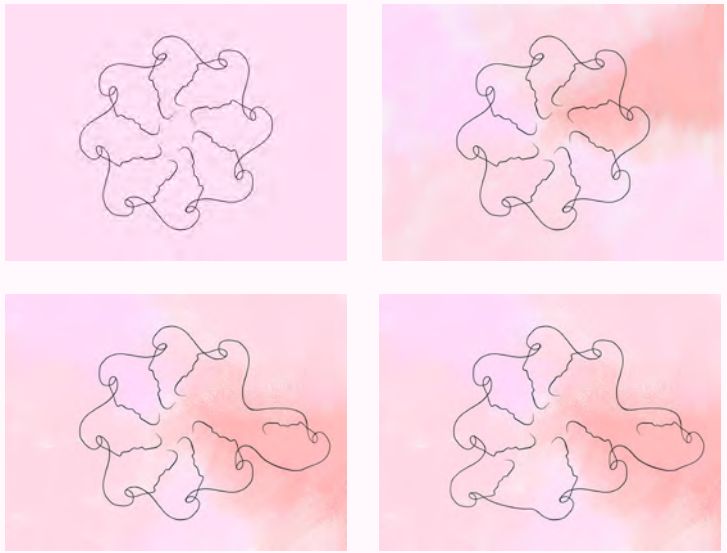
1. Results Co-Creation Session



2. First Research Artefact

3. Sorting Experiment





Final Design

Figure 11. Representation of the design process, 11.1: all results of the first co-creation session, 11.2: the first research artefact, 11.3: the sorting experiment, of which the visualization with the faces was chosen as final design.

FINAL DESIGN

The final design for the research artefact was named VIT.IN (Vitality Insight). It s a digital research artefact, aimed at the representation of collective stress. We have created VIT.IN to study the (negative) impact of increased stress levels, it was not a tool for finding the optimal stress level or showcasing positive effects of stress. Another important note regarding VIT.IN is that this artefact was developed for investigating behavioral triggers related to collective stress visualizations, in a hypothetical setting. It has been evaluated amongst different fictional situations, without using real data or measuring equipment.

We thought of combining individual data to create a whole since integrating individual data could create a more meaningful design (Brombacher et al., 2019). We believed in the value of having a whole, while this principle was evident in the preliminary user studies. Each face within VIT.IN represents an employee, employees are only aware of which face is a representation of themselves, they have no information about their colleagues' data. The background colors demonstrated the amount of stress, whereas the soft pink represented the most relaxed ambiance; as a result from the sorting experiment (Figure 13). Inspired by both preliminary user-studies, a color changed to a stronger color when the stress level increased (Figure 13). This color change occurred in the background of the face representing an employee who experienced an increased stress level. Next to the height of stress levels, the duration of an increased stress level is important to consider whether someone is suffering from chronic stress (Maslach & Leiter, 2016). Therefore, the faces floated away from the center once someone experienced stress for a longer amount of time (Figure 13). This disconnection resulted from both preliminary studies in which disconnection was perceived as a heavier effect than a color change. Therefore, disconnection was applied for serious health situations, whilst a color change represented a less hazardous health situation.

We initialized the design of VIT.IN in Adobe Fresco. After these static visualizations, we have created an animated visualization in Adobe XD. This animated visualization served as the research artefact. We have created different scenarios of VIT.IN for most plausible situations.

Figure 12. VIT.IN presented in an animated context, demonstrating its social impact.

Figure 13. The three scenarios designed in Adobe XD. On the left, scenario 1: no stress measured. In the middle, scenario 2: some office workers experience an increased stress level.On the left, scenario 3: one colleague disconnects from the whole, due to an endured increased stress level; other colleagues experience an increased stress level..

ETHICAL CONSIDERATIONS

Intention

The Dutch working community suffers from stress-related health problems, which eventually results in burnout when no action is taken (TNO, 2020). Burnouts affect an individual's mental and physical health, furthermore full recovery is mostly impossible (Maslach & Leiter, 2016). Besides negative health effects, absenteeism costs due to burnout symptoms costed employers about 3.1 billion euros in 2019 (TNO, 2020). Therefore, prevention of chronic stress is essential to protect the working community from negative social and economic consequences.

The designerly intention of investigating VIT.IN is to identify behavioral triggers related to collective stress visualizations. Conducting knowledge about these behavioral triggers is an initial step of achieving actual behavior change (Montaño & Kasprzyk, 2008). By focusing on the collective instead of individuals, we have aimed at creating an overall view of behavioral influences. Namely, social and organizational factors could be identified easier when investigating collective stress (Lansisalmi et al., 2000). Therefore, we aimed at doing an exploratory study, to create a starting point for a healthier working environment.

Potential Risks

Within this section, we have elaborated on risks that could arise if VIT.IN would be implemented in context and represent real data of employees.

We considered VIT.IN of having the desired influence within companies with a culture focused on the Rhineland model. The Rhineland model values capitalism whilst its social characteristic safeguards the community with job security, public healthcare and public education (Peters & Weggeman, 2013a). Companies with this kind of culture seem likely to protect their employees against chronic stress and eventually burnouts. Namely, the company has to continue paying the employee's salaries, even when this employee is not able to work due to a burnout. Therefore, it helps both employee and employer most when health problems are prevented. However, this is different when VIT.IN would be embedded in a company that holds an Anglo-American culture. These companies focus in general on money-making and employees have no job security, public healthcare nor public education (Peters & Weggeman, 2013a). When a manager of such a company could have insight in someone's health, it is likely that an employee with bad health circumstances will get fired. The other way around, an employee with low stress levels could also be fired, because a manager would argue that 'they work not hard enough'. They could hire someone who can work harder and does not face these health problems, which increases the amount of money made. Since there is no public healthcare in these cultures, implementation of VIT.IN could have a serious effect on someone's life.

Zooming in on implementation on the work floor of VIT.IN, it could have a positive effect when employees have a good connection to each other. However, in situations where employees are less collegiate, people could feel left out, because no one asks how they are doing unless VIT.IN shows high stress levels. Moreover, employees could speculate about why a specific colleague always or never feels stressed, based on matching someone's behavior with the represented visual data. Therefore, VIT.IN aims at displaying data anonymously, but in situations where all employees except one share their information; this other employee could be identified as well.

Therefore, we have minimized above mentioned ethical risks of implementing VIT.IN in context, by doing an experiment with hypothetical scenarios, based on fictional data. This allowed us to discover ethical boundaries which are important for future studies on this topic, without violating ethical regulations.

METHODOLOGY

Participants

Office workers were recruited via personal networks and Instagram. We have executed this study with 6 Dutch participants (Table 1). P2 and P6 had a managing function, whilst P1, P3, P4 and P5 had an executive function.

This study was approved by the ethical committee of Eindhoven University of Technology , and we have used informed consent forms to clarify ethical regulations to the participants. Participation within this study was voluntary and without any compensation (Appendix A).

Material

We have made use of the following material to execute this study.

- Notebook or desktop for displaying VIT.IN.
- Adobe XD: an animation program of Adobe in which we have created VIT.IN. VIT.IN is displayed via this program to the participant.
- Printed or digital images of 3 different scenarios of the sketched version of VIT.IN (created in Adobe Fresco, Figure 13).
- Informed consent form for ethical regulations.
- Notebook, writing down findings.
- Procedure: study protocol and questions for the semi-structured interview (Appendix C.2).
- Survey Aesthetics: VisAWI short survey (Appendix B.1) (Moshagen & Thielsch, 2013). This survey was filled in via Microsoft Forms with the addition of Dutch subtitles.
- Survey Big Five Personality traits by DRLabs (Appendix B.2) (Smith, 2018). This survey was filled in via Microsoft Forms with the addition of Dutch subtitles.
- In case of online user-study: Microsoft Teams.

Procedure

The user-study was conducted in an environment in which participants' felt most comfortable. The study with P1 was conducted online, and the other studies were conducted in a physical home-setting. The study started with explaining the procedure and related ethical regulations, which were accepted by all participants via a signed informed consent form (Appendix A3). The study started with the scenario experiment (Appendix C.2), after which two digital surveys (Appendix B) were filled in.

Hypothetical Scenario Experiment

First, demographic and contextual information of the participant was collected. Such as personal information and whether the participant had experiences with work-related stress, and if it is a topic that could be discussed openly within their organization. Furthermore, the participant had to describe the amount of direct

colleagues; in one room, most closely located; and the kind of connections with these colleagues. Then the research artefact VIT.IN was explained by 3 different scenarios of the sketched prototype (Figure 14). We consciously chose to variate between the example and the actual prototype, in order to activate the participant to interpret the situations themselves, instead of repeating the example. The participants were informed that this study focused on investigating their behavior, related to VIT.IN, whilst this study was not about measuring and collecting real stress data. After the introduction was clear to the participant, the first scenario of VIT.IN was opened in our notebook, on full screen. We have indicated which avatar within VIT.IN represented the participant, whilst they received no information about which avatars represented their colleagues. Furthermore, the participants were informed that the location of their and their colleagues' avatar would change per day for ethical reasons. The situation was sketched to the participant, in which VIT.IN was attached to a wall where most employees could see it. We have emphasized to imagine the scenarios in real-life, and answer as honestly as possible. Per scenario the following questions were asked, there were 7 scenarios in total (Figure 15).

- How would you feel when this scenario occurs at your office?
- Does this depend on the situation, day or time?
- Would you do something with regard to this visual?
- In case of a visual in which the participant experiences stress themselves:
    - o If a colleague asks how you're doing, would you answer this honestly?
    - o If a colleague asks to take a break would you accept this?
    - o If a colleague asks if they can take some work from you, would you accept this?

The amount of questions was not limited to the above, since a semi-structured interview was conducted, based on elicitation interviews by Montaño and Kasprzyk (2008). Participants had to explain their answers on the above stated questions. Furthermore, participants had to elaborate upon their actions, if there were certain conditions under which they performed the mentioned action or not. In situations regarding social interactions, participants had to explain whether the connection between themselves and their colleagues influenced their behavior.

Survey Visual Quality

After the hypothetical scenario experiment, the aesthetic quality of VIT.IN was assessed in a VisAWI short survey via Microsoft Forms, with the addition of Dutch translations (Moshagen & Thielsch, 2013). VisAWI is an approved quantitative methodology, which was used to gain insight in design strengths and weaknesses, which might influence the study.

Survey Personal Traits

It is valuable to indicate differences in personality when investigating behavior (Grant & Langan-Fox, 2006; Penley & Tomaka, 2002; Petasis & Economides, 2020; Vollrath, 2001). This could be quantitatively evaluated by the Big Five Personality traits. A short, approved survey of IDR Labs was filled in via Microsoft Forms, with the addition of Dutch translations (Smith, 2018). Although a longer survey would be more reliable, this survey gives basic insights without making participation burdensome (Rammstedt & John, 2007).

Data Analysis

A thematic analysis as defined by Braun and Clarke (2006, 2012), was applied to obtain a basis of the collected interview data. The use of a thematic analysis was also present in previous studies related to stress (Young et al., 2018), collective stress (Brombacher et al., 2019) and office workers (Oliver et al., 2020). Per hypothetical scenario, we have created codes which were eventually divided into larger themes. These themes allowed for comparing of participants, which was done after the thematic analysis. The quantitative survey data was analyzed in Microsoft Excel.

The overall results were eventually analyzed by an expert with a background in Psychology & Technology. This allowed us to validate and verify results from a perspective of psychology. The data was evaluated anonymously and the expert signed an informed consent form (Appendix A.4).

Figure 14. The three sketched scenarios. Scenario 1: no stress measured. Scenario 2: some office workers experience an increased stress level. Scenario 3: one colleague disconnects from the whole, due to an endured increased stress level.

Details / *Participant*	Gender	Age	Job	Amount of hours per week	Direct Colleagues
1	Male	25	Executive	Full time	2
2	Male	51	Manager	Full time	7
3	Female	52	Executive	28	1, 4 and 2*
4	Female	55	Executive	16-20	4
5	Female	49	Executive	24	4
6	Female	51	Manager	Full time	2-5

Table 1. More detailed participant information.

* Participant 3 works at three different locations of the same company.

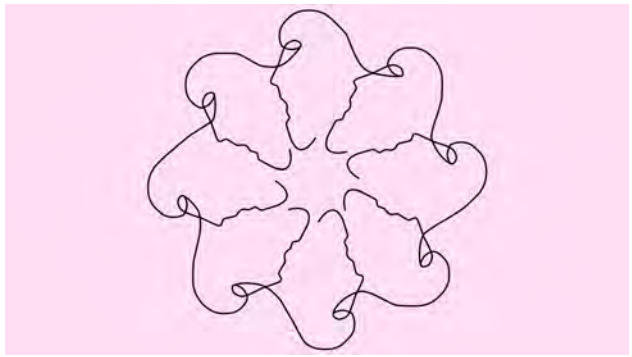


Figure 15.1 Scenario 1

No employees experience stress.

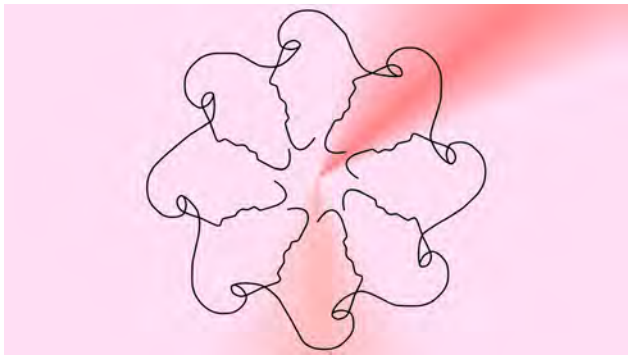


Figure 15.2 Scenario 2

The employee on the right top experiences a high increase in stress and the employee on the bottom a bit of an increase in stress level.

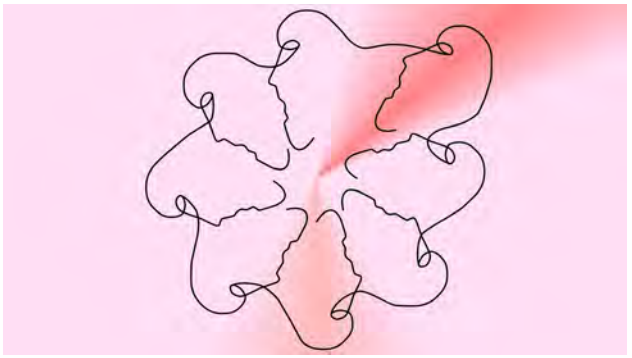


Figure 15.3 Scenario 3

The employee on the right top experiences a high increase in stress for a longer amount of time. The employee on the bottom experiences still a bit of an increase.

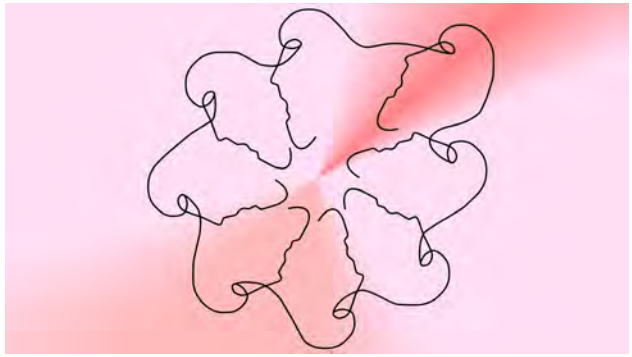


Figure 15.4 Scenario 4

The employee on the right top experiences a high increase in stress for a longer amount of time. Both employees on the bottom experience an increased stress level, the participant is one of these.

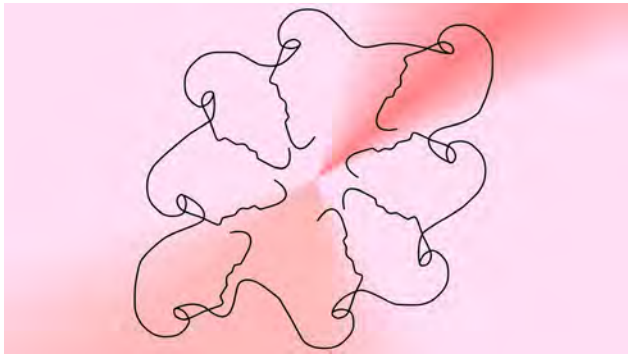


Figure 15.5 Scenario 5

The employee on the right top experiences a high increase in stress for a longer amount of time. The employee on the bottom experiences still a bit of an increase. The employee that represents the particpant experiences an increased stress level over a longer time.

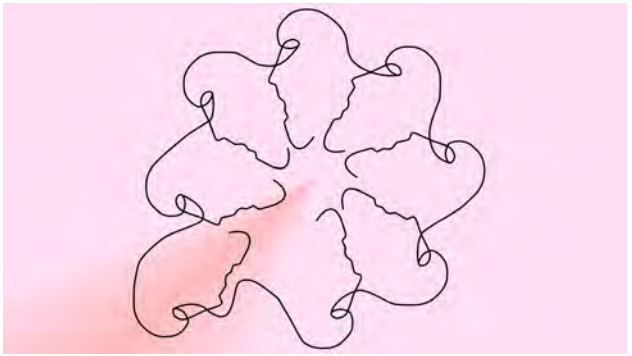


Figure 15.6 Scenario 6

The employee on the right top and on the bottom no longer experiences stress. The employee that represents the particpant experiences an increased stress level over a longer time.

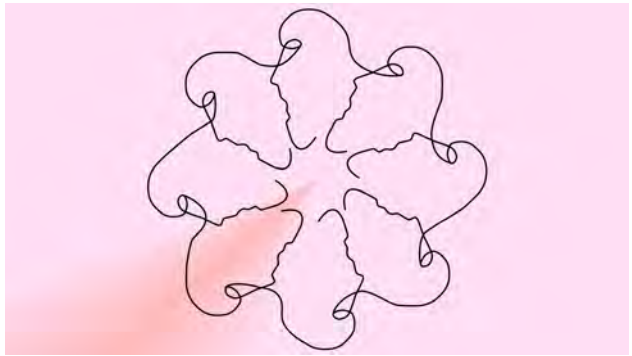


Figure 15.7 Scenario 7

The employee that represents the particpant experiences an increased stress level, but connected to the whole again.

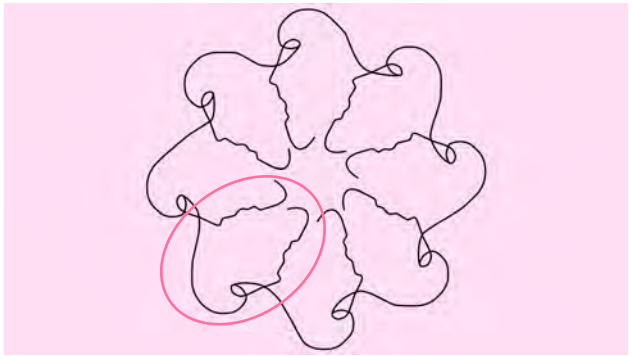


Figure 15.8 Participant Clarification

The marked employee 'face' represented each participant in the user study.

Figure 15. The seven scenarios which were used for the final user-study. The face which represents the participant in each study is shown in Figure 15.8

Explore Aimated Research Artefact in Notebook Resolution in Browser

RESULTS

All collected information from the semi-structured interviews was carefully documented per participant (Appendix D.1). We have conducted a thematic analysis as an initial step, to create oversight in the qualitative interview data. We have created codes per kind of action that participants took hypothetically. Behavioral influences were coded as well. We perceived an aspect as a behavioral influence when a change in the aspect correlated with a change in the participant's behavior. The codes were revised and combined in themes, as suggested by Braun & Clarke (2006, 2012). We have linked the themes and corresponding codes per scenario, per participant (Appendix D.3). Eventually, we have used these themes to compare how participants acted in a situation and whether this depended on certain social or contextual factors (behavioral influences). Participants will be discussed by 'P' followed by their number.

Hypothetical Experiment

Organizational Culture & Expectations

All participants indicated that they work in an organization in which topics like wellbeing and experiences with stress could be discussed openly. P2, P4, P5 and P6 mentioned this open environment several times in multiple scenarios. This open environment was according to these participants a ground for expecting colleagues to be honest about their feelings and have trust in their colleagues, 'they should know that we help each other in hard situations' (P2, Appendix D.1). Furthermore, P2 and P5 expected all other colleagues to help them, when they experienced stress. P5 indicated the following: 'I always take care of how others are feeling, so I expect them to take care of me in return. If they do not notice it, I will react snippy to them till they show interest in me.' (Appendix D.1). P1 and P4 had no expectations of receiving help in return, but would appreciate this. P6 expected colleagues with a close personal connection to help her in return, help from others was appreciated but not expected. P3 was the only participant who had colleagues with whom she had no connection. She indicated to help colleagues with a personal or normal connection, and also with a distant connection when this person was experiencing a serious stress level. She expected this help in return from the colleagues with a personal and normal connection, it was appreciated when a colleague with a distant connection showed interest. She did not appreciate help or showing interest from colleagues with no connection, 'I have nothing to do with these colleagues, so I would prefer them to mind their own business. Furthermore, I would just say that everything is fine if they ask how I am doing, they do not need to know more.' (P3, Appendix D.1).

Investigate

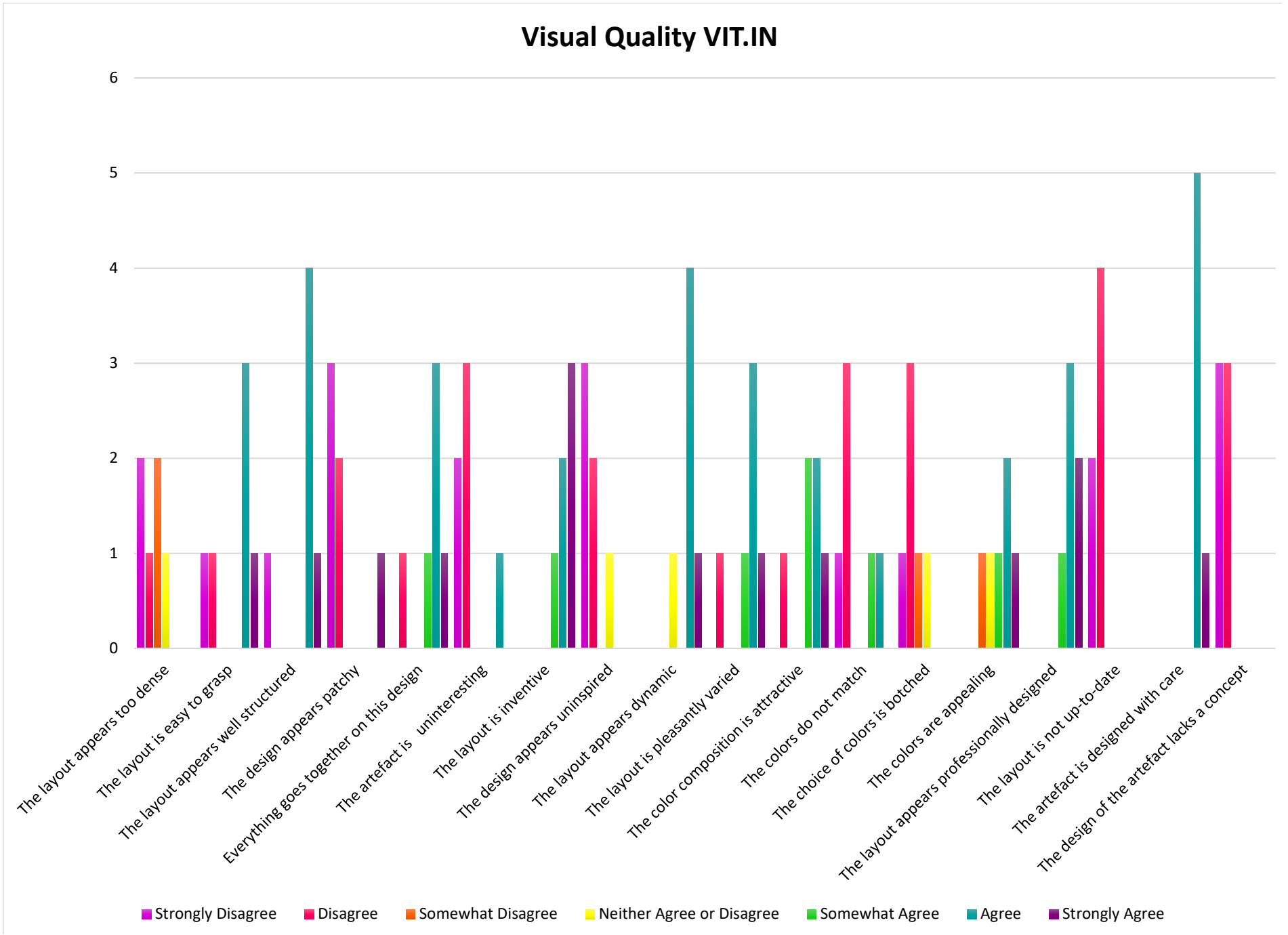
All participants indicated that once there was a change within the visual displayed by VIT.IN, that they would try to investigate which colleague experienced the most stress from colleagues in category A and B. P3 was the only participant who had experiences with colleagues with whom she had no connection (category D). Only in a situation that a colleague experienced serious stress for a longer time, such as in scenario 3, P3 would check upon colleagues within category C and D. All participants except P3 would check up on colleagues within category C, but had no experience with colleagues of category D. Furthermore, P2, P3, P4, P5 and P6 indicated that they immediately had a colleague in mind, corresponding with an avatar facing most stress, when scenario 2 and 3 were displayed. In a situation that VIT.IN did not represent the colleague that they first thought of, they would still try to find out who it would be; except for P3.

A = colleague with a personal connection
B = colleague with a normal connection
C = colleague with a distant connection
D = colleague with no/negative connection
E = all colleagues a participant has
– = no colleagues
* = only when emphasized / depends on situation

= in all situations
= in scenario 2 and 3
= in scenario 3
= in scenario 4,5,6 and 7
= in scenario 4,5 and 6
= in scenario 5 and 6

Participant \ Theme	Investigate	Accept Assistance	Offer Assistance	Accept Break-taking	Offer Break-taking	Expect Involvement
1 (A,C)	E	A	A	A*	–	–
2 (A,B,C)	E	E	E	E	E	E
3 (A,B,C,D)	A,B C,D	A,B C*	A,B	A,B* C*	A,B	A,B
4 (A,B,C)	E	E	E	E	E	–
5 (A,B,C)	E	E	E	–	E	E
6 (A,B,C)	E	E	E	E	E	A

Table 2. This table represents actions that the participants would perform in a certain fictive scenario (see color legenda on the left) and based on a certain type of colleague (see letter legenda on the left). The kind of colleagues that the participants have are indicated behind the participant number with the same letter categories.



Graph 1. This graph represents the evaluation of VITIN's aesthetic quality. The amount of participants is indicated on the left, whereas the colors represent the agreeableness.

Involvement

The theme 'Involvement' was sub-divided within 'Assistance' and 'Break-taking'. We have used the code assistance for improving task division, either taking tasks from a colleague, dividing the tasks in a better way or prioritizing tasks. Furthermore, the code break-taking is about taking a short break from a work-related task such as, a short walk to the coffee machinery, take a walk outside or have a personal conversation in another room or location. In general, assistance was more frequently accepted and offered than break-taking.

Assistance

P4 and P5 both accepted assistance from all colleagues in scenario 4,5,6 and 7 and offered it to all colleagues in scenario 2 and 3. P2 differed from P4 and P5 by accepting assistance in scenario 4,5 and 6, P6 only accepted assistance in scenario 5 and 6, P6: 'I will not give any of my work to others when I am experiencing stress, even if they emphasize it I will not listen to them.' (Appendix D.1). P1 accepted assistance in scenario 4, 5 and 6 from a colleague with a personal connection (category A). P1 also offered assistance to a colleague within category A in scenario 2 and 3. P3 accepted assistance from colleagues within category A and B in scenario 4,5 and 6 whilst she would only accept assistance sometimes from a colleague of category C in scenario 5 and 6. P3 offered assistance to colleagues within category A and B.

Break-taking

P1 would accept a break only from colleagues within category A, when this offer is emphasized. Additionally, P1 would not offer a colleague to take a break when they feel stressed. In contrast, P5 would offer a stressed colleague to take a break, whereas she would not accept this offer herself in any situation, from any colleague. P4 and P6 would both offer all colleagues in scenario 2 and 3 a break, whereas they would also accept this offer from all colleagues in scenario 4, 5 and 6. P2 would offer any colleague in scenario 2 and 3 to take a break, whilst he would accept this offer from any colleague in any scenario, P2: 'I would always accept an offer when colleagues ask me to have a coffee or a walk, also when the visual would not show that I am stressed. I prefer that people share their concerns with me, because they have noticed something and I think there is always an opportunity to learn from that.' (Appendix D.1). P3 would offer colleagues in category A and B to take a break in scenario 2 and 3. P3 would accept this offer from colleagues in category A and sometimes B in scenario 4, 5 and 6, and sometimes from category C in scenario 5 and 6.

Managing Personal Stress

P1, P2, P4, P5 and P6 would focus on themselves when they experience stress, P6: 'I will focus more on myself in this situation, I think that that is also the best for the person who is experiencing stress since I will not be able to give good assistance' (Appendix D.1). P3 would still focus on helping others, when colleagues with a personal connection are feeling stressed. For P4 and P5 it would make a difference if they were the only ones from their colleagues who experienced stress. P4 indicated that it would raise personal doubts, 'I would think that there is something in my personal situation not going well, I would relate this to myself' (Appendix D.1). P5 indicated that it would feel different in a way of an unfair workload 'I would be frustrated if I am the only one experiencing this high workload and the rest would not help me.' (Appendix D.1). P2 would report the disbalance in workload to other colleagues directly, but would not feel frustrated about this disbalance.

Survey Visual

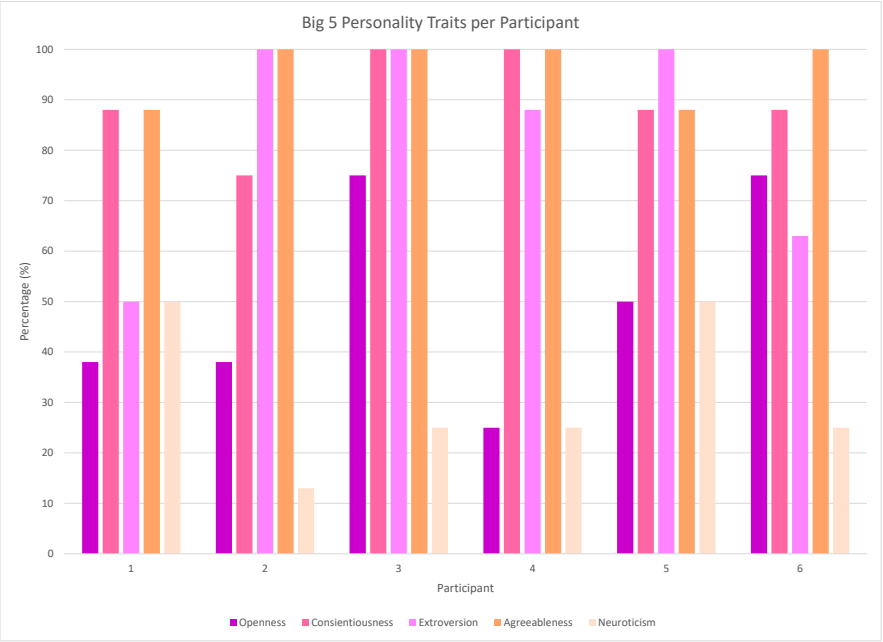
The structure of the design and its understanding delivered mixed results (Graph 1). Furthermore, the colors were assessed differently as well. The professionality and carefulness of VIT.IN was assessed quite positively

Survey Personal Traits

The personality traits showed differences per participant. P1 and P5 scored relatively high on 'Neuroticism', with a score of 50% (Graph 2). P3, P5 and P6 scored above 50% on openness, whilst P1, P2 and P4 scored below 38%. All participants scored above 75% on Conscientiousness and above 88% on Agreeableness. P2 till P5 scored 88% or higher on extraversion.

Expert Evaluation

According to the expert evaluation, there was little correlation between personality traits and the behavior of participants per scenario. P1 and P5 both had a relatively higher score of the trait Neuroticism than other participants (Graph 2). Furthermore, P1 would only accept an additional break when this is strongly emphasized by a colleague with a close personal connection, whilst P5 would never accept an additional break. Additionally, both participants indicated that they would work harder when they experienced stress, instead of taking more rest. Since neuroticism is related to stress management, this personality trait could result in this specific behavior, according to the expert.



Graph 2. This graph represents the outcomes of the Big Five Personality traits survey. The personality traits are shown per participant.

DISCUSSION

Challenge & Approach

Respectively 17% in 2019 and 15.7% in 2020 of the Dutch working community suffered from burnout symptoms (TNO, 2020, 2021). Burnouts have a serious affect on mental and physical wellbeing, often caused by chronic stress (Maslach & Leiter, 2016). We have evaluated VIT.IN in different fictive situations, to gain insight in behavioral influences by data visualizations about collective stress. We believe that this creates initial insights for chronic stress prevention amongst office workers.

We have found that the visualized data had an effect on the (fictive) performed behavior of the participant. For some participants, the connection with other colleagues was an important aspect that influenced their behavior (P1, P3, P6). Presence of a personal connection could mean that someone would easier accept assistance or be involved with a colleague's wellbeing. In contrast, VIT.IN would not function as a dialogue enabler for colleagues who have no connection, since they would not engage in sharing health circumstances (P3). In this situation, the collective data visualization caused discomfort (P3). Furthermore, the values that organizations hold seemed important behavioral influences. Participants who emphasized that they work in an environment where personal wellbeing is valued, were more open to assisting all other colleagues and accepting this in return from all other colleagues (P2, P4, P5, P6). Lastly, the participants argued that their behavior was based on the visualized data, but it is not determined whether they would act differently without VIT.IN or if their fictive behavior corresponds with their behavior in real life.

Behavioral Influences

As discussed by Peters & Weggeman (2013a, 2013b) it is more common for a company that holds a Rhineland Model to look after employees' health. All participants described their company as an open environment where personal health and stress could be discussed, which is in line with the Rhineland Model. However, we noted differences between the participants who only discussed this open environment when asked (P1 and P3) and participants who started about this topic themselves (P2,P4,P5 and P6). Namely, P2, P4, P5 and P6 were more involved with the collective of all colleagues instead of focusing on colleagues with most personal connections. Specifically, for P2 and P5 this functioned as a give-and-take situation, they offered help to all colleagues, but they expected their help in return. Other participants expected help from only colleagues with a closer connection, or from no colleagues, but it was appreciated. The only exception on this situation of social involvement is P3, who would not appreciate involvement of colleagues with whom she has no connection. P3 was the only participant who had experiences with colleagues with whom she had no connection. This resulted in in-depth insights related to ethical and privacy regulations. From one side VIT.IN could assist a manager within these situations, to create a better ambiance between colleagues within an organization. From the other side, using a tool to improve collective wellbeing would be a paradox when it eventually leads to personal discomfort, isolation and embarrassment (P3). It is hard to determine whether this situation applies to the majority of employees who have no connection with their colleagues, but we have found that this situation is present for at least one employee. Therefore, when designing for the collective, there should be paid attention to individual effects concerning visualizing stress related data.

Social Exchange

These kinds of give-and-take relationships were framed in a social exchange model, by Schaufeli (2006). Social give-and-take is about putting effort into a relationship while expecting this effort from the other in return. Disbalance in equal give-and-take relationships stimulates motivation to restore the balance. Furthermore, Schaufeli (2006) has found that a disbalance in an inequal relationship in a working environment could lead to frustration and stress by a lack of behavioral rewards; which could eventually result in burnout. The correspondence between our findings and the theory of Schaufeli (2006) does reflect the importance of applying collective stress visualizations, to keep each other in balance. Additionally, this is in line with the perceived norm someone holds concerning their behavior, the injunctive and descriptive norm (Montaño & Kasprzyk, 2008). The injunctive norm could trigger extra motivation to perform the behavior of being more involved with each other's wellbeing because it is expected, whilst the descriptive norm would stimulate performing this behavior because the person in question notices others' performing who perform this behavior. People's social behavior is determined by their personality traits, and these traits could also demonstrate insight in how stress is managed (Grant & Langan-Fox, 2006; Penley & Tomaka, 2002; Petasis & Economides, 2020; Vollrath, 2001). We have found that the relatively higher scores of P1 and P5 in neuroticism and their behavior of rejecting or rarely accepting additional breaks could create a logical connection. Analyzing this psychological data with an expert, gave us the insight that the mentioned connection could direct at not effective coping strategies with stress. However, the sample size and the amount of data is too small to conclude general findings from this information. Furthermore, there were no other valuable links found between personality traits and the fictive performed behavior, which was confirmed by the expert. More valuable results could probably be generated when the sample size is bigger, and when all participants work in the same organization, to limit the effect of difference in environmental factors.

Limitations

The limitations of our study include that the research artefact, VIT.IN, was partly inspired on user-studies with students. Since students are not the target group, this could be a possible declaration from the results of the visual quality of VIT.IN (Graph 1). Furthermore, we would like to emphasize that findings of this study could be used as initial points for future work, but should not be generalized. Namely, our study was not executed with a representative group of the working community. Additionally, the behavioral influences were evaluated in different fictive scenarios and could vary from behavior in a real setting. Lastly, we did not conduct knowledge about the need or essence of a research artefact such as VIT.IN since we did not execute a separate control experiment to evaluate behavior without a collective data visualization.

Contribution & Future Work

We have investigated collective stress by a data visualization based on preliminary studies of Brombacher et al. (2019), Xue et al. (2017), Xue et al. (2019). Our findings are in line with theirs by demonstrating the value of collective stress, we have found that social and organizational values create an environment in which employees look after each other. Additionally, our study has built up on this by exploring these behavioral

influences, that play a role to perform or not perform a specific behavior. More general, these influences should be considered when designing interventions for a collective of employees, while they have an essential impact on the performance of a behavior. Furthermore, implementing collective stress visualizations in context could raise ethical concerns. We have found that it could also cause discomfort and embarrassment when it involved colleagues who had no connection with each other. Therefore, it is an important note for future studies, to carefully minimize the risk for participation in in-context studies. Furthermore, we would recommend to investigate collective stress with a control experiment, to evaluate a situation with a collective data visualization and a situation without. This can firstly demonstrate which behavior was actually performed by participants instead of thinking they would do so, and it can show whether there is a difference in behavior when the data visualization is present. Lastly, a more holistic view could be created when the sample size forms a good representation of the working community or at least a department of one company, which was not the case within this study.

CONCLUSION

Chronic stress is a problematic phenomenon within the Dutch working community, which eventually leads to burnout if not taken seriously. Awareness is raised, but behavioral influences should be discovered before current behavior can be changed to a healthier behavior.

While investigating collective stress, we have focused on the whole of employees instead of focusing on individuals. This way, collective stress allowed us to include social and organizational factors, which play an important role within organizations and stress management. An experiment with several fictive scenarios was executed by a collective data visualization, VIT.IN. The found behavioral influences were mostly related to social connections between colleagues or expectations about desired behavior of both organizations and / or colleagues. We have specifically contributed towards the field of collective stress by investigating behavioral influences. We have identified initial influences that play a role in determining one's behavior. These influences need to be known before behavior change can be reached. Furthermore, we have found important ethical boundaries that should be respected. Namely, a collective data visualization could cause discomfort or shame amongst employees who have colleagues they have no connection with.

Therefore, we encourage future work on collective stress based on our found behavioral influences. Furthermore, we aim for discovery of other behavioral triggers in real life settings, while considering ethical boundaries found in this study. This way, our study could function as an initial point toward a healthier working community by chronic stress prevention.

ACKNOWLEDGEMENTS

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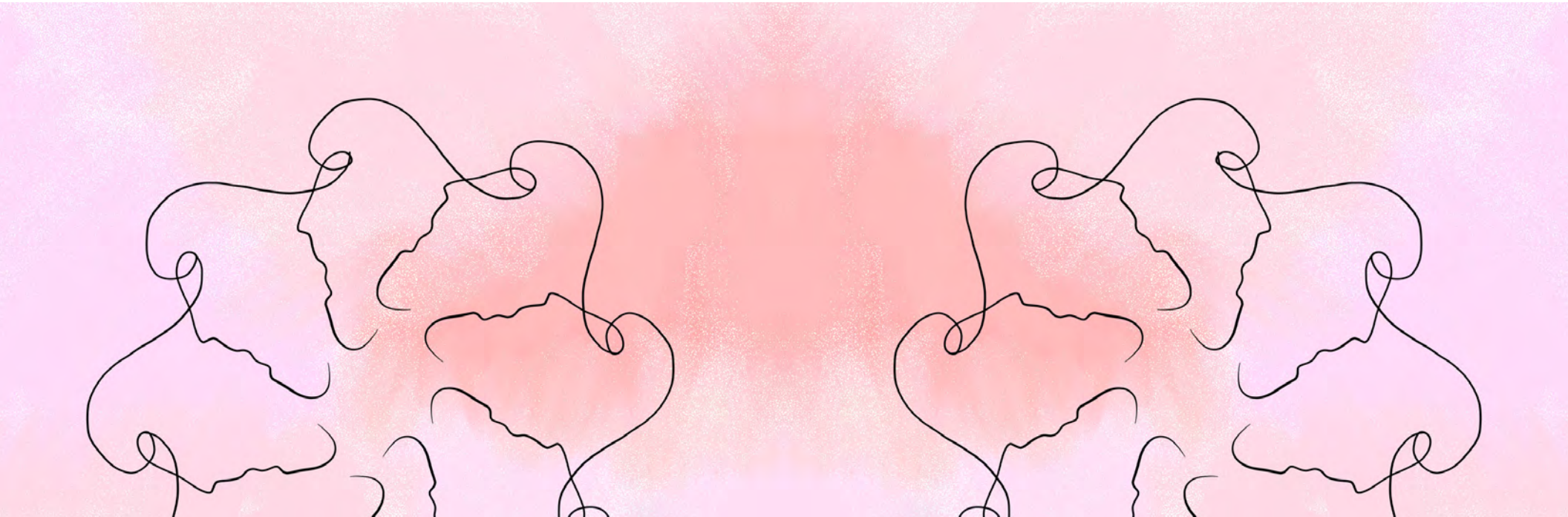

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INDIVIDUAL REFLECTIONS

At the beginning of this project, I would work with sensors that were implemented in office chair cushions. These sensors could measure various aspects when someone sits on this cushion. One of these values is the Heart Rate Variability (HRV), an important value for predicting and measuring stress. Unfortunately, the sensor cushions were delivered after midterm, which decreased the time of exploring these cushions. In the meantime, I prepared my methodologies and tried to work in Processing without real measured data. There were issues with the firmware, and later on with the server. I have decided, together with my coach, to not integrate the sensors in my project since this was not feasible anymore. This was about 3 weeks before Final Demo-Day, I have used this time to think of a new methodology and to adapt my prototype to this new situation. This allowed me to learn about other methodologies, namely using hypothetical scenarios (Haghani et al., 2016). It took much time to explore these kinds of methods, mainly because these methods focused on offering stated choices. I altered this in my study, to combine this method with my knowledge about elicitation interviews, Montaño & Kasprzyk (2008) stress the importance of open-ended interviews when investigating behavioral aspects. Even though it could be uncommon to combine methods, I believe it is better to trust my design experience and apply this to my study. Furthermore, I have tried to translate the discontinuation of the sensors to a situation for designing with more ethical freedom. In the first user study with the visualized faces, it became clear that the faces evoked more discussion and ethical challenges than circles. This made me decide to choose the novelty of this design (faces) and discover these ethical boundaries, which could be valuable for future work in this field.

Areas of Expertise

Because of this above-mentioned switch, I mainly focused on User & Society and instead of Math, Data & Computing: Business & Entrepreneurship and Creativity & Aesthetics. I could not achieve my goal for Math, Data & Computing, but I did work on this expertise area in an elective next to this project (Designing for Advanced Artificial Intelligence).

User & Society

Within this expertise area, I would like to apply theories about behavior change, that I learned in the first quartile of this semester (course: Design for Behavioral Change). I have achieved this goal by selecting the most relevant theories, the Integrated Behavioral Model (IBM) and the Transtheoretical Model (TTM) (Montaño & Kasprzyk, 2008; Prochaska et al., 2008). I further connected this knowledge to theories about social exchange (Schaufeli, 2006), to create relevant links between the perceived norm (about social behavior) and social relationships. Additionally, the behavior theories allowed me to alter the methodology of hypothetical stated choice experiments to a better fitting methodology. I also learned about the value of applying the Big Five Personality traits when investigating behavioral aspects by several studies (Grant & Langan-Fox, 2006; Penley & Tomaka, 2002; Petasis & Economides, 2020; Vollrath, 2001). Unfortunately, my sample size was too small to acknowledge this value from my results. Therefore, I look forward to applying these traits in relevant future studies.

Creativity & Aesthetics

During this project, I learned mainly because of this expertise area that I am more capable of designing creative visuals than I imagined beforehand. Since I mostly aim for a more down-to-earth design, a visual which would display philosophical events was quite new to me. Sometimes I doubted whether people would perceive my design as something serious. On Midterm Demo-Day I received much feedback about my 'nicely-designed visual' which gave me much more confidence. From that point on, I dared to trust more on my designerly intuition; because I had probably been too critical to myself. I believe that this has changed my professional identity, by being more open to complex or vague designs; now I have experienced the value of them.

Business & Entrepreneurship

Within this area, I have learned about differences within organizations. I have mainly focused on the difference between the Rhineland Model and the Anglo-American Model (Peters & Weggeman, 2013a, 2013b), while this gave a good understanding of my concept in two extremely different cultures. I was introduced to these theories by my second assessor, which I would like to thank for this interesting information. Furthermore, I have looked into the social aspects in a working community and how health-related data could help employees and managers, but also how it could be misused. Therefore, I have broadened my expertise within this area, which contributes to a better overall knowledge of organizations.

Personal Development

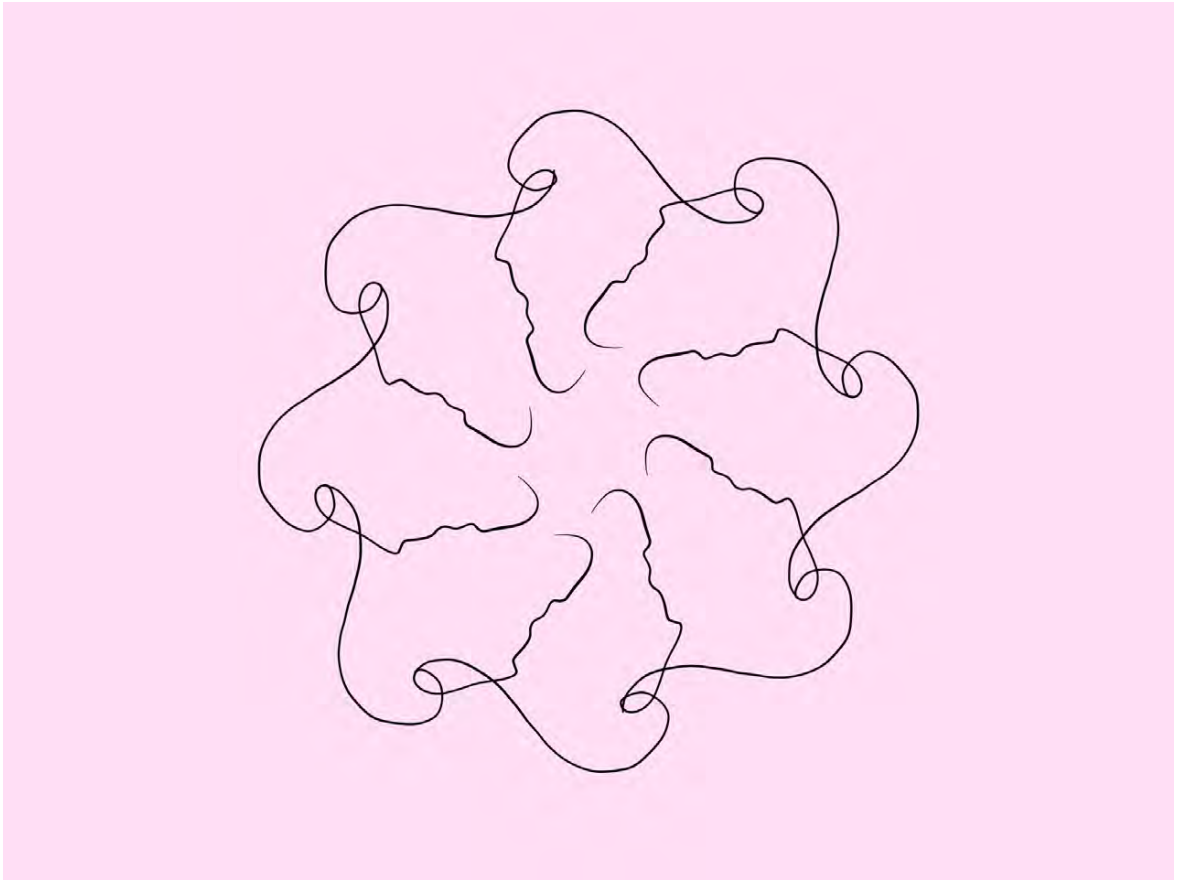
This semester, I was still in a recovery traject of previous stress-related experiences. Although it went quite well, I noticed that I can manage stress not as well as before, while I also need more rest. Especially at the end of my project, when there were some other personal circumstances involved, I have experienced the same health problems as before. I found this hard to accept, but this time I took action to prevent further negative health effects. I would like to thank all coaches for their understanding since this helps with being more honest about my abilities.

The social aspect of investigating and aiming for collective stress is in line with my professional identity. I think empathy and solidarity are important, to take care of each other in an equal way. Moreover, I could strengthen my view on solidarity during this project, while I learned about the importance of balancing social relationships (Schaufeli, 2006). Furthermore, I aim to design for prevention in general; while is in my opinion always better than a cure. I could further apply this style of designing in this project, while I know that prevention is key when it comes to chronic stress and burnout. Concerning my vision, I have learned about collective solutions instead of individual-based solutions, which could become a new trend in design research.

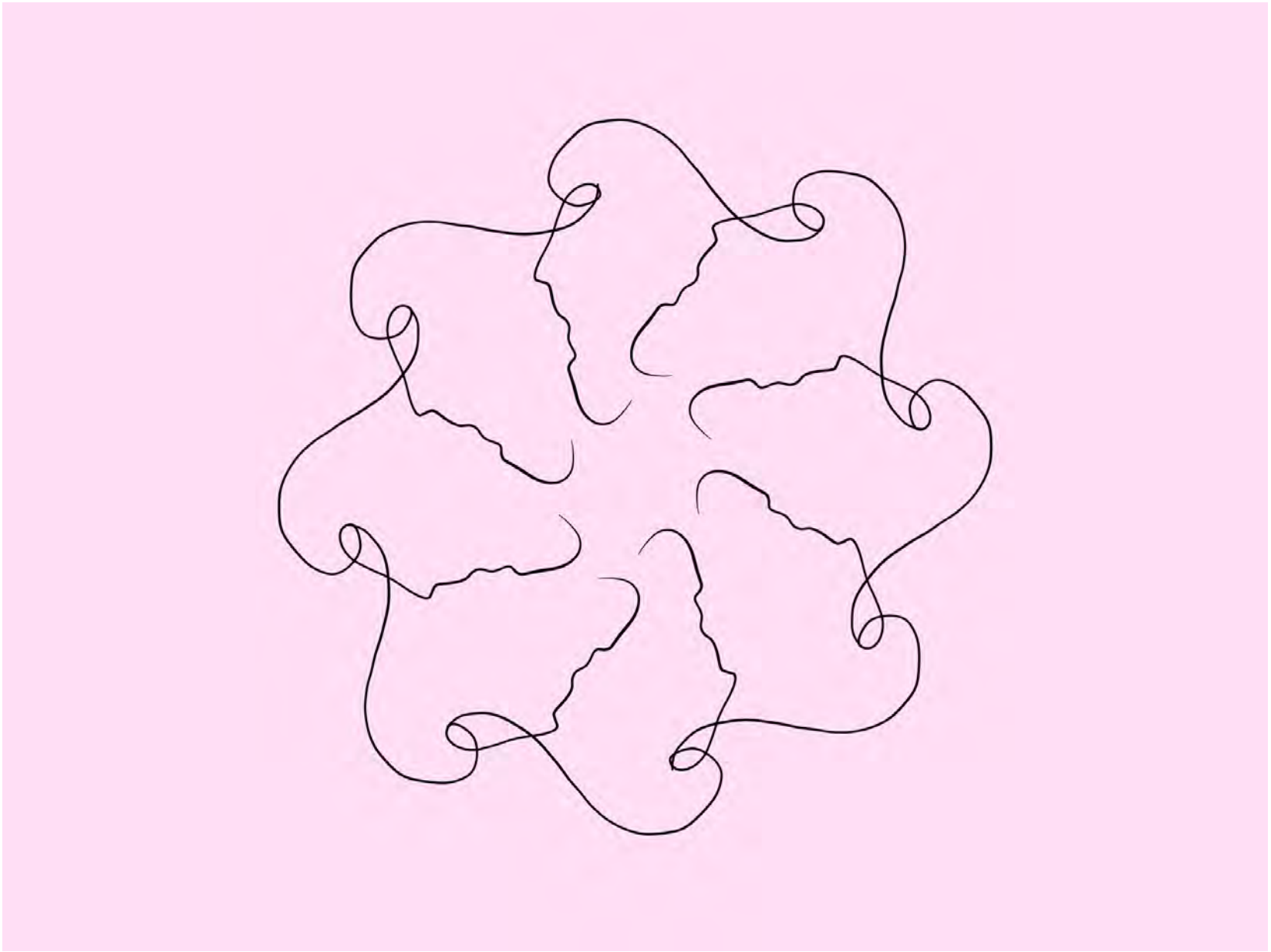
Next semester, I will do my internship at SmartGoals in Veldhoven, which fits my interest in designing for sports and vitality. I will specifically focus on deepening and broadening my knowledge in User & Society and Math, Data & Computing.

Figure 16. The sensor cushion and the electronics inside. A breakout board was temporarily soldered to the sensor chip, to upload the new firmware.

APPENDICES



Appendix A



Consent Form

Co-Design Session Interpretation Visualizations

Introduction & Goal

I will be doing my M1.2 Design Research project about collective stress within an office. This co-creation session should give me insight in the interpretation of visualizations. This way, I could get more clarity whether a certain visualization, shape or color is associated with a more stressed or relaxed ambiance; and whether this agrees with literature.

Description of the Study

This co-creation session consists of 2 rounds in which the participants are asked to categorize various kinds of cards based on their interpretation. The first round is about sorting the cards and the second round is about altering and modifying the cards; with more artistic freedom. After the 2 rounds, there will be a small discussion with all participants.

Risks & Disclaimers

Participation is fully voluntary, the participant can withdrawal at any moment in the study without affecting the relationship with the researcher nor Eindhoven University of Technology. The data that is collected is not sensitive and does not allow for identifying individuals within the study; which keeps the risk at minimum.

Data Collection, Storage & Handling

The participants' divisions and creations of the cards will be photographed. Furthermore, notes will be taken of the participants' discussion and their feedback. The collected data could be used for describing this study in a (published) research paper, presentation and in a video. The data is saved on a secure Microsoft Office 365 account.

☐ I give permission for making photos and videos AND that this media could be used for a (published) research paper, video and presentation. (As a participant I am aware that I could be identified when this media is used).

Contact

If you have got questions regarding this study, you can contact the research via the following mail-address: d.r.c.stappers@student.tue.nl

Consent

I am voluntary participating within this study and I am aware that I can withdrawal at any moment without negative consequences.

Participant	*Researcher*
Date	Date
Signature	Signature

Consent Form

Lab Experiment About Interpreting & Sorting Visualizations

Introduction & Goal

I will be doing my M1.2 Design Research project about collective stress within an office. This lab experiment should give me insight in the interpretation of visualizations and their aesthetic quality. This way, I could get more clarity whether a certain visualization is associated with a more stressed or relaxed ambiance; and whether this agrees with literature.

Description of the Study

The study will start with explaining the research study. After this, the participants should sort the received visuals from a relaxed to a stressed ambiance. This should be done based up on individual insights. After this, there will be a short group discussion about how the participants sorted the visuals and how they have interpreted these, with discussing both similarities and differences. After this sorting round, the participants will be requested to fill in an approved survey on aesthetics, called VisAWI, for the two different categories of visuals.

Risks & Disclaimers

Participation is fully voluntary, the participant can withdrawal at any moment in the study without affecting the relationship with the researcher nor Eindhoven University of Technology. The data that is collected is not sensitive and does not allow for identifying individuals within the study; which keeps the risk at minimum.

Data Collection, Storage & Handling

The participants' sorting results of the cards will be photographed. Furthermore, notes will be taken of the participants' discussion and their feedback. The collected data could be used for describing this study in a (published) research paper, presentation and in a video. The data is saved on a secure Microsoft Office 365 account and the VisAWI password-protected survey environment.

☐ I give permission for making photos and videos AND that this media could be used for a (published) research paper, video and presentation. (As a participant I am aware that I could be identified when this media is used).

Personal Details

☐ Hereby, I give permission for sharing demographical information for a more reliable and complete study. The researcher is allowed to use this data to give more context about the participants, under the condition that participants cannot be identified nor recognized.

Age:

Gender:

Nationality:

Education Program & Level:

Contact

If you have got questions regarding this study, you can contact the research via the following mail-address: d.r.c.stappers@student.tue.nl

Consent

I am voluntary participating within this study and I am aware that I can withdrawal at any moment without negative consequences.

Participant

Date

Signature

Researcher

Date

Signature

Consent Form

User Study About Collective Stress Visualizations

Introduction & Goal

I will be doing my M1.2 Design Research project about collective stress within an office. This final experiment should give me insight in the interpretation of visualizations and their aesthetic quality. Furthermore, hypothetical scenarios are introduced combined with a stress visualization. This way, I could get more clarity whether a certain visualization is associated with a more stressed or relaxed ambiance; and whether this agrees with literature. Furthermore, I can gain insight in how a visualization about collective stress could influence behavior in an office setting.

Description of the Study

The study will start with explaining the research study. After this, the participant will answer questions on how they will react in certain hypothetical scenarios. These scenarios are illustrated with the help of a digital prototype. After the interview, the participant fills in a survey about the aesthetic assessment of the prototype and a survey about personality traits.

Risks & Disclaimers

Participation is fully voluntary, the participant can withdrawal at any moment in the study without affecting the relationship with the researcher nor Eindhoven University of Technology. The data that is collected is not sensitive and does not allow for identifying individuals within the study; which keeps the risk at minimum. Although the data will be anonymized, results of the three tests (interview, and two surveys) could be combined to one participant identification number.

Data Collection, Storage & Handling

The participants' answers and survey results will be saved. The collected data could be used for describing this study in a (published) research paper, presentation and in a video. The data is saved on a secure Microsoft Office 365 account and possibly the VisAWI password-protected survey environment.

Personal Details

Hereby, I give permission for sharing demographical information for a more reliable and complete study. The researcher is allowed to use this data to give more context about the participants, under the condition that participants cannot be identified nor recognized.

Age:

Gender:

Nationality:

Education Program & Level:

Contact

If you have got questions regarding this study, you can contact the research via the following mail-address: d.r.c.stappers@student.tue.nl

Consent

I am voluntary participating within this study and I am aware that I can withdrawal at any moment without negative consequences.

Participant

Date

Signature

Researcher

Date

Signature

Consent Form

Expert Data Anlaysis

Introduction & Goal

I will be doing my M1.2 Design Research project about collective stress within an office. This expert data analysis should give me insight in psychological factors with regard to personality traits.

Description of the Study

The results of participants' actions and their personality traits will be compared to each other. Psychological insights may be shared and honesty is most important. The participants will be evaluated anonymously.

Risks & Disclaimers

Participation is fully voluntary, the participant can withdrawal at any moment in the study without affecting the relationship with the researcher nor Eindhoven University of Technology. The data that is collected is not sensitive and does not allow for identifying individuals within the study; which keeps the risk at minimum.

Data Collection, Storage & Handling

The given answers and explained insights will be noted in the research paper connected to this study. Only the expert background will be shared, with no further personal details.

Contact

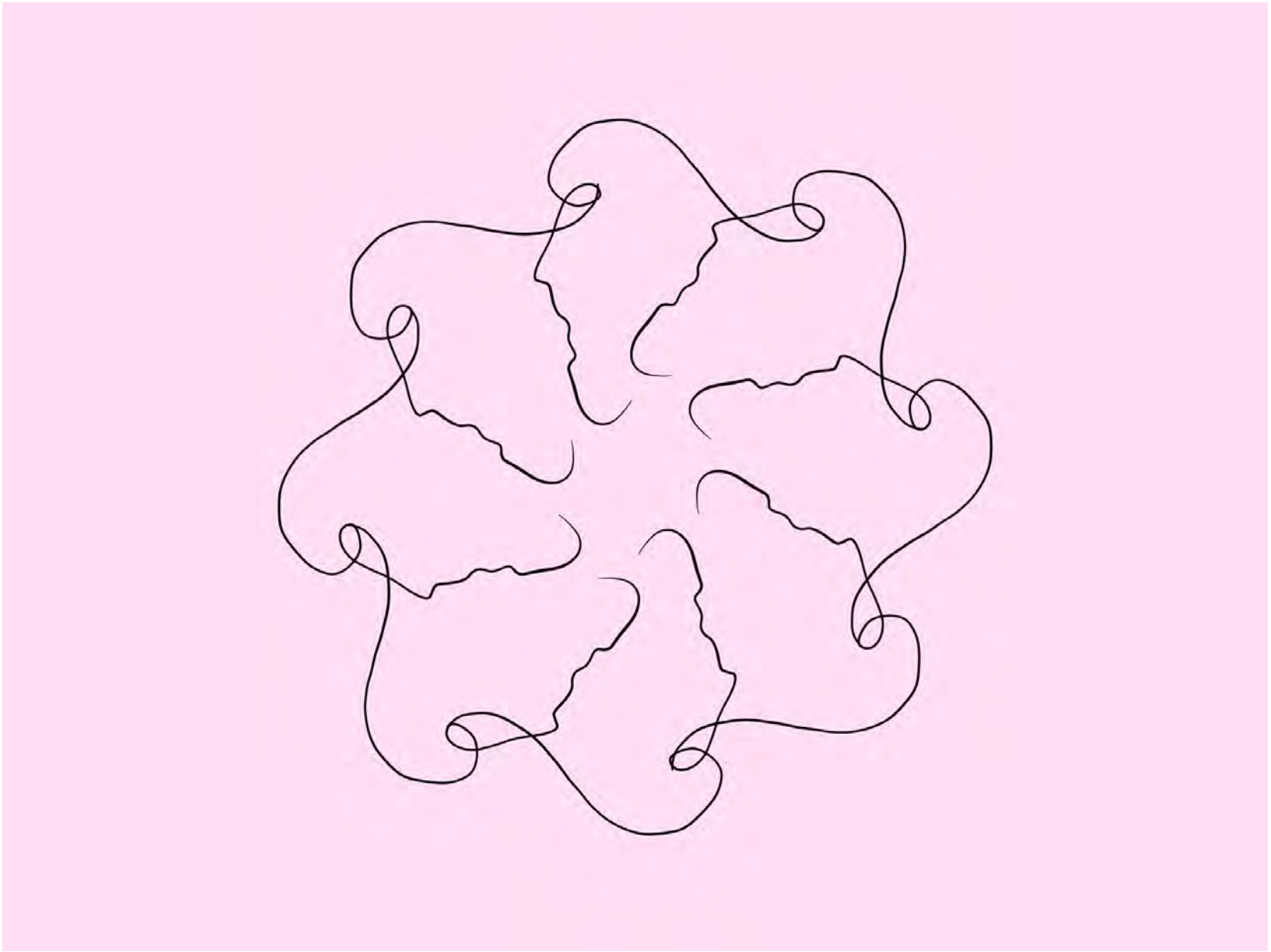
If you have got questions regarding this study, you can contact the research via the following mail-address: d.r.c.stappers@student.tue.nl

Consent

I am voluntary participating within this study and I am aware that I can withdrawal at any moment without negative consequences.

Expert	*Researcher*
Date	Date
Signature	Signature

Appendix B



Visuele Beoordeling Design | Onderzoek Danique

Deze survey vormt onderdeel van een gebruikersonderzoek van Danique Stappers. De voorwaarden van het voorafgaande toestemmingsformulier (consent form) zijn hierop van toepassing. Voor vragen en details, contacteer de onderzoeker.

Terug Computer Mobiele telefoon

* Vereist

1. **The layout appears too dense** *

(NL: in het ontwerp staan de elementen te dicht op elkaar, te druk)

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree or Disagree
- Somewhat Agree
- Agree

Terug Computer Mobiele telefoon

2. **The layout is easy to grasp** *

(NL: het ontwerp is makkelijk te begrijpen)

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree or Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Terug Computer Mobiele telefoon

3. **The layout appears well structured** *

(NL: het ontwerp heeft een goede structuur)

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree or Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Terug Computer Mobiele telefoon

4. **The design appears patchy** *

(NL: het ontwerp is niet zorgvuldig)

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree or Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Terug Computer Mobiele telefoon

5. **Everything goes together on this design** *

(NL: in dit ontwerp gaat alles goed samen)

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree or Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Terug Computer Mobiele telefoon

6. **The artefact is uninteresting** *

(NL: het ontwerp is niet interessant)

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree or Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Terug Computer Mobiele telefoon

*

(NL: het ontwerp is inventief, vernieuwend)

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree or Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Terug Computer Mobiele telefoon

(NL: het ontwerp is niet origineel, niet inspirerend)

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree or Disagree
- Somewhat Agree
- Agree
- Strongly Agree

9. **The layout appears dynamic** *

Terug Computer Mobiele telefoon

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree or Disagree
- Somewhat Agree
- Agree
- Strongly Agree

10. **The layout is pleasantly varied** *

(NL: het ontwerp is gevarieerd)

Terug Computer Mobiele telefoon

- Disagree
- Somewhat Disagree
- Neither Agree or Disagree
- Somewhat Agree
- Agree
- Strongly Agree

11. **The color composition is attractive** *

(NL: aantrekkelijke combinatie van kleuren)

- Strongly Disagree

Terug Computer Mobiele telefoon

- Somewhat Disagree
- Neither Agree or Disagree
- Somewhat Agree
- Agree
- Strongly Agree

12. **The colors do not match** *

(NL: de kleuren matchen niet)

- Strongly Disagree
- Disagree

Terug Computer Mobiele telefoon

- Neither Agree or Disagree
- Somewhat Agree
- Agree
- Strongly Agree

13. **The choice of colors is botched** *

(NL: niet de goede keuze van kleuren)

- Strongly Disagree
- Disagree
- Somewhat Disagree

Terug Computer Mobiele telefoon

- Somewhat Agree
- Agree
- Strongly Agree

14. **The colors are appealing** *

(NL: de kleuren zijn aantrekkelijk)

- Strongly Disagree
- Disagree
- Somewhat Disagree

Terug Computer Mobiele telefoon

- Agree
- Strongly Agree

15. **The layout appears professionally designed** *

(NL: het ontwerp ziet er professioneel uit)

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree or Disagree

Terug Computer Mobiele telefoon

- Agree
- Strongly Agree

16. **The layout is not up-to-date** *

(NL: het ontwerp is niet modern, niet van deze tijd)

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree or Disagree
- Somewhat Agree

Terug Computer Mobiele telefoon

- Strongly Agree

17. **The artefact is designed with care** *

(NL: het ontwerp is zorgvuldig samengesteld)

- Strongly Disagree
- Disagree
- Somewhat Disagree
- Neither Agree or Disagree
- Somewhat Agree
- Agree

Terug Computer Mobiele telefoon

18. **The design of the artefact lacks a concept** *

(NL: het ontwerp ontbreekt aan een idee/ gedachte erachter)

- Strongly Disagree

Terug Computer Mobiele telefoon

- Somewhat Disagree
- Neither Agree or Disagree
- Somewhat Agree
- Agree
- Strongly Agree

Verzenden

Terug Computer Mobiele telefoon

Persoonlijke Eigenschappen | Onderzoek Danique

Deze survey vormt onderdeel van een gebruikersonderzoek van Danique Stappers. De voorwaarden van het voorafgaande toestemmingsformulier (consent form) zijn hierop van toepassing. Voor vragen en details, contacteer de onderzoeker.

Terug Computer Mobiele telefoon

1. **I see myself as someone who does a thorough job**
(NL: iemand die hard en goed werkt)

- Strongly Disagree
- Disagree
- Neither Agree or Disagree
- Agree
- Strongly Agree

2. **I see myself as someone who gets nervous easily**
(NL: iemand die snel zenuwachtig is)

Terug Computer Mobiele telefoon

- Disagree
- Neither Agree or Disagree
- Agree
- Strongly Agree

3. **I see myself as someone who tends to find fault with others**
(NL: iemand die snel ruzie krijgt met anderen)

- Strongly Disagree
- Disagree
- Neither Agree or Disagree

Terug Computer Mobiele telefoon

- Strongly Agree

4. **I see myself as someone who is reserved**
(NL: iemand die gereserveerd is)

- Strongly Disagree
- Disagree
- Neither Agree or Disagree
- Agree
- Strongly Agree

Terug I see myself as someone who is outgoing, sociable Computer Mobiele telefoon

5. **I see myself as someone who is outgoing, sociable**
(NL: iemand die sociaal is)

- Strongly Disagree
- Disagree
- Neither Agree or Disagree
- Agree
- Strongly Agree

6. **I see myself as someone who is relaxed, handles stress well**
(NL: iemand die relaxed is, goed met stress kan omgaan)

- Strongly Disagree

Terug Computer Mobiele telefoon

- Neither Agree or Disagree
- Agree
- Strongly Agree

7. **I see myself as someone who tends to be lazy**
(NL: iemand die lui is)

- Strongly Disagree
- Disagree
- Neither Agree or Disagree

Terug Computer Mobiele telefoon

8. **I see myself as someone who is generally trusting**
(NL: iemand die je kunt vertrouwen)

- Strongly Disagree
- Disagree
- Neither Agree or Disagree
- Agree
- Strongly Agree

Terug I see myself as someone who has an active imagination Computer Mobiele telefoon

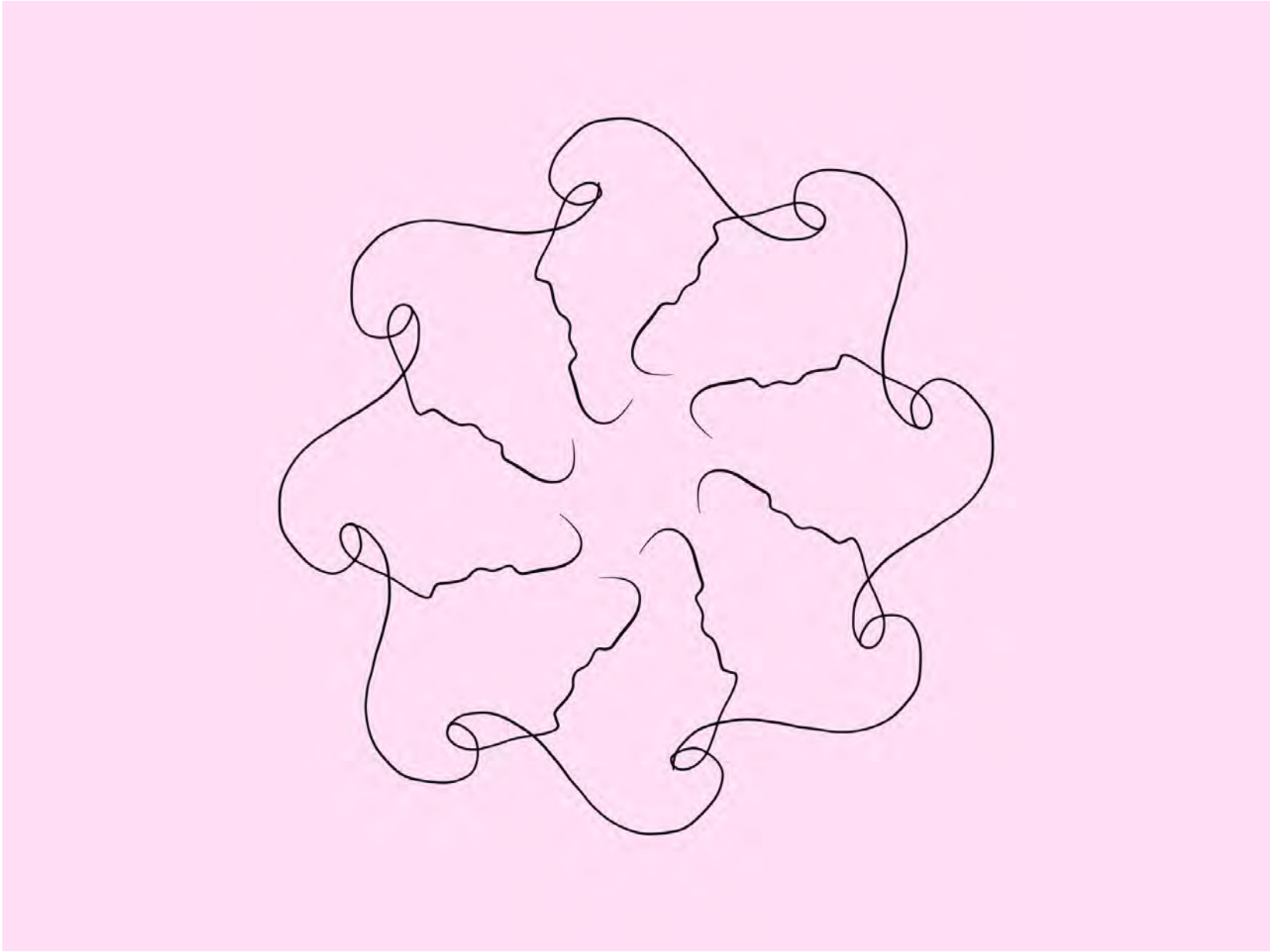
- Strongly Disagree
- Disagree
- Neither Agree or Disagree
- Agree
- Strongly Agree

Terug I see myself as someone who has few artistic interests Computer Mobiele telefoon

- Strongly Disagree
- Disagree
- Neither Agree or Disagree
- Agree
- Strongly Agree

Verzenden

Appendix C



Co-Creation Session About Data Visualizations

M1.2 Design-Research Project - Danique Stappers

Purpose

I will be doing my M1.2 Design Research project about collective stress within an office. This co-creation session should give me insight in the interpretation of visualizations. This way, I could get more clarity whether a certain visualization, shape or color is associated with a more stressed or relaxed ambiance; and whether this agrees with literature.

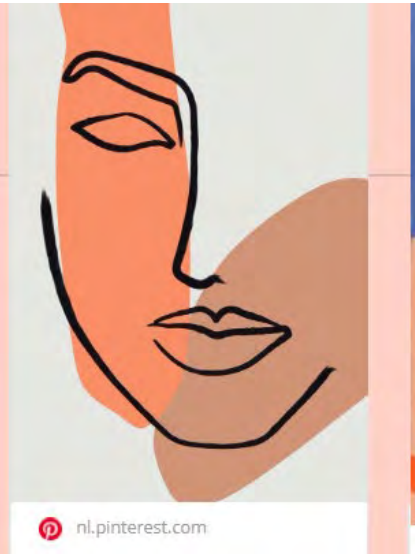
Materials

- Paper cards in different themes: Sorting
    - People / community theme with different ambiances and painting styles
    - Abstract shapes: organic / sharp
    - Colors: pastel / bright / dark / light / neon
- Small coloring pages in different themes: Be the artist
    - Blank cards to enable participants to choose other words that they find more applicable.
- Color markers and pencils (in lots of colors)

Method

1. Sorting
    - People / community theme
        a. Every participant is facilitated with the same amount and kind of cards.
        b. The participants are asked to link the word cards to the visual cards, they are allowed to link one word to more visual cards; they could also use the blank cards to choose their own words.
    - Shape theme
        a. Every participant is facilitated with the same amount and kind of cards.
        b. The participants are asked to link the word cards to the visual cards, they are allowed to link one word to more visual cards; they could also use the blank cards to choose their own words.
    - Color theme
        a. Every participant is facilitated with the same amount and kind of cards.
        b. The participants are asked to link the word cards to the visual cards, they are allowed to link one word to more visual cards; they could also use the blank cards to choose their own words.

2. Be the artist
    - ❖ Blank page
        a. Designing shapes in a style and the kinds of color that the participants associate with representing stress.
        b. Designing shapes in a style and the kinds of color that the participants associate with representing relaxation / rest / peaceful mindset.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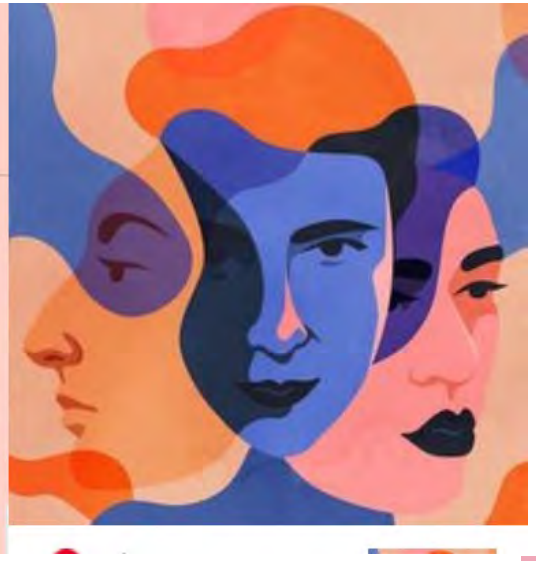
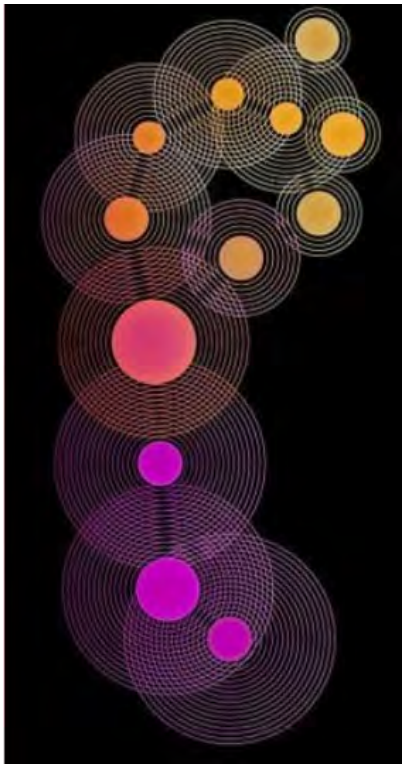
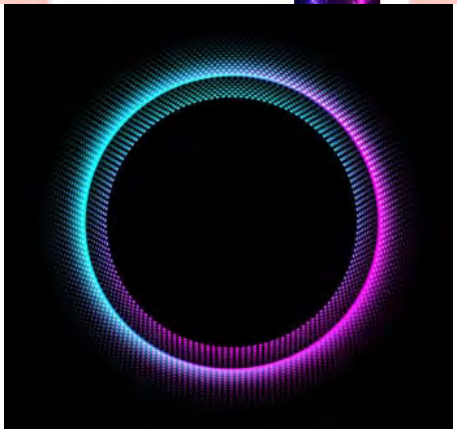
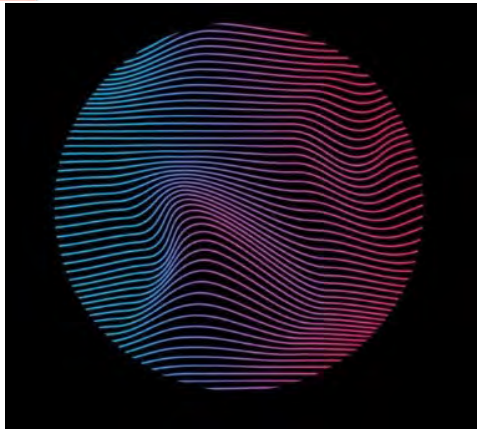
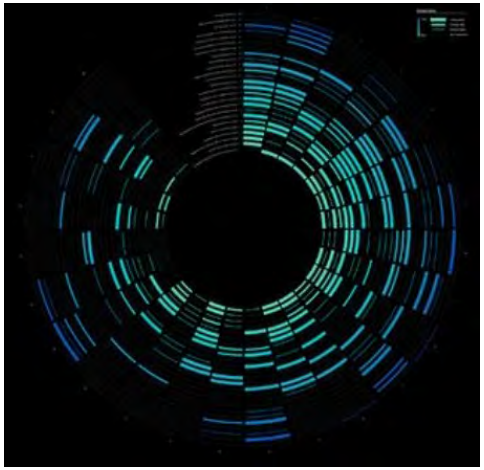
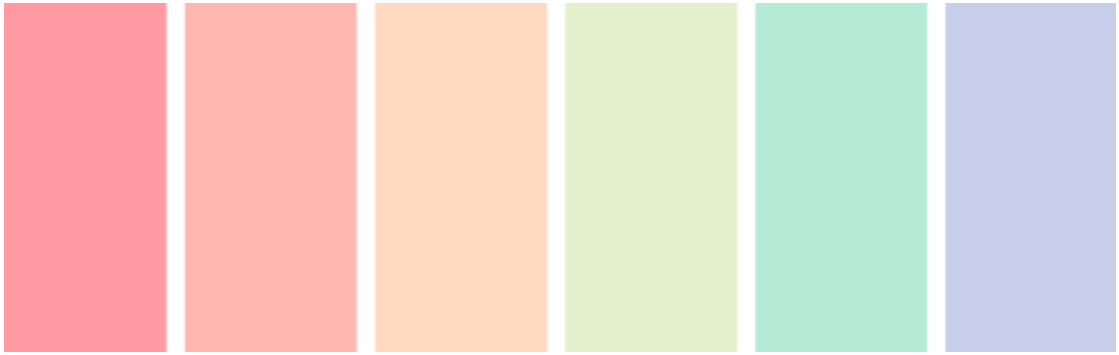


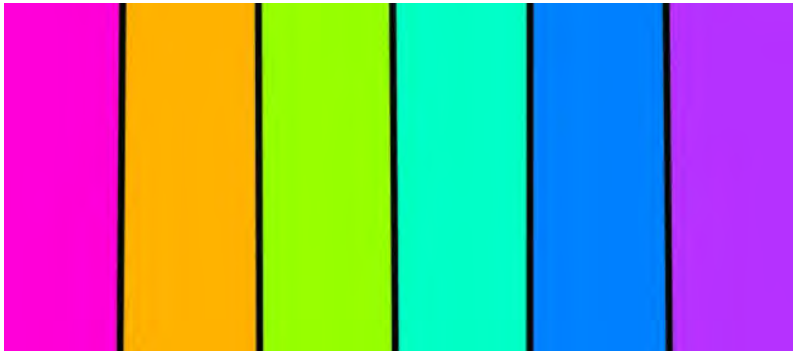


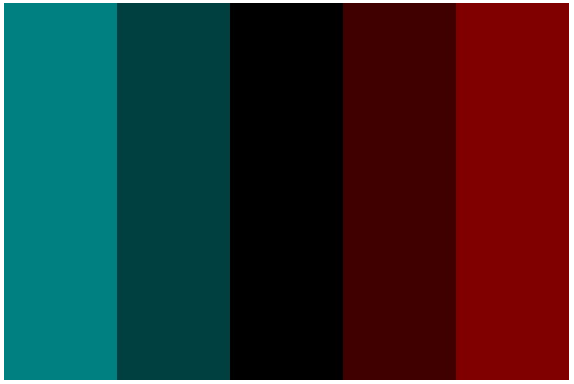


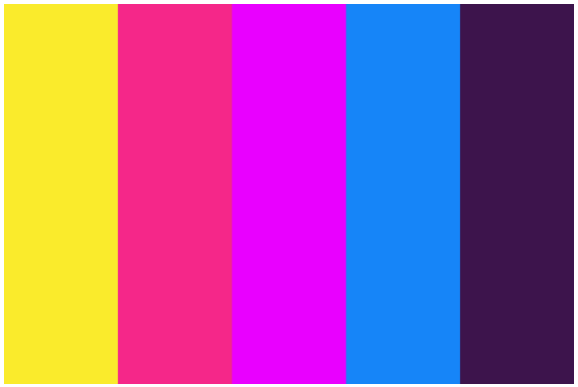










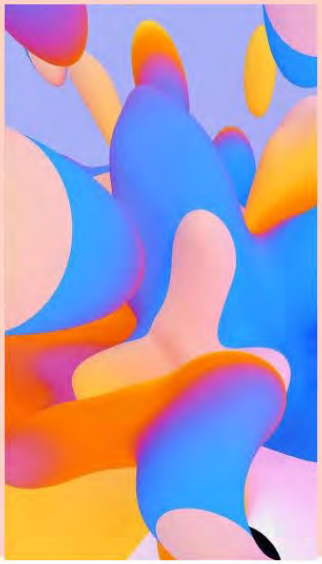




and music artists that have shared

indieground.net

Holographic Design:



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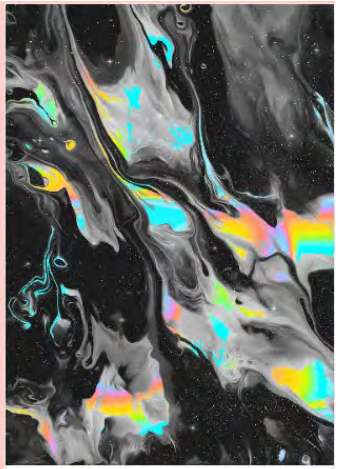

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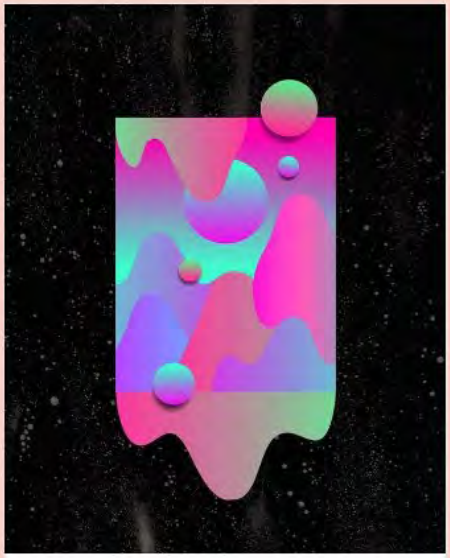
NFT Spotlight -
Stunning Abstract Art
of Alycia Rainaud



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Weekly Inspiration

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Hypothetical Choice Experiment

Target Group

Office workers

Procedure

1. Pilot test
2. Adapt research study if necessary
3. Try to reach 20 participants for the actual research study

Method

1. Consent form
    a. Demographic information
        i. Age
        ii. Gender
        iii. Kind of office (field)
    b. Making pictures
2. Introduce the topic
    a. Is the participant familiar with stress during their work?
        i. Is stress a topic that is discussed at work, both in an informal and formal ambiance?
    b. How is their relationship to their current colleagues? Do they have different relationships with different colleagues?
        i. Are there colleagues who execute the same kind of tasks as the participant or do their colleagues other tasks?
        ii. With how many colleagues are they in touch, do they work in one office (floor)? (Direct colleagues)
3. Introduce the context
    a. Imagine that you're working at your office, and that the stress levels of all office workers are being measured. You have access to your own data about the stress levels only.
    b. The stress levels of all direct colleagues of your office are displayed on a screen that is located in the office, but it is visualized in an abstract and artistic way. You only know which element presents you, you do not have any information about your colleagues and they do not have this insight in you.
    c. Any questions?
4. Introduce VIT.IN (the artefact)

a. This is the baseline of the data visualization. It displays the amount of physically present direct colleagues within your office.

b. In this visualization, there is added a harder and stronger color; this means an (unhealthy) increase in stress level for the respected colleague.

c. In this visualization, one of the colleagues is floating away from the others; this means that the increased stress level stays for a too long time. So this is the duration of the increased stress level.

d. Any questions?

5. Introduce Hypothetical Scenarios

    i. Visual 1: all colleagues are at rest

        - You're working at the office and this is what is displayed on the screen, what do you think? What feeling does this give you? Does this depend on the day or time?

    ii. Visual 2: some colleagues are stressed, you are not.

        - After an hour of being at work, you notice that the visual changes. What do you see? …

            a. What feeling does this give?

            b. Does this depend on day or time?

            c. Are you going to take action based on this visual, why (not)?

    iii. Visual 3: you are stressed, your colleagues are also stressed.

        - After another hour, you notice that the visual has changed again. What do you see?

            a. What feeling does this give?

            b. Does this depend on day or time?

            c. Are you going to take action based on this visual, why (not)?

        - Imagine you are still stressed, and this is because of a work-related issue, problem or struggle. A colleague that you have a close relationship with asks you if everything is going okay and if you would like to take a break with them. What do you answer?

    iv. Visual 4: you are stressed, your colleagues are not

6. Personality Traits

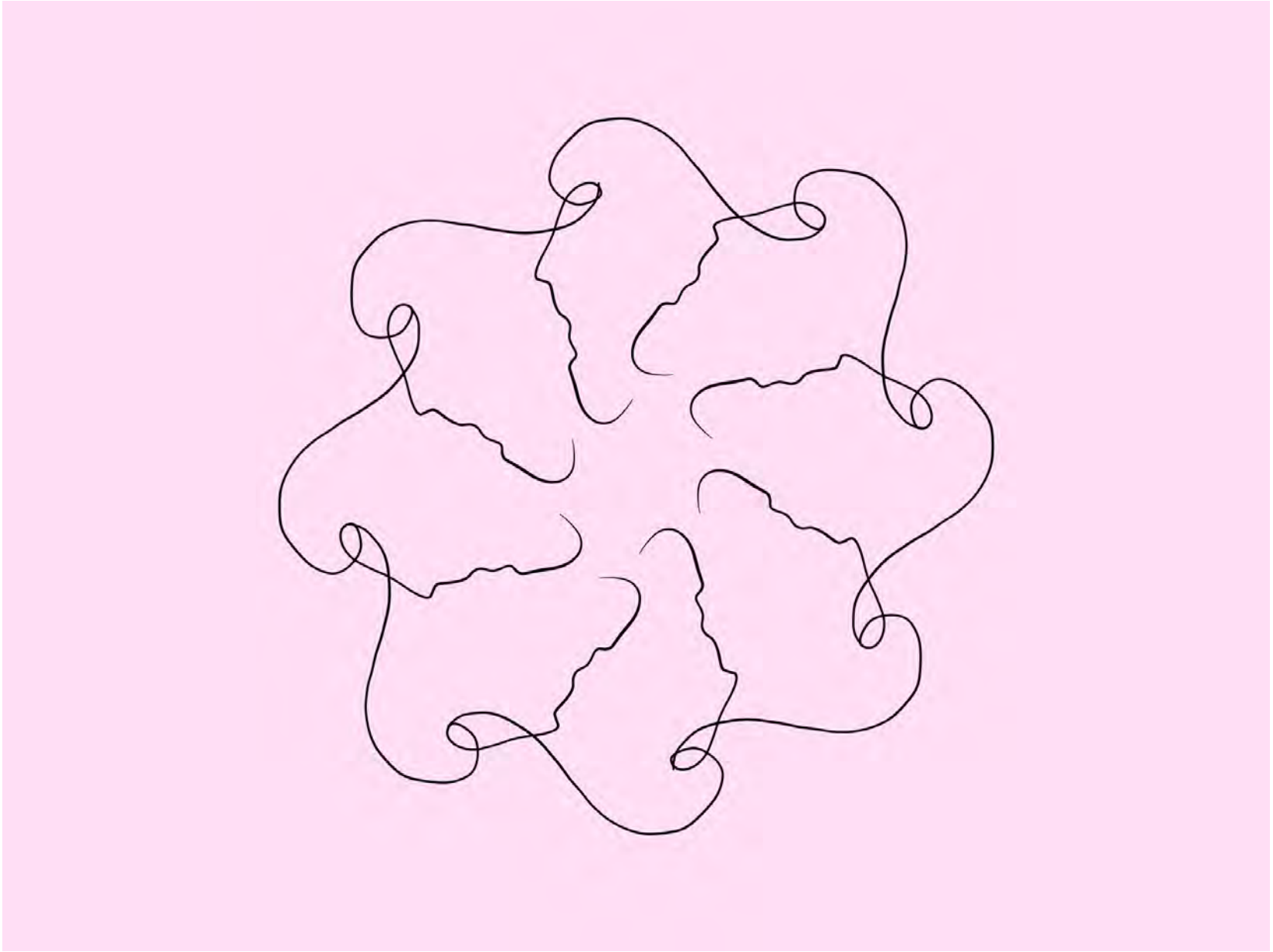
    a. Short Big Five Personality Test:

        i. Reference: https://www.idrlabs.com/short-big-five/test.php

        ii. Survey: https://forms.office.com/r/N0iywVCzhS

7. Visual Aesthetics Survey VisAWI
    a. Survey: https://forms.office.com/r/eCuePLepC9

Appendix D



Interviews Final User-Study

Interview Highlights per Participant & Survey Results

Participant 1

Context

- Familiar with stress: Yes, there is always a high pressure to finish deadlines in time. Furthermore, I put much pressure on myself since I always aim for excellence, so it the high pressure is a result of both personal and work-related factors.
    - Stress is for me on a constant basis, it is part of the job.
    - I reflect on how I did my job in the evening.
- Discussing stress at work: Yes, there is an open ambiance in which stress, including too much stress, can be discussed. It is not a taboo.
- Colleagues: I have mostly 2 direct colleagues, of which one at a time is at the same office room as I am. One of them is my mentor (A) and the other one has the same function as I do (B). Because of flex places, it can differ; but mostly A or B is at the same office as I am. I have a strong personal connection with colleague A, where colleague B is less close nor personally connected.

Visuals

- Visual 1 | Basis
    - This visual makes me restless, because of the doodle lines (no straight lines)
- Visual 2 | Other colleague experiences increased stress level
    - Since I work in a small office, I can probably know which person corresponds with which visually represented person; if I didn't know this I would try to find out by looking at facial expressions.
    - In case of colleague A: no action taken, feels like there is too much distance between me and this colleague.
    - In case of colleague B: I would ask if everything is okay directly
- Visual 3 | Other colleague experiences increased stress level + increased duration
    - In case of colleague A:
        - I wouldn't take much action, but it is not okay if this colleague is not able to work anymore. So, I would ask other colleagues who are closer to A in a subtle way if they know if everything is going okay with A.
    - In case of colleague B: I would ask if everything is okay directly
- Visual 4 | Self + Other colleague experiences increased stress level + increased duration
    - I would totally focus on myself instead of on the others. I would check by myself how the increased stress level could be caused.

    - I would not initiate to take further action
    - Colleague A asks whether I feel okay: I would not deny that I feel stressed, but I would not take a break if A suggests this. Still, it is satisfying that A checks how I am doing.
    - Colleague B asks whether I feel okay: I would admit that I feel stressed and I would take a break if B suggests this.
- Visual 5 | Self + Other colleague experiences increased stress level + Self + increased duration
    - I would work even harder than I did before. Socially I would behave in the same way as with the previous visual.
    - Colleague A asks whether I feel okay: I would not deny that I feel stressed, but I would not take a break if A suggests this. Still, it is satisfying that A checks how I am doing.
    - Colleague B asks whether I feel okay: I would admit that I feel stressed and I would take a break if B suggests this.
- Visual 6 | Self experiences increased stress level + increased duration
    - This does not make a difference from my behavior in visual 5, I focus only on myself when I experience stress. So I would not feel different or behave in another way because other colleagues do or do not experience stress.
- Visual 7 | Self experiences increased stress level
    - I would take no action, I think this is part of my job. Also when colleagues ask me to take a break, I would reject the offer (in case of an additional break related to the increased stress level).

Participant 2

Context

- Familiar with stress: Yes, and I do think it is also necessary in some extent to perform efficiently.
    - If it is necessary, I can do sometimes some work in the evening, but that is what my job requires (but not every day).
    - Tasks I get most stressed of are mostly tasks that are very difficult or require much thinking; and therefore these tasks are often postponed. I try to do these tasks at the beginning of the day, because I know that I experience much stress when I postpone these. (I don't enjoy these kind of tasks).
    - If it is extraordinary busy, I have no issue to postpone tasks with less priority. Because you cannot work harder than you already do.
- Discussing stress at work: Yes, we have a very open environment for this topic, when the workload is very high it will be discussed whether tasks could be divided among other colleagues or set priorities to decrease the workload.
    - I am allowed to divide tasks or set priorities, but for me this doesn't necessarily decrease the work pressure. Because I have to deal with the consequences when work gets postponed or is not finished in time.
- Colleagues: we have a bigger office, but it is not necessarily an open-plan office. We have separate rooms for calls, but there is still always some noise. So it is not a quiet environment. I have 7 colleagues within our office room.
    - Because of covid more colleagues are working from home, but in general 2/3 is present.
    - For work that needs to be done very careful I prefer to work from home or in a separate room, because I can focus better in these environments. Working at the office is mainly important for meetings and communicating with others than getting specific tasks done.

Visuals

- Visual 1 | Basis
    - I get the idea that it is a relaxed environment, not much is happening. Still, it could be productive. I get the idea that there is a good vibe/sociable ('gezellig'), I think that is also necessary to create a good working environment.
- Visual 2 | Other colleague experiences increased stress level
    - The lighter change in color (a bit like orange): I think that this will be fine, so I will not take specific action to help / discover this person.
    - The darker change in color (a bit like red): this seems more serious, I would get a bit worried about this.
        - I will look around to check how everybody is working, taking a look at their faces. I will specifically focus on my knowledge about my

colleagues. There are some colleagues that I have already concerns about, where I know that there are other colleagues who get unnecessarily stressed about nothing (according to me).

- A personal connection is important as well, I pay more attention on some people than on others. Especially when I know that people don't want help, I will respect this.

▪ I will have a chat with the colleagues that I expect to have a too high stress level. I will try to see whether tasks could be better divided, but if I am not directly in charge of this colleague I will just have a chat.

- I will ask active questions to find out who is experiencing too much stress
- I will ask them to have a coffee and to give them a moment that they can take a total break, without interruptions of a laptop screen etc. I think this is the best way to have a real conversation without having people 'hiding behind their laptops'.

- Visual 3 | Other colleague experiences increased stress level + increased duration
  - I will first try to find out who experiences this much stress, my personal connection with a colleague doesn't determine whether I will ask a colleague how they're doing; I will ask this to anyone.
  - Colleague of which I am in charge: I will decrease the amount of tasks and asks whether the amount of stress is caused due to work or personal related issues or a combination.
  - Colleague of which I am not in charge: I will discuss my concerns with colleagues who are in charge of this person.
  - Our office is a direct and transparent environment which allows for discussing these kind of topics.
- Visual 4 | Self + Other colleague experiences increased stress level + increased duration
  - I would tell people in my environment that I am experiencing more workload, I will postpone tasks with less priority. I will try to shift some of my work to colleagues who are less busy.
  - Sometimes I can do a bit of extra work, but not too often. But this is normal for my job, in the same way I am also allowed to quit a bit earlier or start later. So I think that is in balance.
- Visual 5 | Self + Other colleague experiences increased stress level + Self + increased duration
  - I will tell people in my environment (both work and personal) that I am experiencing more workload.
  - I will have a chat with a colleague with whom I have a close personal connection, someone I can trust. I will take care that this is not one of the colleagues who

is experiencing much stress as well; to give them the space to focus on their own situation.

        - I am worried that I am not able any more to set priorities, because it is hard to have a realistic overview when experiencing high amounts of stress.

            - I would like them to put things in perspective, to 'mirror' myself.

    - Furthermore, I do think that this is not healthy if this happens at our office. This should be openly discussed with all colleagues. This would also need an intervention for the whole office, to change the organizational structure to a healthier way of working.

- Visual 6 | Self experiences increased stress level + increased duration

    - This doesn't necessarily make much difference, I will feel the same about myself and focus on how I can fix my increased stress level.

    - I will search for spare time activities, to set my mind of all the tasks that I need to do.

    - I will tell my other colleagues that the task division is not in balance.

    - I will also expect from others that they will ask me how I am doing, because we aim for this in our human-centered office. We take care of each other.

    - If a colleague asks me to have a coffee or a walk with them, I will accept this offer. This is not dependent on the personal connection with this colleague, I think that if someone does me this offer that I should accept it; because others will probably have a better view of how I am doing than myself (because you cannot make realistic estimations when experiencing much stress).

        - I know that I can also react a bit different when I am experiencing stress, so it could also be that someone just wants to discuss my behavior to other colleagues.

- Visual 7 | Self experiences increased stress level

    - I find it much better that my 'avatar' is back to the whole, although it is still pointing out that I am stressed. It is okay to work better and harder than in general for a short time, but this shouldn't become the norm.

    - I would always accept an offer when colleagues ask me to have a coffee or a walk, also when the visual would not show that I am stressed. I prefer that people share their concerns with me, because they have noticed something and I think there is always an opportunity to learn from that.

Participant 3

Context

- Familiar with stress:
    - I have monthly deadlines which can cause stress, I have to make sure that all salaries are paid each month.
        - Especially when the program which I use crashes, I experience more stress. I cannot fix this myself, so I need to ask other departments and eventually call the helpdesk.
            - It happened twice that the salaries could not be paid in time because of an external issue with this program, so I could do nothing about this. Still, it felt bad because I know that employees set collection dates near the date that they receive their salaries. It feels bad when I have to disappoint my coworkers.
    - I manage stress easily, I am stress resistant
        - But if something goes wrong and I know that it can have bad consequences, I will immediately inform my manager and eventually other colleagues if necessary. I am responsible for this.
- Discussing stress at work: I work at three different offices and sometimes at home. In all offices it can be discussed, but in office B I am less likely to share my personal health or stress levels.
- Colleagues: three different locations
    - A: I work with my manager, she has the function of HR manager.
        - I can discuss how I feel with her, but she cannot directly change my amount of tasks, since I am the only one with this function of salary administration. I like her as a colleague, but we do not have a close personal connection.
    - B: 4 other colleagues, Finance department
        - I have to work at this location, because this was decided by the managing board of our company. I did not want this, but it was decided that I work here 2 times a month. I do not have a personal connection with these colleagues and I don't have interest to socialize with them.
    - C: 2 other colleagues, Finance department
        - I consider these colleagues as my friends, I have a close connection with all of them. I can share my frustrations with these colleagues.

Visuals

- Visual 1 | Basis
    - I would take no action with this visual, I don't see this visual as something negative.

- Visual 2 | Other colleague experiences increased stress level
    - A: In case she is the darker 'avatar' on the visual, I would ask whether she needs help. Since I am also HR-assistant, I could take a task from her if necessary. In case she is the more orange like avatar, I would assume that it will be manageable by herself. (Because we are with 2 I will know who she is, otherwise I would check facial expressions).
    - B: Since I feel not (personally) connected to these colleagues I will not do anything with this information. I just sit at this location to work, otherwise they will talk continuously and it will interrupt me in getting my own work done. The managing board made me go to this location and I do not support that decision.
    - C: I would definitely ask how they are doing, I think I would ask the colleague who I suspect to experience most stress (because I know about personal circumstances). But if this colleague does not feel stressed, I will ask the others. These are my favorite colleagues.
- Visual 3 | Other colleague experiences increased stress level + increased duration
    - A: I would take a task from her if she asks me to, because if she gets burned out we will have a bigger problem. Furthermore, I will get a lot more work in that situation. I would mainly take a look at how she is working, but I expect that she will take initiative to divide tasks etc. because she is my manager and not the other way around.
    - B: I would try to discover which colleague is 'disconnecting' from the whole. And if I think I know who it is, I will ask another colleague what is going on with this stressed colleague. If I cannot find out, I will do nothing about it.
    - C: I would take this more personal, at this moment there is actually one colleague sitting at home because of a probable burnout. I will not wait till someone asks me for help, but I will immediately take action with taking tasks from this colleague; even when these tasks are not within my job responsibility.
        - I would furthermore mention this to my manager, that she is informed of what is going on (although it is on another location) and also that she keeps an eye on me that I do not take too much work on me.
        - I would ask all of the colleagues in this office directly if they are okay or how I could help them, no exceptions in this office.
- Visual 4 | Self + Other colleague experiences increased stress level + increased duration
    - A: In this case, there should be a lot of work, since I do not often experience much stress. My manager will help me in this situation. I will probably work longer, working faster with my job makes no sense, because it should be done carefully.
        - It is dependent whether the stress is caused by tasks related to my salary administration function; because she cannot help me with this. I am the only one with this function, and receiving help will probably not

improve the quality and amount of work, because I need to check afterwards if everything is done correctly.

        - But with other tasks, she will help me. Furthermore, I will take my planned breaks, but I will not take additional breaks. I will work longer to finish the work before the deadline.

    - B: I would work longer, I don't have anything to do with these colleagues. Therefore, I would find it frustrating if they know that I am stressed, I think it is better if they mind their own business. Furthermore, I would not admit it if they ask how I am doing, I would just say that I am fine.

    - C: I would mention that I am experiencing stress, but I would not make it a 'whole speech'. If one of my colleagues would ask me to take a short break with him or her I would accept this, then I will just work a bit longer. I will not discuss it with my manager, if I am at this office. I think it is fine that I can discuss it with my colleagues in the break.

- Visual 5 | Self + Other colleague experiences increased stress level + Self + increased duration

    - A: In case we are both disconnected from the whole, I would together with her talk to the managing board that this situation is not healthy. It is problematic if I have to stay at home, because there is no back-up for my job. I am almost never sick, so till now this has not been a problem.

        - In case she is the more orange avatar, we will seek for a solution together by dividing tasks. I think the workload will be manageable in this situation, so we will not talk with the managing board.

    - B: I would still not tell these colleagues, I will ask my manager (A) if I can work temporarily only at the other location (A and C) because of personal circumstances. If these colleagues (C) ask if I am experiencing stress, I will deny it again. I will take no additional breaks. Furthermore, I don't care about how the others are doing.

    - C: I will worry about both colleagues who experience a bit more increased stress (orange alike) and very much stress (more red). I would worry more about them than about myself. I would take an additional break with all of them if they ask me to, furthermore I would also ask this question to them.

        - Orange alike: I would talk to them directly and also explain my concerns about our department, since almost everyone seems to have to high stress levels. I would suggest to meet with all colleagues (except the red alike) to discuss the situation.

        - Red alike: I would not involve this colleague in a discussion about the department, to give them the space to focus on their own situation.

- Visual 6 | Self experiences increased stress level + increased duration

    - A: My manager will immediately ask how I am doing. I will only take an additional break when I am not close to the deadline. If I am close to the

deadline, I will work even longer. It would be nice if she offers to take tasks from me.

  - B: If it is a task that could be done by someone else in a good way, I will accept the offer of taking this task by only one of these colleagues. I will not ask this myself. This one colleague is also the only one of which I will maybe accept an offer for an additional break if it is not close to the deadline. I don't feel the need to build a personal connection with these colleagues.
  - C: I would ask who could take some tasks from me. I would even ask a single time if someone would take a walk with me. If someone else of them offers me to take an additional break, I would accept it if it is not close to the deadline. In the case that one of the colleagues emphasizes the importance of taking an additional break, I would also accept it if it is just before the deadline.

- Visual 7 | Self experiences increased stress level
  - A: I will not bring it up myself, and if she asks I will say that I just need to work a bit longer and it will be fine.
  - B: I will not bring it up myself, and if they ask I will say that I just need to work a bit longer and it will be fine.
  - C: I will not bring it up myself, and if they ask I will say that I just need to work a bit longer and it will be fine.

Participant 4

Context

- Job
    - I do administration in the direction of renters' personal data.
- Familiar with stress
    - I experience stress in my job on a regular basis.
    - Mainly for new building projects, everything should be done carefully. All of these administrations that I have to do have deadlines.
- Discussing stress at work
    - We aim for an open environment in which stress can be discussed.
- Colleagues
    - We have a kind of open office, where our space is divided from other spaces with division screens. We have a specific desk per employee, but if someone feels not comfortable due to covid, they can sit somewhere else.
    - I experience my colleagues as a nice team, which is quite variated in terms of gender and age. I have 4 other colleagues in the space, at this moment.
        - Most colleagues make often a talk to me, and I know about their personal situations. They know that I am always there for them, and they come to me, because they know they can trust me.
- Other
    - I work 16 – 20 hours a week, I used to work 16 hours, but due to much workload I work 20 hours.
    - At the moment we work at home, and we are starting with working once a week again due to covid19.

Visuals

- Visual 1 | Basis
    - Gives a nice feeling of being involved with each other.
- Visual 2 | Other colleague experiences increased stress level
    - I can interpret this situation, I will look around to check whether I know who it is. If I find who it is I will do the following:
        - In case of the orange-a-like person: can I help you? Are there tasks that I could take from you? Is there something work-related or at home?
        - In case of the red-a-like person: I think I know who this would be in my office. I will ask how it is going both work-related and at home. If it is work-related I will ask if I can decrease the workload. If it is not work-related, I will just listen to the story; but I am not in a position to take action.

- Visual 3 | Other colleague experiences increased stress level + increased duration
    - I would expect that I cannot solve this problem, but I would still go to this problem to listen to their story and ask whether I can do anything for them to make it better. I would do this for each colleague
    - I would advise them to go to the manager or managing board or Human Resources, if the person needs help, I will ask it for them.
    - Previously, I also alarmed my manager when the workload was too high and the situation got out of hand. I am person who faces these situations.
- Visual 4 | Self + Other colleague experiences increased stress level + increased duration
    - I am responsible for the administration of the annual rent increase. Although I do not decide whether the rent will be increased, I am the messenger. So I receive many calls from complaining and angry renters. This is on top of my regular job, in the months of April and May.
        - Mostly, I try to help renters to ask on the building's owner whether payments could be postponed, especially with covid19 at the moment. But sometimes it is not possible and then it feels bad to disappoint people.
            - Each year I know that these months are rough and I am so glad once these months have passed.
    - For me, the visual reminds me to these months. I would ask each colleague for help. Furthermore I would ask my manager which tasks have priority, I do this currently in my job as well; when the workload gets too high.
    - If my colleagues would not ask how I am feeling I would not be offended when this is work-related. But if I felt personally stressed, due to something at home, and my friends would not ask how I am doing, that would be frustrating. Because my friends are closer to me than my colleagues. Still, I would like it if my colleagues ask how I am doing, since there is an open ambiance in which this could be discussed.
- Visual 5 | Self + Other colleague experiences increased stress level + Self + increased duration
    - I would alarm my manager that the workload is too high. At first I would work longer and check my mail in the evening when I am at home. If this has no result, I will report it to my manager. Especially since overtime is not applied in our company structure any more. So I would tell my manager that this should be solved.
    - I would take more micro breaks, I would accept also an offer for a break of another colleague.
    - I would ask the colleague who has the same job as me if there is time to talk about my experiences and work situation at the moment.
-

- Visual 6 | Self experiences increased stress level + increased duration
    - I would think in this situation that it is maybe a problem which is more personal, I will doubt myself. I will think about my personal situation.
        - I will tell my manager that I am feeling stressed, and still figuring out was caused this.
        - I will tell my colleagues that I am doing less fine, probably due to personal reasons.
- Visual 7 | Self experiences increased stress level
    - I would still take a critical look at myself within this situation, since I am the only one experiencing stress.
    - I would still report this to my manager as well, because I like to create an open environment. Therefore, I am open in my communication as well. I would also be open about getting or receiving (professional) help.

Participant 5

Context

- Job
    - I work 24 hours
- Familiar with stress
    - I experience stress in my job, mostly when something has to be changed all at once. I do experience less stress from this than when I started working. Still it is a frustrating feeling. If I experience stress, my colleagues notice this and ask what is going on.
- Discussing stress at work
    - This can be discussed at our company.
    - In our office, I expect that I will receive help as well, since I would do the same for my colleagues. My department is collegial, better than the other departments, I have build up a bound with them.
- Colleagues
    - It is a kind of small open office, with 4 desktop places in separate rooms. These are all connected together, since we have our doors open.
    - There is often noise of colleagues who are calling which can be a bit frustrating, but mostly this does not take too long.

Visuals

- Visual 1 | Basis
    - I have the idea of starting up in the morning, that is fine.
- Visual 2 | Other colleague experiences increased stress level
    - I am curious who the person is who experienced the most stress. I have once colleague in my mind who has a lot of deadlines. I will ask this colleague first whether everything is in control. I will ask whether I can do some work for her, but since her job requires other skills than I have; I would not be able to do all the work for her. But I will ask some assisting tasks.
    - I will also try to find the other colleague who is feeling a bit stressed, I would ask all colleagues in our office room how they are doing.
- Visual 3 | Other colleague experiences increased stress level + increased duration
    - This seems that it is not getting better, it seems like the colleague is forcing the situation. I will notice this on someone's behavior, for example when someone is hiding behind their computer screen or not engaging in conversations amongst the other colleagues. I would ask whether it helps for them to work from home or whether tasks could be divided amongst all colleagues.
    - I would prefer if this colleague would tell the manager and the other colleagues, I would also advise them to tell the manager. I would not tell other colleagues,

also not to take tasks from this colleague; but I would tell our manager that I am having concerns. We have two managers, and I would tell the one who focuses on employees, I have also a closer personal connection with this person. I would tell the other one as well, but probably wait a bit longer.

- There are also colleagues who say they are busy, while they don't seem to be. I will also ask these colleagues whether I can help them, but less quick than others. I am more suspicious of this behavior.
-

- Visual 4 | Self + Other colleague experiences increased stress level + increased duration
    - I think I will probably have to finish something very quickly, I will focus on myself. I would like it my colleagues ask me how I am doing, but I know that the colleague who has the same job as me will ask this. I will expect this from my department, but I know that other departments will not do this.
    - It would be nice if colleagues ask me to take some tasks from me, but I would ask them as well when I notice that I cannot finish it in time. I would not ask the colleague who is already stressed, to let them focus on themselves.
    - I would not take an additional break, I prefer to be finished at the same time as normal than working longer.
- Visual 5 | Self + Other colleague experiences increased stress level + Self + increased duration
    - I would prefer to prevent this situation. I would immediately tell my management that I cannot finish this amount of work. If it really has to be finished I will work longer. Furthermore, I would tell the management that they need to hire more people, if this is a structural issue.
    - I would not take an additional break because I would not get more relaxed from this, it would help me colleagues take tasks from me. If the importance of this break gets emphasized, I will still not accept this offer. I will even work in my lunch break to get finished in time or at least limit the amount of overtime.
    - I would ask other colleagues when they feel stressed, and I am not experiencing stress whether they would like to have a short break; but I know they will not accept this. Often you know how your colleagues will react.
- Visual 6 | Self experiences increased stress level + increased duration
    - I would feel different in this situation like 'Hi, don't you see how much work I have to do?!' I will also react snippy if they ask me questions not related to how I feel or how I am doing. I will also say that I am busy.
        - I expect my colleagues that they ask how I am doing, I pay attention to everyone of them, so I expect this in return.
            - I know some colleagues will ask and some will not. Taking tasks from me would be nice, but I would also ask them to do this.
- Visual 7 | Self experiences increased stress level

- I would notice this by myself, it would not be a surprise if my stress level decreased in duration. It is good to have a confirmation of this, gives a feeling of having control.
- It would be nice if colleagues ask me how I am doing, I will also ask when I need help.
- I think it is most important to be collegial, that is what makes you really a team.
- I would not make a secret of it when I am experiencing stress, but this visual would be nice to help others who hide these experiences in their behavior.

Participant 6

Context

- Job
    -
    - The director of our company is the HR manager, but this person is not educated within HR (it is a family company). Since he is not capable of doing this task, I often get HR work on top of my regular job. This is a stress factor for me.
    - I receive a lot of mails and these are all connected to deadlines. This is very stressful, because if a request of a customer is late; we can receive a negative review. This is a stressor amongst all colleagues.
    - Computers are the most frustrating. These take a lot of time when loading information or programs, and our company does not fix these issues. Therefore, it is frustration number 1 at our office.
- Familiar with stress:
    - Stress is common at my work, I have experience with stress. I am learning to deal with stress, which makes it easier to manage this.
    - There is much noise at our office, this causes stress as well. Sometimes I close my door a bit to get more rest.
- Discussing stress at work
    - This can be discussed, I also tell my colleagues that they can share their experiences with me (also because this is part of my job).
- Colleagues
    - I sit alone in a room, but I am near the other 2 – 5 colleagues who work at the same floor. Mostly I leave the door open, to have a better connection with them. This situation used to be different, but it changed due to covid19.
    - I get along well with all of my colleagues. I have a better connection with the colleagues of my department, since I talk most with them. I do also have closer personal connections within the company, but these colleagues are from different departments.

Visuals

- Visual 1 | Basis
    - I think this visual already makes me feel a bit restless, due to the plane background and the doodle lines.
- Visual 2 | Other colleague experiences increased stress level
    - I would look around to check if I can find who it might be. Then I will make an estimation of this person can handle a high amount of stress and whether he/she will accept help. If the person is used to high amounts of stress, or does

not accept help, I will continue with my own work. Because I get stress when I am behind on schedule of my own work.

- Furthermore, if I have discovered who the person is, who experiences the most stress; I will not look for the other colleague who experiences stress. It is an open environment in which these things can be discussed and we know each other well since we are a small company.
    - I would already have someone in mind, I have a colleague who experiences much stress, I often walk to her desk and check how she is doing.
        - I mostly try to make contact in a way that fits the person, in this case it will be making use of humor.

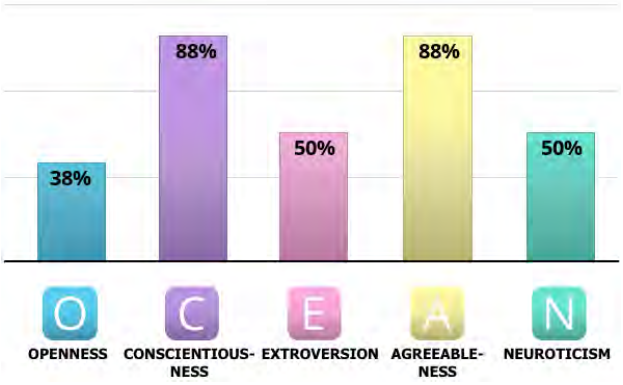
- Visual 3 | Other colleague experiences increased stress level + increased duration
    - I would try to find this colleague, talk to every colleague if this is necessary to find out. But as I mentioned, I have an idea of who it might be. I would at first check the people who have problems in their personal situation, I do this normally.
        - I would ask whether this person would be helped with taking an afternoon off or if to get (professional) help. If the problem is not in the working environment, but at home, this person will not be helped with being at home. I will ask them what I can do to make the situation better for them. I would help all colleagues in the exact same way.
            - But since I am closely connected with this specific colleague, I would say it is a give and take situation. She pays attention to me when it is necessary.

- Visual 4 | Self + Other colleague experiences increased stress level + increased duration
    - It is very hard for me, but I have to let go of some of my work and that is not a part of my character. I am currently learning about this, and receiving training for this. This training learns me to go more often to the coffee machinery or send a mail to a customer that the work cannot be finished in time.
    - But there is also this side of me which wants to work harder and harder, especially when I feel bad, I will work harder which will make me feel better.
    - I will focus more on myself in this situation, I think that that is also the best for the person who is experiencing stress (since I will not be able to give good assistance). Still I would make a talk to the stressed colleague and tell them that they can come to me when experiencing problems. I would also mention that I feel stressed to the colleagues of which I am their manager. The colleagues with whom I share a personal connection will already know about my increased stress level.
    - If a colleague would do me a offer to walk to the coffee machinery, I will accept this offer from everyone. I would also tell all of them the truth when they ask how I am doing. We value being collegial and create an open ambiance, we will

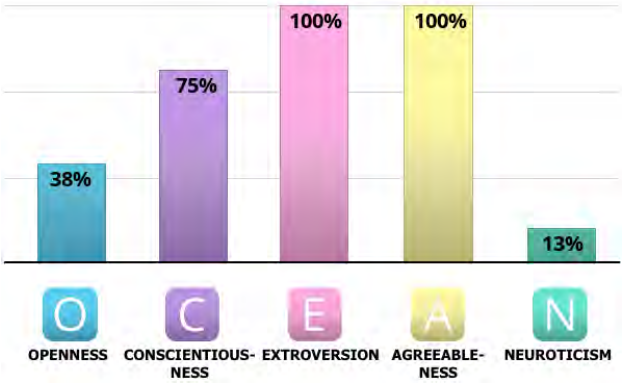
notice it when someone is not doing well. I would appreciate when colleagues ask how I am doing, but now all the time because I want to focus on my work.

- Visual 5 | Self + Other colleague experiences increased stress level + Self + increased duration
    - In this situation, I would (with my current working experience) tell the colleague I trust most and who can take tasks from me. I would first try to work harder to get the work finished, while knowing that this colleague will pay specifically attention on me. If working harder is not the solution, I will request whether I can take a few days off to get rest.
    - If this person is too stressed, I will ask another colleague who I trust much. (I have two of them). I will still also tell the stressed colleague, but in less detail, just to prevent that this person feels left out when she will her it via someone else.
- Visual 6 | Self experiences increased stress level + increased duration
    - I would look at this in the same way. The only difference will be, that I can immediately ask my preferred colleague to keep an eye on me.
    - I think I have to float outside of this visual when it comes to my mind to take a day off
        - I can manage stress fine, I am not confronted with my work. For me, it is for example my goal to satisfy angry customers, so this is my reward.
- Visual 7 | Self experiences increased stress level
    - A bit of stress is common, so I would say this is okay.
        - It is also fine if someone will ask about it. I will not give work out of my hands when experiencing a little bit of stress, even if they emphasize it I will not listen to them. Only when it is as bad as in the previous situation or worse, I will give work out of my hands.

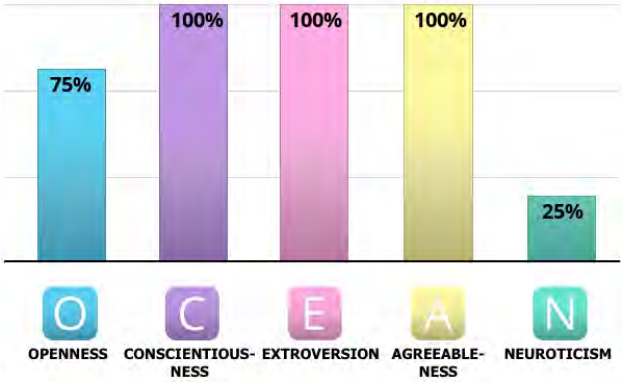
Participant 1



Participant 2



Participant 3



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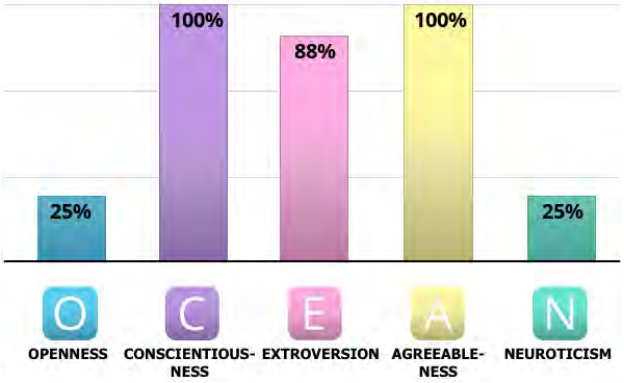
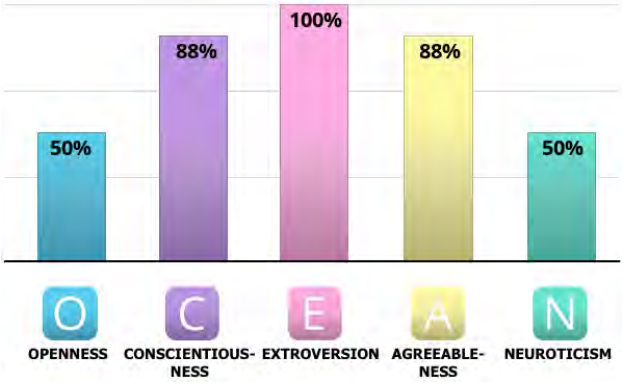
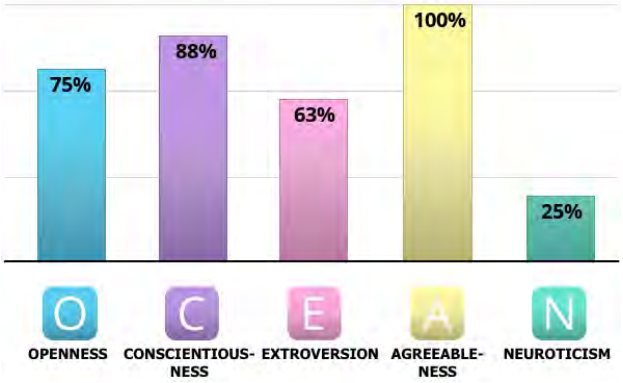


Participant 5



Participant 6



Scenario 2

Theme / Participant	Explore	Accept Assistance	Offer Assistance	Accept Break-taking	Offer Break-taking	Expect Involvement
1 (A,C)	E		A			
2 (A,B,C)	E		E	E	E	
3 (A,B,C,D)	E		A,B, (C)			
4 (A,B,C)	E		E		E	
5 (A,B,C)	E		E		E	
6 (A,B,C)	E		E		E	

Scenario 3

Theme / Participant	Explore	Accept Assistance	Offer Assistance	Accept Break-taking	Offer Break-taking	Expect Involvement
1 (A,C)	E		A			
2 (A,B,C)	E		E	E	E	E
3 (A,B,C,D)	E		A,B, (C)		A,B	A,B
4 (A,B,C)	E		E		E	
5 (A,B,C)	E		E		E	E
6 (A,B,C)	E		E		E	A

Scenario 4

Theme / Participant	Explore	Accept Assistance	Offer Assistance	Accept Break-taking	Offer Break-taking	Expect Involvement
1 (A,C)	E	A		A		
2 (A,B,C)	E	E		E		E
3 (A,B,C,D)	E	A,B	A,B	A	A,B	A,B
4 (A,B,C)	E	E		E		
5 (A,B,C)	E	E		X		E
6 (A,B,C)	E	X		E		A

Scenario 5

Theme / Participant	Explore	Accept Assistance	Offer Assistance	Accept Break-taking	Offer Break-taking	Expect Involvement
1 (A,C)	E	A		A		
2 (A,B,C)	E	E		E		E
3 (A,B,C,D)	E	A,B (C)	A,B	A (B, (C))*	A,B	A,B
4 (A,B,C)	E	E		E		
5 (A,B,C)	E	E		X		E
6 (A,B,C)	E	E		E		A

Scenario 6

Theme / Participant	Explore	Accept Assistance	Offer Assistance	Accept Break-taking	Offer Break-taking	Expect Involvement
1 (A,C)	E	A		A		
2 (A,B,C)	E	E		E		E
3 (A,B,C,D)	E	A,B (C)		A (B, (C))*		A,B
4 (A,B,C)	E	E		E		
5 (A,B,C)	E	E		X		E
6 (A,B,C)	E	E		E		A

Scenario 7

Theme / Participant	Explore	Accept Assistance	Offer Assistance	Accept Break-taking	Offer Break-taking	Expect Involvement
1 (A,C)	E			X		
2 (A,B,C)	E			E		E
3 (A,B,C,D)	E			X		
4 (A,B,C)	E	E		E		
5 (A,B,C)	E	E		X		E
6 (A,B,C)	E	X		X		

Total Result of Scenarios

Theme / Participant	Explore	Accept Assistance	Offer Assistance	Accept Break-taking	Offer Break-taking	Expect Involvement
1 (A,C)	E	A (4,5,6)	A (2,3)	A (4,5,6)*	X	X
2 (A,B,C)	E	E	E (2,3)	E	E	E
3 (A,B,C,D)	E	A,B (4,5,6) C (5,6)	A,B	A,B (4,5,6) C (5,6)*	A,B	A,B
4 (A,B,C)	E	E (4,5,6,7)	E (2,3)	E (4,5,6)	E (2,3)	X
5 (A,B,C)	E	E (4,5,6,7)	E (2,3)	X	E	E
6 (A,B,C)	E	E (5,6)	E (2,3)	X	E	A

Theme / Participant	Explore	Accept Assistance	Offer Assistance	Accept Break-taking	Offer Break-taking	Expect Involvement
1 (A,C)	E	A	A	A*	–	–
2 (A,B,C)	E	E	E	E	E	E
3 (A,B,C,D)	A,B C,D	A,B C*	A,B	A,B* C*	A,B	A,B
4 (A,B,C)	E	E	E	E	E	–
5 (A,B,C)	E	E	E	–	E	E
6 (A,B,C)	E	E	E	E	E	A

A: colleague with a personal connection

B: colleague with a normal connection

C: colleague with a distant connection

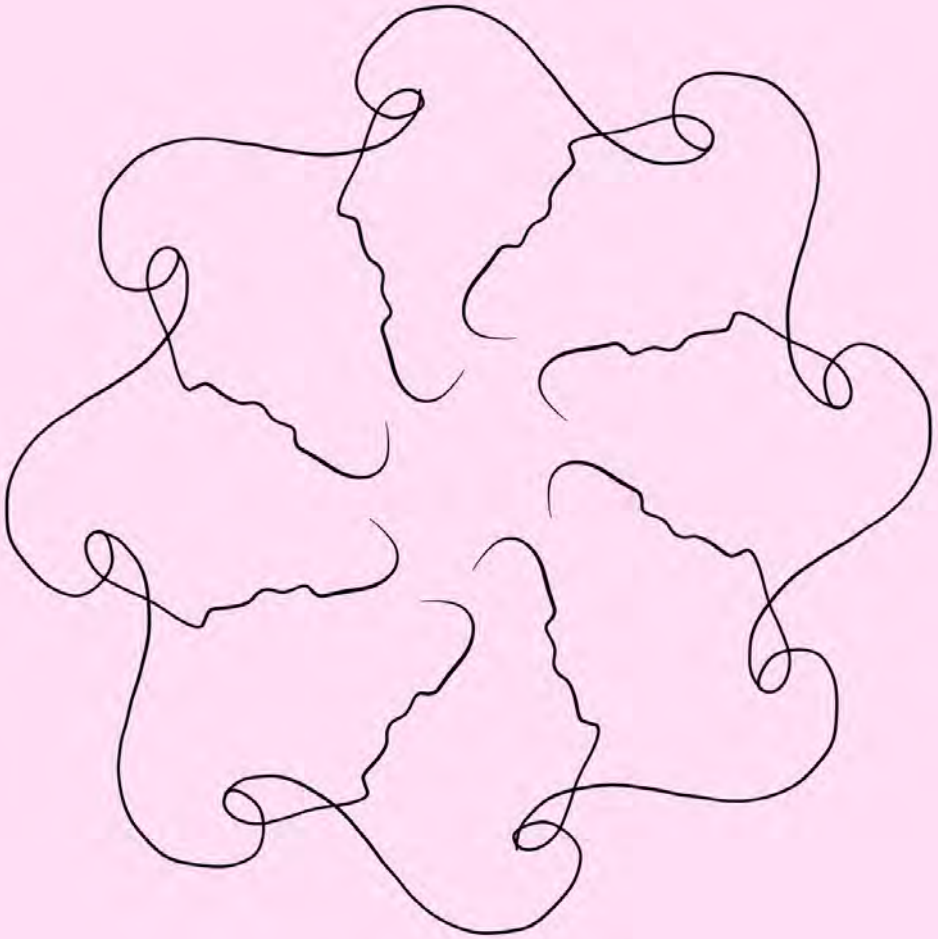
D: colleague with no/negative connection

E: all colleagues a participant has

-: rejected to all colleagues

[empty]: not discussed

Appendix E



Link to Demo-Day Page

VITALITY

VISUALIZING COLLECTIVE STRESS TO BECOME HEALTHIER TOGETHER

VISUALIZING COLLECTIVE STRESS

VIT.IN

STUDENT NAME:

DANIQUE STAPPERS

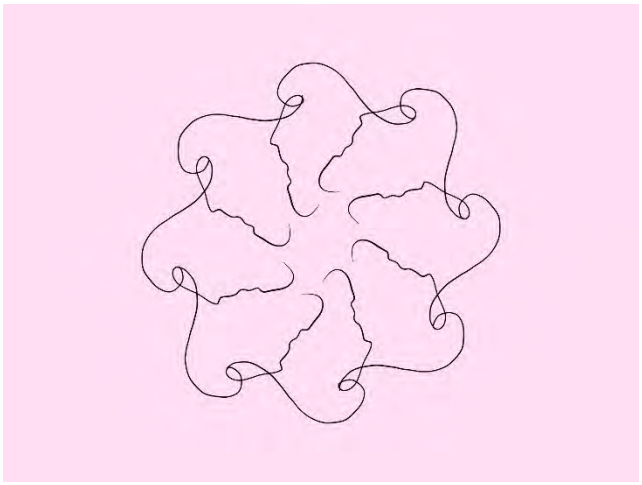
COACH:

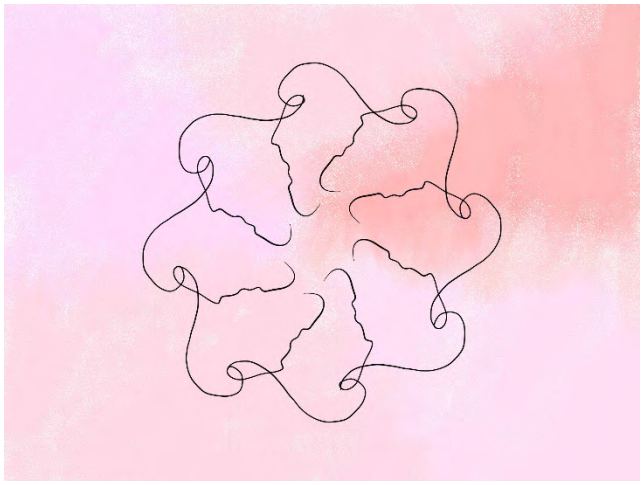
JUN HU

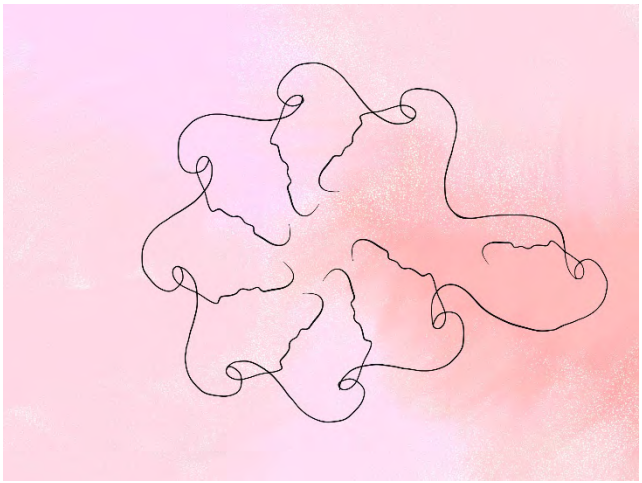
SEMESTER:

M12

Office workers face high working pressure and often spend their day sitting. These conditions affect their vitality and can lead to health problems and burnouts. VIT.IN is a dynamic painting that represents the collective stress level of employees. Based on the intensity and duration of stress, the dynamic painting will partially morph towards a more stressed or relaxed visualization. Within design research, investigating collective stress can unveil new triggers to a healthier behavior change. VIT.IN supports future studies about collective stress, aimed at encouraging healthier behavior amongst the working community.








VISUALIZING COLLECTIVE
STRESS TO BECOME HEALTHIER
TOGETHER