LESS IS MORE CREATIVITY

The possible influence of minimalist interior designs in office environments on the creativity of millennials

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Master thesis Communication Studies

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Abstract

Purpose

This study focuses on the possible influence of minimalist interior design in office environments on the creativity of (post)millennials. Research shows that due to the current social pressure through work and learning, an increasing number of people (especially millennials) prefer a simpler, minimalistic and tasteful life. Minimalism is an upcoming worldwide trend which also has an impact on the future of office interiors. As this is a new trend, only a few studies have measured the influence of the minimalist style in office environments on creativity. Therefore, this study experimentally investigates the relation between both.

Method

This study measures environmental characteristics of the trend minimalism (little or much furniture versus no or multiple of details and accessories) that will potentially influence the creative performance, mediated by mood states (positive or negative). A quantitative 2x2 research design was conducted among 145 millennial students of Universities located in The Netherlands. In order to measure the students' amount of creativity this study used two creativity tasks to measure the participants' creativity of problem solving (Guilford's Alternative Uses Task) and creating a new cooking recipe (Brager's New Recipe Task). In addition, they were also asked to fill in a questionnaire about their demographics, mood state, perception of the office environments and their knowledge about the creativity tasks.

Findings

The main effect of this study showed that the amount of details and accessories in a minimalist environment significantly influences the creative performance of participants. This is especially significant negatively in a minimalist office environment when no details or accessories are interacted with a high amount of furniture. Furthermore, the effects on the creative performance vary depending on the participants' mood state, but this is not mediated. For example, a happy, confident and enthusiastic mood, and sleep efficiency, do significantly influence the creative performance in a positive way. Finally, an extra finding showed that a higher level of education does increase the level of the participants' creative performance. Thus, this study provides practical implications for interior designers and upcoming companies to rethink the amount of furniture and accessories being used in a minimalist office environment. Especially for minimalist office environments with millennial employees.

Keywords

Office interiors, Millennials, Students, Creativity performance, Minimalistic design, Mood states, Furniture, Accessories.

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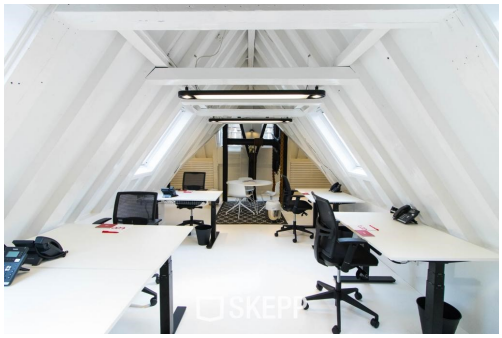
1. Introduction

Trying to get by while spending as little as possible has become the norm for a lot of young people; living a minimalist life is the new cool. Millennials, born between 1984 and 2001, are maintaining a minimalist lifestyle (Vance, 2018). This open-minded group prefers to spend their resources on experiences above spending resources on materialistic items. These people do no longer mind whether their house is spacious, convenient for transportation or reasonable residential planned. They care about how concise, lively or fashion sensed their interior design is for their own experience at home (Zhang, 2016). Recessions, struggles with finding a job and having to repay a large amount of student debt makes them choose a simpler lifestyle, because they must save for emergencies and not buy things they don't need (Vasiljeva, 2019). 78% of millennials, compared to 59% of baby boomers, "would rather pay for an experience than material goods," according to a survey from Harris Poll and Eventbrite cited on Bloomberg (2016). In addition, because of the social pressure that comes from work and studying, an increasing number of people prefer a simpler, minimalistic and tasteful life (Kuang and Zhang, 2017).

According to Vance (2018), this new style trend has a major impact on the future of design, for example on interior design. On top of that, it brings the discussion of the minimalist style in the working sector to the forefront (Forbes, 2017). Since 2016, IKEA has focused on the millennials by building minimalist designs that target their aesthetic needs (Rose, 2015). The style of a minimalist design is very unique, modern, and is mostly described as "less is more". To make characteristics of a minimalist style more complete, marketeers of Skepp (2019) ranked all Dutch trends in a blog about upcoming components that improve minimalist office designs. First, the colour white radiates peace and tranquillity and can also give a luxurious effect, so it is important to go 'back to the basis'. Second, normally dark colours are not appropriate as the basis for offices, but it can have a good function in details and accessories. Black details in a white environment exude a special luxury (figure 1; A). Third, the balance between the amount of furniture and accessories is very important: 'the less accents and elements, the better' (figure 1; B). Fourth, natural materials can add more atmosphere and warmth in a minimalist office design, by using plants, wood or bamboo (figure 1; C). Last, the use of smooth lines in furniture, the placing of furniture and lighting creates a cohesive working environment (figure 1; D).



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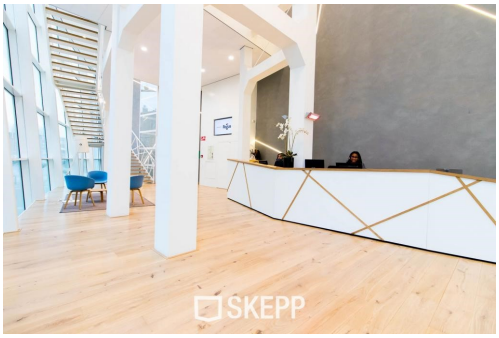

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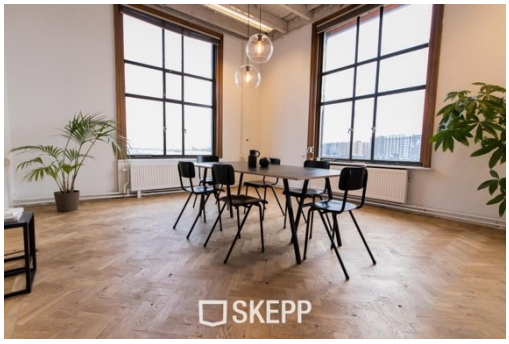

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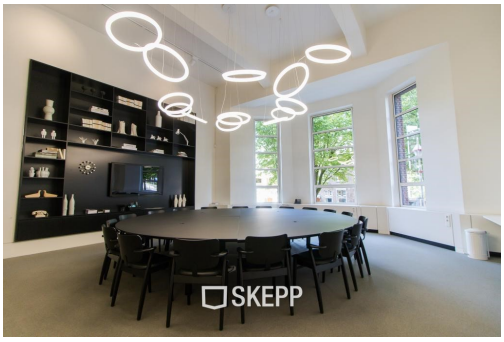

D

Figure 1: Offices with a minimalistic design (Skepp, 2019)

Only a few studies have measured the influence of the minimalistic design style in a workplace/office to the creativity of individuals. This gap in literature is noteworthy, because creative ideas can increase the innovation, growth, and societal development of organizations (Zhou & Hoever, 2014). The wellbeing of employees and success of an organization is strongly related to the created environment (Becker, 2004). So, workplace environments are continuing to evolve, because the employees' needs and work modes change. The study of Okken et al. (2013a) already concluded that spaciousness in (interview) environments stimulates the creativity of people, especially when it is combined with unpredictability. In addition, De Korte, Kuijt and Van Der Kleij (2011) detailed an experiment regarding the creativity of employees in workplaces. It proposes that the effects of an atmosphere on the creativity in meetings are mediated by the mood state of the employees. They expected with experiments that arousal mood states (excited) are more related to a greater creativity than safety mood states (relaxed). However, most of the previous studies only did examine how ambient elements in office environments, such as lighting, temperature, the number of windows, can influence persons' attitudes, behaviours, satisfaction, motivations, performance or productivity (Ajala, 2012). Therefore, this research is needed to provide a better understanding of how individuals get their inspiration to think creatively in environments with the 'less is more' style. In conclusion, with the rise of millennials in the workforce, the minimalist lifestyle will only become more prominent in business. Therefore, the research question for this study is: *To what extent can a minimalist interior in a workplace/office affect the creativity of millennials?*

2. Theoretical Framework

In this section the dependent and independent variables will be conceptualized. Based on literature research, several hypotheses are proposed and finally the research model is presented.

2.1. The grow of minimalism

In the early 1900's, Theo van Doesburg founded the movement 'minimalism' with horizontal and vertical lines in his artworks (Kangas, 2017). Doesburg's Japanese predecessor appeared around 1960 with other minimalistic paintings and sculptures (Kuang & Zhang, 2017). These artists used different kinds of methods to make the artworks richer and more artistic. The Japanese style was proposed as a design that should follow "less is more" in furniture, materials, colours and lights and would take functional objects as its key point (Kuang & Zhang, 2017). Besides, the minimalist design style has simple, functional and rational forms combined with a luxury touch (Zhang, 2016). Later, minimalism had a large impact on brands, pictures, industrial designs, products, advertisements and clothing. For example, the minimalist fashion on blogs (Karg, 2015), the product design of an iPhone or the brand logo of Google (Kangas, 2017). Google also implemented minimalism on the website by using white spaces. For example, the brand's look on the website is very simple and calm. There is no clutter to find only the brand name and search bar, so there is less work for audiences' eyes and mind. The audience can focus on the reason they are on the website: to search for something (Soegaard, 2017). Another example of white space is in advertising. It uses the technique of restricted text in combination with reduced images that highlights absence rather than presence (Margariti, Boutsouki, Hatzithomas, & Zotos, 2017). According to Sani et al. (2016), it increases the features of minimalism and removes the details that are not essential for the message. This white space technique is part of the Gestalt Theory, which predicts that empty spaces lead to the reduction of confusions (Sani et al., 2016) and allows peoples' permission to be creative with the empty spaces (Amendt-Lyon, 2001).

Because of the enormous social pressure, busy lives, learning and work, Kuang and Zhang (2017) argued that an increasing amount of people want to enjoy a simple and tasteful life with minimalism. The style minimalism in life became widely accepted and very popular, especially among post-millennials and millennials (Vance, 2018). Nowadays, this is a very important aspect for business, because millennials (born between 1984 and 2001) will dominate as the largest group of employees in the working sector (Vasiljeva, 2019). Statistics show (CBS, 2019) that in the last ten years the number of active students in The Netherlands pursuing an HBO or WO degree increased from 604.217 in 2008 to 750.505 in 2019 (CBS, 2019). It is important for companies to maintain the employees' job satisfaction and to decrease their intention to leave. A work environment that stimulates the creative performance of employees will advance their wellbeing (Shalley, Gilson, & Blum, 2000), because wellbeing of employees and success of an organization is strongly related to the created environment (Becker, 2004). So, workplace environments are continuing to evolve, because the employees' needs and work modes change. It is expected that minimalistic work environments would stimulate the creativity of people (Okken et al. (2013a), and thus increases the economy as well (Zakarish Shaheen, 2018). For instance, creativity in the workplace can be seen as a driver of innovation, growth, and societal development for organizations (Zhou & Hoever, 2014). It brings the discussion of the minimalist style in the working sector to the forefront as a worldwide phenomenon (Forbes, 2017). Nowadays, a lot of Dutch companies hire external interior stylists to redesign their workplace environments. On top of that, the trade association of Dutch architectural firms (BNA) announces every year which company has the best office (NRC, 2016). The eight nominees of 2016 all have a minimalist interior (appendix A).

2.2. Furniture in environments

Emptiness falls under the minimalism umbrella and is often used by architects and designers in order to achieve order, frugality and purity to prevent the stressful, busy and noisy outside world (Verhetsel, Pombo & Heynen, 2013). Minimalism is based on the empty Japanese traditions such as quietness, sobriety and harmony of mind, spirit and nature. Emptiness disallows a lot of signs and objects that might block the experience of the space, which are for example furniture and details/accessories. According to Zhang (2016), furniture in the minimalist interior design becomes very important, because it can avoid monotonous spaces. To achieve this, the perfect amount of furniture and the placement of it in environments is needed to create unity and integration.

Similar to emptiness, spaciousness operates in the same manner. An experiment (Stamps III, 2011) showed that environments which do not provide enough space are ambient stressors and thus can negatively affect the creative performance of a person. For instance, Imamoglu (1973) showed the effect of barricades on perceived spaciousness, based on the amount of furniture in rooms. He discovered that much furniture in an environment creates less space. Hence, an environment with much furniture, has a negative effect on the creativity performance of a person (Stamps III, 2011; Imamoglu, 1973). This is in line with a research in environmental psychology and consumer behaviour (Okken, Van Rompay & Pruyn, 2013a). They argued that spacious environments may enhance peoples' self-expression and feelings of freedom (Meyers-Levy & Zhu, 2007). This is important for developing the explorative phase of creativity processes. Hence, spaciousness stimulates the self-reported creativity and, when combined with unpredictability, it also boosts peoples' actual creativity. The studies showed that spaciousness is related to the room size, desk size (Okken, Van Rompay & Pruyn, 2013a), ceiling height and spatial proportions (Meyers-Levy & Zhu, 2007). Besides, Okken, Van Rompay & Pruyn (2013a) claimed that especially the room size influences peoples' perceived comfort, which supports peoples' creative performance (Csikszentmihalyi, 1996). Figure 2 shows a picture of a spacious office environment.

Figure 2: picture of a spacious meeting room with little furniture (Image produced by SPACES. Antwerpen, Berchem Station Post X)

However, McCoy and Evans (2002) suggested that the presence of furniture stimulates the creation for getting new ideas. Especially when furniture is labelled as 'crazy' (Van Dijk, 2014), because weird designed furniture plays with the mind of people and it triggers them to come up with other 'crazy' thoughts. Van Dijk (2014) finds it an important factor when creating creative workspaces, because it enhances peoples' creativity. This contradicts the statements of Imamoglu (1973), Okken et al. (2013a) and Meyers-Levy and Zhu (2007). On the other hand, McCoy

and Evans (2002) argued that to crowded spaces with furniture may reduce peoples' privacy and concentration. To conclude, we state:

Hypothesis 1a*: Little furniture in workplace environments will increase the creative performance of people*

Hypothesis 1b*: Much furniture in workplace environments will decrease the creative performance of people.*

2.3. Details and accessories in environments

Another term often used with minimalism is simplicity (Chen, 2015). It emphasises the avoidance of useless details in the interior design to safeguard the hierarchy, integrity, fluency and naturalness indoors. The definition of simplicity is not simple; it is a 'perfect combination of excellent quality of furniture and materials. It forms a natural and unified aesthetic feeling in a minimalist environment. Zhang (2016) gave the advice to storage unnecessary accessories inside furniture, for example a closet. To some extent, people feel more relaxed, calm and peaceful when furniture becomes more prominent in an environment, compared to the accessories. It leads people in busy everyday life to find a more relaxed and free visual space. The goal is to make this working environment look simple and meaningful. A designed library is a good example of an office environment with a lot of open storage, in this case open bookshelves, large format drawers, and wall mounted hook storage. Figure 3 shows a picture of a designed library, created by Leodon (2015). According to Reiter-Palmon and Illies (2004), gathering information in a work environment helps to increase the creation of new ideas, for example the availability of books, a computer on the desk or walls painted in dry erase paint to share creative ideas (figure 4) (Leadon, 2015). Although, Zhang (2016) also argued that a small number of accessories can play a necessary role in the finishing touch of a furnished room. For example, a soft textured curtain or carpet can increase the sense and affinity of a room and make it more convenient. In addition, paintings placed in the same environment with a different style individually, makes every room harmonious. Overall, a harmonious and meaningful office environment can help people to become more creative (Csikszentmihalyi, 1996, p. 146).

Figure 3: View of a design library with a worktable (Image produced by Leadon, 2015)

Figure 4: Picture of a meeting room with dry erase paint (Image produced by SPACES. Amsterdam, Zuidas)

Also, visual details and accessories, wood grain textures, and natural views are potentially perceived to increase people's creative process (McCoy and Evans, 2002). For example, viewing pictures, posters or videos of natural surroundings in a room (Keniger, Gaston, Irvine & Fuller, 2013) reduces stress (Beukeboom, Langeveld & Tanja-Dijkstra, 2012) and enhances the cognitive performance of people (Berman, Jonides & Kaplan, 2008). In line with this finding, Beukeboom et al. (2012) showed that patients in a hospital waiting rooms experience less stress when exposed to real plants or posters of plants, compared to no visualisations of natural surroundings in the waiting room. The study of Van Rompay and Jol (2016) proposed that these visualisations of natural surroundings do also inspire and stimulate peoples' creative performance. In general, Amabile (1996, p.222) stated that "Stimuli present in the immediate environment can, conceivably, influence an individual's performance on a creativity task". These elements could be perceived as stimulation for the creativity process. Apparently, the influence of the physical elements on creativity can vary by the type of career (Brewer, 2019). For example, 43% of office employees prefer a quiet office for idea-generation. Also, 46% of designers said that a quiet environment would increase their creativity, versus 8% of designers who prefer a noisy environment with music. Because of these findings, we state:

Hypothesis 2a*: No visual details and accessories in an office environment will decrease the creative performance of people.*

Hypothesis 2b*: Multiple visual details and accessories in an office environment will increase the creative performance of people.*

2.4. Characteristics of minimalism

The minimalist design is known for the 'less is more' style. To accomplish this, designers mostly use the geometric dot, line and plane in their design. The style is smooth, transparent, elegant and fashion designed (Zhang, 2016). The analysing method of Kuang and Zhang (2016) showed that the shapes of a minimalist style are often hard lined, simple and clear. In addition, the colours are very simple, grey, white or black, matching with a few bright or natural colours. It can create more relaxed, calm and peaceful environments for modern people (Zhang, 2016). According to Kwallek & Lewis (1990) a white office is perceived as less distracting than a red office. For example, when performing a high-demanding task in a white office environment, the performance might increase (Stone,

2003). Next, wood and leather are the basic materials of minimalist furniture. These natural materials might affect peoples' mood and creativity (Ceylan, Dul & Aytac, 2008). Ridoutt et al. (2002b) expect that people who work in office environments with wood are associated with professionalism, success, honesty, caring, and creativity. According to the study of Chen (2015), it is possible to also use new materials of the modern industry: aluminium, carbon fibre, plastics, high density glass, etc. These manufactured materials will probably not affect peoples' mood and creativity, compared to natural materials (Ceylan, Dul & Aytac, 2008).

2.5. Measurement of creativity

The study of Feist (1998) defined creativity in general as "the uniqueness and originality of a person's ideas and behaviours of what makes a person unique from others" (p. 290). According to Amabile (1998) "we tend to associate creativity with the arts and to think of it as the expression of highly original ideas" (p. 78). People believe that creativity is a spiritual process, such as love, and thus cannot be measured easily by psychologists (Sternberg, 1999). It is difficult for individuals to view themselves as creative, because the quality of creative ideas differs per person (Egan, 2005).

Therefore, each of the following studies have indicated a different aspect for which they claim is the most contributing factor for creativity. First, important psychology researchers, Freud and Fliess (1957), stated that creativity is potentially strongly connected to time, experience, emotion, pleasure and motivation. In this study, it is expected that millennials would be motivated to work in a minimalistic designed environment and experience it as beneficiary, because the style is simple, minimal and tasteful (Kuang and Zhang, 2017). Later, Freud (2001) described that, through his investigations, creativity is not a personal quality but rather the result of circumstances. Second, Wade and Tavris (2008) have found that a high Intelligent Quotient (IQ) on its own does not guarantee a high level of creativity; however, a certain level of IQ is necessary. Third, Guilford (1968) also investigated the processes of creativity through investigating divergent and convergent thinking. His Guilford's Alternative Uses Task showed that divergent thinking can stimulate the creativity and problem-solving process. Fourth, Csikszentmihalyi (1996) described that the level of creativity depends on the combination of the environment and the determination of a person, because stimulating an environment can create new ideas and innovation. On the other hand, Amabile (1998) was confident about the fact that creativity is based on three components: talent, the knowledge of a person and his/her technical skills to solve the task (expertise), how flexible people approach problems (creative thinking skills) and a person's inner passion to solve a problem (motivation). The third component 'motivation' can probably be influenced the most by the work environment, which will be in this study a minimalistic environment. Therefore, Amabile (1996, p. 249) stated that "physical environments that are engineered to be cognitively and perceptually stimulating can enhance creativity." All three elements are crucial; the greater the areas of overlap between expertise, creative-thinking skills and motivation, the greater the amount of creativity (Amabile, 1983).

2.6. Creative moments during the day

Different variables during the day can influence the level of creativity per person. For example, a diary study of Binnewies and Wörnlein (2011) predicted that when employees are feeling active and enthusiastic in the morning, they are more creative during the day. On the other hand, the problem-solving study of Mareike, Wieth, Rose and Zacks (2011) state the opposite. Participants of the study had to tackle problem-solving tasks at different moments of the day. The participants who identified themselves as a morning person performed better on problem-solving tasks in the evening and night owls perform better at moments earlier in the day. This indicates that the moment of your highest creativity level does not always depend on whether you are a night owl or morning person. Moreover, the survey of Brewer (2019) investigated that 11:05am is the average time for optimum creativity, thus the time when people feel most creative. Apparently, this can vary by the type of career; designers have their best creative moments at 10:16am, architects get their creative ideas earlier at 10:06am, and artists take a little longer to warm up, performing best at 11:46am. This means that people's level of creativity is the highest before noon. Next, if a person is long or frequently awakened in his sleep it can hinder the moments of being creative negatively. Weinberger et al. (2018) predicts that within-person variability in people's day-by-day sleep efficiency affects creativity during the day. Factors such as stress are known to influence people's sleep and wake cycle on a daily basis (Weinberger, Wach, Stephan & Wegge, 2018). Millenials and other generations that work or study do all experience stress and interrupted sleep during the week. This can be caused by external factors (William, Shiel Jr, 2018), for example deadlines.

2.7. Mediation by mood states

The study of Korte, Kuijt and Van Der Kleij (2011) proposed that the effects of a physical space on creativity is mediated by the mood state of a person (the excited and relaxed state). This is in line with the study of Ceylan, Dul and Aytac (2008), who prove that particular characteristics of a work environment can influence creativity directly or indirectly via mood state, such as indoor plants, windows, colours, light, effects, materials and spatial arrangements. Also, the study of Shibata and Suzuki (2002) confirmed that plants in the workplace may have a supportive role of inspiration for creative tasks. According to Stone and Irvine (1994), the presence of windows may have similar effects as plants; people who work in rooms with a window will have a more positive perception regarding creative tasks. Küller et al. (2006) supports this view. He showed the positive influence of physical work environments, such as colours, plants and window views, on peoples' mood. According to these findings, we state:

Hypothesis 3: *The effects of a physical space on creativity is mediated by the mood state of a person.*

Mood states are negative or positive. Both mood states can potentially influence the creative performance in important and different ways (George & Zhou, 2007). First, the positive mood state, which can be 'happy', 'relaxed', 'calm' or 'relieved'. It is expected that people who have a positive mood have richer associations with existing knowledge and are likely to be more flexible, original and creative (Lin & Chang, 2020). The experimental study of Baas et al. (2008) observed participants completing creative tasks following the induction of happy moods. The meta-analysis shows that a happy mood is related to an enhanced creative performance. This mood state (happiness) is the most crucial predictor of creativity (Baas et al., 2008). On the other hand, Baas et al. (2008) and Baas (2019) stated that people's creativity is largely unaffected by relaxed, calm, or relieved mood states. Second, the negative mood state, which can be 'sadness' or 'depressed'. The meta-analysis of Baas et al (2008) shows that sadness or troubled mood is not associated with more or less creativity. These results of Baas et al (2008) and Baas

(2019) are not in line with the study of George and Zhou (2002). They hypothesized and identified that negative mood states are positively related to the creative performance of individuals. Also, George and Zhou (2002) claimed, indeed, that people with negative moods are more critical and discerning, which can lead to produce more useful ideas. Because of these findings, we state the following hypotheses:

Hypothesis 4: *A happy mood state is positively related to the creative performance of people.*

Hypothesis 5a: *Positive moods states are positively related to the creative performance.*

Hypothesis 5b: *Negative moods states are positively related to the creative performance*

2.8. Conceptual model

All hypotheses presented in the theoretical framework predict the outcome of this experimental study. The independent variables of the study are the 'amount of minimalistic furniture', and the 'amount of minimalistic details and accessories' placed in a 2x2 designed office environment. It is hypothesised that these independent variables influence the creative performance of millennials, mediated by a negative or positive mood state. Figure 5 shows a conceptual model of the main research question, which is: *To what extent can a minimalist interior in a workplace/office affect the creativity of students?*

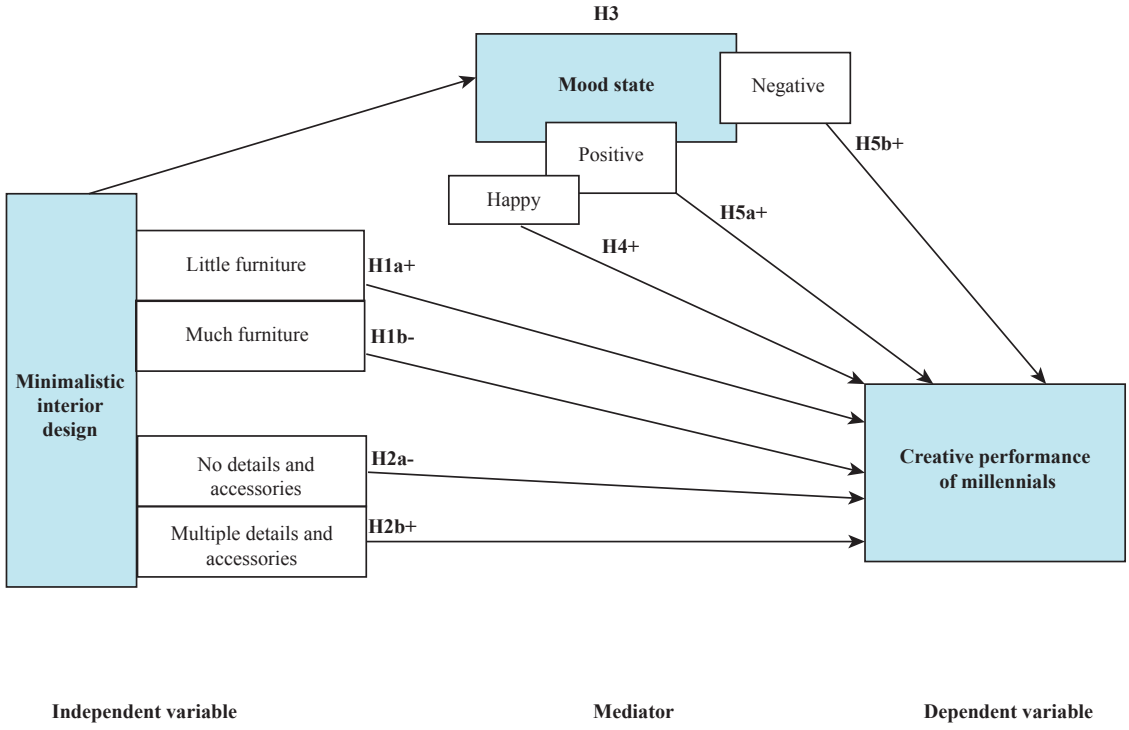

Figure 5: Conceptual model of this research

3. Research Design and Method

This study has a quantitative approach, consists of primary data and answers the research question: *To what extent can a minimalist interior in a workplace/office affect the creativity of students?* The paper will present an experimental analysis of four office environments at the University of Twente (UT) with different minimalistic interiors, divided into a 2x2 design. The aim is to understand the possible influence of a minimalistic office interior (independent variable) on the creativity level (dependent variable) of students. In addition, the mood state (excited/positive, relaxed or negative) of a student can function as a mediator. The experiment is performed during twelve working days in January of 2020.

3.1. Pre-test

Before designing the creative task of the experiment, an anonymous pre-test with a survey was conducted among 42 sampled students at Universities located in Enschede. The aim of this survey was to measure the students' most and least important categories of creativity. The results were used to choose the creative task which will be performed during the experiment phase. Respondents had to fill in four demographic questions about their gender, age, education faculty and level of education. After that, the respondents had to select their creative outlet(s). The creative outlets were divided in 11 categories; writing, drawing/painting, problem solving, cooking, music, photography, construction, communication, studying, designing and other. A Crosstab Analysis in SPSS calculated that the category 'problem solving' was frequently chosen as a creative outlet among male students (78 %) and the category 'cooking' was frequently chosen as a creative outlet among female students (75%). In addition, 'problem solving' and 'cooking' were also equally divided between the faculties of education. Therefore, these categories were chosen to be measured during the experiment with the Guilford's Alternative Uses Task and the Brager's New Recipe Task.

Appendix B shows the complete online survey of the pre-test. Based on the results of this pre-test, all 42 respondents were post-millennials (n=17) or millennials (n=25), male (n=14) or female (n=28), and followed a study at a faculty of education: Behavioural, Management and Social Sciences (n=19), Engineering Technology (n=6), Electrical Engineering, Mathematics and Computer Science (n=3), Science and Technology (n=14) and Geo-Information Science and Earth Observation (n=0). These outcomes of this pre-test were approximately equal to the demographic answers of the participants during the experiment. Most of the students came from the faculty Behavioural, Management and Social Sciences, because the experiment was conducted in the building Cubicus of the University of Twente. In addition, all students of the SONA System who participated in the experiment follow a study in the University building 'Cubicus' and received credits by participating in the study. This building is part of the BMS faculty where a larger group of students are female instead of male.

3.2. Procedure

All participants got a number (1, 2, 6 or 7) and were seated in front of a computer monitor inside an office environment (one of the four conditions). They had to select the language of the experiment (English or Dutch) and fill out demographic questions about their age, gender, faculty of education and level of education. See appendix C for the complete questionnaire. After the demographic questions, the participants were asked to take 30 seconds to look around in the office environment. After that, the participants had to evaluate their mood state,

and their perception of the office environment on a seven-point scale questionnaire. Last, they had to fill in their level of motivation to participate in the experiment. After the evaluation, they got an instruction for both of the creative tasks, the Guilford's Alternative Uses Task and the Brager's New Recipe Task:

1. Participants had to solve a problem during the first creative task. They were asked to complete the most popular solving task of Guilford's Alternative Uses Task (Guilford et al., 1978), which is to list as many possible uses for a brick in three minutes. Participants were given the following instructions: 'I would like you to list as many different uses as you can think of for a brick. Please write down as many uses as you can in three minutes. It is always possible to click on the button 'next' when you are out of thoughts'. They only got extra information about how the brick normally is used, but they had to try and produce as many possible uses that are different from the brick's normal use.

2. During the second task, participants had to be creative in creating a new recipe with three suggested ingredients (Brager's New Recipe Task). This creative task was reported by the author of this study, and thus was not tested on validity in previous studies. Participants were asked to make an original recipe in 6 minutes for four students with the ingredients 'eggs', 'carrots' and 'tomatoes' and 15 euros for buying other ingredients. These ingredients were chosen because of the fact that every participant, vegetarian or not, or international or not, could make an original recipe out of it. Participants were given the following instructions: 'I would like you to make a recipe for yourself and three other students (4 persons in total) with the ingredients two eggs, two carrots and two tomatoes. Besides that, you get 15 euros to buy other ingredients in the supermarket to make your recipe complete. Please, list all the ingredients you need besides the given ingredients (eggs, carrots and tomatoes), give an original name to your recipe and list the kitchen appliances you need. It is always possible to click on the button 'next' when you are out of thoughts'.

The participants had 10 minutes to perform the tasks, which is plenty of time, so participants were not affected by time pressure. After the creative tasks, the participants had to provide answers about having prior knowledge about the tasks they did. As a reward for their participation, all respondents got a Milka chocolate bar of choice after finishing the experiment.

3.3. Participants

A total group of 145 students (42 male, 101 female and 1 other) participated in the experiment during the twelve working days in January of 2020. All students were signed in via the BMS SONA System (59,3%) or were personally chosen (40,7%), based on their study and gender. Participants were recruited by approaching them via the social media channel Whatsapp with the request to participate in a study on their creativity in an office environment. All respondents were students enrolled in graduate programs of Dutch Universities and Colleges. Before entering an experimental office environment, participants had to register themselves via SONA Systems or an online date planner to select the timeslot to participate (between 10:00 and 16:00). A maximum of four students could sign in for each 30-minute time slot. 145 students participated in the experiment, and 144 answers of the obtained data could be used for this study. It is clear to see that the biggest group of participants (66%) is studying at the faculty Behavioural, Management and Social Sciences (n = 95). Finally, 74 students preferred English (51,4%) and 70 students preferred Dutch (48,6%) as the language for the experiment.

Participants (N = 144) were all tested individually in one of the offices and were divided randomly, except from the variable gender, see table 1. The total group of participants was almost equally divided into the four conditions: office 1 (n = 37), office 2 (n = 34), office 6 (n = 37) and office 7 (n = 36). Gender was also equally divided into the four conditions: 11 students out of 37 were male and participated in office 1 (29,7%), 10 students out of 34 were male and participated in office 2 (29,4%) and one student selected 'other' as gender (2,9%), 11 students out of 37 were male and participated in office 6 (29,7%), and 10 students out of 36 were male and participated in office 7 (27,8%). Also, the generations were equally divided to office 1 (post-millennial = 78,4%, millennial = 21,6%), office 2 (post-millennial = 85,3%, millennial = 14,7%), office 6 (post-millennial = 75,7%, millennial = 24,3%) and office 7 (post-millennial = 77,8%, millennial = 22,2%). Lastly, the level of education was not perfect equally divided between the four conditions.

Table 1: Crosstabulation of gender, age and level of education divided by office

Crosstabulation			**Office number**				**Total participants**
			1	**2**	**6**	**7**	
Gender	**Female**	Count	26	23	26	26	101
		Percentage	25,7%	22,8%	25,7%	25,7%	100%
	Male	Count	11	10	11	10	42
		Percentage	26,2%	23,8%	26,2%	23,8%	100%
	Other	Count	0	1	0	0	1
		Percentage	0,0%	100%	0,0%	0,0%	100%
Age	**Post millennials (born > 1996)**	Count	29	29	28	28	114
		Percentage	25,4%	25,4%	24,6%	24,6%	100,0%
	Millennials (born 1984 – 1996)	Count	8	5	9	8	30
		Percentage	26,7%	16,7%	30,0%	26,7%	100,0%
Level of education	**MBO**	Count	5	9	4	3	21
		Percentage	23,8%	42,9%	19,0%	14,3%	100%
	HBO	Count	8	12	11	12	43
		Percentage	18,6%	27,9%	25,6%	27,9%	100%
	WO Bachelor	Count	18	10	16	17	61
		Percentage	29,5%	16,4%	26,2%	27,9%	100%
	WO Master	Count	6	3	6	4	19
		Percentage	31,6%	15,8%	31,6%	21,1%	100%
Total participants		Count	37	34	37	36	144
		Percentage	25,7%	23,6%	25,7%	25,0%	100,0%

3.5. Materials

The 2x2 experiment was performed at four self-designed flexperiment offices of the BMS LAB (office 1, 2, 6 and 7) at the building Cubicus (University of Twente). The four offices had the same basis, size (2,5 meters by 2 meter), two windows, one heater and the walls were white with black coloured window frames. The curtains of the windows were open during the experiment sessions, because, according to Tennessen and Cimprich (1995), participants will perform better on attention-demanding tests when rooms have a natural view. Offices 1 and 2 of the BMS LAB had a natural view with trees and grass, while offices 6 and 7 had a view of the patio. Therefore, the offices' furniture and accessories had to switch after the 70th participant, to make the window view different per office. In addition, the two different coloured coat racks also switched rooms. The only item that stayed in the office environments was the Windows computer monitor. This computer was used during the experiment sessions to give answers to the questions of the survey and to follow the steps of the creative tasks.

The company Kato Projecten in Enschede leased the office furniture for all four office environments. They furnished all offices based on literature in the Theoretical Framework (see table 2); Kuang and Zhang (2017), Chen (2015), Zhang (2016), the environmental characteristic "spatial complexity" of McCoy and Evans (2002), and the component no versus multiple details and elements of Skepp (2019). In addition, all the office details and accessories were bought at IKEA and Flying Tiger and were also selected based on literature in the Theoretical Framework (see table 3). The furniture and accessories were needed to create a 2x2 design:

- Office 1 was designed with all elements of the furniture and accessories list.
- Office 2 was designed with only all elements of the furniture list.
- Office 6 was designed with only all elements of the accessories list.
- Office 7 was designed with no elements of the furniture and accessories list.

Figures 6, 7, 8 and 9 show a map of the four offices with pictures of the furniture and accessories used during the experimental sessions. Figures 10, 11, 12 and 13 show pictures of the furnished experimental environments participants worked in.

Table 2: Table of furniture used in the experiment

Furniture	**Characteristics of minimalism**
Computer monitor	Grey, Black
Desk	Wooden, Steel
Chair	White, Black, Transparent, Soft material, No pattern
Coat rack	Wood/Black, Hard lined, Simple
Visitors chair	Black, Aluminium, Soft material, No pattern
Carpet	Grey, Soft material, No pattern
Garbage can	Black, Round lined, Simple, Steel, Clear
Ottoman	Leather, Steel, Black, Cognac coloured

Table 3: Table of accessories and details used in the experiment

Details and accessories	**Characteristics of minimalism**
Artist figure ‘Gestalta’ from IKEA	Wood, Simple, Clear
Two vases ‘Glittrig’ from IKEA	Black, White, Simple, Clear
Three candle holders ‘Fulltalig’ from IKEA	Black, Steel, Simple, Clear
Table lamp ‘Fado’ from IKEA	Glass, Transparent, Grey, Round lined
Pen holder ‘Dokument’ from IKEA	Grey, Aluminium, Transparent
Poster ‘Cactus’	Black, White, Round lined, Simple
Poster of a minimalistic building	White, Grey, Hard lined, Simple
Stapler ‘Flying Tiger’	Black, Simple, Clear
Tape roller ‘Flying Tiger’	Black, Simple, Clear
Three pens ‘Flying Tiger’	Black, Simple, Clear

Figure 6: Map of office 1 - Furniture with accessories

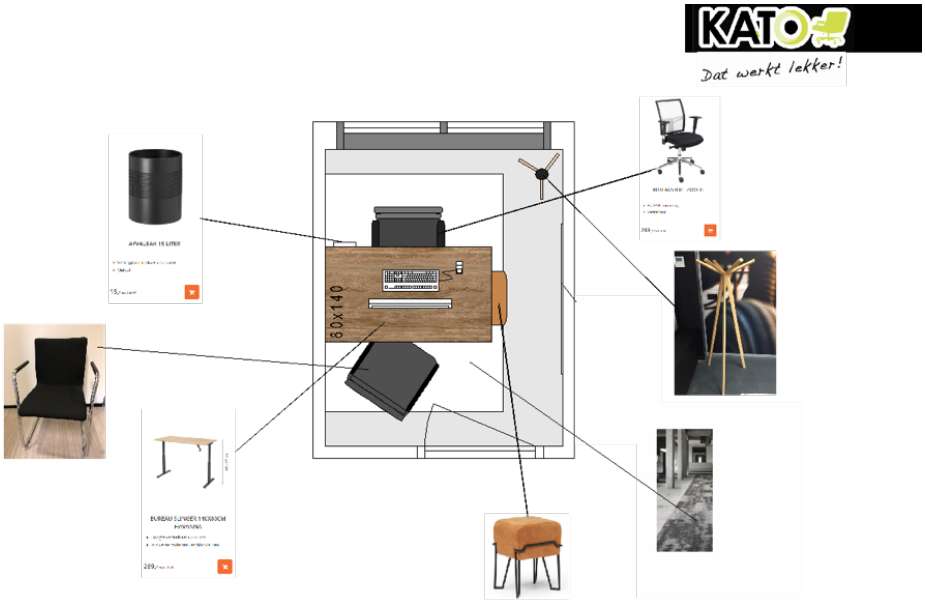

Figure 7: Map of office 2 - Furniture with no accessories

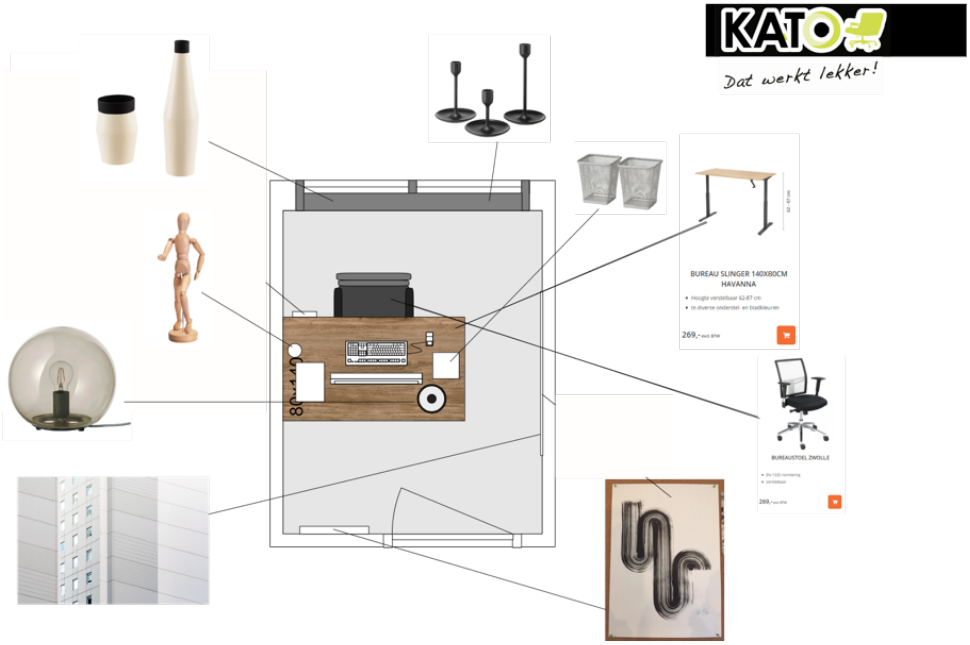

Figure 8: Map of office 6 - Little furniture with accessories

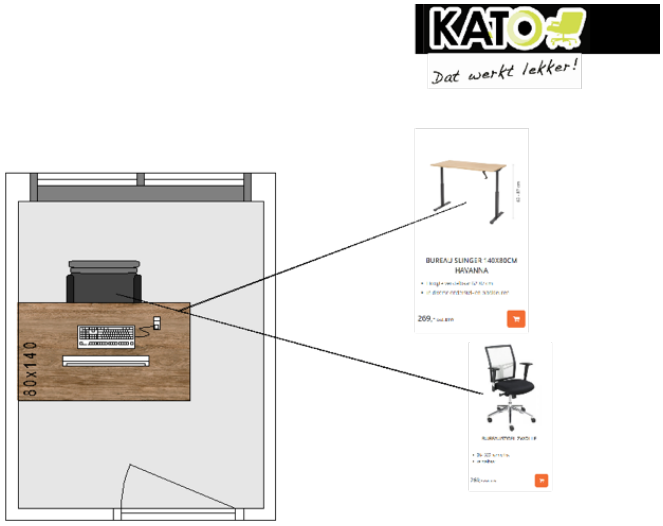

Figure 9: Map of office 7 - Little furniture with no accessories

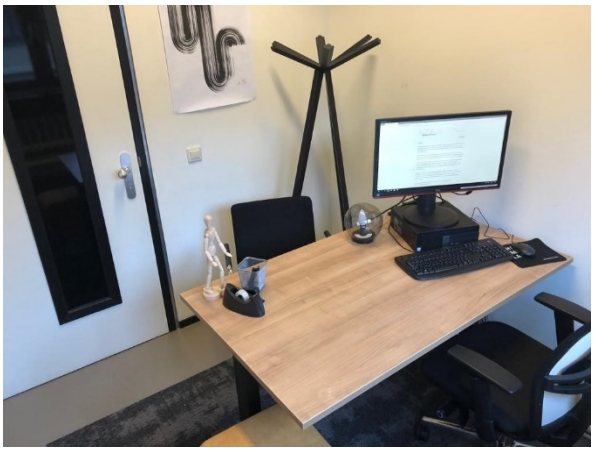

Figure 10: Office 1 - Furniture with accessories

Figure 11: Office 2 - Furniture with no accessories

Figure 12: Office 6 - Little furniture with accessories

Figure 13: Office 7 - Little furniture with no accessories

3.7. Measures

This chapter gives an overview of the questionnaires' structure and the measurement of the creativity tasks being used during the experiment. Two researchers scored the outcomes of the tasks independently to make the results more valid.

Questionnaire

The experiment had three questionnaires (plus the questionnaire of the pre-test), two before the creative tasks and one after. The questionnaires before the tasks had demographic open questions and seven-point-scale questions about the participant's mood state and the perception of the room. See appendix C for the complete questionnaire. First, the demographic questionnaire had questions about the number they received before entering the office, gender, age, type of study and the level of education. Second, the questionnaire assessed the participants' feelings regarding the task environment by fifteen terms: sober, energetic, distracting, spacious, minimalistic, tense, bright, tranquil, empty, noisy, gloomy, crowded, concentrating, small and busy. These statement seven-point scale questions were similar to the experiment of Shibata and Suzuki (2004) (1 (*strongly disagree*) to 7 (*strongly agree*). The terms 'minimalistic', 'gloomy' and 'busy' were added to this questionnaire to measure the participants' consciousness about the independent variable of this study. In addition, these extra variables were needed to create five constructs of all perceptions to make the collected data more valid. After filling in their perception of the office environment, the participants were asked to give their opinion about the style and amount of the furniture and accessories. Third, to assess the participants' mood state, a questionnaire with a seven-point scale was used, which is also similar to the experiment of Shibata and Suzuki (2004): 1 (*strongly disagree*) to 7 (*strongly agree*). The questionnaire had fifteen mood terms included in the questions: happy, tired, calm, confident, tense, concentrated, sad, at-ease, energized, distracted, sleepy, insecure, hopeful, focussed and enthusiastic. The variables 'sad', 'sleepy', 'insecure', 'hopeful', 'focussed' and 'enthusiastic' were added to the questionnaire, because, it is possible that people can have the feeling of being stressed and not focussed at the time of the experiment. In addition, these extra variables were needed to create five constructs of all mood states to make the collected data more valid. After filling in the mood states, participants were asked to fill in one extra seven-point scale question: 'Are you excited to participate in this experiment?'. This last question measured the students' motivation to participate. Last, the questionnaire after the two creative tasks, was about the participants' prior knowledge about the Guilford's Alternative Uses and Brager's New Recipe Tasks.

Guilford's Alternative Uses Task

The first creative task 'problem solving' was done in earlier studies and is officially called Guilford's Alternative Uses Task (Guilford et al., 1978). This study used a brick as the subject and a scoring form for grading the answers (table 4). The decision on what was a good use for a brick was based on the function for which the object was originally designed. For example, the brick was designed for construction so the answer 'building a wall' for the brick was not rated as a point. For each other different response a point was given (fluency). Besides that, it was possible to earn extra points per answer. First, multiple similar responses in the same category were combined and given just an extra single point per category (flexibility). For example, 'building a fireplace' and 'building a wall' fall into the category 'building construction', so would be assigned only one point. An answer could get two extra points if it was described in more detail (elaboration). For example, 'a doorstop' got no points for elaboration, whereas 'a doorstop to prevent a door slamming shut in a strong wind' got two extra points. It had one point for explanation of door slamming and a second point for further detail about the wind. Third, each response was

compared to the total amount of responses from all participants (originality). Responses that were given between only 1% to 5% of the group were unusual and got one extra point. Responses that were given by less than 1% of the group were unique and got two points. The total points of the four criteria were summed up to test a single total score for each participant for the category 'problem solving' (see the scoring form of table 4).

Table 4: Problem solving scoring form

Problem solving score	**Number of points**
Originality	Each response compared to the total amount of responses from all of the people you gave the test to (responses that were given between 1% to 5% of the group = 1 point, responses that were given by less than 1% of the group = 2 points)
Fluency	Total uses for a brick, by adding up all the responses.
Flexibility	Number of different categories (extra point per category)
Elaboration	Amount of detail per use for a brick. (explanation plus further detail = 2 points)

Brager's New Recipe Task

The second creative task 'Brager's New Recipe task' has not been carried out yet in other studies. The researcher of this study created the task and scoring form based on the valid scoring form of the 'problem solving' task (table 5). During the creative task, participants had to make an original recipe by listing ingredients and kitchen appliances that were needed to make their recipe complete. Besides, they also had to mention the name of the recipe. For example, a participant could list a red pepper, salmon, onions and spinach next to the other ingredients to make a 'superior salmon'. The participant would probably need a whisk, a baking pan and cup to make the dish. For each extra ingredient a point was awarded (fluency[1]). It was also possible to get extra points per answer. First, multiple similar responses in the same food group were combined and given just one extra single point per category (flexibility[1]). For example, 'red pepper' and 'spinach' fall into the food group of fruit and vegetables, so would be assigned as only one point. Second, an ingredient could get two extra points if it was described more in detail (elaboration). For example, 'salmon' got no points for elaboration, whereas 'smoke the salmon to give more flavour to the dish' got two extra points. Third, each response was compared to the total amount of responses from all participants (originality). Responses that were given between only 1% to 5% of the group were unusual and got one extra point. Responses that were given by less than 1% of the group were unique and got two points.

The answers of the kitchen appliances were scored almost the same (table 5). First, each kitchen appliance was given a point (fluency[2]). Second, multiple similar responses in the same kitchen category were combined and given just one extra single point per category (flexibility[2]). The kitchen categories were tableware, ingredient containers, electrical kitchen equipment, heat sources, pans and pots, heat resistant moulds and dishes, kitchen utensils and other. For example, 'whisk' and 'serving spoon' fall into the category kitchen utensils, so would be assigned as only one point. Second, a kitchen appliance could get two extra points if it was described more in detail (elaboration). For example, 'whisk' got no points for elaboration, whereas 'whisk to mix all the eggs with the spinach' got two extra points. Third, each response was compared to the total amount of responses from all participants (originality). Responses that were given between only 1% to 5% of the group were unusual and got one extra point. Responses that were given by less than 1% of the group were unique and got two points.

Lastly, the name of the recipe had two other scoring elements (table 5). First, existing recipe names or a combination of existing recipe names got a negative point. A joke or alliteration in the recipe name was given two extra points (creativity). For example, 'superior salmon' has an alliteration, so would be assigned as two points. Second, mentions of the participant's own name, the name of a country or the given ingredients, were not given a point (quality). Whereas, other examples for a recipe name were given two extra points. For example, 'superior salmon' has the ingredient salmon in the name, so this name would not be assigned with points. The total points of the criteria were summed up to test a single total score for each participant for the category 'recipe' (table 4).

Table 5: Cooking recipe scoring form

Cooking recipe score	**Number of points**
Originality	Each response compared to the total amount of responses from all of the people you gave the test to (responses that were given between 1% to 5% of the group = 1 point, responses that were given by less than 1% of the group = 2 points)
Fluency	1. Total number of ingredients for the recipe, by adding up all of the responses. 2. Total number of kitchen appliances for the recipe, by adding up all of the responses.
Flexibility	1. Number of different food groups (extra point per food group). 2. Number of different kitchen categories (extra point per category)
Elaboration	Amount of detail per ingredient/kitchen appliances. (explanation plus further detail = 2 points)
Creativity	Existing recipe or combination of recipes = -1 point, Joke = 2 points, Alliteration = 2 points.
Quality	Own name, the name of a country, names of the given ingredients = 0 points. Other = 2 points.

3.9. Data analysis

Only 139 responses of the total of 145 students who participated in the study, were left for data analysis (95,86%). This is because the Guilford's Alternative Uses Task that measured the problem-solving creativity of participants, had 3 dropouts out of 144 responses. These dropouts were not selected for data analysis on problem-solving, because the responses were not in line with the question of the Guilford's Alternative Uses Task. It is expected that these three participants thought to list as many different uses instead of a brick. They answered, for example, 'wood', 'glass' or 'marble'. This means that 3 responses of the total brick score did not complete the participation of the experiment. Besides that, the Brager's New Recipe Task that measured the cooking creativity of participants, had 3 dropouts out of 144 responses. These dropouts were not selected for data analysis on cooking, because the participants did not respond, or the responses were not in line with the question. They answered, for example, 'twenty chocolate bars, because I cannot cook'. This means that 3 responses of the total recipe score did not complete the participation of this experiment. To sum up, this means that 6 responses of the total creativity score (4,2%) did not complete the participation in this study.

Furthermore, to check if the data included outliers, a z-score was calculated to indicate that the data did include outliers. This means that the data was biased. Therefore, all the outliers with a z-score above 3 or less than -3 were

removed from data analysis. Concluded, four responses of the brick score and one response of the recipe score were excluded. Lastly, the total mean score of the Brager's New Recipe Task (M = 25.58, SD = 8.97) was higher than the mean score of the Guilford's Alternative Uses Task (M = 17.95, SD = 9.79). In order to equalize the results, the Brager's New Recipe Task was weighed down by 0.7%. This value was based on the mean score of the Guilford's Alternative Uses Task. The new mean score of the Brager's New Recipe Task became 17.91 with a standard deviation of 6.27. This means that the total creativity score of participants was equally divided by the score of the Guilford's Alternative Uses Task and the Brager's New Recipe Task (0.7%).

Reliability

A reliability analysis was conducted to discover whether all terms measured the right construct of participants' feelings regarding the task environment. Fifteen terms created five perception constructs: energetic, bright and gloomy (1), tranquil, empty and busy (2), concentrating, distracting and noisy (3), spacious, small and crowded (4), minimalistic, sober and tense (5). In order to analyse the reliability of the constructs together, a Cronbach's alpha test was performed (Cronbach's alpha > 0.7). Unfortunately, the terms per construct did not have a satisfying reliability level: construct 1 (Cronbach's alpha = 0.608), construct 2 (Cronbach's alpha = 0.286), construct 3 (Cronbach's alpha = 0.438), construct 4 (Cronbach's alpha = 0.394) and construct 5 (Cronbach's alpha = -0.167). Because of an unsatisfying Cronbach's alpha for all constructs (Cronbach's alpha < 0.7), all five perception constructs will not be included into the data analysis.

Furthermore, a second reliability analysis was conducted to discover whether all terms measured the right construct of mood state during the experiment, see table 6. Fifteen terms created five mood state constructs: sleepy, energized and tired (1), confident, insecure and hopeful (2), happy, sad and enthusiastic (3), focussed, concentrated and distracted (4), calm, at-ease and tense (5). In order to analyse the reliability of the constructs together, a Cronbach's alpha test was performed, see table 6 (Cronbach's alpha > 0.7). Next, the terms per construct also had a satisfying reliability level: construct 1 (Cronbach's alpha = 0.762), construct 2 (Cronbach's alpha = 0.688), construct 3 (Cronbach's alpha = 0.789), construct 4 (Cronbach's alpha = 0.778) and construct 5 (Cronbach's alpha = 0.656). Because of the satisfying Cronbach's alpha for three of the constructs (Cronbach's alpha > 0.7), all five mood state constructs will be included into the data analysis.

Table 6: Reliability overview of the mood state constructs

Construct	Number of items	Measurement	Cronbach's Alpha
1. sleepy, energized and tired	3	7-point Likert	0.762
2. confident, insecure and hopeful	3	7-point Likert	0.688
3. happy, sad and enthusiastic	3	7-point Likert	0.789
4. focussed, concentrated and distracted	3	7-point Likert	0.778
5. calm, at-ease and tense	3	7-point Likert	0.656
Total	5	7-point Likert	0.787

Lastly, again, a reliability analysis was conducted to discover whether all mood state terms measured the right negative or positive mood state construct, see table 7. All fifteen terms created two mood state constructs:

- Negative mood states = tired, tense, sad, distracted, sleepy, insecure (Cronbach's Alpha = 0.688).

- Positive mood states = happy, calm, confident, concentrated, at-ease, energized, hopeful, focussed, enthusiastic (Cronbach's Alpha = 0.824).

Because of the satisfying Cronbach's alpha for almost both constructs (Cronbach's alpha > 0.7), the two mood state constructs will be included into the data analysis.

Table 2: Reliability overview of the negative en postive mood states constructs

Construct	Number of items	Measurement	Cronbach's Alpha
Negative mood states	6	7-point Likert	0.688
Positive mood states	9	7-point Likert	0.824
Total	2	7-point Likert	0.797

4. Results

The main focus of this study is the effect of the independent variables, furniture (little or much) and accessories (none or multiple), on the participants' creativity score on the brick (Guilford's Alternative Uses Task) and recipe task (Brager's New Recipe Task). This chapter presents the analyses and interpretation of the results and whether these results are influenced by other variables, such as mood state and the level of education. In order to test the hypotheses, an analysis of variance (ANOVA) and regression analysis are conducted.

4.1. Main effects on creative performance

All the mean scores of the two creativity tasks were compared to see the difference between a minimalist office environment with little and much furniture, versus multiple and no details/accessories. An analysis of variance (ANOVA) was conducted to measure the main effects. The main effect of the variable 'amount of furniture' on the participants' creativity score was not significant for both of the creativity tasks Guilford's Alternative Uses Task (F_{brick} (1, 134)= 0.381, p_{brick} = .538), and Brager's New Recipe Task (F_{recipe}(1, 134) = 1.641, p_{recipe} = .202). The total performed creativity score was a combination of the Guilford's Alternative Uses Task and the Brager's New Recipe Task. Therefore, the means of the creativity tasks were combined and were also analysed with an analysis of variance. Again, no significant effect was found of the amount of furniture on the participants' total creativity score (F_{total} (1, 134)= 0.057, p_{total} = .812), see table 5.

The only main effect that that was significant was the variable 'details and accessories' on the creativity score of the recipe task (Brager's New Recipe Task) (F_{recipe} (1, 134)= 5.651, p_{recipe} = .019), see table 6. It was found that participants in a minimalist office with multiple details and accessories (M = 18.84, SD = 6.045) scored higher on creativity than participants in a minimalist office with no details and accessories (M = 16.43, SD = 5.767). So, minimalist office environments with details and accessories has more effect on participants' creativity score of the Brager's New Recipe Task than no details and accessories. The total performed creativity score was a combination of the Guilford's Alternative Uses Task and the Brager's New Recipe Task. Therefore, the means of the creativity tasks were combined and were also analysed with an analysis of variance. No significant effect was found of the amount of details and accessories on the participants' total creativity score (F_{total} (1, 132)= 0.054, p_{total} = .479), see table 6.

The interaction effect of no details and accessories and much furniture on the creative performance was found to be significant (F (3, 132) = 4.460, p < .01). This was only significant for the participants' creativity score of the Brager's New Recipe Task. It was found that participants in a minimalist office with no details and accessories and much furniture (M = 14.53, SD = 4.6) scored lower on creativity than participants in a minimalist office with multiple details and accessories and much furniture (M = 19.26, SD = 5.9). They also score lower on creativity than participants in a minimalist office with multiple details and accessories and little furniture (M = 18.37, SD = 6.3), and participants in a minimalist office with no details and accessories and little furniture (M = 18.33, SD = 6.2). See table 7 for the mean values of the interaction with the Brager's New Recipe Task.

Table 5: The influence of furniture on the creative performance

ANOVA						
		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Creativity score: Guilford's Alternative Uses Task	Between groups	24,183	1	24,183	,381	**.538**
	Within groups	8507,928	134	63,492		
	Total	8532,110	135			
Creativity score: Brager's New Recipe Task	Between groups	59,055	1	59,055	1,641	**.202**
	Within groups	4821,832	134	35,984		
	Total	4880,886	135			
Total creativity score	Between groups	6,986	1	6,986	,057	**.812**
	Within groups	16085,25	131	122,788		
	Total	16092,24	132			

*Table 6: The influence of details and accessories on the creative performance (*significant effect p < 0.05)*

ANOVA						
		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Creativity score: Guilford's Alternative Uses Task	Between groups	32,718	1	32,718	0,515	**.474**
	Within groups	8499,393	134	63,428		
	Total	8532,110	135			
Creativity score: Brager's New Recipe Task	Between groups	197,503	1	197,503	5,651	***.019**
	Within groups	4683,383	134	34,951		
	Total	4880,886	135			
Total creativity score	Between groups	61,722	1	61,722	0,504	**.479**
	Within groups	16030,518	131	122,370		
	Total	16092,241	132			

Table 7: Mean values of the interaction on the Brager's New Recipe Score

Mean values of the interaction effect				
	Mean	**SD**	**Minimum**	**Maximum**
Much furniture x Multiple details and accessories	19,259	5,909	6,3	30,1
Much furniture x No details and accessories	14,530	4,637	7,0	27,3
Little furniture x Multiple details and accessories	18,370	6,251	6,3	35,0
Little furniture x No details and accessories	18,327	6,216	6,2	35,0

4.2. The creative performance mediated by a negative and positive mood state

A regression analysis showed that there is a significant association between a negative mood state and the total creativity score of participants (R^2 adjusted = 0.035, F (1, 131) = 5.795, p = .017) with a greater creativity score being associated with an increased negative mood state (B = 2.49, SE = 1.03, p <.05). This outcome supports the hypothesis that a negative mood state influences the creative performance in a positive way. In addition, a regression analysis showed that there is also a significant association between a positive mood state and the total creativity score of participants (R^2 adjusted = 0.049, F (1, 131) = 7.812, p = .006) with a greater creativity score being associated with an increased positive mood state (B = 3.16, SE = 1.13, p <.05). This also supports the hypothesis. Table 8 shows the coefficients model for the negative and positive mood state on the participants' total creativity score.

Whereas, a regression analysis is performed to determine if the creativity score per condition is mediated by mood. It measures the association between the four conditions (the amount of furniture versus the amount of details and accessories) and mood state (negative or positive) on the total creativity. There was no significant effect or interaction effect between the independent conditions and a negative (F(1, 137) = 0.177, p = .674) or positive mood state (F(1, 137) = 1.346, p = .248). Thus, no significant association is found that the amount of furniture or details/accessories is associated with a negative or positive mood state. This does not support the hypothesis that suggests mood states mediate the creative performance.

*Table 8: Coefficients model of negative and positive mood states on the creativity score (*significant effect p < 0.05)*

Coefficients					
Model	**B**	**Std. Error**	**Beta**	**T**	**Sig.**
(Constant)	19,247	5,611		3,430	**.001**
Positive mood	3,161	1,131	,237	2,795	***.006**
(Constant)	22,543	5,141		4,385	**.000**
Negative mood	2,490	1,034	,206	2,407	***.017**

Mood state constructs

The participants' mood state can also be divided into five mood state constructs. Again, a regression analysis is performed to see whether the five mood state constructs individually had an effect on the participants' creative performance. First, the regression analysis showed that construct one (sleepy, energized and tired) significantly effects participants' creativity score of the Guilford's Alternative Uses Task (R^2 adjusted = 0.054, F (1, 134) = 8.660, p = .004) with a greater creativity score (Guilford's Alternative Uses Task) being associated with an increased mood state on construct one (sleepy, energized, tired) (B = 1.58, SE = 0.538, p <.01). Second, the regression analysis showed that construct two (confident, insecure, hopeful) significantly effects participants' total creativity score (Guilford's Alternative Uses Task and Brager's New Recipe Task) (R^2 adjusted = 0.033, F (1, 131) = 5.450, p = .021) with a greater total creativity score being associated with an increased mood state on construct two (confident, insecure, hopeful) (B = 2.25, SE = 0.96, p < .05). Last, a third regression analysis showed that construct three (happy, sad, enthusiastic) also significantly effects participants' total creativity score (Guilford's Alternative Uses Task and Brager's New Recipe Task) (R^2 adjusted = 0.044, F (1, 131) = 7.099, p = .009) with a greater total creativity score being associated with an increased mood state on construct three (happy, sad, enthusiastic) (B = 2.28, SE = 0.86, p < .01). Thus, construct two (confident, insecure, hopeful) and construct three (happy, sad, enthusiastic) are both positively associated with the total creativity score of participants. Moreover, construct one (sleepy, energized, tired) is positively associated with the creativity score of the Guilford's Alternative Uses Task. For construct four (focussed, concentrated and distracted) and construct five (calm, at-ease and tense) no main effect on creative performance was found. Table 9 shows the coefficients model for construct one (sleepy, energized and tired) on the participants' creativity score of the Guilford's Alternative Uses Task, plus for construct two (confident, insecure, hopeful) and construct three (happy, sad, enthusiastic) the participants' total creativity score

*Table 9: Coefficients model of the mood state constructs on the creativity score (*significant effect p < 0.05)*

Coefficients					
Model	**B**	**Std. Error**	**Beta**	**T**	**Sig.**
(Constant)	10,694	2,217		4,824	**.000**
(1) Sleepy, Energized, Tired	1,584	0,538	0,246	2,943	***.004**
(Constant)	23,586	4,858		4,855	**.000**
Confident, Insecure, Hopeful	2,249	0,963	0,200	2,334	***.021**
(Constant)	23,074	4,467		5,166	**.000**
Happy, Sad, Enthusiastic	2,282	0,856	0,227	2,664	***.009**

Enthusiasm, sleep efficiency and happiness

Moving on to the hypotheses, it is expected that the mood state 'enthusiasm', 'sleep efficiency' and 'happiness' are associated with the creative performance of participants. First, the regression analysis showed that an enthusiastic mood state and the total creativity score of participants are significant associated (R^2 adjusted = 0.033,

F (1, 131) = 5,561, p = .020) with a greater total creativity score being associated with an enthusiastic mood state (B = 1.54, SE = 0.65, p <.05). Second, a regression analysis showed that efficient sleep and the total creativity score are also significantly associated (R^2 adjusted = 0.032, F (1, 131) = 5,331, p = .023) with a greater creativity score associated with efficient sleep (B = 1,4, SE = 0.61, p < .05). Last, a third regression analysis showed that a happy mood state and the total creativity score of participants are marginally significant associated (R^2 adjusted = 0.015, F (1, 131) = 3.075, p = .082) with a greater total creativity score being associated with an enthusiastic mood state (B = 1.4, SE = 0.8, p = 0.082). This supports the hypothesis that suggests that a happy mood state is positively related to participants' creative performance. Table 10 shows the coefficients model for participants' enthusiasm, sleep efficiency and happiness on their total creativity score.

*Table 10: Coefficients model of enthuasism, sleep efficiency and happiness on the creativity score (*significant effect p < 0.05)*

Coefficients					
Model	**B**	**Std. Error**	**Beta**	**T**	**Sig.**
(Constant)	27,603	3,158		8,739	**.000**
Enthusiasm	1,538	0,652	0,202	2,358	***.020**
(Constant)	29,055	2,625		11,068	**.000**
Sleep efficiency	1,398	0,606	0,198	2,309	***.023**
(Constant)	27,850	4,027		6,916	**.000**
Happiness	1,398	0,797	1,151	1,754	**.082**

4.4. Effect of Level of education on the creative performance

An analysis of variance (one-way ANOVA) showed a statistically significant difference at the p < .01 level of the total creativity score related with the participants' level of education (F (3, 129) = 3.589, p = .016). A posthoc comparisons model using the Tukey HSD test indicated that the mean score for WO Master students (M = 40.39, SD = 10.85) was significantly different from MBO students (M = 31.17, SD = 10.79, p = .05) and HBO Bachelor students (M = 31.86, SD = 8.87, p = .03). The regression analysis in table 11 indicates a greater creativity score being associated with a higher level of education (B = 1.77, SE = 0.58, p <.01).

The other fixed factors age, gender, study and to what extent participants like the furniture and accessories, are not statistically significantly associated with the creativity score in both creativity tasks.

*Table 11: Coefficients model of the level of education on the creativity score (*significant effect p < 0.05)*

Coefficients					
Model	**B**	**Std. Error**	**Beta**	**T**	**Sig.**
(Constant)	24,175	3,604		6,707	**.000**
Level of education	1,769	0,585	0,256	3,026	***.003**

4.5. Results of the hypotheses

The results in this chapter show which hypotheses are supported and which are not supported. An alpha value of .05 and below is applied to the significant outcomes. A summary of the results of the hypotheses testing section can be found below in table 12. Interestingly, based on the results, it is expected that other variables, such as a confident mood state, sleep efficiency, the level of enthusiasm and the level of education, also positively influence the creativity level of participants.

Table 12: Summary of the hypotheses' results

	Hypotheses	Outcome
H1a	Little furniture in workplace environments will increase the creative performance of people.	Not supported
H1b	Much furniture in workplace environments will decrease the creative performance of people.	Not supported
H2a	No visual details and accessories in an office environment will decrease the creative performance of people.	Supported on one creativity task
H2b	Multiple visual details and accessories in an office environment will increase the creative performance of people.	Supported on one creativity task
H3	The effects of a physical space on creativity is mediated by the mood state of a person.	Not supported
H4	A happy mood state is positively related to the creative performance of people.	Marginally supported
H5a	Positive mood states are positively related to the creative performance.	Supported
H5b	Negative mood states are positively related to the creative performance.	Supported
New	A confident mood state is positively related to the creative performance.	
New	Sleep efficiency is positively related to people's creativity during the day.	
New	The level of enthusiasm in the morning influences a person's creativity positively during the day.	
New	Millennials with a high level of education have a higher creative performance.	

5. Discussion

This chapter discusses the results of this study. The aim of this study was to experimentally investigate whether a minimalist interior design in offices influences the creative performance of millennials. It was expected that the creativity level is mediated by the participants' mood state. Five mood state constructs, and two other mood state constructs (negative or positive), were created to predict the associations with the creativity score. In addition, the variable 'education level' was also tested to predict associations.

5.1. Discussion of the results

The results of this study indicate that a minimalist office with details and accessories increases the total creativity of millennials more than a minimalist office with no details and accessories. This is only significant for the millennials' creativity score on the Brager's New Recipe task. The experiment of McCoy and Evans (2002) proves this statement as they found that visual details and accessories, wood grain textures, and natural views are potentially perceived to increase people's creative process. This study used one informative element in the four offices, which was the computer monitor. This indicates that also other elements (details and accessories) in the offices influence the participants' creative performance, such as the artist figure 'Gestalta', the poster 'Cactus' or the vases 'Glittrig' (see table 3). Whereas, the amount of furniture in office environments does not influence peoples' creative performance on one of the creativity tasks. Furthermore, an interaction effect showed that a minimalist office with a much furniture combined with no details and accessories, decreases the total creativity of millennials. This is in line with the results of Stamps III (2011), Okken, Van Rompay an Pruyn (2013a) and Imamoglu (1973), who found that a minimalist environment with a high amount of furniture has a negative effect on the creative performance of a person.

A regression analysis measured that a negative and positive mood state increase the creative performance of millennials. This is in line with the study of Lin and Chang (2020). They reported that both positive moods and negative moods enhance peoples' creativity at work. Also, other studies (George and Zhou, 2002; 2007) claimed that negative and positive mood states can potentially influence in important and different ways the creative performance of people. Whereas, they expected that negative mood states are positively related to the creative performance, and that positive mood states are negatively related to creative performance (George and Zhou, 2002). Besides, no significant association is found to support the hypothesis that the amount of furniture or accessories is mediated by (a negative or positive) mood state. This is not in line with the hypothesis stated by Korte, Kuijt and Van Der Kleij (2011) and Ceylan, Dul and Aytac (2008), who proved that particular characteristics of a work environment can influence creativity directly or indirectly via a mood state as a mediator. In short, the mood state (negative or positive) does not significantly mediates a minimalist office environment on the millennials' creative performance.

Furthermore, extra measures were conducted during this study to test the association between five mood state constructs and the participants' creative performance. The following measures were done.
For the first construct, Weinberger et al. (2018) argued that an efficient sleep is positively related to peoples' creative performance. This study supports this statement as a regression analysis showed that construct one (sleep, energized, tired) is positively significantly associated with the creative performance of millennials. Furthermore, the mood state 'sleepy' on its own is also significantly associated with the creative performance. This double check

makes the expectation more valid. For the second construct, the studies Baas et al. (2008), Bandura et al. (1999), Chorpita, Brown, Marlow (2016) all claimed that people who think to be creative are likely to also be confident about their abilities in general. This does not directly state that a confident mood state is associated with creative performance. While, this study significantly proves that construct two (confident, insecure, hopeful) does positively influence the participants' creative performance. A higher level of confidence increases the level of individuals' creative performance. Third, Baas et al. (2008) predict that a happy mood state is the most crucial predictor of creativity. This study supports that a happy mood is a predictor of creativity; it shows that construct three (happy, sad, enthusiastic) does significantly influence the creative performance of millennials positively. A higher level of happiness increases the level of individuals' creativity. Finally, according to Binnewies and Wörnlein (2011), Baas et al. (2008) and Amabile et al. (2005), it was expected that people who are feeling enthusiastic in the morning were more creative during the day. This study also supports that claim with a regression analysis; an enthusiastic mood state does significantly influence the millennials' creativity performance.

Additional results

For the level of education there was no expectation before starting the research, because Wade and Tavris (2008) found that a high Intelligent Quotient (IQ) on its own does not guarantee a good level of creativity. Surprisingly, a regression analysis of this study showed that the level of education does significantly influence the creative performance of millennials. It is expected that millennials with a higher level of education (WO Master students) have a higher creativity level in a minimalist office environment than students with a lower level of education (MBO and HBO Bachelor students). Researchers found some different results equal to this finding. For example, the study of Silvia (2008a), who supports the finding of this study. He showed that people's intelligence is positively related to creativity by reanalysing the study of Wallach and Kogan (1965). Moreover, the finding is also in line with the study of Karwowski et al. (2016) who demonstrated that, there are indeed reasons to predict that intelligence is a necessary factor of creativity.

5.2. Brager's New Recipe Task

The second creative task 'Brager's New Recipe Task' was invented by the author and supervisor themselves. This was necessary, because no existing creativity task in literature could be found to measure peoples' creativity in cooking. The Brager's New Recipe Task was created based on the valid Guilford's Alternative Uses Task (Guilford, 1968; Guilford, Christensen, Merrifield & Wilson, 1978), so the scoring elements 'fluency', 'flexibility', 'elaboration' and 'originality' were also adopted into the Brager's New Recipe Task (table 4). These elements were used to score peoples' creativity by listing ingredients and kitchen appliances that were required for their new recipe (see table 5). Besides, two new scoring elements were developed, 'creativity' and 'quality', to also score peoples' creativity on the name of their new recipe. The points that were assigned to the Brager's New Recipe Task were valued equally to the Guilford's Alternative Uses Task. Because of that, the participants could get a higher mean creativity score on the Brager's New Recipe Task, because it had more questions than the Guilford's Alternative Uses Task. Therefore, in order to equalize the results, the Brager's New Recipe Task was weighed down by 0.7%.

This study was the first that worked with the Brager's New Recipe Task to measure peoples' creative performance, so the Brager's New Recipe Task was not tested by previous studies, and thus was not proven to be valid before.

It is remarkable to see with data analysis that the Brager's New Recipe Task does measure the millennials' creative performance, on some occasions even better than the Guilford's Alternative Uses Task. For example, when it is related to a minimalist office environment with multiple or no accessories and details, or when it is related to a minimalist office environment with no accessories and details and much furniture. In this case, people who perform a creativity task in office 2 (figure 7 and 11).

There may be several reasons for why it is effective. First, participants can be more creative with the Brager's New Recipe Task, because they have more experience with this task in their daily life. In general, people need to eat to survive, so cooking a dish for themselves or others is a daily task that people perform. Besides, the Brager's New Recipe Task allows participants to make a recipe for others with leftovers and a limited budget for groceries. This is also a daily problem for a large group of people, especially when it comes to students who live in dorms. Only students were needed for this study, so that can be a reason why the Brager's New Recipe Task is effective to measure their creative performance. Second, there is more room to be creative with the Brager's New Recipe Task, because there are more questions to respond to and the answers can be more diverse. For instance, there are more options of ingredients to choose from (vegetables, meat, grains, oils or sauces), compared to the options of possible uses for a brick. Thus, the Brager's New Recipe Task gave participants more room to be creative and therefore, it might be more useable as measurement for creativity than the Guilford's Alternative Uses Task for this study.

Nevertheless, future research is needed to measure whether the Brager's New Recipe Task can achieve the same effectiveness on an equalled group of females and males. Because, only 42 participants of the total 145 were male in this study, which means that a larger proportion of participants were female participants. The Brager's New Recipe Task was implemented in the experiment because the majority of female students (75%) chose for 'cooking' as their most creative outlet in the pre-test questionnaire. While, the data analysis of this study showed that the mean creativity score of male students ($M = 18.38$, $SD = 6.05$) was higher than female students ($M = 17.40$, $SD = 6.03$) on the Brager's New Recipe Task. In addition, future research is also needed to test the Brager's New Recipe Task in other circumstances than a minimalist design office environment and a group of millennials. This would make the Brager's New Recipe Task more valid.

5.3. Limitations and future research

The first limitation concerns the control group that was not implemented in this study. It was not possible to implement a control group before or after the experimental phase, because it would take a long time to experiment with a group of students who are studying in the same minimalist office environment. It was necessary that the creativity score of all participants were tested in offices that were equal to the minimalist interiors of the four conditions. This was hard to do in a short time of doing research. The participants ($n = 145$) that did participate in this study were asked to be as creative as possible during the creative tasks, so the creativity score was not based on their regular creative performance during a normal working day. When conducting a similar experiment in future research, it is recommended to perform a test with a control group in their own minimalist office environment. This will result in more reliable results.

The offices of this study were 2 by 2,5 meters big, so it was not possible to design the environments with more furniture, such as a bookcase or filing cabinet. According to Imamoglu (1973), perceived spaciousness is based on

the amount of furniture in rooms; the more furniture in a room, the less space appears. This argues that it was not possible to create more spaciousness in the four offices, because it was limited by the offices' size. In addition, almost all participants mentioned that they perceived the offices as small (82,9%), while spaciousness is a key element of a minimalist interior. The size of the offices were a key limitation element on the minimalist style. Future research with a similar experiment could focus on bigger office spaces, flex office environments or combi-offices where, for example, people work with more employees in the same environment (Taskin, Parmentier & Stinglhamber, 2019). This is important, because Okken, Van Rompay & Pruyn (2013a) claimed that especially the room size influences peoples' perceived comfort, which supports peoples' creative performance (Csikszentmihalyi, 1996). Studies that experiment with different types of offices have probably more reliable results than the results of this study.

Creativity is another interesting topic for future research. The study of Amabile (1998; 1983) found that a persons' creativity is based on three components: talent, the knowledge of a person and his/her technical skills to solve the task (expertise), how flexible people approach problems (creative-thinking skills) and a person's inner passion to solve a problem (motivation). Amabile (1983) argued that all three elements are crucial; the greater the areas of overlap between expertise, creative-thinking skills and motivation, the greater the amount of creativity. The components 'expertise', 'creative-thinking skills' and 'motivation' were implemented in the experiment, but it required a complicated calculation to measure these components for data-analysis. The calculation would take a lot of time and expertise to complete. Future research that has more time to measure peoples' creativity, it is recommended to use the three components of Amabile in the study (1998; 1983). It is interesting for these studies to re-analyse the findings of Amabile (1998; 1983) about the three components of creativity. In that case, the components of creativity would be based on more future findings.

6. Conclusion

This study examined four minimalist office environments and the creative performance among 145 millennials. The four minimalist offices had different amount of furniture (little or much) and details and accessories (none or multiple). It tested whether these minimalist office environments influenced millennials' creative performance by doing two creativity tasks: Guilford's Alternative Uses Task and the Brager's New Recipe Task.

It can be concluded that the amount of details and accessories in a minimalist office influence peoples' creativity. Multiple details and accessories in an office increases peoples' creativity, whereas no details and accessories in an office decreases peoples' creativity. These outcomes can be concluded based on the results from the Brager's New Recipe Task. Furthermore, mood states do also influence peoples' creativity, but this is not mediator. For example, both positive and negative mood states influence peoples' creativity in a positive way. Also, the mood states sleep efficiency, confidence, happiness and enthusiasm influence the creativity level a positive way. This means that millennials with efficient sleep, and who are happy, confident and enthusiastic about performing a creative task, score higher on creativity in a minimalist office environment. Other mood states, such as focused and at-ease do not influence it. The influence on peoples' creative performance depends on the type of the mood state.
Lastly, this study confirms that millennials with a higher level of education (WO Master students) have a higher creativity level in minimalist office environments, than millennials with a lower level of education (MBO and HBO Bachelor students). These findings indicate that young employees in business with a high education, do

prefer a minimalist designed workspace when being creative, especially when the workspace has multiple details and accessories. Thus, this study provides practical implications for interior designers and upcoming companies to rethink the amount of furniture and accessories being used in a minimalist office environment. Especially for minimalist office environments with millennial employees, because it can influence their creative performance.

7. References

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Appendix A : The eight nominees of the Dutch architectural firms (BNA)

De Resident in Den Haag

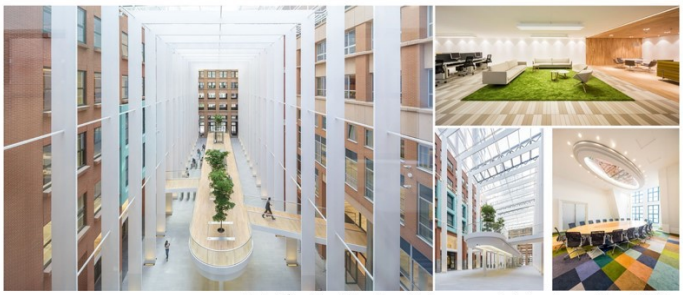

Foto Léon Van Woerkom/Gebouw van het Jaar, bewerking NRC

De Timmerfabriek

Foto Marcel van der Burg/Gebouw van het Jaar, bewerking NRC

HANDEL Amsterdam

Foto Peter Cuypers/Gebouw van het Jaar, bewerking NRC

Lucent in Hilversum

Foto Peter Cuypers/Gebouw van het Jaar, bewerking NRC

1000Mahler in Amsterdam

Foto Ronald Tilleman/Gebouw van het Jaar, bewerking NRC

Plus Ultra in Wageningen

Foto Kim Zwarts & Marloes Verhoeven/Gebouw van het Jaar, bewerking NRC

Appendix B: Questionnaire Pre-test

Welcome!

You are participating in the pre-test of my Master Thesis. The purpose of this research project is to measure the **creativity interest of students** at the University of Twente. The procedure involves filling in an online survey with five questions that will take approximately **1 minute**. The survey questions will be about your demographics and interest of creativity.

I will do my best to keep your information confidential. To help protect your confidentiality, the survey will not contain information that will personally identify you. The results of this study will be used for scholarly purposes only.
If you have any questions about the research, please contact me (Mijke Brager: m.e.m.brager@student.utwente.nl).

→

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What gender do you identify as?

- ◯ Male
- ◯ Female
- ◯ Other

What is your age?

- ◯ 0-21
- ◯ 22-37
- ◯ 38 or older

What current education faculty do you follow at the University of Twente?

- ◯ Behavioural, Management and Social sciences (BMS)
- ◯ Engineering Technology (ET)
- ◯ Electrical Engineering, Mathematics and Computer Science (EEMCS / EWI)
- ◯ Science and Technology (TNW)
- ◯ Geo-Information Science and Earth Observation (ITC)

What is your level of education now?

- ◯ WO Bachelor, first year
- ◯ WO Bachelor, second year
- ◯ WO Bachelor, third year or longer
- ◯ WO Bachelor, pre-master
- ◯ WO Master, first year
- ◯ WO Master, second year
- ◯ WO Master, third year or longer
- ◯ PhD

Of the following options, which category is your creative outlet? (multiple answers are allowed)

- [ ] Writing
- [ ] Drawing/Painting
- [ ] Problem solving
- [ ] Cooking
- [ ] Music
- [ ] Photography
- [ ] Construction
- [ ] Communication
- [ ] Studying
- [ ] Designing
- [ ] Other

←

→

We thank you for your time spent taking this survey.
Your response has been recorded.

Appendix C: Questionnaire

English

Welcome!

You are participating in one of the flex rooms of the BMS LAB at the University of Twente. The purpose of this research project is to measure the creativity level of students in an office environment. You are invited to participate in this research project because you are invited or part of the SONA Systems.

Your participation in this research study is voluntary. You may choose not to participate. If you decide to participate in this research survey, you may withdraw at any time. It is allowed to not participate in this study or withdraw from participating at any time.

The procedure involves filling in an online survey and two online experiments that will take approximately **15-20 minutes**. Your responses will be confidential and we do not collect identifying information such as your name, email address or IP address. The survey questions and online experiments will be about your demographics, your mood states, the experimental task and the office environment.

We will do our best to keep your information confidential. All data is stored in a password protected electronic format. To help protect your confidentiality, the surveys will not contain information that will personally identify you. The results of this study will be used for scholarly purposes only.

If you have any questions about the research study, please contact me (Mijke Brager: m.e.m.brager@student.utwente.nl).

Clicking on the 'agree' button bellow indicates that:

- you have read the above information.
- you voluntarily agree to participate.
- you are a student of the University of Twente, University of Applied Science Saxion or the ArtEZ Academy.

If you do not wish to participate in the research study, please decline participation by clicking on the 'disagree' button.

- ○ Agree
- ○ Disagree

What was the number you received from the researcher?

- ○ 1
- ○ 2
- ○ 6
- ○ 7

English

What gender do you identify as?

- Female
- Male
- Other

What is your age?

What is the level of your current education?

- MBO
- HBO Bachelor
- WO Bachelor
- WO Master
- PhD

What type of study do you follow?

- Earth and Environment
- Economics and Business
- Information and Computer Science
- Behaviour and Society
- Health
- Art and Culture
- Education
- Law and Governance
- Language and Communication
- Technic and Construction

English

Please, indicate your perception about the office environment you're now working in:

	Strongly agree	Agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Disagree	Strongly disagree
Sober	○	○	○	○	○	○	○
Energetic	○	○	○	○	○	○	○
Distracting	○	○	○	○	○	○	○
Spacious	○	○	○	○	○	○	○
Minimalistic	○	○	○	○	○	○	○
Tense	○	○	○	○	○	○	○
Bright	○	○	○	○	○	○	○
Tranquil	○	○	○	○	○	○	○
Empty	○	○	○	○	○	○	○
Noisy	○	○	○	○	○	○	○
Gloomy	○	○	○	○	○	○	○
Crowded	○	○	○	○	○	○	○
Concentrating	○	○	○	○	○	○	○
Small	○	○	○	○	○	○	○
Busy	○	○	○	○	○	○	○

Do you like the style of furniture/accessories used in this office?

Definitely not	Not really	Neutral	Yes, a little bit	Definitely yes
○	○	○	○	○

What do you think about the number of furniture used in this office?

Far too much	Moderately too much	Slightly too much	Neither too much nor too little	Slightly too little	Moderately too little	Far too little
○	○	○	○	○	○	○

What do you think about the number of accessoires used in this office?

Far too much	Moderately too much	Slightly too much	Neither too much nor too little	Slightly too little	Moderately too little	Far too little
○	○	○	○	○	○	○

Would you like to work in a similar style office environment at your future job?

English

Please, indicate to what extent your mood state is at this moment.

	Strongly disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
Happy	○	○	○	○	○	○	○
Tired	○	○	○	○	○	○	○
Calm	○	○	○	○	○	○	○
Confident	○	○	○	○	○	○	○
Tense	○	○	○	○	○	○	○
Concentrated	○	○	○	○	○	○	○
Sad	○	○	○	○	○	○	○
At-ease	○	○	○	○	○	○	○
Energized	○	○	○	○	○	○	○
Distracted	○	○	○	○	○	○	○
Sleepy	○	○	○	○	○	○	○
Insecure	○	○	○	○	○	○	○
Hopeful	○	○	○	○	○	○	○
Focussed	○	○	○	○	○	○	○
Enthusiastic	○	○	○	○	○	○	○

Are you excited to participate in this experiment?

Definitely not	Not really	Neutral	Yes, a little bit	Definitely yes
○	○	○	○	○

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English

This is the first task of the experiment:

Unfortunately, all bricks in the Netherlands are sold out for building. I only have a couple bricks left at home. I would like you to make a list of as many different uses you can think of for a brick. It is not possible to write down the normal use of a brick, which is for building. Try to be as creative as you can. For example, "table leg" would be a very good answer.
Now it is your turn, you have **3 minutes** to perform this task. Good luck!

It is always possible to click on the button 'next' when you ran out of ideas.

Write down your answers. It is possible to enlarge the answer box by dragging the bottom right corner:

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English

This is the last task of the experiment, you are almost there!

Tonight you will cook an original dish for yourself and three other students at home (4 people in total). You already have two eggs, two carrots and two tomatoes in the fridge, so you want to use these ingredients for the dish. You also get 15 euro's from me to buy more ingredients at the supermarket to make the dish complete. Make a list below of all the ingredients you want to buy and the kitchen appliances you want to use. Also, please give your unique recipe an original name.

It is always possible to click on the button 'next' when you ran out of ideas. You have **5 minutes** to perform this task. Good luck!

You have 15 euro in your wallet. Which ingredients do you want to buy to make your unique recipe complete? (you already have 2 eggs, 2 carrots and 2 tomatoes)

Do you make use of kitchen appliances while making the dish? If so, which one?

Give an original name to your creative dish:

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English

The questions below are related to the the first task you did. You were given the task to list as many possible uses for a brick in three minutes.

I have done the brick task before:

I have heard about the brick task before:

I have interests in problem solving:

Definitely yes	Yes, a little bit	Neutral	Not really	Definitely not
○	○	○	○	○

I think I am an expert in problem solving:

Definitely yes	Yes, a little bit	Neutral	Not really	Definitely not
○	○	○	○	○

The questions below are related to the the second task you did. You were given the task to make an original cooking recipe in 5 minutes for yourself and three other students with the ingredients eggs, carrots, tomatoes and 15 euros to buy other ingredients.

I have done the cooking recipe task before:

I have heard about the cooking recipe task before:

I have interests in making new cooking recipes:

Definitely yes	Yes, a little bit	Neutral	Not really	Definitely not
○	○	○	○	○

I think I am an expert in cooking:

Definitely yes	Yes, a little bit	Neutral	Not really	Definitely not
○	○	○	○	○

[English]
This is the end of the experiment. Thank you for participating, all your answers have been recorded! Please, do not talk about the content of this experiment with other people. Participants have to make the experiment with no knowledge about what to do in order to make the results valid.

A Milka chocolate bar is waiting for you outside the office :)

This experiement measured the creativity level of students in a minimalistic office environment. Four offices at the University of Twente were divided into four conditions: no minimalistic accessoires versus a lot minimalistic accessoires, by no minimalistic furniture versus a lot minimalistic furniture. All furniture and accessoires were borrowed from KATO Projecten, located in Enschede.
Your answers of the two experiments will be summed up to measure your total level of creativity.

Are you curious about your total score or do you have any questions about the experiment and/or survey, please contact me face-to-face or via e-mail:
m.e.m.brager@student.utwente.nl

[Nederlands]
Dit is het einde van het experiment. Bedankt voor de deelname, al jouw antwoorden zijn opgeslagen! Zou je alsjeblieft niet over de inhoud van dit experiment willen praten met anderen. Deelnemers moeten namelijke het experiment in gaan zonder voorkennis om zodoende de antwoorden valide te houden.

Een Milka chocoladereep wacht op je buiten het kantoor :)

Dit experiment heeft de hoeveelheid creativiteit gemeten van studenten in een minimalistich ingerichte kantoorruimte. Vier kantoren aan de Universiteit Twente waren ingedeeld in vier condities: geen minimalistische accessoires versus veel minimalistische accessoires, en geen minimalistische meubels verus veel minimalistische meubels. Alle meubels en accessoires waren geleend van het bedrijf KATO Projecten in Enschede. Jouw antwoorden tijdens de experimenten zullen opgeteld worden om de totale score van creativiteit te meten.

Ben je benieuwd naar jouw totale score of heb je vragen over het experiment en/of vragenlijst, neem dan face-to-face contact met mij op of via de e-mail:
m.e.m.brager@student.utwente.nl