

**“On the right track”:**

## **Lighting as a function of a positive station perception?**

A study of the influence of light on the station perception of lust- and must travelers.



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**Sanne de Kinkelder – juli 2013**

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## **Preface**

Here it is: my Master thesis! After more than eight months of hard work, I proudly present my Master thesis. Unfortunately after writing my theoretical framework and completing the questionnaire, the organization 'ProRail' decided to stop with the project. Thanks to my supervisors Mirjam and Peter, I could continue my thesis with some small adjustments. The real life setting was converted into a lab setting and the questionnaire needed some changes. Fortunately there was little delay in the time that I needed to graduate!

During the whole process, I was certainly not alone. I had two good supervisors from who I have learned a lot: Mirjam Galetzka and Peter de Vries. Mirjam, I want to thank you for all the help and advice that I have received from you and that you convinced me to change my supermarket theme into the station theme. Peter, I want to thank you for being my second supervisor. Not only at the end of my thesis you provided me with valuable feedback, but also the group meetings were very useful.

Obviously I do not only want to thank my supervisors, but also Laura Vos. I have done a part of the thesis with her, especially the data collection part. And last but not least, I want to thank my family, friends and many students of the University who filled in our questionnaire. Thanks to you, I can now graduate!

Sanne de Kinkelder

Enschede, juli 2013

## Summary

Waiting on a platform at a station hall is inevitable for train passengers. Because it is often not possible to shorten the waiting time, it is interesting to examine other possibilities to influence the behavior of train passengers. Travelers often have limited time and the consequence is that most of them stand still at the top of the stairs or at the exit of a platform (Helbing, Buzna, Johansson, & Werner, 2005). This phenomenon creates bottlenecks. Especially for service environments it is important to influence the environment through for example lighting, because this is easy to adapt on a platform instead of changing the whole station. Enriching this waiting environment can thus have a positive impact on travelers' perception.

To this end, this study explored whether lighting influences the station experience and perception of lust- and must travelers. The design consisted of a 2 (lighting: light vs. dark) x 2 (passenger's travel objective: lust vs. must) between-subjects design. To influence the travel objectives a distinction was made between the so-called lust- and must travelers. Respondents were randomly assigned to one of the two scenarios where they were asked to imagine that they are going to travel by train and that they are in a hurry (or not). After reading the scenario, respondents were randomly divided in one of the lighting conditions. A PowerPoint was shown where a slideshow of pictures of the platform of Eindhoven passed by. The pictures consisted of snapshots from the beginning to the end of the platform. There was a difference in the PowerPoint. Half of the respondents saw a slideshow with light at the end of the platform, whereas the other half saw a slideshow where the whole platform was dark. The PowerPoint was intended to manipulate the lighting condition.

The findings reveal that lust travelers experienced more arousal in the lighting condition compared to must travelers. Also a significant interaction effect was found for perceived control. Must travelers perceived more control in the dark condition compared to lust travelers. No significant differences were found for dominance and the place where travelers were waiting on the platform. Not many effects were found in this study, because there is a chance that the lighting manipulation was too subtle and it was too hard for respondents to project oneself into a scenario. It is thus recommended to perform this study in a real life setting.

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## 1. Introduction

When you think about the word 'Railway station', many people immediately think of a crowded place during peak hours where hundreds of people are crawling together. It is not strange that people think that, because the Dutch Railways have the busiest railway stations from Europe. At a normal working day, averages of 6193 people are passing through a station (ProRail, 2007). Most of the people are traveling in the morning or at the end of the day in order to go to their work or home. Because of the large number of travelers at these specific times, they are seen as peak hours. During these peak hours it is often too busy at the station and therefor it is desirable to look for a solution to the forming of crowds.

One possible but very expensive solution for clustering of so many people at peak hours are infrastructural expansions. Besides the infrastructural expansions and physical measures it is possible to influence the behavior of travelers, because the (service) environment is influential on satisfaction and perceived service qualities (Bäckström & Johansson, 2006). It is important to tailor the service environment to the needs and preferences of travelers. A side effect could be that travelers are more pleased, orientate better and the flow of travelers on platforms is optimized. On that way travelers are spreading better across the platforms (Galetzka & De Vries, 2012). This is important, because travelers do not like crowded platforms and they create negative feelings about traveling by train with the consequence that they avoid the station hall (Van Hagen, 2011).

The main problem is the behavior of the crowd itself. A part of the travelers do not take the same train every day, because they travel for a visit to family. They are standing still at the top of the stairs or at the exit of a platform (just like the routine travelers) when entering the station hall (Helbing, Buzna, Johansson, & Werner, 2005). This phenomenon creates bottlenecks of traveler flows and travelers experience (over)crowding, which means that individuals experience an unpleasant density at their physical environment (Hui & Bateson, 1999) and the flow of travelers gets jammed. This is not a desirable situation, because there is too much crowding at peak hours at stations and platforms when travelers are going to work or school. They might even consider avoiding this environment (Apter, 2007).

Unfortunately it is difficult to influence the behavior of travelers, because they unconsciously choose the easiest way (e.g., standing still at top of stairs) (Van Hagen, 1998). Therefore it is easier to influence the behavior of hedonic passengers in the service environment compared to utilitarian passengers, because the behavior of the second group is more automatic and habitual. The hedonic travelers value their stay in the service environment as an activity itself. They are more relaxed and enjoy the environment more, so they are subconsciously stimulated to learn new behavior.

A relatively easily changeable aspect on a station hall/platform is the use of light or music (Baker & Cameron, 1996; Lin, 2004). Therefore this type of element (lighting) is chosen to influence the behavior of travelers (Baker & Cameron, 1996). In the next section this will be explained.

This study focuses on the impact of lighting on a platform. It investigates how lighting can be used to influence the perception of train passengers at a platform and additional to achieve that train passengers are spread more evenly over the platform.



## 2. Theoretical Background

It is well known that humans are influenced by their environment. Especially for service companies the environment is important, because this environment has the ability to influence behaviors and to create a desirable image. Because services are generally purchased and consumed simultaneously, customers and employees interact with each other within the organization's physical environment. The place where the service is produced cannot be hidden and may in fact have a strong impact on customers' perceptions of the service experience (Bitner, 1992). Before purchasing or consuming, consumers look (unconsciously) for cues about the firm's capabilities and quality (Berry & Clark, 1986). The physical environment is rich in such cues and may be very influential on internal responses and behavior of people (Bitner, 1992).

The physical environment is divided into a mix of different cues. Baker (1986) divides this mix of cues into three components: design elements, ambient elements and social elements. Design elements represent components of the environment that tend to be visual in nature (e.g., furnishing, spatial layout). Ambient elements are often present in the background and are often perceived subconsciously (e.g., lighting, music) and social elements are people that are present in the service setting such as personnel and customers.

### 2.1 SOR model

This study employs the model of Mehrabian and Russell (1974) who suggest that behavior of customers can be influenced by their environment according to the Stimulus-Organism-Response (SOR) model. The S-O-R paradigm suggests that certain environmental cues influence the affective and cognitive states, which intervenes the approach and avoidance responses of customers. The affective state is related to the intangible elements of the service environment. The stimulus (e.g., light) can be a cue in the crowding problem at platforms that can change the emotions of travelers. The goal with this stimulus is to spread the travelers over the platform.

Mehrabian and Russell (1974) proposed that feelings, emotions and moods are viewed as the key mediators by influencing the service environment. The affective state in the S-O-R model focuses on pleasure, arousal and dominance (PAD) for understanding these environment behavior relationships. The SOR model is shown in figure 1.

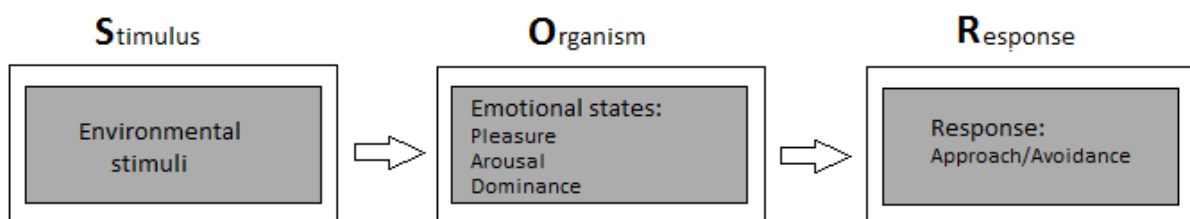


Figure 1. Stimulus-Organism-Response Model (Mehrabian & Russell, 1974).

Different studies showed that pleasure and arousal affects behavior (e.g., Bellizzi & Hite, 1992; Donovan, Rossiter, Marcolyn, & Nesdale, 1994; Turley & Milliman, 2000). However, little attention has been paid in literature to 'dominance' (Bellizzi & Hite, 1992). When looking at the platforms on a station, sense of control and thus dominance is important. Travelers may want to reduce feelings of uncertainty and pressure and want to orientate themselves (Helbing, Buzna, Johansson, & Werner, 2005). These aspects will be included in this research in order to ensure that after changing the behavior of travelers at the platforms, they really feel less pressure and uncertainty.

All the different studies who used the S-O-R model tried to influence the approach (and avoidance) behavior by influencing the servicescape (e.g., ambient elements) (Bellizzi & Hite, 1992). Approach behavior is a positive response to the environment. Conversely, avoidance behavior is a negative response and customers would like to leave the environment as fast as they can (Kaltcheva & Weitz, 2006). According to the explanations of these different studies, this study expected that pleasure, arousal and dominance have a positive influence on the service environment of platforms at a station hall.

## *2.2 Lighting*

Light is surrounding us everywhere, within enclosed spaces and outside in open spaces. Lighting is approached as a way to create an experience that can influence, consciously or subconsciously, the consumers' mood and, in a retail environment, buying behavior (Quartier, Christiaans, & Van Cleempoel, 2008). It is clear that lighting has a strong impact on human behavior. Baker and Cameron (1996) indicate that individuals have a preference for a basic level how they perceive light as the most pleasant. It depends on the type of activity, the situation and one's surroundings which light intensity people prefer the most (Van den Bommel, 2004). For instance brightness preferences are lower with a romantic dinner, whereas lighting levels preferences are higher for activities with a more visual nature.

Kumari and Venkatramaiah (1974) suggest that higher levels of illumination have a strong effect on arousal. Arousal is defined as a continuum of state of alertness, ranging from a comatose state to one of extreme excitement (Cloughan, Aspinall, & Webb, 1998). Looking more specific to lighting in relation to mood and affect, Knez (1995) studied the effect of indoor lighting on cognitive performance via mood. The experiment was conducted in a chamber-room where subjects were informed that their general task was to work with several cognitive tasks. In the beginning of the experiment and after about 85 minutes of luminous exposure, subjects completed a current affective state questionnaire to test whether the luminous exposure acted as a mood inducer. Knez (1995) found that the luminous exposure changed the mood of the subjects. An interaction between color

temperature and gender showed that the 'cool' room light induced least negative mood in males and the 'warm' room light accounted for the same effect in females. There is thus a relation between lighting and mood.

Baron, Rea and Daniels (1992) also found an interaction between lighting and mood. It was hypothesized that lighting conditions which generated positive affect among subjects would influence behavior and cognitions in ways consistent with the findings of previous research of Baron (1990). In this study Baron (1990) suggests that subjects reported more positive affect in conditions of low levels of lighting compared to high levels of lighting. The results of the experiments by Baron, Rea and Daniels (1992) offered partial support for the hypothesis. They found that variations in indoor lighting can influence performance on several tasks. Subjects that were exposed to relatively low levels of luminance behaved like those experiencing positive affect in previous research of Baron (1990).

Mehrabian and Russell (1974) found that lighting is an extremely important determinant of the environment, because brightly lit rooms are more arousing than softly lit ones, increased levels of lighting will produce arousal and pleasure and increases the approach behavior of customers. In a study of Chung and Ha (n.d.) they investigate the effects of different lighting sources on interior spatial image by evaluating emotional responses of customers in relation to different lighting conditions. Respondents filled out a questionnaire in selected bars in order to identify the spatial images. These spatial images were formed by artificial lighting. The results of this study were that if lighting conditions are altered, visual composition and effects will also be changed which in turn alters the perception of space and overview. Boyce, Lloyd, Eklund and Brandston (1996) confirmed these findings on the perception of space. Their study took place inside a supermarket and was aimed at measuring whether lighting can create a specific atmosphere. The impact of lighting was measured via consumer opinions and merchandise sales. They placed a new lighting system inside the supermarket that projected more lux. The results showed that consumers considered the new lighting condition, when making the store look brighter, as more comfortable and more pleasing to the eye.

The different studies above showed that different lighting levels influence the environment dependent of the context. More complex environments and more stimuli require more light. A complex environment that has many stimuli is a platform at a station hall. More light increases visibility and overview and thus orientation of travelers. Under these circumstances travelers will be spread better over the platforms and they rather choose a quieter entrance or exit (Helbing, Buzna, Johansson, & Werner, 2005).

Flynn (1988) on the other hand studied different dimensions of lighting such as bright and soft lighting in relation to visual brightness, space, relaxation, privacy and pleasantness. Flynn's (1988) results showed that soft lighting plays an important role on relaxed feelings and emotion towards others inside rooms.

An important factor that may determine the degree of pleasure, arousal and dominance depends on the passengers travel objective. This means that travelers can prefer more bright lighting (which leads to overview and orientation) or soft lighting (which leads to a more relaxed feeling) depending on their travel objective (Kaltcheva & Weitz, 2006). Their travel objectives depend on what type of traveler they are.

### *2.3 Type of traveler*

It is clear that not every traveler reacts the same way when they are influenced by different lighting levels, because emotions are responses generated to address problems of adaptation to the environment. Emotions thus have an environmental determinant (what is objectively appraised) and a personal determinant (an individual's goals within that environment) (Massara, Liu, & Melara, 2010). According to Massara, Liu and Melara (2010) travelers' orientations toward a service environment vary along a continuum from efficiency-oriented to recreation-oriented. So travelers can have a task-oriented motivational orientation or a recreation-oriented motivational orientation. Various names have been given to these groups, for example utilitarian travelers and hedonistic travelers (Babin, Darden, & Griffin, 1994). In this study we called these groups 'must travelers' and 'lust travelers'.

The hedonistic travelers (lust travelers) value their stay in the service environment as an activity itself. They have an intrinsic motivation and taking part in the activity leads to satisfaction. The lust travelers are relaxed and enjoy the environment more. They act this way, because the activities they undertake take place in their leisure time. They are less concerned about things like travel time and location (Van Hagen, 1999). Their needs are more emotional, which leads to a more positive travel attitude compared to utilitarian travelers (Wakefield & Blodgett, 1994). Because lust travelers have no ambiguous goals, they desire a high level of arousal and a low level of dominance in the environment (Massara, Liu, & Melara, 2010). This group is an interesting group of travelers when looking at the possibility to influence their behavior through stimuli in the environment. Lust travelers are more sensitive for environmental influences and are more open for stimuli and experiences in contrast to utilitarian travelers (must travelers) (Ang & Leong, 1987).

On the other hand, there is the utilitarian traveler (must traveler). They travel mostly during peak hours and are more serious, goal oriented and stressed. They do not want to be distracted by their environment and appreciate overview, optimal navigation and control. Their behavior is largely automatic and unconscious (Van Hagen, 1999; Van Hagen, Pruyn, Galetzka, & Sauren, 2010). The must traveler is rather more irritated when their environment is looking different than they expected, because they are frequent visitors at station halls and have strong expectations of what they can expect. (Machleit, Eroglu, & Mantel, 2000). The needs of must travelers are more cognitive and eccentric oriented. They get their satisfaction when their goal is met (Wakefield & Blodgett, 1994). Must travelers desire a low level of arousal and a high level of dominance in the environment that are consistent with previous expectations (Massara, Liu, & Melara, 2010).

#### *2.4 Reversal Theory*

The different travel objectives in the previous section can be explained on the basis of the 'Reversal Theory' by Apter (2007). This theory suggests that the need for environmental stimuli (e.g., lighting) depends on the emotional state of a person at a certain moment. As shown in figure 2, the theory assumed a relationship between the degree of pleasure and arousal. According to Apter (2007) there are two different emotional states: people who are in a 'telic state' and people who are in a 'paratelic' state. The first group is serious and goal driven and they do not need arousal enhancing stimuli. The second group, the 'paratelic state', just needs arousal enhancing stimuli. They are more spontaneous and less systematic. If there is a tension between the environment and one of the two states, than the person tried to avoid the environment and expressed him- or herself negatively about the organization (Apter, 2007).

The two states correspond with the must- and lust travelers of ProRail. The 'telic state' of the 'Reversal Theory' represents the must traveler, because (as mentioned before) must travelers are more serious, goal oriented and stressed. They do not need arousal enhancing stimuli, because they do not want to be distracted by their environment. The 'paratelic state' represents the lust traveler, because (as mentioned before) lust travelers are relaxed and enjoy more of the environment. Their needs are more emotional and need more arousal enhancing stimuli (Wakefield & Blodgett, 1994).

The need for stimuli is different for these two groups. Must travelers are less influenced by all its facets in the environment compared to lust travelers (who are less likely to develop habitual behavior on a station). You need to take into account that implementation of the environmental stimuli meet the needs of the traveler (Van Hagen, 2011).

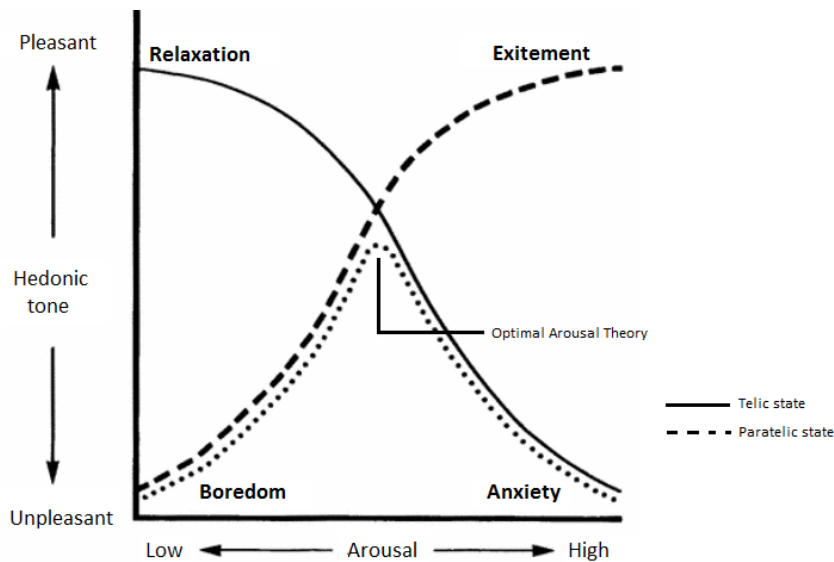


Figure 2. Reversal Theory (Walters, Apter & Svebak, 1982).

To show the difference between ‘Reversal Theory’ (Walters, Apter, & Svebak, 1982) and ‘Optimal Arousal Theory’ (Berlyne, 1971), in figure 2 the Optimal Arousal Theory is also shown. The Optimal Arousal Theory suggests that there is only one arousal system and that system has a single optimal point on the arousal dimension. This point is being optimal in terms of both performance and hedonic tone (Walters, Apter, & Svebak, 1982). The Reversal Theory accomplishes this by suggesting that there are two curves rather than one. Each curve represents an opposite way in which the organism interprets arousal. In one curve the optimal point is high on the arousal dimension. The feeling of arousal is being increasingly pleasant as this high point is approached. In the other curve the optimal point is low on the dimension. The feeling of arousal is being increasingly pleasant as this low point is approached (Apter, 1984). The Reversal Theory suggests that it depends on the moment which state is preferred.

It is clear that must- and lust travelers are two different, but important groups to take into account. This study influences lighting at a platform to ensure that travelers are spread better over the platform. Although must travelers are responsible for most of the trips (70%), their behavior is habitual and hard to influence (stations in beeld, 2005). Therefore this study is focusing more whether lust travelers can be influenced more easily than must travelers, because the first group of passengers is more sensitive to environmental stimuli (Van Hagen, 2011). By influencing lighting we attempt to move lust travelers to the end of the platform, so the traveler flow is better and it seems optically less crowded at peak hours.

## 2.5 Hypotheses

As mentioned before, it is clear that travelers have different moods, depending on their travel objectives: must travelers are in a 'telic' state and experience more stress, lust travelers are in a 'paratelic' state and are more relaxed. The goal of this research is to see how these different types of travelers are reacting to different lighting situations. This study investigates whether the environmental factor light can influence the station perception of travelers.

As previously mentioned, The Reversal Theory suggests that the use of arousal enhancing stimuli (e.g., lighting) depends on the moment which state is preferred (Apter, 2007). So it depends on the passengers travel objective at a specific moment. It is also suggested that higher levels of illumination have a stronger effect on an increased arousal (Kumari & Venkatramaiah, 1974). This is confirmed by Mehrabian and Russell (1974) who found that lighting is an important determinant of the environment. They suggest that brightly lit rooms are more arousing than softly lit ones, but this depends on which state is preferred.

The Reversal Theory (Apter, 2007) suggests that people in a paratelic state (lust travelers) needs arousing enhancing stimuli (Apter, 2007). Massara, Liu and Melara (2010) confirmed these findings. They suggest that lust travelers have no ambiguous goals, so they desire a high level of arousal and a low level of dominance in the environment. Must travelers are more serious and goal-oriented, they do not want to be distracted by their environment and appreciate overview, optimal navigation and control (Van Hagen, 1999). Therefore must travelers desire a low level of arousal and a high level of dominance (Massara, Liu, & Melara, 2010). On the basis of these findings, various expectations can be outlined with regard to the research findings:

**H1:** *Lust travelers (versus must travelers) show a higher arousal level (lower arousal level) when there is light at the end of the platform rather than when it is dark.*

**H2:** *Lust travelers (versus must travelers) show less dominance (more dominance) when there is light at the end of the platform rather than when it is dark.*

**H3:** *Lust travelers (versus must travelers) perceive less control (more control) when there is light at the end of the platform rather than when it is dark.*

There may also be a difference where lust- and must travelers are standing on the platform when they are waiting for the train. Lust travelers are more spontaneous and less systematic. Overall they

have more time when they enter the platform. Must travelers are more serious and goal driven (Apter, 2007). So there is a difference in how to influence these two groups.

Lust travelers are more sensitive for environmental influences and are more open for stimuli and experiences in contrast to must travelers (Ang & Leong, 1987). Therefore it is easier to influence the behavior of lust travelers, because the behavior of must travelers is more automatic and habitual. So we expect that lust travelers are more sensitive for the stimulus 'light' and because they are more sensitive for this stimulus, they are more likely to walk through the end of the platform.

With this literature in mind, the following hypothesis is expected:

***H4: Lust travelers (versus must travelers) are more likely to walk to the end of the platform (beginning of the platform) when there is more light at the end of the platform than in the beginning.***



### 3. Method

#### 3.1 Participants and design

To test these hypotheses, an experimental scenario study was conducted to manipulate the passengers travel objectives (lust- or must traveler). The design of this study consisted of a 2 (lighting: light vs. dark) x 2 (traveler objective: lust vs. must) between-subjects design. The design examined the influence of lighting in relation to the traveler objectives. In total, 105 respondents, all randomly assigned, took part in the experiment. Of these, 104 questionnaires (53 women and 51 men; average age 25; range 18-61 years) were included in the analysis. One person was excluded, because he or she filled in the questionnaire incorrectly. The education level ranged from primary education to academic education, including 40% secondary education, 25% vocational education and 30% academic education. From all studied respondents, only 23 of them were familiar with Eindhoven station.

#### 3.2 Procedure

Participants were intercepted at random intervals at the entrance of the building, were invited via e-mail to participate and were gathered via the Sona-system. They filled out the questionnaire in a small classroom with no artificial light. Also the blinds for the windows were partly closed, so that the light in the classroom corresponded with the light in the images. The classroom was tidy, so that they were not distracted. Prior to filling out the questionnaire, they read a scenario in which they were asked to imagine that they were a train traveler and they were going to Maastricht. The scenarios were used to manipulate the travel objectives (must- vs. lust travelers) and consisted of: 'you are in a hurry' vs. 'you are not in a hurry' (see appendix A for the scenarios). Next, they were asked to carefully study the series of photos and imagine themselves being in the situation. The set of photos consisted of many snapshots from a video on platform one of Eindhoven. Participants viewed the slideshow in a PowerPoint. Every two seconds the slideshow continued to the next picture. The lighting conditions in the snapshots were manipulated with Photoshop (see figure 3a and 3b).



Figure 3a. Dark condition.



Figure 3b. Lighting condition.

Half of the participants saw the dark condition of the slideshow and the other half saw the slideshow with lighting at the end of the platform. The must- and lust scenarios were randomly assigned. After this projection procedure, participants filled out the questionnaire.

### 3.3 Measurement

The dependent variables were measured with a 5-points Likert scale (with exception of the PAD scale), where value '1' represents 'strongly disagree' and value '5' represents 'strongly agree'. The experience and perception of the platform were measured by the following variables:

- **Pleasure, Arousal and Dominance:** Emotional responses were measured using the Pleasure and Dominance scale of the PAD model (Mehrabian & Russell, 1974). Respondents were asked to indicate to what extent they felt as described by the adjectives during the imagined waiting at a platform at Eindhoven station. Pleasure was measured with a 6-item scale (happy-unhappy, annoyed-pleased, dissatisfied-satisfied, bored-relaxed, pleasant-unpleasant, desperate-hopeful;  $\alpha = .86$ ) and Dominance with a 3-item scale (influenced-influential, controlling-controlled, dominant-submissive;  $\alpha = .73$ ). Arousal was measured with a 10-item scale and was adopted from the Swedish Core Affect Scale (SCAS) (sad-glad, depressed-happy, sleepy-awake, passive-active, bored-interested, indifferent-engaged, pessimistic-optimistic, tense-serene, anxious-calm, nervous-relaxed;  $\alpha = .82$ ). Items were rated using five-point semantic differentials.
- **Perceived Control:** Perceived control was measured with one item derived from Mehrabian and Russell's dominance scale (1974). This was a measure closely related to perceived control (Hui & Bateson, 1991). The item was: "*At this platform, I feel in control over the situation*".
- **Orientation and overview:** Based on Kaltcheva and Weitz (2006) orientation was measured with a 3-item scale. A sample item was: "*I could get lost here*". Except orientation, overview was also measured with 6-items derived from the Environmental Rating Scale by Pedersen (1976) and Bitner (1990), complemented with questions about concealment, lighting and spatial impression. Sample items were "*This platform contains many standing or hanging objects that restrict overview*", and "*This platform has many dark spots*". The coefficient alpha reliability for this construct was .81.
- **Perceived Crowding:** How respondents perceived crowding was measured with the Hui and Bateson's (1991) perceived crowding scale, comprising of 4 items related to the perceived crowding at platform one at Eindhoven. One sample item was: "*I feel crowded being there*". Coefficient alpha reliability for this 4-item scale was .85.

- **General attitude of the platform:** The general attitude of the platform was measured with eight items. The scale that has been used was (just as the variable 'overview') a combination of the Environmental Rating by Pedersen (1978) and Bitner (1990). Example questions were: *"The platform is attractive"*, *"The platform is messy"* and *"The platform has a warm atmosphere"*. The alpha reliability for this scale was .86.
- **Approach & Avoidance:** Behavioral responses (approach and avoidance behaviors) were measured with a 7-item scale from Mehrabian and Russell (1974). Sample items were: *"I avoid other passengers on the platform"* and *"I would explore the platform"*. Alpha reliability for the approach and avoidance scale was .72 (when item 6 was deleted).

Finally, the following questions were determined:

- **Questions regarding lighting manipulation:** Respondents were asked whether the lighting at the platform was dark or bright, cool or warm and gray or colorful. Items were rated using five-point semantic differentials.
- **Waiting choice:** To determine which waiting situation respondents preferred, they were asked to make a choice between four images after watching the PowerPoint (see appendix B). The first two images (image A and B) were images at the beginning of the platform, whereas the last two images (image C and D) were places at the end of the platform. These images varied in lighting (depending which lighting condition respondents saw). In the lighting condition, the last two images (C and D) were provided with light spots. This was in contrast to the dark condition, whereas all four images were equally dark.
- **Personal data:** At the end of the questionnaire there were a few questions related to demographic data, data about travel frequency and travel objectives (must- vs. lust traveler), whether respondents travel most of the time at peak hours (or not) and whether they were familiar with Eindhoven station.

The questionnaire is included in Appendix C.

## 4. Results

### 4.1 Manipulation check

In order to determine whether the condition with artificial light vs. the dark condition was actually respectively experienced as light vs. dark, a manipulation check was done. An independent sample *t*-test was used to determine how light vs. dark respondents found the beginning and end of the platform: “*The lighting at the beginning of the platform was very dark – very light*” and “*The lighting at the end of the platform was very dark – very light*”. The *t*-test was statistically significant and showed that in the lighting condition, respondents found the end of the platform lighter than the beginning of the platform ( $M = 3.75$ ,  $SD = .90$ ) compared to the dark condition ( $M = 3.39$ ,  $SD = .87$ ),  $t(102) = -2.09$ ,  $p = 0.04$ . In the dark condition respondents experienced the platform not as dark, so the manipulation check is partially successful.

### 4.2 Waiting choice for travelers

Looking at the traveler objectives, respondents had to imagine that they were lust- or must travelers (according to the scenarios that were randomly assigned). All respondents completed a question where they would be waiting on the platform (see appendix B). When respondents chose option A or B, they would wait at the beginning of the platform. Option C and D represented the end of the platform. The first three waiting choices were equally chosen by must- and lust travelers. 16 must- and 16 lust travelers chose option A (beginning of the platform). When looking at option B (beginning of the platform), only 3 must- and 5 lust travelers chose this place to wait. Just like picture A 15 must- and 16 lust travelers chose option C (end of the platform). For the last option (option D) there was a difference between must- and lust travelers. Only 12 must travelers chose the end of the platform and 21 lust travelers chose this place (see figure 4).

A Pearson’s chi-square test of contingencies (with  $\alpha = .05$ ) was used to evaluate whether the place respondents picked when waiting for the train is related to the type of traveler (must or lust). The chi-square test was statistically not significant,  $\chi^2(3, N = 104) = 2.04$ ,  $p = .56$ . As illustrated in Figure 4, must travelers were not significantly more likely to choose for a specific waiting place than lust travelers.

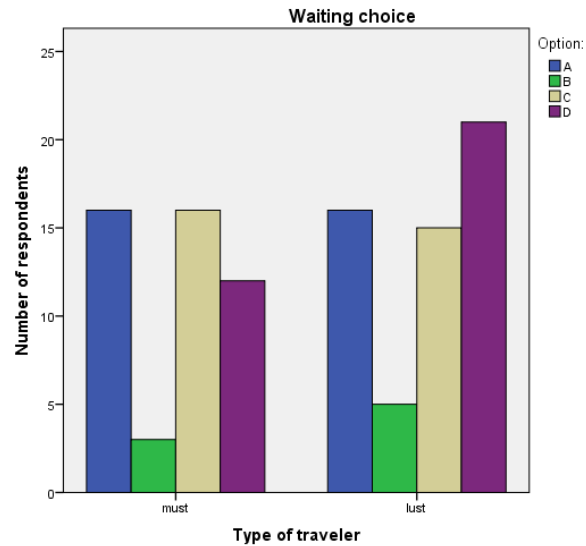


Figure 4. Number of respondents that chose for a specific waiting place in relation to type of traveler.

#### 4.3 Waiting choice in relation to lighting

After analyzing the travelers' choice in relation to the place where they were waiting, this choice may also depend on the lighting condition (light vs. dark). Again, option A and B represented the beginning of the platform, whereas option C and D represented the end of the platform. 17 travelers chose option A in the condition with light in relation to 15 travelers in the dark condition. Travelers chose option B just a few times, 3 in the condition with light and also 3 in the dark condition. For option C (end of the platform) there was a small difference between the two lighting conditions. Travelers chose in the condition with light 12 times for option C and 19 times they chose this option in the dark condition. The last option (option D) showed that 18 travelers chose this option in the condition with light and 15 travelers chose this place in the dark condition.

A Pearson's chi-square test of contingencies (with  $\alpha = .05$ ) was used to evaluate whether the place respondents picked when waiting for the train is related to the lighting condition (light vs. dark). The chi-square test was statistically not significant,  $\chi^2(3, N = 104) = 1.94, p = .59$ . As illustrated in figure 5, the lighting condition did not depend on which specific place respondents choose to wait on the platform.

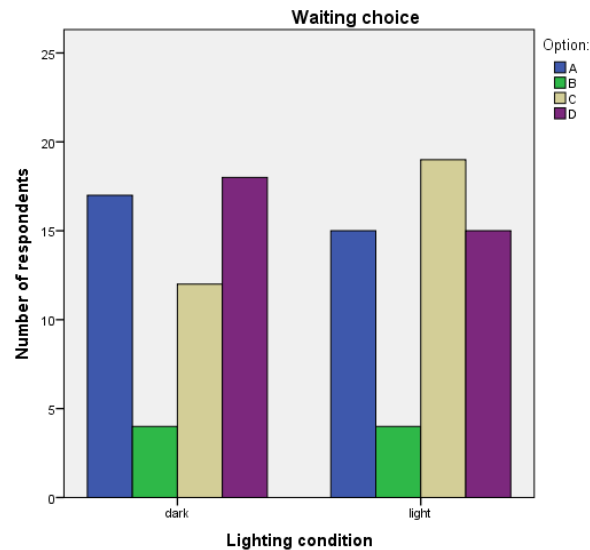


Figure 4. Number of respondents that chose for a specific waiting place in relation to the lighting condition.

#### 4.4 Waiting choice in relation to travel objective and lighting

After analyzing the travel objectives and lighting conditions in relation to the waiting choice, it is important to combine these two conditions to see whether there are any differences between lust- and must travelers in relation to a specific lighting condition. Did lust- and must travelers have a certain preference when they were waiting for the train in relation to a specific lighting condition?

In the dark condition, must travelers chose option A, C and D almost equally (8, 6 and 6 must travelers). Just 1 must traveler chooses option B. In the condition with light, must travelers chose 8 times for option A, 2 times for option B, 10 times for option C and 6 times for option D.

Looking at the lust travelers, in the dark condition they chose 9 times for option A, only 3 times for option B, 6 times for option C and 12 times for option D. When comparing these findings with the condition with light, 7 lust travelers chose option A, 2 times for option B, 9 times for option C and 9 times for option D.

A Pearson's chi-square test of contingencies (with  $\alpha = .05$ ) was used to evaluate whether there is a difference between must- and lust travelers which waiting place they choose in relation to a specific lighting condition. The chi-square test was statistically not significant for must travelers,  $\chi^2(3, N = 47) = 0,81$   $p = .85$  and lust travelers  $\chi^2(3, N = 57) = 1,32$   $p = .72$ . As illustrated in Figure 6a and 6b, passengers travel objective and lighting condition did not depend on which specific waiting place respondents choose.

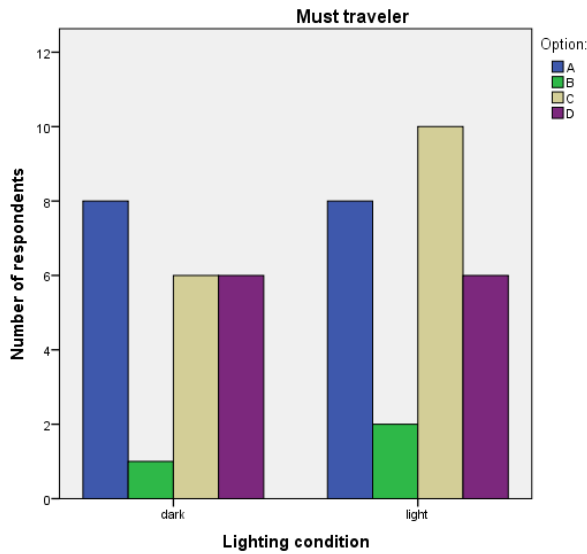


Figure 6a. Must travelers that chose for a specific waiting place in relation to the lighting condition.

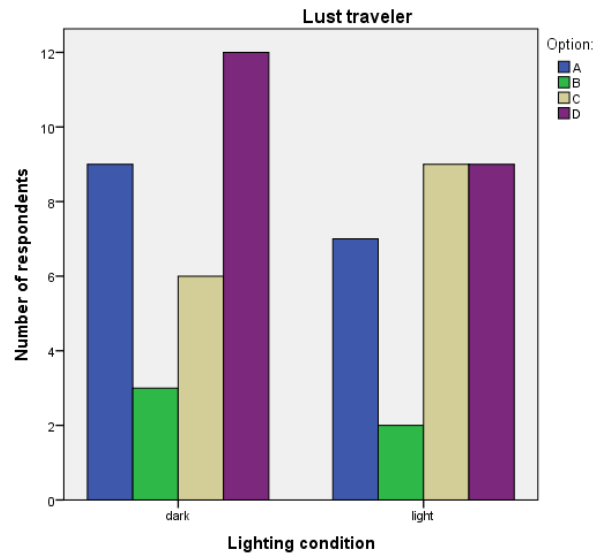


Figure 6b. Lust travelers that chose for a specific waiting place in relation to the lighting condition.

#### 4.5 Perception of the station/platform

In order to ascertain whether there are any differences between must and lust travelers and the light at the platform, an ANOVA test was conducted with all aspects of station/platform perception as dependent variables (see paragraph 3.3) and light and travel objective as independent variables. The ANOVA test used a significance level of  $\alpha = .05$ .

##### 4.5.1 PAD-emotions

###### Pleasure

An ANOVA analysis showed that no significant main effects were found for type of lighting and type of traveler in relation to the construct pleasure ( $F(1, 100) = 0.06, p = .80$  and  $F(1, 100) = 0.74, p = .39$ ). This means that travelers did not feel more pleasure when the lighting at the end of the platform is lighter instead of dark. Also there was no difference between lust- and must travelers in relation to pleasure. None of the two groups experienced more pleasure compared to the other group.

The analysis also showed that there was no interaction effect between the lighting conditions (light vs. dark) and travel objectives (lust vs. must) in relation to degree of pleasure ( $F(1, 100) = 1.83, p = .18$ ). This means that in the dark condition, lust traveler experienced not more pleasure compared to must travelers. This also applies for the lighting condition.

### Arousal

When analyzing (ANOVA test) the main- and interaction effects for the construct arousal, no significant main effect was found for type of lighting in relation to arousal,  $F(1, 100) = 0.01, p = .92$ . Travelers did not experience more arousal in the condition with light. But ANOVA showed a significant main effect for type of traveler on the degree of arousal, showing that lust travelers experienced more arousal ( $M = 3.41, SD = .51$ ) at the platform compared to must travelers ( $M = 3.13, SD = .56$ ), regardless of light intensity,  $F(1, 100) = 6.79, p = .01$ .

Also an interaction effect was found between the lighting conditions (light vs. dark) and the travel objectives (lust vs. must) in relation to degree of arousal,  $F(1, 100) = 3.69, p = .05$  (figure 7). In the condition with light, lust travelers experienced more arousal ( $M = 3.52, SD = .50$ ) compared to must travelers ( $M = 3.05, SD = .51$ ),  $F(1, 100) = 10.61, p = .00$ . This difference is not significant for the dark condition,  $F(1, 100) = 0.23, p = .64$ .

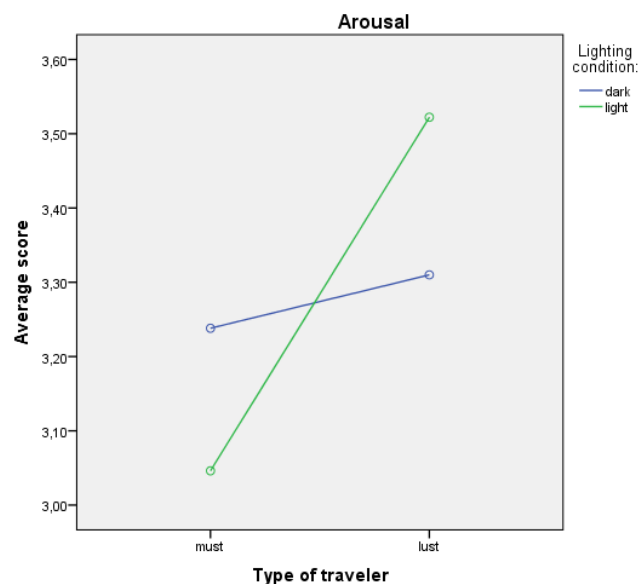


Figure 7. Interaction between lighting condition and type of traveler in relation to degree of arousal.

### Dominance

An ANOVA showed no significant main effect for type of lighting ( $F(1, 100) = 0.00, p = .99$ ). The lighting condition did not depend whether travelers experienced more control (dominance). Also it did not depend whether they are lust- or must travelers in relation to the control they have on the platform,  $F(1, 100) = 0.34, p = .56$ . Must travelers were not significantly more dominant than lust travelers.

Besides that no significant main effects were found, there is also no significant interaction effect between the lighting conditions and travel objectives in relation to the control they



experienced on the platform,  $F(1,100) = 0.55$ ,  $p = .46$ . It did not depend on the lighting condition whether must- or lust travelers experienced more dominance.

#### 4.5.2 Perceived control

An ANCOVA analysis indicated that no significant main effects were found for type of lighting ( $F(1, 99) = 1.16$ ,  $p = .29$ ) and type of traveler ( $F(1, 99) = 0.21$ ,  $p = .65$ ) in relation to the degree of control they perceived on the platform. When looking at type of lighting, there is no difference between the condition with light and the dark condition in relation to the control travelers perceived. Travelers did not perceive more control when they had more light at the end of the platform compared to the dark condition. For type of traveler, there is also no difference when they perceive more control. Must travelers did not perceive significant more control on the platform compared to lust travelers.

When looking at the interaction effect, a significant effect was found,  $F(1, 99) = 9.90$ ,  $p = .00$  (figure 8). In the dark condition, must travelers perceived more control ( $M = 3.86$ ,  $SD = .96$ ) compared to lust travelers ( $M = 3.13$ ,  $SD = 1.04$ ),  $F(1, 100) = 6.80$ ,  $p = .01$ . This difference is not significant for the condition with light,  $F(1, 100) = 2.20$ ,  $p = .14$

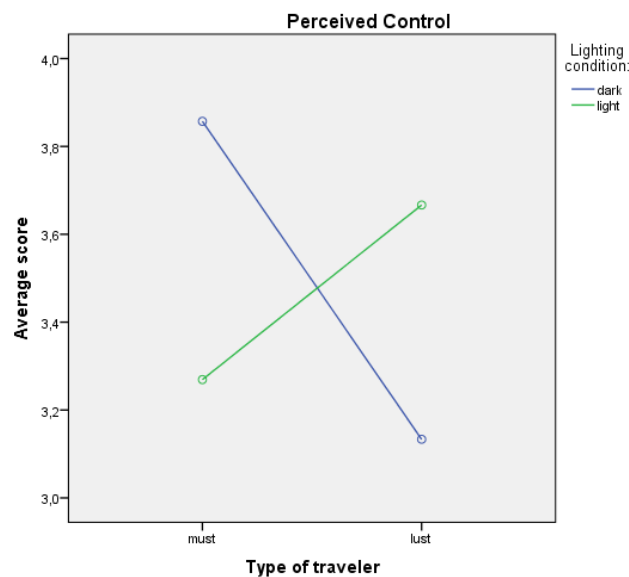


Figure 8. Interaction between lighting condition and type of traveler in relation to the perceived control.

#### 4.5.3 Orientation

ANOVA showed that no significant main effect was found for type of lighting in relation to the construct orientation. This means that travelers cannot orientate better when they have light on the platform instead of darkness,  $F(1, 100) = 0.00$ ,  $p = .99$ . When looking at the second possible main effect, ANOVA showed no significant main effect for type of traveler in relation to the orientation

both types of travelers experience,  $F(1, 100) = 0.66, p = .42$ . Must travelers did not experience more orientation on the platform compared to lust travelers.

After looking at the main effects, also no significant interaction effect was found,  $F(1, 100) = 2.14, p = .15$ . It did not depend on the lighting condition whether must- or lust travelers can orientate better.

#### *4.5.4 Perceived crowding*

An ANOVA revealed that no significant main effect was found for type of lighting in relation to perceived crowding,  $F(1, 100) = 3.22, p = .08$ . This finding means that travelers did not perceive more crowds in a specific lighting condition. There was no difference for travelers between lighting at the end of the platform or at a dark platform. Perceived crowding had also no significant main effect whether the traveler was a must- or lust traveler,  $F(1, 100) = 0.13, p = .72$ . The two types of travelers did not experience more crowding compared to the other.

ANOVA showed that there was no significant interaction effect between the lighting conditions and travel objectives in relation to how crowded travelers experienced the platform,  $F(1, 100) = 0.36, p = .55$ . Must travelers did not feel more crowded in a specific lighting condition in relation to lust travelers.

#### *4.5.5 General attitude*

An ANOVA analysis showed that no main effects were found for type of lighting and type of traveler in relation to the general attitude of the platform. This means for type of lighting that it did not depend whether travelers had the condition with lights or the dark condition. In both conditions, they did not perceive a more positive attitude,  $F(1, 100) = 0.01, p = .92$ . No main effect for type of traveler ( $F(1, 100) = 0.06, p = .80$ ) means that it did not matter whether the traveler was a lust- or must traveler. Must travelers did not experience a more positive attitude about the platform than lust travelers or vice versa.

When looking at possible interaction effects, no significant interaction effect was found between the lighting conditions and the travel objectives in relation to the general attitude,  $F(1, 100) = 2.13, p = .15$ . It did not depend whether a lust- or must traveler had a specific lighting condition compared to what their attitude was on the platform.

#### *4.5.6 Approach/Avoidance*

When analyzing (ANOVA test) the main- and interaction effects for approach/avoidance, no significant main effect was found for type of lighting in relation to the approach/avoidance

behavior of travelers ( $F(1, 100) = 0.03, p = .86$ ). Travelers did not show more approach behavior when the end of the platform has more light instead of when the platform was darker. Also no significant main effect was found for type of traveler ( $F(1, 100) = 0.00, p = .99$ ). Must travelers did not show more approach or avoidance behavior on the platform compared to lust travelers.

An ANOVA showed that no interaction effect was found between the lighting conditions and travel objectives in relation to the approach (or avoidance) behavior,  $F(1, 100) = 0.00, p = .98$ . This means that a must traveler did not show more approach behavior in a specific lighting condition compared to lust travelers.

## 4.6 Feedback hypotheses

Table 4.2 Overview hypotheses.

| <b>Hypothesis:</b>   | <b>Confirmed:</b>  |
|--|--|
| <b>H1:</b> <i>Lust travelers (versus must travelers) show a higher arousal level (lower arousal level) when there is light at the end of the platform rather than when it is dark.</i>                             | H1 is partly confirmed.<br>This applies only for the lighting condition. |
| <b>H2:</b> <i>Lust travelers (versus must travelers) show less dominance (more dominance) when there is light at the end of the platform rather than when it is dark.</i>  | H2 is not confirmed.   |
| <b>H3:</b> <i>Lust travelers (versus must travelers) perceived less control (more control) when there is light at the end of the platform rather than when it is dark.</i>   | H3 is not confirmed.<br>(findings showed the opposite)                   |
| <b>H4:</b> <i>Lust travelers (versus must travelers) are more likely to walk to the end of the platform (beginning of the platform) when there is more light at the end of the platform than in the beginning.</i> | H4 is not confirmed.   |

## 5. Discussion

The goal of the present study is to investigate whether lighting has an impact on the station/platform perception of train passengers (must- and lust travelers). What is the influence of light at the end of a platform with respect to the perception of travelers?

### *5.1 Interpretation of the results*

This study showed that lust travelers experienced a higher arousal level when there is light at the end of the platform. This is not confirmed for must travelers when it is dark at the entire platform, but this group perceived in the dark condition more control. Other effects are not found. In the next paragraphs this will be explained.

Considering that previous studies of Peters (2008) and Sauren (2010) generated outcomes that would fit within the Reversal Theory of Walters, Apter and Svebak (1982), this theory is taken as a guide for the current study. In this research, it is assumed that light intensity leads to a positive station perception, because light intensity can achieve the right arousal level. This means for train travelers that they perceive a higher 'hedonic tone' (Walters, Apter, & Svebak, 1982). They perceive more pleasure, experience more control and a positive attitude about the platform and show more approach behavior. But this depends on the travel objectives (must- or lust traveler). According to the Reversal Theory, the feeling of arousal depends on the moment what state you are in. So a higher 'hedonic tone' is different for lust- and must travelers, because they prefer a different state. On the basis of this theory, this study expects that more light leads to a higher arousal level for lust travelers.

In terms of the extent of arousal it has been found that lust travelers, who are more sensitive for environmental influences and stimuli (Ang & Leong, 1987), experience more arousal when there is light at the end of the platform. This can provide an extra stimulation and causing the arousal to increase for this type of travelers. Lust travelers were aroused more compared to must travelers when it is lighter at the end of the platform. These findings are consistent with the Reversal Theory (Apter, 2007) which suggests that it depends on the type of traveler whether they perceive a higher 'hedonic tone'. It is also consistent with the profile of the traveler. Lust travelers are more sensitive to environmental stimuli in contrast to must travelers who are more experienced travelers. Traveling by train is more a habit for must travelers and they do not need arousal enhancing stimuli. Because of this habit it can be assumed that the stimulus of light is not reported by must travelers.

In terms of degree of dominance, the findings of this study were not in line with previous research of Massara, Liu and Melara (2010) and the Reversal Theory of Apter (2007). Despite the fact

that lust travelers have no ambiguous goals and therefore desire a low level of dominance, the results show no significant differences between the two lighting conditions and type of traveler in relation to dominance. Lust travelers (must travelers) did not experienced more dominance when there is light at the end of the platform.

When looking at perceived control, this study found that must travelers perceived more control when it is dark at the end of the platform compared to lust travelers. A dark platform generated a positive effect for must travelers and they perceived more control. This is in contrast with the hypothesis and the study of Helbing, Buzna, Johansson and Werner (2005) who suggests that more light increases visibility and overview and thus a better orientation of travelers. Must travelers desire a high level of dominance in the environment that is consistent with previous expectations (Massara, Liu, & Melara, 2010). But the findings from this study are in line with the Reversal Theory (Apter, 2007), because this theory suggests that it depends on the type of traveler which degree of stimulation generates a positive effect. It is also in line with the profile of the traveler. Must travelers are experienced travelers and know the station better than lust travelers. Therefore the finding of this study that must travelers experienced more control when it is dark at the platform can be explained, because even without light at the platform, they know the platform and thereby they experience control. But given the lab-setting this is not very likely, because many respondents (even if there were must travelers according to the scenarios) did not know the station.

The results where lust- or must travelers are standing on the platform when they are waiting for the train show no significant differences. Both must- and lust travelers chose in both lighting conditions especially for option A (beginning of the platform), C and D (end of the platform). Only option B (also the beginning of the platform) was only a few times chosen by must- and lust travelers. This applies to both lighting conditions. Despite that lust travelers are more sensitive to environmental stimuli and therefore it is easier to influence their behavior, this study cannot confirm these findings of Ang and Leon (1987) and Apter (2007) with his Reversal Theory. A possible reason for the absence of significant differences is that option B (beginning of the platform) was an unattractive image where travelers can wait. Another reason is that the lighting manipulation was too subtle. In the next paragraph this will be explained.

## *5.2 Suggestions and limitations*

The results showed that the manipulation in a lab setting do not successfully produce effects with light and type of traveler. The condition using artificial lighting was experienced as brighter (at the end of the platform) as compared to the dark condition, but the dark condition was not experienced

as dark. With the exception of perceived control, no differences between the two lighting conditions were found. Looking at these lighting effects of perceived control, most travelers perceived only in the dark condition more control while the opposite was found in previous literature. This can be explained that effects failed to materialize, because travelers did not see the dark condition as dark. This also applies for the effects of perceived control. It is possible that the lighting manipulation was too subtle and the lighting manipulation was not noticed, because the lighting was only at the end of the platform. For further research this must be taken into account that a lighting manipulation should not be too subtle.

Another point that may have been affected by the lack of results is that it was too hard for respondents to imagine that they are going to travel by train and that they are in a hurry or that they have all the time. A suggestion for further research is to pretest the manipulation by asking after reading the scenario whether they found that they were really in a hurry or have all the time.

However, the study was conducted in a lab-setting, which might have influenced the outcomes and it was too hard to project oneself into a scenario. The question arises whether the findings of this study would also be found in a real station setting. Different studies showed that a lab-setting can work with scenarios and manipulations, for instance studies of Wirtz, Mattila and Tan (2000) and Massara, Liu and Melara (2010). The differences with this study are that in the other studies the scenarios and manipulations were examined in a restaurant and a shop and they used more than one manipulation. In the study of Massara, Liu and Melara (2010), they manipulated color and music tempo. Wirtz, Mattila and Tan (2000) used even more manipulations: light, music tempo and volume and sounds.

For the service environment like station halls, it is possible that scenarios and manipulations do not work properly and that only one manipulation was not enough. So the disadvantages of a lab-setting in a service environment, such as projecting oneself into a scenario, would thus be prevented. Further research in a real-life setting in which light is manipulated can therefore verify the findings. Also another advantage of a real-life setting is that travelers do not need to imagine that they were a must- or lust traveler, because they already have a travel objective.

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## **Appendices**

## Appendix A. Scenarios (must- vs. lust travelers)

### Scenario 1: Mustreiziger

Beste Deelnemer,

Bedankt voor je deelname aan dit onderzoek. Dit onderzoek richt zich op de beleving van stations. Het onderzoek bestaat uit verschillende onderdelen. Eerst krijg je een scenario te lezen van een situatie, daarna zie je een aantal korte slides. Na deze slides is het de bedoeling een vragenlijst in te vullen. Probeer bij het zien van de slides en het invullen van de vragenlijst je in te leven alsof je de persoon in het scenario bent.

Hier volgt jouw scenario:

*“Het is vrijdagmiddag 17.00 uur en je werkdag zit erop; tijd om naar huis te gaan. Je bent net als de rest van de dagen met de trein en stapt in op station Eindhoven. Je wilt uiterlijk om 19.00 uur thuis zijn, want vrienden komen je dan ophalen”.*

“Je krijgt nu een aantal slides te zien van het station van Eindhoven. Vul na het bekijken van deze slides de vragenlijst in vanuit bovenstaand perspectief”.

### Scenario 2: Lustreiziger

Beste Deelnemer,

Bedankt voor je deelname aan dit onderzoek. Dit onderzoek richt zich op de beleving van stations. Het onderzoek bestaat uit verschillende onderdelen. Eerst krijg je een scenario te lezen van een situatie, daarna zie je een aantal korte slides. Na deze slides is het de bedoeling een vragenlijst in te vullen. Probeer bij het zien van de slides en het invullen van de vragenlijst je in te leven alsof je de persoon in het scenario bent.

Hier volgt jouw scenario:

*“Het is vrijdagmiddag 17.00 uur. Je hebt vandaag een dagje vrij van je werk en hebt besloten je familie te gaan opzoeken in Maastricht met de trein. Je stapt in op station Eindhoven. Je familie verwacht je niet op een bepaald tijdstip, dus je hebt alle tijd om in Maastricht te komen”.*

“Je krijgt nu een aantal slides te zien van het station van Eindhoven. Vul na het bekijken van deze slides de vragenlijst in vanuit bovenstaand perspectief”.

**Appendix B. Lighting condition vs. condition without lighting**



*Figure 9a. Condition with light (at the end of the platform).*



*Figure 9b. Condition without light.*

## Appendix CI. Questionnaire (condition with light)

Respondent nr:

### Onderzoek Stationsbeleving

Beste respondent,

De Universiteit Twente doet op dit moment onderzoek naar stationsbeleving. Aangezien uw mening daarbij van groot belang is, willen wij u vragen deze vragenlijst in te vullen. Het duurt gemiddeld 10 minuten om de gehele vragenlijst in te vullen. Er wordt gevraagd naar uw mening, dus er bestaan geen goede of foute antwoorden. Uw antwoorden worden anoniem verwerkt.

Alvast hartelijk dank voor uw deelname!



*U heeft zojuist een aantal slides gezien van het perron in Eindhoven waar uw trein vertrekt. Welke plaats op het perron zou u kiezen om te wachten?*

*Kies uit één van de volgende afbeeldingen:*



afbeelding A



afbeelding B



afbeelding C



afbeelding D

---

*Vult u nu de rest van de vragenlijst in vanuit het perspectief dat u zojuist heeft gelezen door het hokje dat met uw antwoord correspondeert volledig in te kleuren. Bij het verkeerd inkleuren van het hokje, zet u een kruis door het foutieve antwoord en kleurt u het correcte antwoord in. Hieronder kunt u een voorbeeld zien hoe u de vragen moet invullen.*

*Voorbeeldvraag:*

**Ik houd van sporten:**

- |                                |                                 |   |                                     |                              |
|--------------------------------|---------------------------------|---|-------------------------------------|------------------------------|
| <input type="checkbox"/>       | <input type="checkbox"/>        | <input type="checkbox"/>                  | <input checked="" type="checkbox"/> | <input type="checkbox"/>     |
| <i>helemaal<br/>mee oneens</i> | <i>enigszins<br/>mee oneens</i> | <i>niet mee eens/<br/>niet mee oneens</i> | <i>enigszins<br/>mee eens</i>       | <i>helemaal<br/>mee eens</i> |

## 1. Geef aan hoe u zich voelt op het perron:

### Ik voel mij op dit perron:

|               |                          |                          |                          |                          |                          |                |
|---------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------|
| Gelukkig      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Ongelukkig     |
| Geïrriteerd   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Blij           |
| Ontevreden    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Tevreden       |
| Zwaarmoedig   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Voldaan        |
| Onplezierig   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Plezierig      |
| Wanhopig      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Hoopvol        |
| Verdrietig    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Blij           |
| Depressief    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Vrolijk        |
| Passief       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Actief         |
| Slaperig      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Wakker         |
| Verveeld      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Belangstellend |
| Onverschillig | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Betrokken      |
| Pessimistisch | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Optimistisch   |
| Gespannen     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Kalm           |
| Angstig       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Rustig         |
| Nerveus       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Ontspannen     |
| Volgzaam      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Leidend        |
| Volgend       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Sturend        |
| Onderdanig    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Dominant       |

**2. Geef bij onderstaande stellingen aan in hoeverre u het er mee eens bent:**

*Zoals u wellicht heeft kunnen zien, zijn er verschillen tussen het begin en het einde van het perron.*

*Deze vraag (vraag 2) heeft hier betrekking op.*

**Ik voel mij aan het begin van dit perron:**

**Rustig:**

helemaal mee oneens      helemaal mee eens

**Op mijn gemak:**

helemaal mee oneens      helemaal mee eens

**Angstig:**

helemaal mee oneens      helemaal mee eens

**Onzeker:**

helemaal mee oneens      helemaal mee eens

**Veilig:**

helemaal mee oneens      helemaal mee eens

**Ik voel mij aan het einde van dit perron:**

**Rustig:**

helemaal mee oneens      helemaal mee eens

**Op mijn gemak:**

helemaal mee oneens      helemaal mee eens

**Angstig:**

helemaal mee oneens      helemaal mee eens

**Onzeker:**

helemaal mee oneens      helemaal mee eens

**Veilig:**

helemaal mee oneens      helemaal mee eens

**3. Geef ook bij onderstaande stellingen aan in hoeverre u het er mee eens bent:**

**Op dit perron heb ik het gevoel dat ik controle heb over de situatie:**

helemaal mee oneens      helemaal mee eens

**4. Geef ook bij onderstaande stellingen aan in hoeverre u het er mee eens bent:**

**Ik vind het perron overzichtelijk:**

helemaal mee oneens      helemaal mee eens

**Op het perron kan ik mijn weg goed vinden:**

helemaal mee oneens      helemaal mee eens

**Ik zou hier de weg kwijtraken:**

helemaal mee oneens      helemaal mee eens

**Dit perron is chaotisch:**

helemaal mee oneens      helemaal mee eens

**Er staan of hangen op dit perron veel objecten die mijn overzicht beperken:**

helemaal mee oneens      helemaal mee eens

**Dit perron heeft veel plekken waar criminelen zich zouden kunnen verschuilen:**

helemaal mee oneens      helemaal mee eens

**De verlichting op dit perron is goed:**

helemaal mee oneens      helemaal mee eens

**Dit perron heeft veel donkere plekken:**

helemaal mee oneens      helemaal mee eens

**Ik zie op dit perron snel waar ik heen kan als ik andere mensen wil vermijden:**

helemaal mee oneens      helemaal mee eens

**5. Geef ook bij onderstaande stellingen aan in hoeverre u het er mee eens bent:**

**Ik vind dat het op dit perron erg druk oogt:**

helemaal mee oneens      helemaal mee eens

**Ik vind het te druk op dit perron:**

helemaal mee oneens      helemaal mee eens

**Er was niet veel drukte op dit perron gedurende de tijd dat ik hier aanwezig was:**

helemaal mee oneens      helemaal mee eens

**Er waren teveel mensen aanwezig op dit perron:**

helemaal mee oneens      helemaal mee eens

**6. Geef bij onderstaande stellingen aan hoe uw indruk van het perron is:**

**Het perron heeft een warme uitstraling:**

helemaal mee oneens      helemaal mee eens

**Het perron ziet er verzorgd uit:**

helemaal mee oneens      helemaal mee eens

**Het perron is aantrekkelijk:**

helemaal mee oneens      helemaal mee eens

**Het perron is sfeervol:**

helemaal mee oneens      helemaal mee eens

**Het perron oogt professioneel:**

helemaal mee oneens      helemaal mee eens

**Het perron is rommelig:**

helemaal mee oneens      helemaal mee eens

**Het perron is goed onderhouden:**

helemaal mee oneens      helemaal mee eens

**Het perron is comfortabel:**

helemaal mee oneens      helemaal mee eens

**7. Geef bij onderstaande stellingen aan in hoeverre u het er mee eens bent:**

**Ik zou op dit perron rustig een kopje koffie kunnen drinken:**

helemaal mee oneens      helemaal mee eens

**Ik zou op dit perron blijven wachten als de trein vertraging heeft:**

helemaal mee oneens      helemaal mee eens

**Ik zou gemakkelijk een andere reiziger aanspreken op het perron:**

helemaal mee oneens      helemaal mee eens

**Ik vermijd andere reizigers op het perron:**

helemaal mee oneens      helemaal mee eens

**Ik zou het perron gaan verkennen:**

helemaal mee oneens      helemaal mee eens

**Ik zou op dit perron rustig een krant kunnen lezen:**

helemaal mee oneens      helemaal mee eens

**Ik vind dit perron prettig:**

helemaal mee oneens      helemaal mee eens

**8a. Geef ook bij onderstaande stellingen aan in hoeverre u het er mee eens bent:**

**Het licht aan het begin van het perron was:**

erg donker                        erg licht

**De kleuren aan het begin van het perron waren:**

koel                                warm

**De kleuren aan het begin van het perron waren:**

erg grijs                          erg kleurrijk

**Het licht aan het einde van het perron was:**

erg donker                        erg licht

**De kleuren aan het einde van het perron waren:**

koel                                warm

**De kleuren aan het einde van het perron waren:**

erg grijs                          erg kleurrijk

*Hieronder vindt u een aantal algemene vragen die u naar uw eigen mening kunt invullen.*

**9. Hoe vaak reist u met de trein?**

- 4 dagen per week of vaker
- 1-3 dagen per week
- 1-3 dagen per maand
- 6-11 dagen per jaar
- 1-5 dagen per jaar

**10. Wat is meestal de reden van uw treinreis?**

- Van en naar het werk
- Zaken- of dienstreis, bezoek congres
- Van en naar school, studie, opleiding, stage
- Bezoek aan familie, vrienden, kennissen
- Winkelen
- Vakantie of uitstapje
- Sport of hobby
- Anders, namelijk \_\_\_\_\_

**11. Indien u met de trein reist, reist u meestal in of buiten de spitsuren?**

- Zowel 's ochtends als 's middags tijdens de spits
- Meestal 's ochtends in de spits, 's middags niet
- Meestal 's middags in de spits, 's ochtends niet
- Meestal alleen buiten de spitsuren
- Ongeveer even vaak in als buiten de spits

**12. Bent u bekend met station Eindhoven?**

- Ja
- Nee

**13. Wat is uw geslacht?**

- man
- vrouw

**14. Wat is uw leeftijd:**

\_\_\_\_\_ jaar

**15. Wat is uw hoogst afgeronde opleiding:**

- Basisonderwijs
- LBO/VBO/VMBO/ULO
- MAVO/MULO
- MBO
- HAVO, VWO, HBS
- HBO
- WO
- Anders, namelijk;.....

**Dit is het einde van de vragenlijst. Hartelijk dank voor uw medewerking.**

## **Onderzoek Stationsbeleving**

Beste respondent,

De Universiteit Twente doet op dit moment onderzoek naar stationsbeleving. Aangezien uw mening daarbij van groot belang is, willen wij u vragen deze vragenlijst in te vullen. Het duurt gemiddeld 10 minuten om de gehele vragenlijst in te vullen. Er wordt gevraagd naar uw mening, dus er bestaan geen goede of foute antwoorden. Uw antwoorden worden anoniem verwerkt.

Alvast hartelijk dank voor uw deelname!



*U heeft zojuist een aantal slides gezien van het perron in Eindhoven waar uw trein vertrekt. Welke plaats op het perron zou u kiezen om te wachten?*

*Kies uit één van de volgende afbeeldingen:*



afbeelding A



afbeelding B



afbeelding C



afbeelding D

---

*Vult u nu de rest van de vragenlijst in vanuit het perspectief dat u zojuist heeft gelezen door het hokje dat met uw antwoord correspondeert volledig in te kleuren. Bij het verkeerd inkleuren van het hokje, zet u een kruis door het foutieve antwoord en kleurt u het correcte antwoord in. Hieronder kunt u een voorbeeld zien hoe u de vragen moet invullen.*

*Voorbeeldvraag:*

**Ik houd van sporten:**

- |                                |                                 |   |                                     |                              |
|--------------------------------|---------------------------------|---|-------------------------------------|------------------------------|
| <input type="checkbox"/>       | <input type="checkbox"/>        | <input type="checkbox"/>                  | <input checked="" type="checkbox"/> | <input type="checkbox"/>     |
| <i>helemaal<br/>mee oneens</i> | <i>enigszins<br/>mee oneens</i> | <i>niet mee eens/<br/>niet mee oneens</i> | <i>enigszins<br/>mee eens</i>       | <i>helemaal<br/>mee eens</i> |

## 1. Geef aan hoe u zich voelt op het perron:

### Ik voel mij op dit perron:

|               |                          |                          |                          |                          |                          |                |
|---------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------|
| Gelukkig      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Ongelukkig     |
| Geïrriteerd   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Blij           |
| Ontevreden    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Tevreden       |
| Zwaarmoedig   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Voldaan        |
| Onplezierig   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Plezierig      |
| Wanhopig      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Hoopvol        |
| Verdrietig    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Blij           |
| Depressief    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Vrolijk        |
| Passief       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Actief         |
| Slaperig      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Wakker         |
| Verveeld      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Belangstellend |
| Onverschillig | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Betrokken      |
| Pessimistisch | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Optimistisch   |
| Gespannen     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Kalm           |
| Angstig       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Rustig         |
| Nerveus       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Ontspannen     |
| Volgzaam      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Leidend        |
| Volgend       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Sturend        |
| Onderdanig    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Dominant       |

**2. Geef bij onderstaande stellingen aan in hoeverre u het er mee eens bent:**

**Ik voel mij aan het begin van dit perron:**

**Rustig:**

helemaal mee oneens      helemaal mee eens

**Op mijn gemak:**

helemaal mee oneens      helemaal mee eens

**Angstig:**

helemaal mee oneens      helemaal mee eens

**Onzeker:**

helemaal mee oneens      helemaal mee eens

**Veilig:**

helemaal mee oneens      helemaal mee eens

**Ik voel mij aan het einde van dit perron:**

**Rustig:**

helemaal mee oneens      helemaal mee eens

**Op mijn gemak:**

helemaal mee oneens      helemaal mee eens

**Angstig:**

helemaal mee oneens      helemaal mee eens

**Onzeker:**

helemaal mee oneens      helemaal mee eens

**Veilig:**

helemaal mee oneens      helemaal mee eens

**3. Geef ook bij onderstaande stellingen aan in hoeverre u het er mee eens bent:**

**Op dit perron heb ik het gevoel dat ik controle heb over de situatie:**

helemaal mee oneens      helemaal mee eens

**4. Geef ook bij onderstaande stellingen aan in hoeverre u het er mee eens bent:**

**Ik vind het perron overzichtelijk:**

helemaal mee oneens      helemaal mee eens

**Op het perron kan ik mijn weg goed vinden:**

helemaal mee oneens      helemaal mee eens

**Ik zou hier de weg kwijtraken:**

helemaal mee oneens      helemaal mee eens

**Dit perron is chaotisch:**

helemaal mee oneens      helemaal mee eens

**Er staan of hangen op dit perron veel objecten die mijn overzicht beperken:**

helemaal mee oneens      helemaal mee eens

**Dit perron heeft veel plekken waar criminelen zich zouden kunnen verschuilen:**

helemaal mee oneens      helemaal mee eens

**De verlichting op dit perron is goed:**

helemaal mee oneens      helemaal mee eens

**Dit perron heeft veel donkere plekken:**

helemaal mee oneens      helemaal mee eens

**Ik zie op dit perron snel waar ik heen kan als ik andere mensen wil vermijden:**

helemaal mee oneens      helemaal mee eens

**5. Geef ook bij onderstaande stellingen aan in hoeverre u het er mee eens bent:**

**Ik vind dat het op dit perron erg druk oogt:**

helemaal mee oneens      helemaal mee eens

**Ik vind het te druk op dit perron:**

helemaal mee oneens      helemaal mee eens

**Er was niet veel drukte op dit perron gedurende de tijd dat ik hier aanwezig was:**

helemaal mee oneens      helemaal mee eens

**Er waren teveel mensen aanwezig op dit perron:**

helemaal mee oneens      helemaal mee eens

**6. Geef bij onderstaande stellingen aan hoe uw indruk van het perron is:**

**Het perron heeft een warme uitstraling:**

helemaal mee oneens      helemaal mee eens

**Het perron ziet er verzorgd uit:**

helemaal mee oneens      helemaal mee eens

**Het perron is aantrekkelijk:**

helemaal mee oneens      helemaal mee eens

**Het perron is sfeervol:**

helemaal mee oneens      helemaal mee eens

**Het perron oogt professioneel:**

helemaal mee oneens      helemaal mee eens

**Het perron is rommelig:**

helemaal mee oneens      helemaal mee eens

**Het perron is goed onderhouden:**

helemaal mee oneens      helemaal mee eens

**Het perron is comfortabel:**

helemaal mee oneens      helemaal mee eens

**7. Geef bij onderstaande stellingen aan in hoeverre u het er mee eens bent:**

**Ik zou op dit perron rustig een kopje koffie kunnen drinken:**

helemaal mee oneens      helemaal mee eens

**Ik zou op dit perron blijven wachten als de trein vertraging heeft:**

helemaal mee oneens      helemaal mee eens

**Ik zou gemakkelijk een andere reiziger aanspreken op het perron:**

helemaal mee oneens      helemaal mee eens

**Ik vermijd andere reizigers op het perron:**

helemaal mee oneens      helemaal mee eens

**Ik zou het perron gaan verkennen:**

helemaal mee oneens      helemaal mee eens

**Ik zou op dit perron rustig een krant kunnen lezen:**

helemaal mee oneens      helemaal mee eens

**Ik vind dit perron prettig:**

helemaal mee oneens      helemaal mee eens

**8a. Geef ook bij onderstaande stellingen aan in hoeverre u het er mee eens bent:**

**Het licht aan het begin van het perron was:**

erg donker                        erg licht

**De kleuren aan het begin van het perron waren:**

koel                                warm

**De kleuren aan het begin van het perron waren:**

erg grijs                          erg kleurrijk

**Het licht aan het einde van het perron was:**

erg donker                        erg licht

**De kleuren aan het einde van het perron waren:**

koel                                warm

**De kleuren aan het einde van het perron waren:**

erg grijs                          erg kleurrijk

*Hieronder vindt u een aantal algemene vragen die u naar uw eigen mening kunt invullen.*

**9. Hoe vaak reist u met de trein?**

- 4 dagen per week of vaker
- 1-3 dagen per week
- 1-3 dagen per maand
- 6-11 dagen per jaar
- 1-5 dagen per jaar

**10. Wat is meestal de reden van uw treinreis?**

- Van en naar het werk
- Zaken- of dienstreis, bezoek congres
- Van en naar school, studie, opleiding, stage
- Bezoek aan familie, vrienden, kennissen
- Winkelen
- Vakantie of uitstapje
- Sport of hobby
- Anders, namelijk \_\_\_\_\_

**11. Indien u met de trein reist, reist u meestal in of buiten de spitsuren?**

- Zowel 's ochtends als 's middags tijdens de spits
- Meestal 's ochtends in de spits, 's middags niet
- Meestal 's middags in de spits, 's ochtends niet
- Meestal alleen buiten de spitsuren
- Ongeveer even vaak in als buiten de spits

**12. Bent u bekend met station Eindhoven?**

- Ja
- Nee

**13. Wat is uw geslacht?**

- man
- vrouw

**14. Wat is uw leeftijd:**

\_\_\_\_\_ jaar

**15. Wat is uw hoogst afgeronde opleiding:**

- Basisonderwijs
- LBO/VBO/VMBO/ULO
- MAVO/MULO
- MBO
- HAVO, VWO, HBS
- HBO
- WO
- Anders, namelijk;.....

**Dit is het einde van de vragenlijst. Hartelijk dank voor uw medewerking.**

## Appendix D. Constructs

Table 1. *Items per construct.*

| Constructs                  | Items  |
|-----------------------------|--|
| <b>Pleasure</b>             | <ul style="list-style-type: none"> <li>• Gelukkig – Ongelukkig</li> <li>• Geïrriteerd – Blij</li> <li>• Ontevreden – Tevreden</li> <li>• Zwaarmoedig – Voldaan</li> <li>• Onplezierig – Plezierig</li> <li>• Wanhopig – Hoopvol</li> </ul>   |
| <b>Arousal</b>              | <ul style="list-style-type: none"> <li>• Verdrietig – Blij</li> <li>• Depressief – Vrolijk</li> <li>• Passief – Actief</li> <li>• Slaperig – Wakker</li> <li>• Verveeld – Belangstellend</li> <li>• Onverschillig – Betrokken</li> <li>• Pessimistisch – Optimistisch</li> <li>• Gespannen – Kalm</li> <li>• Angstig – Rustig</li> <li>• Nerveus – Ontspannen</li> </ul>                             |
| <b>Dominance</b>            | <ul style="list-style-type: none"> <li>• Volgzaam – Leidend</li> <li>• Volgend – Sturend</li> <li>• Onderdanig – Dominant</li> </ul>   |
| <b>Perceived Control</b>    | <ul style="list-style-type: none"> <li>• Op dit perron heb ik het gevoel dat ik controle heb over de situatie</li> </ul>   |
| <b>Orientation/overview</b> | <ul style="list-style-type: none"> <li>• Ik vind het perron overzichtelijk</li> <li>• Op het perron kan ik goed mijn weg vinden</li> <li>• Ik zou hier de weg kwijtraken</li> <li>• Dit perron is chaotisch</li> <li>• Er staan of hangen op dit perron veel objecten die mijn overzicht beperken</li> <li>• Dit perron heeft veel plekken waar criminelen zich zouden kunnen verschuilen</li> </ul> |



- De verlichting op dit perron is goed
  - Dit perron heeft veel donkere plekken
  - Ik zie op dit perron snel waar ik heen kan als ik word aangevallen
- Perceived Crowding**
- Ik vind dat het op dit perron druk oogt
  - Ik vind het te druk op dit perron
  - Er was niet veel drukte op dit perron gedurende de tijd dat ik hier aanwezig was
  - Er waren teveel mensen aanwezig op dit perron
- General attitude of the platform**
- Het perron heeft een warme uitstraling
  - Het perron ziet er verzorgd uit
  - Het perron is aantrekkelijk
  - Het perron is sfeervol
  - Het perron oogt professioneel
  - Het perron is rommelig
  - Het perron is goed onderhouden
  - Het perron is comfortabel
- Approach/Avoidance behaviors**
- Ik zou op dit perron rustig een kopje koffie kunnen drinken
  - Ik zou op dit perron blijven wachten als de trein vertraging heeft
  - Ik zou gemakkelijk een andere reiziger aanspreken op het perron
  - Ik vermijd andere reizigers op dit perron
  - Ik zou het perron gaan verkennen
  - Ik zou op dit perron rustig een krant kunnen lezen
  - Ik vind dit perron prettig
-